



**Stima del volume e della fitomassa delle  
principali specie forestali italiane**

**Equazioni di previsione, tavole del volume e  
tavole della fitomassa arborea epigea**

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## 1 Premessa

Nell'ambito delle attività di progettazione e di realizzazione del primo inventario forestale nazionale italiano, venne predisposto un insieme di tavole di cubatura a doppia entrata finalizzato alla stima del volume cormometrico degli alberi presenti nelle unità di campionamento inventariale (Castellani *et al.*, 1984). Quelle tavole vennero approntate mediante perequazione analitica dei valori medi di volume per classi di diametro e di altezza calcolati sulla base di quelli riportati in tavole di cubatura già esistenti e impiegate per le stime delle masse legnose dei popolamenti forestali italiani. Per la procedura seguita nella loro costruzione, quell'insieme di tavole a valenza nazionale è caratterizzato da alcuni aspetti di rilievo che è utile ricordare.

In primo luogo, il numero di tavole di cubatura di base considerate non era costante per le varie specie. Infatti, per le specie ampiamente diffuse in aree forestali del Paese con una lunga tradizione di gestione forestale era disponibile, in genere, un numero sufficiente di tavole di cubatura costruite nel tempo (Castellani, 1982), mentre per quelle poco frequenti o diffuse in aree con minore tradizione in materia di pianificazione forestale, si disponeva al più di una o di poche tavole di cubatura a doppia entrata.

In secondo luogo, la necessità di ricondurre ad uno standard comune le diverse tavole di base, prima di una loro integrazione, costrinse a stimare i valori "mancanti" per interpolazione o estrapolazione e ad operare adattamenti di vario tipo. Infatti, a causa della diversità degli usi e delle consuetudini seguiti nell'allestimento dei prodotti forestali di prima lavorazione nei diversi contesti territoriali italiani e delle differenze dimensionali degli alberi campione utilizzati, le tavole di cubatura disponibili per una stessa specie differivano quasi sempre per l'intervallo di validità dimensionale, per l'articolazione in classi di diametro e di altezza e, molto spesso, anche per il significato dendrometrico dei valori medi attesi presentati. Di conseguenza, la base informativa di volta in volta impiegata per la perequazione non era omogenea per qualità e quantità dei dati.

Infine, la costruzione di tavole a valenza nazionale a partire da valori medi calcolati per le diverse classi dimensionali, anziché da osservazioni condotte sui singoli alberi campione, non consentì di corredare i valori medi attesi con informazioni utili alla stima del loro grado di accuratezza e di precisione.

Oltre a queste criticità legate alla procedura adottata, alcune delle tavole di cubatura risultanti presentavano una differenziazione, a parità di specie, in funzione della forma di governo dei soprassuoli per i quali le tavole di base erano state costruite. Per alcune

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latifoglie, ad esempio, erano disponibili tavole di cubatura specifiche per alberi cresciuti in fustaia o in una delle forme del governo a ceduo.

La componente di volume stimata variava in genere per conifere e latifoglie. Per la maggioranza delle conifere, le tavole di base fornivano previsioni del volume del fusto intero al netto dei rami, mentre per i pini a chioma espansa e per le latifoglie le tavole fornivano previsioni del volume del fusto comprensivo anche dei rami svettati in corrispondenza della sezione con diametro di 3 cm.

Nonostante questi limiti e caratteristiche, dettagliatamente illustrati nel volume di presentazione (Castellani *et al.*, 1984), le tavole approntate in occasione del primo inventario forestale nazionale italiano hanno permesso un'agevole e uniforme elaborazione dei dati campionari raccolti sull'intero territorio nazionale e, fino ad ora, hanno rappresentato l'unico riferimento estimativo comune a livello nazionale.

In occasione dello studio preparatorio del secondo inventario forestale italiano (ISAF, 1999), è emersa la necessità di migliorare l'insieme degli strumenti estimativi disponibili, per consentire una più efficace e articolata elaborazione delle informazioni campionarie, anche alla luce delle nuove necessità di stima e di informazione statistica dovute agli impegni assunti dall'Italia in ambito sovranazionale. In particolare, si è evidenziata la necessità di avviare la predisposizione di nuove equazioni di previsione del volume e del peso secco degli alberi in piedi che superassero alcune delle limitazioni insite nelle tavole di cubatura fino ad allora disponibili.

Per questo motivo, nell'ambito del programma nazionale RiSelvItalia, finanziato dal Ministero delle Politiche Agricole, Alimentari e Forestali, venne proposta e attivata una linea di ricerca finalizzata allo studio e all'implementazione di modelli di previsione della massa legnosa negli ecosistemi forestali italiani<sup>1</sup>. In particolare, i nuovi modelli dovevano permettere la stima della massa legnosa sia in termini di volume sia di peso secco degli alberi in piedi, in funzione del loro diametro a 1.30 m dal suolo e dell'altezza totale, per singola specie o per gruppi di specie.

Con finalità e metodologie del tutto analoghe, nell'ambito del progetto di ricerca EFOMI (Valutazione ecologica di cenosi forestali sottoposte a monitoraggio integrato), finanziato dalla Provincia Autonoma di Trento, veniva nel contempo avviato uno studio che ha portato alla costruzione di modelli di previsione del volume cormometrico e della fitomassa arborea epigea valevoli per i popolamenti forestali trentini (Fattorini *et al.*, 2005).

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<sup>1</sup> Programma RiSelvItalia 2001-2003, Linea di ricerca 4.1.6 – Modelli di previsione della biomassa e del carbonio stoccato negli ecosistemi forestali italiani.

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L'esigenza di disporre di nuovi modelli di previsione a valenza nazionale divenne particolarmente impellente nel corso del 2008, in occasione delle elaborazioni delle variabili quantitative del nuovo inventario forestale nazionale (INFC, 2009). A quel momento, la base informativa prodotta dal progetto RiSelvItalia, anche se non ancora completa, appariva già abbastanza consistente per la costruzione di nuovi modelli. Inoltre, considerati i costi e le difficoltà operative e burocratiche connesse alla conduzione delle misurazioni di campagna sugli alberi campione, nonché alle determinazioni di laboratorio, non era ipotizzabile il completamento in tempi brevi dell'indagine, con la raccolta di tutti i 2 800 alberi inizialmente previsti.

Pertanto, grazie al campione di alberi già acquisito nelle diverse regioni italiane con il programma RiSelvItalia, integrato con una parte del campione di alberi raccolto in Trentino, selezionata in modo tale da risultare - per le diverse specie o gruppi di specie - equilibrata all'interno dell'insieme di alberi da acquisire a livello nazionale, vennero approntati nel 2008 venticinque dei ventisei modelli di stima del volume cormometrico e della fitomassa arborea epigea previsti dal programma nazionale. Tredici di questi modelli riguardano le latifoglie (il faggio, il castagno, il cerro, il leccio, la roverella, la robinia, il gruppo degli aceri, il gruppo degli ontani, il gruppo dei carpini, il gruppo degli eucalitti, il gruppo dei frassini, il gruppo dei salici e il gruppo delle altre latifoglie), mentre dodici modelli afferiscono alle conifere (l'abete bianco, l'abete rosso, il larice, il pino cembro, il pino laricio, il pino nero, il pino marittimo, il pino domestico, il pino silvestre, la douglasia, il gruppo dei cipressi, il gruppo dei pini esotici). Per il pino d'Aleppo non fu possibile, a quel tempo, approntare i modelli previsionali a causa del limitato numero di osservazioni disponibili; solo in occasione della pubblicazione del presente volume è stato possibile colmare la lacuna mediante il completamento - con fondi CRA-MPF - del campione di alberi necessario per tale specie.

Le equazioni di previsione messe a punto permettono la stima del volume di fusto (svettato a 5 cm, sopra corteccia e al netto della ceppaia) e rami grossi (anch'essi svettati a 5 cm di diametro in punta) e la stima del peso secco delle componenti arboree epigee. Le equazioni approntate per quest'ultima grandezza consentono la stima del peso secco di fusto e rami grossi, come specificato per il volume, la stima del peso secco di tutta la ramaglia e del cimale con diametro inferiore a 5 cm, la stima del peso secco della frazione epigea della ceppaia e, infine, la stima del peso secco di tutto l'albero al di sopra del livello del suolo. I quattro modelli relativi alla fitomassa sono stati tarati in modo tale da rispettare l'additività delle previsioni, vale a dire che per ogni albero la somma delle stime di peso



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secco di fusto e rami grossi, della ramaglia e della ceppaia risulta esattamente pari alla previsione del peso secco arboreo epigeo<sup>2</sup>.

La recente attività di modellizzazione ha consentito di superare alcuni dei limiti segnalati per i modelli predisposti in occasione del primo inventario forestale nazionale.

Le nuove equazioni sviluppate consentono, in primo luogo, di stimare non solo il volume, ma anche la fitomassa delle diverse componenti epigee; inoltre è aumentato il numero di specie per cui si dispone di equazioni di stima anche se, per alcune specie non molto diffuse, tassonomicamente e/o morfologicamente simili, è stato predisposto un modello comune. Le variabili dipendenti dei modelli presentati sono sempre le stesse, senza alcuna distinzione tra conifere e latifoglie, e le stime di volume e di peso secco sono uniche per la specie, non più funzione anche della modalità di rinnovazione e di allevamento dei singoli individui arborei e cioè del loro dendrotipo (albero da seme, pollone o matricina). È sempre possibile, infine, corredare i valori attesi di volume e di fitomassa ottenibili ai vari livelli, e cioè di singolo albero, di classe dimensionale, di intero popolamento, con una indicazione della loro incertezza campionaria, come illustrato negli esempi proposti nel capitolo 4.

Per alcune specie (cipressi, larice, abete rosso, pino d'Aleppo, pino nero, douglasia, ontani, castagno, leccio) la possibilità d'impiego dei modelli in corrispondenza dei valori dimensionali più bassi è parzialmente limitata dalla restituzione di valori negativi, nulli o anomali in una o più delle variabili stimate. Dal punto di vista procedurale, l'inconveniente non è del tutto inatteso poiché si tratta di modelli che interpolano osservazioni lungo un campo dimensionale piuttosto ampio, per cui il condizionamento dovuto alle osservazioni relative agli alberi di maggiori dimensioni nella loro taratura può comportare la formulazione di equazioni che prevedono valori non accettabili in corrispondenza delle classi dimensionali più piccole.

Dal punto di vista applicativo, si pone allora il problema di quale valore attribuire al volume o alla fitomassa degli alberi di piccole dimensioni nei casi sopra segnalati.

Per quanto attiene alle conifere, la soluzione qui proposta consiste nell'adozione di equazioni di stima del tutto analoghe a quelle costruite per specie o gruppi di specie, ma ottenute mediante l'elaborazione delle informazioni relative a 196 alberi campione con diametro a 1.30 m da terra compreso nelle classi tra 1 e 15 cm. Tale campione di alberi

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<sup>2</sup> A seguito dell'arrotondamento numerico delle previsioni, in qualche caso la somma delle stime della fitomassa delle tre componenti epigee può non essere perfettamente coincidente al valore stimato per l'intera parte arborea epigea; tali differenze sono comunque in genere contenute entro il decimo di chilogrammo.

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proviene dall'archivio del programma RiSelvItalia integrato con alberi modello raccolti nell'ambito del progetto FutMon<sup>3</sup>. Le cinque equazioni di stima prodotte riguardano il gruppo generale delle conifere senza ulteriore ripartizione per specie.

Per le latifoglie non si dispone ancora di un sufficiente numero di osservazioni per le classi diametriche più piccole, utile a sviluppare modelli analoghi. Nelle situazioni – fortunatamente non molto frequenti – in cui i modelli approntati restituiscano valori non accettabili, sarà necessario quindi ricorrere a soluzioni empiriche. A questo proposito sembra utile segnalare un modello alternativo per la stima del volume utilizzato anche per la soluzione del problema dei valori negativi nell'ambito delle elaborazioni INFC. Tale modello<sup>4</sup> è stato approntato utilizzando ancora i dati resi disponibili dal programma RiSelvItalia, ma effettuando la taratura dell'equazione esclusivamente sui dati degli alberi con diametro inferiore o uguale a 10 cm.

Nei capitoli che seguono viene presentata una sintesi della metodologia seguita nella raccolta delle informazioni campionarie e nella implementazione dei modelli di stima. Per illustrazioni di maggior dettaglio si rimanda alla letteratura elencata in bibliografia, con particolare riferimento agli articoli di Fattorini *et al.* del 2005 e di Tabacchi *et al.* del 2011.

La prima parte di questa presentazione si chiude con un capitolo dedicato all'accuratezza delle stime e alla loro precisione, di ausilio per un esame mirato ad approfondire gli aspetti inerenti alla qualità delle stime ottenibili con i modelli previsionali proposti. Nella seconda parte, invece, sono presentati i vari modelli approntati, completi delle varie statistiche utili al loro impiego e delle tabelle dei valori previsti per le diverse classi dimensionali.

## 2 Materiali e metodi

### 2.1 Individuazione del campione di alberi

Nelle indagini campionarie, il numero di osservazioni da acquisire è in genere stabilito sulla base di una previsione o misura della variabilità delle grandezze in esame, della precisione attesa delle stime ottenibili e delle risorse disponibili per la conduzione delle

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<sup>3</sup> L'Azione L2b del Progetto FutMon (LIFE+07 ENV/D/000218) aveva tra gli obiettivi lo sviluppo di metodi per l'armonizzazione degli inventari forestali a livello europeo; uno dei problemi affrontati è quello della stima del volume e della massa degli alberi in piedi non rilevati in ambito inventariale poiché sotto la soglia diametrica adottata dei 5 cm.

<sup>4</sup>  $V = 0.599670 + 0.039619 d^2 h$  con  $V$  (dm<sup>3</sup>),  $d$  (cm) e  $h$  (m).

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attività. Al momento della progettazione dello studio per la costruzione delle equazioni di previsione del volume e della fitomassa degli alberi, erano insufficienti in Italia indicazioni sulla variabilità campionaria attesa delle variabili dendrometriche coinvolte nel processo di modellizzazione, in particolare per la fitomassa arborea, poiché disponibili solamente per alcune specie in ambiti territoriali limitati. Per questo motivo è stato adottato un dimensionamento preliminare degli insiemi di alberi da misurare basato su criteri empirici (Garson, 2008). Per ogni specie o gruppo di specie, il numero di alberi campione è stato determinato in modo proporzionale all'estensione delle formazioni boschive in cui la specie o il gruppo di specie risultava presente, sulla base delle conoscenze di natura inventariale e cartografica disponibili per i boschi italiani all'inizio degli anni Duemila. Si è ritenuto, inoltre, necessario campionare un numero minimo di quaranta alberi per le specie o gruppi di specie meno frequenti nelle formazioni forestali italiane, quali il pino cembro e il pino domestico, e di arrivare ad un massimo di duecentoquaranta alberi per le specie più diffuse, quali il faggio e la roverella, in maniera da misurare adeguatamente la possibile variabilità indotta sulla forma degli alberi dalla maggiore ampiezza dei contesti climatici, stazionali e colturali in cui si trovano a crescere. Numerosità intermedie sono state adottate per le altre specie o gruppi di specie. L'entità complessiva dei campioni delle singole specie o gruppi di specie sono state ripartite, infine, per singolo distretto amministrativo (regioni e province autonome).

Il numero complessivo di alberi da misurare, risultato pari a 2 800 per l'intera nazione, è subito apparso ben al di là delle capacità operative del gruppo di lavoro e delle disponibilità finanziarie del programma di ricerca RiSelvItalia. Ciò nonostante, si è ritenuto di mantenere valido il dimensionamento ottenuto, nell'ottica di un progetto più ampio, da completare nel tempo, di acquisizione delle informazioni necessarie per la costruzione di modelli di previsione del volume e della fitomassa arborea con validità nazionale, di cui il programma di ricerca realizzato costituisce un primo e importante contributo. Al programma RiSelvItalia, come ricordato nella premessa, si è affiancata l'attività svolta in Trentino nell'ambito del progetto EFOMI (Fattorini *et al.*, 2005), svolta in modo autonomo per raggiungere obiettivi specifici, ma con modalità che consentivano una agevole integrazione delle procedure e dei risultati con quanto svolto a livello nazionale.

Dei 2 800 alberi campione del volume e della fitomassa ritenuti necessari per l'approntamento dei modelli di stima, alla conclusione del programma nazionale ne erano stati misurati in bosco, e trattati in laboratorio, circa 1 300, con un tasso di realizzazione abbastanza diversificato per macroaree. Nei distretti amministrativi del Nord-Est (Trentino,



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Alto Adige, Veneto e Friuli V.G.) erano stati misurati circa il 48% degli alberi previsti, con una copertura totale solo per il Trentino, grazie alla citata attività finanziata dalla Provincia autonoma. Per la parte Nord-Ovest del Paese (Piemonte, Valle d'Aosta, Lombardia e Liguria), era stato acquisito solamente il 23% del campione ipotizzato, mentre per le regioni più settentrionali del Centro (Emilia Romagna, Toscana, Marche e Umbria) tutto il campione di alberi era stato individuato, misurato e trattato in laboratorio. Nelle regioni più meridionali del Centro Italia (Abruzzo, Molise, Lazio e Campania), il tasso di acquisizione dei campioni arborei si aggirava intorno al 30%, mentre per le regioni più a Sud del Paese (Puglia, Basilicata, Calabria, Sicilia) e per la Sardegna tale tasso non raggiungeva il 19%. Complessivamente, quindi, l'attività di modellizzazione condotta con le informazioni derivanti dai due progetti di ricerca citati si è basata sul 46% circa dei campioni totali preventivati, corrispondente a 1 289 alberi. A questi vanno aggiunti venticinque nuovi alberi campione di pino d'Aleppo, provenienti dalle regioni meridionali del Centro Italia e da quelle del Sud.

Riguardo alle dimensioni degli alberi campionati, sono stati oggetto di rilievo individui con diametro a 1.30 m da terra  $\geq 5$  cm<sup>5</sup>. Il campo di variazione ipsodiametrico è stato diviso in più classi, con l'obiettivo di raggiungere una ripartizione equa del numero di campioni in ciascuna classe dimensionale. Una simile ripartizione, di natura convenzionale, mirava a tenere conto della maggiore numerosità, nei boschi, degli individui nelle classi più piccole e al contempo della maggiore variabilità di quelli nelle classi dimensionali più grandi, considerando che i due fattori (numerosità e variabilità) contribuiscono entrambi ad un aumento della numerosità campionaria.

## *2.2 Misurazioni in campo e determinazioni di laboratorio*

Prima dell'abbattimento, di ogni albero campione veniva misurato il diametro sopra corteccia a 1.30 m da terra, secondo due direttrici ortogonali tra loro, con approssimazione al millimetro. Una volta abbattuto l'albero, venivano misurati i diametri alla sezione di taglio (due diametri ortogonali tra loro), l'altezza della ceppaia, la lunghezza del tronco e l'altezza di inserzione della chioma.

Per la determinazione per via geometrica del volume del fusto e dei rami grossi (porzione dei rami con sezione  $\geq 5$  cm), le due componenti venivano idealmente divise in

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<sup>5</sup> Ad eccezione del campione degli alberi raccolti con il Progetto FutMon.

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toppi di lunghezza in genere non superiore a 1 m; per i topi di forma irregolare, più frequenti nella componente dei rami grossi, non essendo opportuno applicare formule geometriche veniva registrato il peso fresco, in maniera da poterne derivare il volume a posteriori mediante fattori di conversione.

Le altre componenti della chioma (genericamente indicate con il termine "ramaglia") e cioè i rami con diametro alla sezione maggiore < 5 cm, comprensivi di foglie, fiori, ecc., venivano pesate dopo essere state separate in quattro gruppi distinti: il primo conteneva i rami vivi con sezioni di diametro compreso tra 5 e 3 cm; il secondo conteneva i rami vivi con sezioni di diametro compreso tra 3 e 1 cm; il terzo conteneva i rami vivi con sezione di base con diametro inferiore a 1 cm e l'ultimo gruppo riuniva i rami morti, indipendentemente dalle dimensioni. Questa ripartizione si è resa necessaria per campionare in maniera adeguata tutte le parti della chioma con sezione inferiore ai 5 cm, sebbene in fase di stima la variabile sia rappresentata dal peso della ramaglia nel suo insieme.

La raccolta di campioni da inviare in laboratorio per la quantificazione della fitomassa è avvenuta prelevando: una rotella di legno (o porzione nel caso di sezioni molto larghe) dal terzo inferiore del fusto; una rotella (o porzione) dal terzo intermedio del fusto; una rotella (o porzione) dal terzo superiore del fusto; tre campioni di rami grossi; un campione di ramaglia viva da ognuno dei tre gruppi dimensionali; un campione dal gruppo dei rami morti. Ognuno dei campioni menzionati veniva pesato in campo per la determinazione del peso fresco.

Una volta in laboratorio, i campioni di fusto e di rami grossi venivano immersi in acqua per la determinazione del volume e successivamente seccati in stufa per la determinazione del peso secco. I campioni di ramaglia viva e di rami secchi venivano direttamente seccati in stufa per la determinazione del peso secco.

La determinazione in laboratorio dei rapporti tra peso secco e volume, per i campioni di fusto e rami grossi, e tra peso secco e peso fresco per le altre componenti della chioma (rami vivi e morti) ha consentito di derivare i fattori di conversione specifici per ogni soggetto campionato che, una volta applicati alle misurazioni di campo (volume totale del fusto e rami grossi e peso fresco complessivo della ramaglia), hanno consentito di derivare le stime di peso secco per l'intera porzione epigea sopra la sezione di taglio. Il peso secco delle ceppaie è stato derivato dal rapporto peso secco su volume relativo agli alberi corrispondenti, essendo noto il volume delle ceppaie dalle misurazioni in campo.

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## 2.3 La modellizzazione

Per ognuna delle ventisei specie o gruppi di specie considerate, è stato ricercato un unico modello di previsione che, attraverso cinque equazioni distinte, permettesse la stima delle seguenti variabili: volume di fusto e rami grossi, fitomassa di fusto e rami grossi, fitomassa della ramaglia, fitomassa della porzione epigea della ceppaia, fitomassa totale epigea dell'albero. L'adozione di un'unica forma del modello per ogni singola specie o gruppo garantisce che, a meno di errori di approssimazione, la somma della fitomassa stimata per le singole componenti sopraterza di un albero (ceppaia, fusto e rami grossi, ramaglia) equivalga al valore totale previsto mediante l'equazione di stima della fitomassa arborea epigea.

Le variabili indipendenti prese in esame si basano sulla misurazione del diametro a 1.30 m da terra ( $d$ ) e dell'altezza dendrometrica ( $h$ ).

La forma generale della famiglia di modelli testati è la seguente  $y_0 = b_0 + b_1 d^2 h + b_2 d^x h^y$ , in cui  $y_0$  è una delle cinque grandezze da stimare, con valori degli esponenti  $x$  e  $y$  variabili tra 0 e 2. Nella pratica, la seconda variabile indipendente ( $d^x h^y$ ) si è dimostrata utile a migliorare le capacità perequative del modello solo nella forma  $b_2 d^1 h^0$ , limitatamente al cinquanta per cento dei casi (tredici specie o gruppi di specie). In definitiva, quindi, il modello di stima del volume o della fitomassa, in una qualsiasi delle quattro componenti considerate, adottato per una specifica specie o gruppo di specie è del tipo  $y_0 = b_0 + b_1 d^2 h$  oppure del tipo  $y_0 = b_0 + b_1 d^2 h + b_2 d$ .

Per ogni singola specie, o gruppo di specie, il modello prescelto è stato selezionato, tra i molti testati, sulla base dei risultati ottenuti per la fitomassa epigea totale e successivamente adottato anche per la stima delle altre componenti della fitomassa, a garanzia dell'additività precedentemente ricordata, e per la stima del volume di fusto e rami grossi, allo scopo di semplificare l'applicazione (un solo modello per specie).

Poiché i test condotti sui dati originari per verificare la sussistenza delle assunzioni su cui si basa l'analisi di regressione lineare hanno messo in luce la violazione di alcune di esse (distribuzione non normale dei residui in un numero consistente di casi e condizioni generali di eteroschedasticità), l'analisi di regressione è stata ripetuta una seconda volta, sulle variabili ponderate, in modo tale da ottenere le migliori stime dei coefficienti numerici delle equazioni interpolanti (stime corrette ed a minima varianza). È questa una importante



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variante metodologica, le cui implicazioni estimative sono in parte affrontate nel successivo capitolo 4.

### 3 Risultati

Dal punto di vista pratico e applicativo, i risultati ottenuti si concretizzano nelle equazioni di stima presentate insieme alle relative tabelle di valori nelle due successive sezioni dedicate, rispettivamente, alle specie - o gruppi di specie - afferenti alle conifere e alle latifoglie.

Per ciascuna specie, i valori riportati nelle tabelle indicano anche gli ambiti dimensionali (diametri e altezze minimi e massimi) degli alberi di cui è possibile stimare il volume o la fitomassa. Quei limiti discendono principalmente dalle dimensioni degli alberi campione disponibili per la modellizzazione.

Si tratta di tabelle a doppia entrata che prevedono classi diametriche di ampiezza pari a un centimetro e classi di altezza pari a un metro, con valori espressi in decimetri cubi per il volume e in chilogrammi per la fitomassa.

Nelle pagine che introducono le tavole del volume e delle fitomasse di ogni singola specie o gruppo, per ogni variabile dipendente sono riportati l'equazione di previsione adottata, il numero di osservazioni campionarie e dei coefficienti stimati, il vettore dei coefficienti numerici, la matrice delle varianze e covarianze dei coefficienti<sup>6</sup>, la varianza residua relativa alle osservazioni ponderate e la relazione che permette di calcolare la corrispondente varianza residua in termini di valori originali. Il numero di osservazioni campionarie e di coefficienti stimati, unitamente alla matrice di varianza e covarianza dei coefficienti e alle varianze residue, permettono di quantificare l'incertezza campionaria dei coefficienti numerici stimati e delle varie previsioni che è possibile operare con i modelli proposti, come descritto nel capitolo seguente.

Nella figura 1 sono riportati i valori minimi, medi e massimi dei coefficienti di determinazione relativi alle equazioni di stima per le cinque grandezze considerate nella modellizzazione delle ventisei specie o gruppi di specie<sup>7</sup>. Questa figura segnala una

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<sup>6</sup> Trattandosi di matrici simmetriche, è stata riportata solo una parte di ogni matrice di varianza-covarianza. La parte mancante, comunque necessaria per i calcoli, va dedotta sulla base delle posizioni simmetriche riportate.

<sup>7</sup> I valori relativi al modello per i piccoli alberi di conifere sono esclusi dal grafico a causa del peso assunto dal valore massimo nel campo dei valori relativi alle equazioni di stima della fitomassa delle ceppaie ( $R^2 = 0.996$ )

buona capacità perequativa delle equazioni relative alle grandezze di maggiore importanza, quali il volume di fusto e rami grossi ( $V$ ), la fitomassa di fusto e rami grossi ( $dw_1$ ) e la fitomassa arborea epigea totale ( $dw_4$ ), con valori del coefficiente molto elevati e confinati entro un campo di variazione limitato. Al contrario, nel caso della fitomassa della ramaglia ( $dw_2$ ) e delle ceppaie ( $dw_3$ ), la capacità perequativa dei modelli risulta più variabile tra le specie e, nel complesso, inferiore. Per queste due variabili inoltre, nel caso particolare del larice, a parità di diametro il modello restituisce valori decrescenti all'aumentare dell'altezza, oppure propone lo stesso valore per un ampio gradiente di altezze. La distribuzione non ottimale dei residui denota anche per l'equazione di stima della fitomassa della ramaglia del castagno una limitata capacità perequativa dei dati, sebbene in fase predittiva non si verificano gli inconvenienti evidenziati per il larice. È presumibile che le capacità perequative, nonché predittive, dei modelli relativi alla fitomassa della ramaglia e delle ceppaie potranno essere migliorate, una volta completata la raccolta dei dati, mediante l'introduzione di ulteriori variabili esplicative.

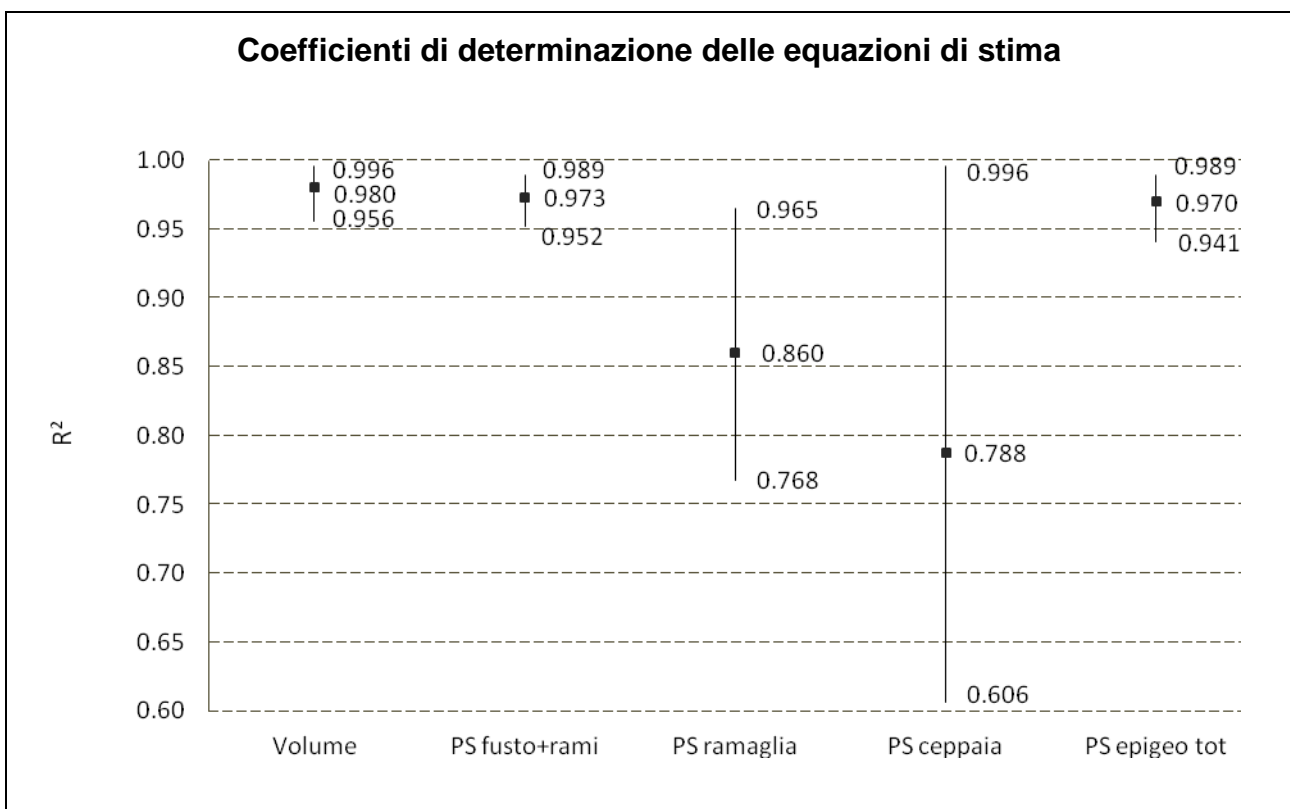


Figura 1: Coefficienti di determinazione (valori minimi, medi e massimi) ottenuti per le equazioni di regressione per le variabili stimate.

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## 4 Accuratezza e precisione delle stime

Un modello di previsione è ritenuto tanto più accurato quanto più la stima (o valore atteso) che esso produce per un dato insieme di valori delle variabili indipendenti è prossima al corrispondente valore osservato della variabile dipendente. È così evidente che l'accuratezza di un modello può essere valutata esclusivamente sulla base di un insieme di osservazioni campionarie di cui si conoscono tutti i valori assunti sia dalle variabili indipendenti sia da quella dipendente.

Le tecniche di valutazione dell'accuratezza di un modello si basano sull'osservazione del suo comportamento previsionale nei confronti di insiemi di osservazioni non impiegate nella taratura dello stesso modello. Con le varie tecniche proposte, che afferiscono alla procedura denominata "validazione incrociata" (*cross-validation*, Meko 2011), una parte del campione raccolto viene impiegato per la taratura del modello mentre la restante parte viene utilizzata per valutare la sua accuratezza. Quando il secondo insieme di osservazioni è numeroso (fino alla metà del campione disponibile) si parla di validazione con campione suddiviso (*split-sample validation* o *leave n out*), mentre quando il confronto tra valori attesi e valori osservati si basa di volta in volta su un'unica osservazione campionaria non impiegata nella taratura del modello si parla di validazione incrociata del tipo *leave one out*.

In quest'ultimo approccio, che è stato adottato per valutare l'accuratezza dei modelli di previsione del volume e della fitomassa qui presentati, viene tarata una serie di equazioni eliminando ogni volta dal campione una diversa osservazione e usando le equazioni risultanti per stimare il valore atteso relativo all'osservazione eliminata. La serie delle previsioni ottenute per le osservazioni di volta in volta sottratte al campione completo è poi impiegata per valutare l'accuratezza confrontandola con la serie dei corrispondenti valori osservati.

A tal fine si definisce l'errore di validazione, che è dato dalla differenza tra valori osservati e valori predetti dai modelli

$$\hat{e}_{(i)} = y_i - \hat{y}_{(i)} \quad [1]$$

dove  $y_i$  e  $\hat{y}_{(i)}$  sono i valori osservati e i valori predetti dai modelli per l' $i$ -esima unità campionaria e la notazione (i) indica che le informazioni relative alla stessa unità non sono state impiegate nella taratura del modello che genera la previsione  $\hat{y}_{(i)}$ .



Tra le varie statistiche che si possono costruire con le grandezze appena definite per valutare l'accuratezza dei modelli, nel presente caso sono stati prescelti due indicatori, il primo costituito dal valore medio degli errori di validazione, considerati in termini percentuali e senza segno, denominato *mapd* (*mean absolute percent difference*)

$$mapd = \left( \sum_{i=1}^n (100 * |\hat{e}_{\epsilon}| / y_i) / n \right) \quad [2]$$

e il secondo costituito dal valore dello scostamento percentuale tra somma dei valori predetti e somma dei valori osservati, denominato *spd* (*summation percent difference*)

$$spd = 100 \left( \frac{\sum_{i=1}^n \hat{y}_{\epsilon} - \sum_{i=1}^n y_i}{\sum_{i=1}^n y_i} \right) \quad [3]$$

Per quanto attiene al primo indicatore (*mapd*, cfr. tabella 1 e figura 2) calcolato per singola specie e per l'intero campione di alberi, si osservano valori contenuti e debolmente crescenti passando dal volume di fusto e rami grossi al peso secco di fusto e rami grossi e al peso secco arboreo epigeo (rispettivi valori per l'intero campione di alberi pari a 11.3%, 13.1% e 14.0%) e valori decisamente maggiori nel caso del peso secco della ramaglia (43.5% per l'intero campione) e del peso secco della ceppaia (54.3% per l'intero campione).

Da queste osservazioni si evince che le equazioni di previsione relative al volume e alla fitomassa di fusto e rami grossi, così come quelle relative all'intera fitomassa arborea epigea, producono mediamente previsioni abbastanza accurate, con scostamenti medi - senza differenziazione per specie - che si aggirano intorno al 11-14%, mentre le equazioni di previsione della fitomassa della ramaglia minuta e della fitomassa della ceppaia risultano meno accurate, con scostamenti medi superiori, rispettivamente, al 40 e al 50%.

Per quanto attiene al secondo indicatore (*spd*, cfr. tabella 1 e figura 2), gli scostamenti percentuali tra somme di valori attesi e di valori osservati per il volume di fusto e rami grossi, per il peso secco di fusto e rami grossi e per il peso secco arboreo epigeo sono distribuiti entro un campo di variazione abbastanza contenuto e di ampiezza simile, con valori per l'intero campione di alberi pari rispettivamente a 0.8%, 0.5% e 0.8%, mentre riguardano un intervallo decisamente più ampio nel caso del peso secco della ramaglia minuta e del peso secco della ceppaia, con valori per l'intero campione di alberi ancora contenuti e rispettivamente di 1.1% e 0.1%.

Tabella 1 - Numero di osservazioni campionarie, valori medi degli scostamenti, percentuali e senza segno, tra valori predetti e valori osservati (*mapd*) e valori percentuali delle differenze tra somme dei valori predetti e somme dei valori osservati (*spd*) - per specie o gruppo di specie e per l'intero campione di alberi - per il volume (*v*) e per il peso secco di fusto e rami grossi (*dw<sub>1</sub>*), della ramaglia (*dw<sub>2</sub>*), della ceppaia (*dw<sub>3</sub>*) e totale arboreo epigeo (*dw<sub>4</sub>*).

Specie o gruppo di specie	<i>n</i>	<i>v</i>		<i>dw<sub>1</sub></i>		<i>dw<sub>2</sub></i>		<i>dw<sub>3</sub></i>		<i>dw<sub>4</sub></i>	
		<i>mapd</i>	<i>spd</i>	<i>mapd</i>	<i>spd</i>	<i>mapd</i>	<i>spd</i>	<i>mapd</i>	<i>spd</i>	<i>mapd</i>	<i>Spd</i>
		%	%	%	%	%	%	%	%	%	%
<i>Abies alba</i> Mill.	46	8.0	1.4	10.3	0.2	50.8	9.0	67.4	-5.0	12.9	1.9
<i>Acer</i> spp.	37	9.7	0.3	13.7	-0.1	36.7	-1.5	44.7	0.0	17.0	-0.4
<i>Alnus</i> spp.	35	17.5	0.0	20.4	1.2	33.1	-1.1	63.5	0.3	16.3	0.8
<i>Carpinus</i> – <i>Ostrya</i> spp.	65	10.5	2.0	11.7	2.7	35.8	5.4	60.4	9.6	13.7	3.4
<i>Castanea sativa</i> Mill.	85	10.9	0.2	10.7	0.4	25.0	9.1	52.6	-6.8	10.1	1.5
<i>Cupressus</i> spp.	45	10.5	-2.3	13.5	-1.0	43.9	9.6	58.2	3.5	15.4	2.2
<i>Eucalyptus</i> spp.	24	16.5	3.6	16.4	1.5	50.0	5.4	31.9	15.2	11.7	2.4
<i>Fagus sylvatica</i> L.	91	16.5	-0.5	10.4	-2.4	55.5	17.3	49.1	0.5	12.4	0.6
<i>Fraxinus</i> spp.	33	16.8	-1.3	14.9	-0.1	37.9	9.9	67.7	29.9	15.2	3.0
Gruppo pini esotici	24	7.0	3.4	11.7	2.8	46.7	7.9	39.3	18.8	10.3	4.1
Gruppo altre latifoglie	22	15.1	-6.4	24.4	-13.9	61.2	26.5	69.3	56.0	15.5	-2.9
<i>Larix decidua</i> Mill.	45	10.0	4.4	12.8	5.4	62.2	-34.6	53.4	-25.2	16.3	-0.3
<i>Picea abies</i> K.	93	9.9	2.9	14.8	3.6	44.0	4.3	60.5	-5.1	13.0	4.2
<i>Pinus cembra</i> L.	22	12.2	1.1	11.8	2.1	41.0	-5.6	66.8	6.3	12.4	0.8
<i>Pinus halepensis</i>	31	22.5	-6.5	25.8	-7.6	42.2	-16.0	52.0	0.6	25.9	-10.2
<i>Pinus laricio</i> Poiret	50	5.0	0.4	12.2	-0.3	16.4	-0.3	31.7	1.0	11.2	-0.2
<i>Pinus nigra</i> Arn.	63	8.6	0.5	12.4	-0.2	54.3	0.5	42.2	-1.0	16.2	0.0
<i>Pinus pinaster</i> Ait.	26	9.5	4.6	12.1	4.2	31.4	4.6	50.1	11.0	10.4	4.4
<i>Pinus pinea</i> L.	23	15.3	-0.6	15.8	-0.8	28.3	0.1	45.9	8.5	12.8	-0.4
<i>Pinus sylvestris</i> L.	43	10.5	1.5	16.1	2.6	63.4	14.8	54.2	7.2	16.4	5.1
<i>Pseudotsuga menziesii</i> Franco	35	6.5	2.8	8.7	2.6	34.7	-0.7	63.8	7.6	11.0	2.1
<i>Quercus cerris</i> L.	88	9.3	-0.8	10.6	-0.3	56.5	-2.7	47.1	14.5	13.4	-0.4
<i>Quercus ilex</i> L.	83	13.8	-4.6	13.6	-2.5	55.9	-10.3	68.4	-5.6	16.5	-4.6
<i>Quercus pubescens</i> <i>Willd.</i>	117	10.4	-1.2	10.4	-0.6	31.5	-7.7	60.6	-1.9	12.2	-2.0
<i>Robinia pseudoacacia</i> L.	50	9.8	0.2	10.4	1.0	48.9	3.6	33.9	-1.3	13.8	1.4
<i>Salix</i> spp.	38	11.0	-1.2	19.7	1.0	38.9	11.2	65.8	25.9	20.6	3.7
Tutte le specie	1 314	11.3	0.8	13.1	0.5	43.5	1.1	54.3	0.1	14.0	0.8

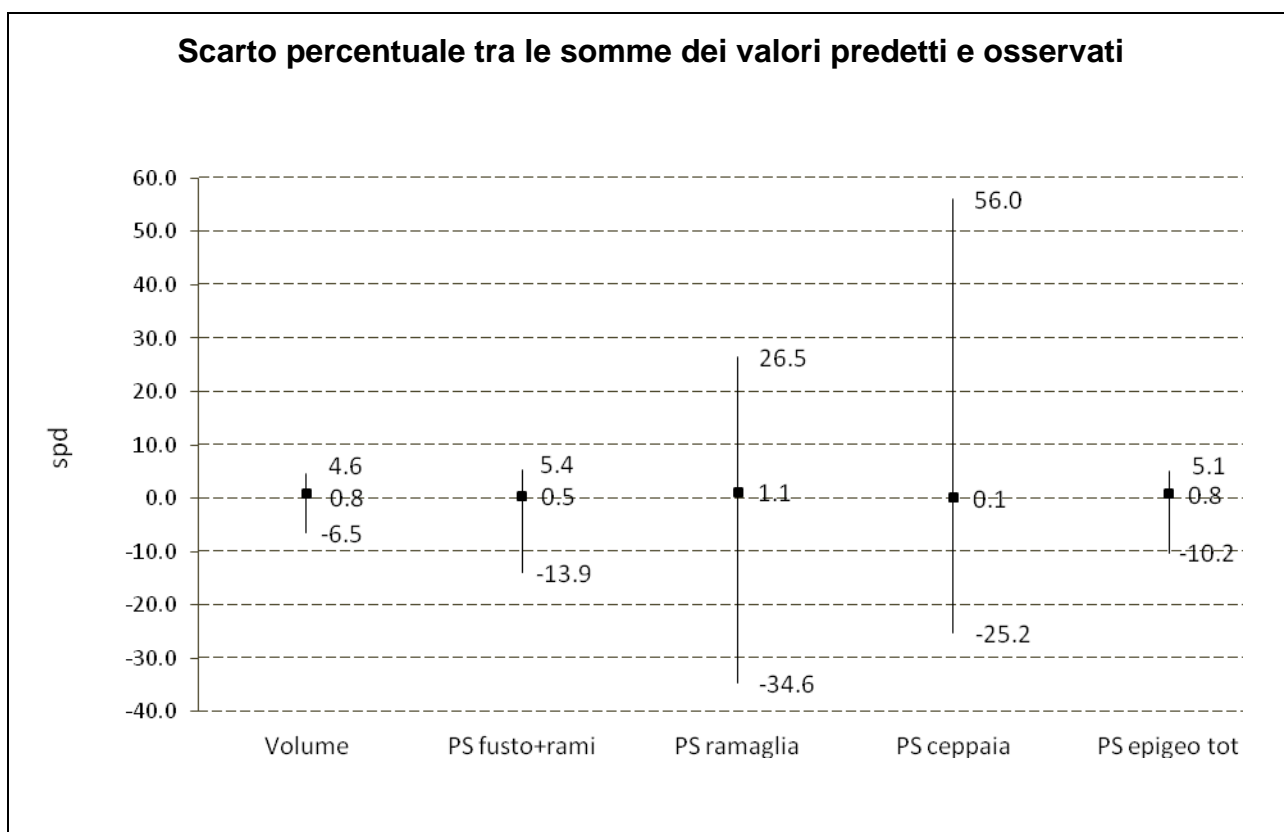
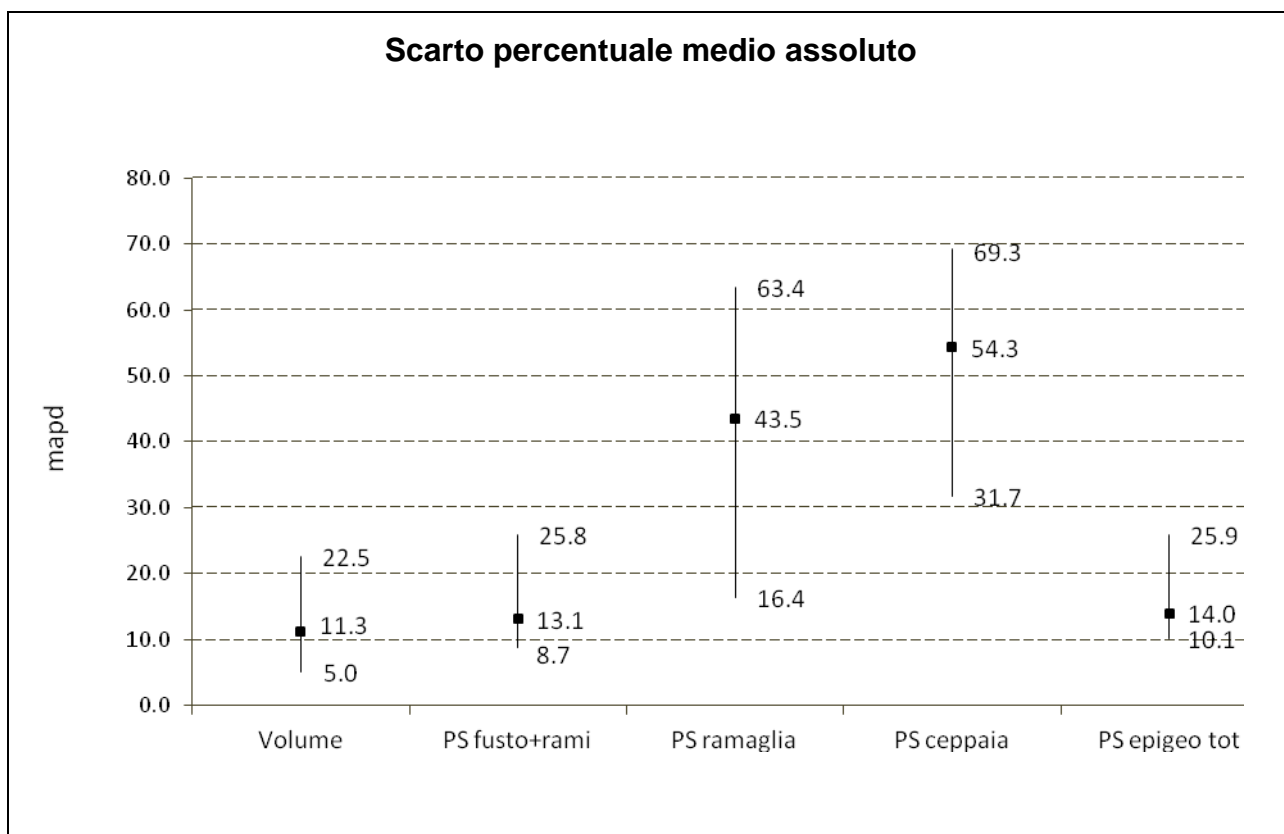


Figura 2 - Valori minimi e massimi di *mapd* e *spd* per i campioni delle ventisei specie di tabella 1 e valori degli stessi indicatori per l'intero campione (1 314 alberi).

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Anche nel caso di questo secondo indicatore si può osservare che le equazioni approntate per il volume e per la fitomassa di fusto e rami grossi, unitamente a quelle per la fitomassa arborea epigea, appaiono a livello di specie mediamente più accurate di quelle calibrate per la fitomassa della ramaglia minuta e della ceppaia. Si ha inoltre conferma della scarsa capacità predittiva del modello relativamente al peso secco della ramaglia per il larice, già segnalata nel capitolo 3, mentre non emerge lo stesso limite per la previsione del peso secco della ramaglia del castagno, a fronte di una limitata capacità interpolante del modello, evidenziata nello stesso capitolo. L'alternanza di segno (negativo e positivo) nell'indicatore *spd* per le varie specie e gli scostamenti a livello dell'intero campione decisamente più contenuti di quelli calcolati per le singole specie o gruppi di specie (al massimo dell'1.1%) suggeriscono che le stime risultanti dall'applicazione dei modelli qui presentati saranno tanto più accurate quanto più grande è l'insieme degli alberi per i quali si intende stimare il valore totale della variabile dipendente e quante più specie sono coinvolte al contempo nel processo di stima.

Riguardo alla precisione delle stime, un modello di previsione è ritenuto tanto più preciso quanto più ridotto è l'intervallo di variazione delle stime che esso produce attorno al valore medio stimato, ad un prefissato livello di probabilità e di gradi di libertà.

Per indicare le modalità di calcolo e misura delle incertezze che connotano le stime ottenibili con le equazioni approntate, è necessario introdurre, seppur sinteticamente, le principali relazioni che stanno alla base dell'analisi di regressione. Tali notazioni, inoltre, sono presentate nella forma matriciale per garantire la loro piena validità al di là del modello matematico prescelto e che lega la variabile dipendente a quelle indipendenti.

Dato il modello di regressione lineare

$$Y = X\beta + \varepsilon \quad [4]$$

dove

$Y$  è il vettore ( $n \times 1$ ) delle osservazioni

$X$  è la matrice ( $n \times p$ ) delle  $n$  osservazioni su  $p$  variabili indipendenti (compresa la costante)

$\beta$  è il vettore ( $p \times 1$ ) dei parametri da stimare

$\varepsilon$  è il vettore ( $n \times 1$ ) degli errori casuali, con distribuzione normale, media zero e varianza costante [ $\varepsilon \sim N(\mathbf{0}, \sigma^2 I)$ ]



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le migliori stime non distorte dei parametri sono date da

$$\mathbf{b} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{Y} \quad [5]$$

qualora la matrice inversa  $(\mathbf{X}'\mathbf{X})^{-1}$  risulti non singolare. La varianza di queste stime è data da

$$\mathbf{V}(\mathbf{b}) = (\mathbf{X}'\mathbf{X})^{-1}\sigma^2 \quad [6]$$

per la quale una stima non distorta della varianza residua  $\sigma^2$  è data da

$$s^2 = (\mathbf{Y} - \mathbf{X}\mathbf{b})'(\mathbf{Y} - \mathbf{X}\mathbf{b}) / (n - p) = \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{n - p} \quad [7]$$

Il valore medio atteso della variabile dipendente per una data combinazione di valori delle variabili indipendenti  $\mathbf{X}'_0 = [1, X_{02}, \dots, X_{0p}]$  è dato da

$$\hat{Y}_0 = \mathbf{X}'_0 \mathbf{b} = \mathbf{b}' \mathbf{X}_0 \quad [8]$$

con varianza stimata pari a

$$\text{var}(\hat{Y}_0) = \mathbf{X}'_0 \mathbf{V}(\mathbf{b}) \mathbf{X}_0 = \mathbf{X}'_0 (\mathbf{X}'\mathbf{X})^{-1} \mathbf{X}_0 s^2 \quad [9]$$

L'intervallo fiduciario della stima del valore medio atteso risulta allora

$$\text{l.f.}(\hat{Y}_0) = \hat{Y}_0 \pm t_{(v, 1-\alpha/2)} \sqrt{\mathbf{X}'_0 (\mathbf{X}'\mathbf{X})^{-1} \mathbf{X}_0 s^2} \quad [10]$$

per  $v (= n-p)$  gradi di libertà e al livello probabilistico  $1-\alpha$ .

Qualora si impieghi il modello per stimare un singolo valore atteso per una data combinazione di valori delle variabili indipendenti, tale valore è ancora dato da

$$\hat{Y}_0 = X_0' b = b' X_0 \quad [11]$$

mentre l'intervallo fiduciario di tale stima, conosciuto anche come intervallo di predizione (Freese 1964, Neter *et al.* 1989, Myers 1990), cioè l'intervallo in cui con una data probabilità si colloca il valore vero sconosciuto della variabile dipendente conoscendo solo i valori delle variabili indipendenti, risulta pari a

$$\text{l.f.}(\hat{Y}_0) = \hat{Y}_0 \pm t_{(v, 1-\alpha/2)} \sqrt{X_0' (X' X)^{-1} X_0 s^2 + s^2} \quad [12]$$

Spesso risulta di particolare interesse conoscere la stima della somma di più valori attesi e la corrispondente incertezza. In tale caso si definisce  $D_0$  la matrice dei valori delle  $p$  variabili indipendenti per le  $h$  osservazioni di cui si vuole stimare la somma dei valori attesi

$$D_0 = \begin{bmatrix} 1 & X_{21} & \dots & X_{p1} \\ 1 & X_{22} & \dots & X_{p2} \\ \dots & \dots & \dots & \dots \\ 1 & X_{2h} & \dots & X_{ph} \end{bmatrix}$$

Il valore totale delle previsioni (o predizioni) è dato da

$$T_0 = \sum_i \hat{Y}_{0i} = \sum_i \sum_j b_j X_{ij} \quad \text{con } j = 1, \dots, p \quad \text{e } i = 1, \dots, h$$

che in forma matriciale diventa

$$T_0 = \mathbf{1}' D_0 b = \underline{D}_0 b \quad [13]$$

con  $\mathbf{1}' = [1 \ 1 \ 1 \ \dots \ 1]$  vettore di  $h$  valori unitari.

L'intervallo fiduciario del valore totale delle predizioni è dato (O'Reagan 1964, Bouchon 1974, Palm 1983) da

$$\text{l.f. } (T_0) = T_0 \pm t_{(v, 1-\alpha/2)} \sqrt{\underline{D}_0 (\mathbf{X}' \mathbf{X})^{-1} \underline{D}_0' s^2 + h s^2} \quad [14]$$

Qualora la condizione di omoschedasticità non sia rispettata, e cioè il vettore degli errori casuali non è caratterizzato da varianza costante ( $\mathbf{V}(\varepsilon) \neq \sigma^2 \mathbf{I}$ ), la regressione ponderata rappresenta una appropriata procedura di stima (Draper e Smith 1981). E' questo il caso del volume e della fitomassa degli alberi, per i quali la varianza di queste due grandezze è sempre crescente con l'aumentare delle dimensioni degli alberi.

È dimostrato che esiste una matrice dei pesi  $\mathbf{W}$ , di dimensione  $(n, n)$ , la cui struttura è usualmente conosciuta o che può essere dedotta dai dati, tale che - se impiegata in una ponderazione dei valori delle variabili osservate - vengono ripristinate le condizioni richieste per il vettore dei residui. Allora le migliori stime non distorte dei parametri sono date da

$$\mathbf{b} = (\mathbf{X}' \mathbf{W} \mathbf{X})^{-1} \mathbf{X}' \mathbf{W} \mathbf{Y} \quad [15]$$

con varianza e covarianza pari a

$$\mathbf{V}(\mathbf{b}) = (\mathbf{X}' \mathbf{W} \mathbf{X})^{-1} \sigma_*^2 \quad [16]$$

dove la varianza residua  $\sigma_*^2$  è stimata pari a

$$s_*^2 = (\mathbf{Y} - \mathbf{X}\mathbf{b})' \mathbf{W}^{-1} (\mathbf{Y} - \mathbf{X}\mathbf{b}) / (n - p) \quad [17]$$

Nel caso del volume o della fitomassa degli alberi, la matrice dei pesi è costruita sulla base della relazione empirica tra la varianza osservata per tali grandezze e le dimensioni degli alberi (diametro ed eventualmente altezza), con forma  $s^2 = kZ^\lambda$ . I coefficienti  $k$  e  $\lambda$  possono essere stimati con i dati disponibili o essere assunti come noti dalla letteratura; è noto che assumendo valori di  $k = 1$  e  $\lambda = 2$  (Cunia 1987, Meng e Tsai 1986), dove  $Z = d^2$  o  $d^2 h$ , la ponderazione delle osservazioni comporta un sufficiente ripristino delle condizioni di omoschedasticità richieste.

Va inoltre sottolineato che, una volta ottenute le stime mediante regressione ponderata, la varianza residua delle osservazioni originali è data dalla varianza residua in termini ponderati moltiplicata per la funzione di ponderazione utilizzata ( $s_0^2 = s_*^2 k Z_0^{\lambda}$ ) (Cunia 1973).

Da questa relazione si evince facilmente che la varianza residua in termini di variabili originali non è costante ma varia con le dimensioni arboree.

Chiariti questi aspetti, il valore medio atteso della variabile dipendente per una data combinazione di valori delle variabili indipendenti  $X_0' = [1, X_{02}, \dots, X_{0p}]$  è sempre dato da

$$\hat{Y}_0 = X_0' b = b' X_0 \quad [18]$$

ma con varianza stimata pari a

$$\text{var}(\hat{Y}_0) = X_0' V b X_0 = X_0' (X' W^{-1} X)^{-1} X_0 s_*^2 \quad [19]$$

L'intervallo fiduciario della stima del valore medio atteso risulta allora

$$\text{l.f.}(\hat{Y}_0) = \hat{Y}_0 \pm t_{(v, 1-\alpha/2)} \sqrt{X_0' (X' W^{-1} X)^{-1} X_0 s_*^2} \quad [20]$$

per  $v (= n - p)$  gradi di libertà e al livello probabilistico  $1-\alpha$ .

Analogamente a quanto visto per la regressione non ponderata, qualora si impieghi il modello per stimare un singolo valore atteso per una data combinazione di valori delle variabili indipendenti, tale stima è ancora data da

$$\hat{Y}_0 = X_0' b = b' X_0 \quad [21]$$

L'intervallo fiduciario di tale predizione risulta

$$\text{l.f.}(\hat{Y}_0) = \hat{Y}_0 \pm t_{(v, 1-\alpha/2)} \sqrt{X_0' (X' W^{-1} X)^{-1} X_0 s_*^2 + s_0^2} \quad [22]$$



dove, si ricorda che,  $s_0^2 = s^2(d_0^2)$  o  $s_0^2 = s^2(d_0^2 h_0)$  a seconda che si intenda impiegare il solo diametro o il diametro e l'altezza degli alberi nella formulazione delle variabili indipendenti.

Nel caso, infine, della stima della somma di più valori attesi, data la matrice  $D_0$  dei valori delle  $p$  variabili indipendenti per le  $h$  osservazioni di cui si vuole stimare la somma dei singoli valori predetti,

$$D_0 = \begin{bmatrix} 1 & X_{21} & \dots & X_{p1} \\ 1 & X_{22} & \dots & X_{p2} \\ \dots & \dots & \dots & \dots \\ 1 & X_{2h} & \dots & X_{ph} \end{bmatrix}$$

il valore totale delle predizioni è sempre dato da

$$T_0 = \sum_i \hat{Y}_{0i} = \sum_i \sum_j b_j X_{ji} \quad \text{con } j = 1, \dots, p \quad \text{e } i = 1, \dots, h$$

che in forma matriciale risulta

$$T_0 = \mathbf{1}' D_0 \mathbf{b} = \underline{D}_0 \mathbf{b} \quad [23]$$

con  $\mathbf{1}' = [1 \ 1 \ 1 \ \dots \ 1]$  vettore di  $h$  valori unitari.

Definita la matrice  $W_0$  dei pesi relativi alle  $h$  osservazioni, ovviamente di dimensione ( $h \times h$ ),

$$W_0 = \begin{bmatrix} (d_1^2 h_1)^2 & 0 & \dots & 0 \\ 0 & (d_2^2 h_2)^2 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & (d_h^2 h_h)^2 \end{bmatrix} \quad [24]$$

il termine  $hs^2$  presente nella [14] assume la forma  $\sum_{i=1}^h s_*^2 (d_i^2 h_i)^2$ , che in notazione matriciale diventa

$$\mathbf{1}' W_0 \mathbf{1} s_*^2 \quad [25]$$

L'intervallo fiduciario di tale predizione risulta<sup>8</sup> (Schlaegel 1985)

$$\text{l.f. } (T_0) = T_0 \pm t_{(v, 1-\alpha/2)} \sqrt{\underline{D}_0 (\mathbf{X}' W^{-1} \mathbf{X})^{-1} s_*^2 \underline{D}_0' + \mathbf{1}' W_0 \mathbf{1} s_*^2} \quad [26]$$

A titolo di esempio, impiegando le informazioni relative all'equazione di stima del volume del gruppo degli aceri, riportate alla pagina 232, il volume medio atteso degli aceri aventi diametro 22 cm e altezza 14 m, risulta (cfr. relazione [18]) pari a

$$\hat{V}_0 = [1 \quad 6776] * \begin{bmatrix} 1.6905 \\ 3.7082 * 10^{-2} \end{bmatrix} = 253.0 \text{ dm}^3$$

con varianza stimata pari a (cfr. relazione [19])

$$V \hat{V}_0 = [1 \quad 6776] * \begin{bmatrix} 9.8852 * 10^{-1} & -4.7366 * 10^{-4} \\ -4.7366 * 10^{-4} & 8.4075 * 10^{-7} \end{bmatrix} * \begin{bmatrix} 1 \\ 6776 \end{bmatrix} = 33.17 \text{ (dm}^3)^2$$

e limiti fiduciari, con probabilità del 95% e 35 gradi di libertà, pari a (cfr. relazione [20])

$$\text{l.f. } (\hat{V}_0) = 253.0 \pm 2.03 * 5.76 = 253.0 \pm 11.7 \text{ dm}^3$$

Si può così affermare, con probabilità del 95% di non sbagliare, che il vero e incognito volume medio degli aceri con diametro 22 cm e altezza 14 m è compreso nell'intervallo che va da 241.3 dm<sup>3</sup> a 264.7 dm<sup>3</sup>.

<sup>8</sup> Le relazioni qui riassunte sono riportate anche in Tabacchi (1989). È necessario però segnalare che in detto articolo sono presenti alcuni errori e refusi di stampa, in particolare nelle relazioni [32], [33], [36] e [37] dove risultano non correttamente posizionati gli indicatori di matrice trasposta e nella relazione [35] in cui la matrice dei pesi risulta erroneamente moltiplicata per la varianza residua  $\sigma_*^2$ .

Nel caso invece si voglia avere la stima del volume di un singolo acero di cui si conosce il diametro e l'altezza totale, ancora pari a 22 cm e 14 m rispettivamente, con la relazione [21] il volume è dato da

$$\hat{V}_0 = [1 \quad 6776] * \begin{bmatrix} 1.6905 \\ 3.7082 * 10^{-2} \end{bmatrix} = 253.0 \text{ dm}^3$$

e i limiti fiduciarî, con probabilità del 95% e 35 gradi di libertà, pari a (cfr. relazione [22])

$$\text{l.f. } (\hat{V}_0) = 253.0 \pm 2.03 * 32.80 = 253.0 \pm 66.6 \text{ dm}^3$$

Anche in tal caso si può affermare, con probabilità del 95% di non sbagliare, che il vero e incognito volume di un singolo acero con diametro 22 cm e altezza 14 m è compreso nell'intervallo che va da 186.4 dm<sup>3</sup> a 319.6 dm<sup>3</sup>.

Nel caso si voglia ottenere la stima della somma di più valori attesi, ad esempio il volume complessivo degli alberi di una stessa specie presenti su di un'area di saggio, le relazioni da impiegare sono essenzialmente la [23] e la [26].

Conoscendo le dimensioni degli alberi da stimare, ad es. i seguenti dieci aceri con dimensioni

$d$  (cm) 10, 15, 20, 30, 32, 24, 36, 40, 8, 18

$h$  (m) 7, 9, 12, 20, 21, 18, 21, 22, 8, 12

si ottengono le matrici

$$D_0 = \begin{bmatrix} 1 & 700 \\ 1 & 2025 \\ 1 & 4800 \\ 1 & 18000 \\ 1 & 21504 \\ 1 & 10368 \\ 1 & 27216 \\ 1 & 35200 \\ 1 & 512 \\ 1 & 3888 \end{bmatrix} \quad \text{e} \quad \underline{D}_0 = [10 \quad 124 \quad 213]$$

per cui il volume totale stimato per i dieci aceri risulta uguale a

$$T_0 = [10 \quad 124 \quad 213] * \begin{bmatrix} 1.6905 \\ 3.7082 * 10^{-2} \end{bmatrix} = 4 \, 623.0 \, \text{dm}^3$$

La varianza dovuta alla stima campionaria dei coefficienti è pari a

$$\begin{aligned} \underline{D_0} (X' W^{-1} X)^{-1} s_*^2 \underline{D_0}' &= \\ &= [10 \quad 124 \quad 213] * \begin{bmatrix} 9.8852 * 10^{-1} & -4.7366 * 10^{-4} \\ -4.7366 * 10^{-4} & 8.4075 * 10^{-7} \end{bmatrix} * \begin{bmatrix} 10 \\ 124 \quad 213 \end{bmatrix} = \\ &= 11 \, 893.98 \, (\text{dm}^3)^2 \end{aligned}$$

mentre la varianza residua complessiva non spiegata dal modello risulta pari a

$$1' W_0 1 s_*^2 = 66 \, 237.74 \, (\text{dm}^3)^2$$

per una varianza totale pari a  $78 \, 131.72 \, (\text{dm}^3)^2$ .

I limiti fiduciarci, con probabilità del 95% e 35 gradi di libertà, risultano allora pari a (cfr. relazione [26])

$$\text{l.f. } (T_0) = 4 \, 623.0 \pm 2.03 * 279.52 \, \text{dm}^3 = 4 \, 623.0 \pm 567.4 \, \text{dm}^3$$

per cui si può affermare, con probabilità del 95% di non sbagliare, che il vero e incognito volume complessivo dei dieci aceri considerati è compreso nell'intervallo che va da  $4 \, 055.6 \, \text{dm}^3$  a  $5 \, 190.4 \, \text{dm}^3$ .

Qualora, infine, l'insieme di alberi di cui si desidera ottenere una stima del volume totale sia composto da più specie, come spesso accade nel caso di un'area di saggio localizzata in un bosco misto, la procedura appena descritta va ripetuta separatamente per ciascun sottoinsieme di alberi afferente ad una specie per il quale si dispone di un unico modello di

previsione. La stima del volume complessivo è data dalla somma dei volumi totali attesi per singola specie, mentre l'intervallo fiduciario è dato dalla somma quadratica degli intervalli calcolati per ogni singola specie, in virtù del fatto che le equazioni di previsione sono state calibrate sulla base di campioni tra loro indipendenti (Fattorini *et al.* 2005).

Tabella 2 – Stime dei valori attesi di volume, delle varianze e degli intervalli fiduciari al 95% di probabilità per le tre specie e per l'intero insieme di alberi considerati.

	aceri	abete bianco	faggio	totale
$T_0$ (dm <sup>3</sup> )	4 623.0	4 044.2	1 079.4	9 746.6
$\underline{D}_0(X'W^{-1}X)^{-1}s^2\underline{D}_0'$ (dm <sup>3</sup> ) <sup>2</sup>	11 894.0	5 853.9	453.3	-
$1'W_01s^2$ (dm <sup>3</sup> ) <sup>2</sup>	66 237.7	101 666.9	19 228.2	-
$t_{95\%}$	2.03	2.02	1.99	-
$\pm t\sqrt{\underline{D}_0(X'W^{-1}X)^{-1}s^2\underline{D}_0'+1'W_01s^2}$ (dm <sup>3</sup> )	567.4	662.4	279.2	915.8

Come esempio di tale procedura, nella tabella 2 sono riassunti i risultati ottenuti per un'area di saggio in cui sono presenti i dieci aceri già indicati nell'esempio precedente ma anche due abeti bianchi (con diametri pari a 38 e 52 cm e rispettive altezze pari a 21 e 28 m) e tre faggi (con diametri pari a 25, 30 e 12 cm e rispettive altezze pari a 16, 18 e 10 m). Analogamente a quanto fatto negli altri esempi, in questo caso si può affermare, con probabilità del 95% di non sbagliare, che il vero e incognito volume complessivo dei quindici alberi considerati è compreso nell'intervallo che va da 8 830.8 dm<sup>3</sup> a 10 662.4 dm<sup>3</sup>.



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# **SEZIONE A**

# **CONIFERE**





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***Abies alba* Mill.**

**Abete bianco**

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## Abete bianco

### Volume del fusto e dei rami grossi

$n = 46$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.8381 \quad 3.7836 \cdot 10^{-2} \quad 3.9934 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 4.9584 & & \\ 1.1274 \cdot 10^{-3} & 7.6175 \cdot 10^{-7} & \\ -7.1820 \cdot 10^{-1} & -2.0243 \cdot 10^{-4} & 1.1287 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.5284 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 46$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.8060 \quad 1.4255 \cdot 10^{-2} \quad 4.2759 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 1.2068 & & \\ 2.7440 \cdot 10^{-4} & 1.8540 \cdot 10^{-7} & \\ -1.7480 \cdot 10^{-1} & -4.9271 \cdot 10^{-5} & 2.7472 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 3.7199 \cdot 10^{-6}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 46$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-4.2685 \cdot 10^{-1} \quad 3.5168 \cdot 10^{-3} \quad 6.9321 \cdot 10^{-1}]$$

---

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 3.3454 & & \\ 7.6065 \cdot 10^{-4} & 5.1394 \cdot 10^{-7} & \\ -4.8456 \cdot 10^{-1} & -1.3658 \cdot 10^{-4} & 7.6153 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_e^2 = 1.0312 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 46$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [9.4271 \cdot 10^{-2} \quad 3.5357 \cdot 10^{-4} \quad -1.1866 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.3343 \cdot 10^{-2} & & \\ 3.0338 \cdot 10^{-6} & 2.0498 \cdot 10^{-9} & \\ -1.9327 \cdot 10^{-3} & -5.4474 \cdot 10^{-7} & 3.0374 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_e^2 = 4.1128 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 46$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-2.1386 \quad 1.8125 \cdot 10^{-2} \quad 1.1089]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 5.0933 & & \\ 1.1581 \cdot 10^{-3} & 7.8247 \cdot 10^{-7} & \\ -7.3774 \cdot 10^{-1} & -2.0794 \cdot 10^{-4} & 1.1594 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_e^2 = 1.5699 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

Abete bianco  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.9	5.8	6.8	7.7	8.7	9.6													5
6	7.4	8.7	10.1	11.5	12.8	14.2													6
7	10.2	12.1	13.9	15.8	17.6	19.5													7
8	13.5	15.9	18.3	20.7	23.2	25.6	28.0	30.4											8
9	17.1	20.1	23.2	26.3	29.3	32.4	35.5	38.5											9
10	21.1	24.9	28.6	32.4	36.2	40.0	43.8	47.6											10
11	25.4	30.0	34.6	39.2	43.8	48.3	52.9	57.5											11
12		35.6	41.1	46.5	52.0	57.4	62.9	68.3											12
13				54.5	60.9	67.3	73.7	80.1	86.5	92.9									13
14				63.1	70.5	77.9	85.3	92.7	100.2	107.6									14
15				72.3	80.8	89.3	97.8	106.3	114.8	123.3									15
16				82.0	91.7	101.4	111.1	120.8	130.5	140.2									16
17				92.4	103.4	114.3	125.2	136.2	147.1	158.0	169.0	179.9	190.8	201.8					17
18					115.7	127.9	140.2	152.5	164.7	177.0	189.2	201.5	213.8	226.0					18
19					128.7	142.3	156.0	169.7	183.3	197.0	210.6	224.3	237.9	251.6					19
20						157.5	172.6	187.8	202.9	218.0	233.2	248.3	263.4	278.6					20
21						173.4	190.1	206.8	223.5	240.1	256.8	273.5	290.2	306.9					21
22						190.1	208.4	226.7	245.0	263.3	281.6	299.9	318.3	336.6	354.9	373.2	391.5	409.8	22
23								247.5	267.5	287.6	307.6	327.6	347.6	367.6	387.6	407.7	427.7	447.7	23
24								269.3	291.1	312.9	334.6	356.4	378.2	400.0	421.8	443.6	465.4	487.2	24
25								291.9	315.6	339.2	362.9	386.5	410.2	433.8	457.4	481.1	504.7	528.4	25
26								315.5	341.0	366.6	392.2	417.8	443.4	468.9	494.5	520.1	545.7	571.2	26
27								339.9	367.5	395.1	422.7	450.3	477.8	505.4	533.0	560.6	588.2	615.8	27
28										424.6	454.3	484.0	513.6	543.3	572.9	602.6	632.3	661.9	28
29										455.2	487.0	518.9	550.7	582.5	614.3	646.1	678.0	709.8	29
30										486.9	520.9	555.0	589.0	623.1	657.1	691.2	725.2	759.3	30
31										519.6	555.9	592.3	628.7	665.0	701.4	737.7	774.1	810.5	31
32										553.4	592.1	630.8	669.6	708.3	747.1	785.8	824.6	863.3	32
33										670.6	711.8	753.0	794.2	835.4	876.6	917.8			33
34										711.6	755.3	799.0	842.8	886.5	930.2	974.0			34
35										753.7	800.1	846.4	892.8	939.1	985.5	1 031.8			35
36										797.1	846.1	895.2	944.2	993.2	1 042.3	1 091.3			36
37										841.7	893.5	945.3	997.1	1 048.9	1 100.7	1 152.5			37
38												996.8	1 051.4	1 106.0	1 160.7	1 215.3			38
39												1 049.6	1 107.2	1 164.7	1 222.3	1 279.8			39
40												1 103.8	1 164.3	1 224.9	1 285.4	1 346.0			40
41												1 159.4	1 223.0	1 286.6	1 350.2	1 413.8			41
42												1 216.3	1 283.0	1 349.8	1 416.5	1 483.3			42
43														1 414.5	1 484.5	1 554.4			43
44														1 480.7	1 554.0	1 627.2			44
45														1 548.5	1 625.1	1 701.7			45
46														1 617.8	1 697.8	1 777.9			46
47														1 688.5	1 772.1	1 855.7			47
48																	1 935.2		48
49																	2 016.3		49
50																	2 099.1		50
51																	2 183.6		51
52																	2 269.7		52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
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62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete bianco  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	643.3	670.9	698.5	726.1															27
28	691.6	721.3	750.9	780.6															28
29	741.6	773.4	805.2	837.1															29
30	793.3	827.4	861.5	895.5															30
31	846.8	883.2	919.6	955.9															31
32	902.1	940.8	979.5	1 018.3	1 057.0	1 095.8	1 134.5	1 173.3											32
33	959.0	1 000.2	1 041.4	1 082.6	1 123.8	1 165.0	1 206.2	1 247.4											33
34	1 017.7	1 061.5	1 105.2	1 148.9	1 192.7	1 236.4	1 280.2	1 323.9											34
35	1 078.2	1 124.5	1 170.9	1 217.2	1 263.6	1 309.9	1 356.3	1 402.6											35
36	1 140.4	1 189.4	1 238.4	1 287.5	1 336.5	1 385.5	1 434.6	1 483.6											36
37	1 204.3	1 256.1	1 307.9	1 359.7	1 411.5	1 463.3	1 515.1	1 566.9											37
38	1 269.9	1 324.6	1 379.2	1 433.9	1 488.5	1 543.1	1 597.8	1 652.4	1 707.0	1 761.7									38
39	1 337.4	1 394.9	1 452.5	1 510.0	1 567.5	1 625.1	1 682.6	1 740.2	1 797.7	1 855.3									39
40	1 406.5	1 467.0	1 527.6	1 588.1	1 648.7	1 709.2	1 769.7	1 830.3	1 890.8	1 951.3									40
41	1 477.4	1 541.0	1 604.6	1 668.2	1 731.8	1 795.4	1 859.0	1 922.6	1 986.2	2 049.8									41
42	1 550.0	1 616.8	1 683.5	1 750.2	1 817.0	1 883.7	1 950.5	2 017.2	2 084.0	2 150.7									42
43	1 624.4	1 694.3	1 764.3	1 834.3	1 904.2	1 974.2	2 044.1	2 114.1	2 184.1	2 254.0									43
44	1 700.5	1 773.7	1 847.0	1 920.2	1 993.5	2 066.7	2 140.0	2 213.2	2 286.5	2 359.7									44
45	1 778.3	1 855.0	1 931.6	2 008.2	2 084.8	2 161.4	2 238.1	2 314.7	2 391.3	2 467.9									45
46	1 857.9	1 938.0	2 018.1	2 098.1	2 178.2	2 258.2	2 338.3	2 418.4	2 498.4	2 578.5									46
47	1 939.3	2 022.8	2 106.4	2 190.0	2 273.6	2 357.2	2 440.7	2 524.3	2 607.9	2 691.5									47
48	2 022.3	2 109.5	2 196.7	2 283.9	2 371.0	2 458.2	2 545.4	2 632.6	2 719.7	2 806.9									48
49	2 107.1	2 198.0	2 288.8	2 379.7	2 470.5	2 561.4	2 652.2	2 743.1	2 833.9	2 924.7									49
50	2 193.7	2 288.3	2 382.9	2 477.5	2 572.1	2 666.6	2 761.2	2 855.8	2 950.4	3 045.0									50
51	2 282.0	2 380.4	2 478.8	2 577.2	2 675.6	2 774.0	2 872.5	2 970.9	3 069.3	3 167.7									51
52	2 372.0	2 474.3	2 576.6	2 678.9	2 781.3	2 883.6	2 985.9	3 088.2	3 190.5	3 292.8									52
53		2 570.1	2 676.4	2 782.6	2 888.9	2 995.2	3 101.5	3 207.8	3 314.0	3 420.3									53
54		2 667.6	2 778.0	2 888.3	2 998.6	3 109.0	3 219.3	3 329.6	3 439.9	3 550.3									54
55		2 767.0	2 881.5	2 995.9	3 110.4	3 224.8	3 339.3	3 453.7	3 568.2	3 682.7									55
56		2 868.2	2 986.9	3 105.5	3 224.2	3 342.8	3 461.5	3 580.1	3 698.8	3 817.4									56
57		2 971.2	3 094.2	3 217.1	3 340.0	3 462.9	3 585.9	3 708.8	3 831.7	3 954.7									57
58		3 076.1	3 203.3	3 330.6	3 457.9	3 585.2	3 712.5	3 839.7	3 967.0	4 094.3									58
59		3 182.7	3 314.4	3 446.1	3 577.8	3 709.5	3 841.2	3 972.9	4 104.6	4 236.4									59
60		3 291.2	3 427.4	3 563.6	3 699.8	3 836.0	3 972.2	4 108.4	4 244.6	4 380.8									60
61		3 401.4	3 542.2	3 683.0	3 823.8	3 964.6	4 105.4	4 246.2	4 386.9	4 527.7									61
62		3 513.5	3 659.0	3 804.4	3 949.8	4 095.3	4 240.7	4 386.2	4 531.6	4 677.1									62
63				3 927.8	4 077.9	4 228.1	4 378.3	4 528.5	4 678.6	4 828.8									63
64				4 053.1	4 208.1	4 363.1	4 518.0	4 673.0	4 828.0	4 983.0									64
65				4 180.4	4 340.3	4 500.1	4 660.0	4 819.8	4 979.7	5 139.5									65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete bianco  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.1	2.5	2.8	3.2	3.5	3.9													5
6	3.3	3.8	4.4	4.9	5.4	5.9													6
7	4.7	5.4	6.1	6.8	7.5	8.2													7
8	6.2	7.1	8.0	8.9	9.8	10.7	11.7	12.6											8
9	7.8	9.0	10.1	11.3	12.4	13.6	14.7	15.9											9
10	9.6	11.0	12.4	13.9	15.3	16.7	18.2	19.6											10
11	11.5	13.2	15.0	16.7	18.4	20.1	21.9	23.6											11
12		15.6	17.7	19.7	21.8	23.9	25.9	28.0											12
13				23.0	25.4	27.8	30.3	32.7	35.1	37.5									13
14				26.5	29.3	32.1	34.9	37.7	40.5	43.3									14
15				30.3	33.5	36.7	39.9	43.1	46.3	49.5									15
16				34.2	37.9	41.5	45.2	48.8	52.5	56.1									16
17				38.4	42.5	46.7	50.8	54.9	59.0	63.1	67.3	71.4	75.5	79.6					17
18					47.5	52.1	56.7	61.3	65.9	70.6	75.2	79.8	84.4	89.0					18
19					52.6	57.8	62.9	68.1	73.2	78.4	83.5	88.7	93.8	98.9					19
20						63.8	69.5	75.2	80.9	86.6	92.3	98.0	103.7	109.4					20
21						70.0	76.3	82.6	88.9	95.2	101.5	107.8	114.0	120.3					21
22						76.6	83.5	90.4	97.3	104.2	111.1	118.0	124.9	131.8	138.7	145.6	152.5	159.4	22
23								98.5	106.1	113.6	121.1	128.7	136.2	143.8	151.3	158.8	166.4	173.9	23
24								107.0	115.2	123.4	131.6	139.8	148.0	156.3	164.5	172.7	180.9	189.1	24
25								115.8	124.7	133.6	142.5	151.4	160.3	169.3	178.2	187.1	196.0	204.9	25
26								124.9	134.6	144.2	153.9	163.5	173.1	182.8	192.4	202.0	211.7	221.3	26
27								134.4	144.8	155.2	165.6	176.0	186.4	196.8	207.2	217.6	228.0	238.4	27
28										166.6	177.8	189.0	200.2	211.3	222.5	233.7	244.9	256.0	28
29										178.4	190.4	202.4	214.4	226.4	238.4	250.4	262.4	274.3	29
30										190.6	203.5	216.3	229.1	242.0	254.8	267.6	280.4	293.3	30
31										203.2	216.9	230.6	244.3	258.0	271.7	285.4	299.1	312.8	31
32										216.2	230.8	245.4	260.0	274.6	289.2	303.8	318.4	333.0	32
33											260.7	276.2	291.7	307.3	322.8	338.3	353.8	369.3	33
34											276.4	292.9	309.4	325.8	342.3	358.8	375.3	391.8	34
35											292.6	310.0	327.5	344.9	362.4	379.9	397.3	414.8	35
36											309.2	327.7	346.1	364.6	383.1	401.6	420.0	438.5	36
37											326.3	345.8	365.3	384.8	404.3	423.8	443.3	462.8	37
38														385.0	405.5	426.1	446.7	467.3	38
39														405.1	426.8	448.5	470.2	491.9	39
40														425.8	448.6	471.5	494.3	517.1	40
41														447.1	471.0	495.0	518.9	542.9	41
42														468.8	493.9	519.1	544.2	569.4	42
43																543.7	570.1	596.4	43
44																569.0	596.6	624.2	44
45																594.8	623.6	652.5	45
46																621.1	651.3	681.5	46
47																648.1	679.6	711.1	47
48																		741.3	48
49																		772.1	49
50																		803.6	50
51																		835.7	51
52																		868.4	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)



Abete bianco  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	248.8	259.1	269.5	279.9															27
28	267.2	278.4	289.6	300.7															28
29	286.3	298.3	310.3	322.3															29
30	306.1	318.9	331.8	344.6															30
31	326.5	340.2	353.9	367.6															31
32	347.6	362.2	376.8	391.4	406.0	420.6	435.2	449.8											32
33	369.3	384.9	400.4	415.9	431.4	447.0	462.5	478.0											33
34	391.7	408.2	424.7	441.2	457.7	474.1	490.6	507.1											34
35	414.8	432.3	449.7	467.2	484.6	502.1	519.6	537.0											35
36	438.5	457.0	475.4	493.9	512.4	530.9	549.3	567.8											36
37	462.9	482.4	501.9	521.4	540.9	560.4	580.0	599.5											37
38	487.9	508.5	529.0	549.6	570.2	590.8	611.4	632.0	652.6	673.1									38
39	513.6	535.2	556.9	578.6	600.3	622.0	643.6	665.3	687.0	708.7									39
40	539.9	562.7	585.5	608.3	631.1	653.9	676.7	699.5	722.3	745.2									40
41	566.9	590.8	614.8	638.8	662.7	686.7	710.6	734.6	758.6	782.5									41
42	594.5	619.7	644.8	669.9	695.1	720.2	745.4	770.5	795.7	820.8									42
43	622.8	649.2	675.5	701.9	728.2	754.6	780.9	807.3	833.7	860.0									43
44	651.8	679.4	706.9	734.5	762.1	789.7	817.3	844.9	872.5	900.1									44
45	681.4	710.2	739.1	768.0	796.8	825.7	854.6	883.4	912.3	941.2									45
46	711.6	741.8	772.0	802.1	832.3	862.4	892.6	922.8	952.9	983.1									46
47	742.5	774.0	805.5	837.0	868.5	900.0	931.5	963.0	994.5	1 025.9									47
48	774.1	807.0	839.8	872.6	905.5	938.3	971.2	1 004.0	1 036.9	1 069.7									48
49	806.3	840.6	874.8	909.0	943.3	977.5	1 011.7	1 045.9	1 080.2	1 114.4									49
50	839.2	874.9	910.5	946.1	981.8	1 017.4	1 053.1	1 088.7	1 124.3	1 160.0									50
51	872.8	909.9	946.9	984.0	1 021.1	1 058.2	1 095.2	1 132.3	1 169.4	1 206.5									51
52	907.0	945.5	984.1	1 022.6	1 061.2	1 099.7	1 138.2	1 176.8	1 215.3	1 253.9									52
53	981.9	1 021.9	1 062.0	1 102.0	1 142.0	1 182.1	1 222.1	1 262.2	1 302.2										53
54	1 018.9	1 060.5	1 102.0	1 143.6	1 185.2	1 226.7	1 268.3	1 309.9	1 351.4										54
55	1 056.6	1 099.7	1 142.9	1 186.0	1 229.1	1 272.2	1 315.4	1 358.5	1 401.6										55
56	1 095.0	1 139.7	1 184.4	1 229.1	1 273.8	1 318.5	1 363.2	1 408.0	1 452.7										56
57	1 134.1	1 180.4	1 226.7	1 273.1	1 319.4	1 365.7	1 412.0	1 458.3	1 504.6										57
58	1 173.9	1 221.8	1 269.8	1 317.7	1 365.7	1 413.7	1 461.6	1 509.6	1 557.5										58
59	1 214.3	1 264.0	1 313.6	1 363.2	1 412.8	1 462.4	1 512.1	1 561.7	1 611.3										59
60	1 255.5	1 306.8	1 358.1	1 409.4	1 460.8	1 512.1	1 563.4	1 614.7	1 666.0										60
61	1 297.3	1 350.3	1 403.4	1 456.4	1 509.5	1 562.5	1 615.6	1 668.6	1 721.6										61
62	1 339.8	1 394.6	1 449.4	1 504.2	1 559.0	1 613.8	1 668.6	1 723.4	1 778.2										62
63			1 496.2	1 552.7	1 609.3	1 665.9	1 722.5	1 779.1	1 835.6										63
64			1 543.7	1 602.0	1 660.4	1 718.8	1 777.2	1 835.6	1 894.0										64
65			1 591.9	1 652.1	1 712.4	1 772.6	1 832.8	1 893.0	1 953.3										65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete bianco  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.5	3.6	3.7	3.7	3.8	3.9													5
6	4.4	4.5	4.6	4.7	4.9	5.0													6
7	5.3	5.5	5.6	5.8	6.0	6.1													7
8	6.2	6.5	6.7	6.9	7.1	7.4	7.6	7.8											8
9	7.2	7.5	7.8	8.1	8.4	8.7	8.9	9.2											9
10	8.3	8.6	9.0	9.3	9.7	10.0	10.4	10.7											10
11	9.3	9.8	10.2	10.6	11.0	11.5	11.9	12.3											11
12		10.9	11.4	11.9	12.4	13.0	13.5	14.0											12
13				13.3	13.9	14.5	15.1	15.7	16.3	16.9									13
14				14.8	15.5	16.2	16.9	17.5	18.2	18.9									14
15				16.3	17.1	17.9	18.7	19.5	20.3	21.0									15
16				17.9	18.8	19.7	20.6	21.5	22.4	23.3									16
17				19.5	20.5	21.5	22.5	23.6	24.6	25.6	26.6	27.6	28.6	29.7					17
18					22.3	23.4	24.6	25.7	26.9	28.0	29.1	30.3	31.4	32.6					18
19					24.2	25.4	26.7	28.0	29.2	30.5	31.8	33.1	34.3	35.6					19
20						27.5	28.9	30.3	31.7	33.1	34.5	35.9	37.4	38.8					20
21						29.6	31.2	32.7	34.3	35.8	37.4	38.9	40.5	42.0					21
22						31.8	33.5	35.2	37.0	38.7	40.4	42.1	43.8	45.5	47.2	48.9	50.6	52.3	22
23								37.8	39.7	41.6	43.4	45.3	47.1	49.0	50.9	52.7	54.6	56.4	23
24								40.5	42.5	44.6	46.6	48.6	50.6	52.7	54.7	56.7	58.7	60.8	24
25								43.3	45.5	47.7	49.9	52.1	54.3	56.5	58.7	60.9	63.1	65.3	25
26								46.1	48.5	50.9	53.3	55.6	58.0	60.4	62.8	65.1	67.5	69.9	26
27								49.1	51.6	54.2	56.7	59.3	61.9	64.4	67.0	69.6	72.1	74.7	27
28										57.6	60.3	63.1	65.9	68.6	71.4	74.1	76.9	79.6	28
29										61.1	64.0	67.0	70.0	72.9	75.9	78.8	81.8	84.7	29
30										64.7	67.8	71.0	74.2	77.3	80.5	83.7	86.8	90.0	30
31										68.4	71.8	75.1	78.5	81.9	85.3	88.7	92.0	95.4	31
32										72.2	75.8	79.4	83.0	86.6	90.2	93.8	97.4	101.0	32
33												83.7	87.6	91.4	95.2	99.0	102.9	106.7	33
34												88.2	92.3	96.3	100.4	104.5	108.5	112.6	34
35												92.8	97.1	101.4	105.7	110.0	114.3	118.6	35
36												97.5	102.0	106.6	111.1	115.7	120.2	124.8	36
37												102.3	107.1	111.9	116.7	121.5	126.3	131.1	37
38														117.3	122.4	127.5	132.6	137.6	38
39														122.9	128.2	133.6	138.9	144.3	39
40														128.6	134.2	139.8	145.5	151.1	40
41														134.4	140.3	146.2	152.1	158.1	41
42														140.4	146.6	152.8	159.0	165.2	42
43															159.4	165.9	172.4		43
44															166.2	173.1	179.9		44
45															173.2	180.3	187.4		45
46															180.3	187.7	195.2		46
47															187.5	195.3	203.1		47
48																		211.1	48
49																		219.3	49
50																		227.7	50
51																		236.2	51
52																		244.8	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete bianco  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	77.3	79.8	82.4	84.9															27
28	82.4	85.2	87.9	90.7															28
29	87.7	90.7	93.6	96.6															29
30	93.2	96.3	99.5	102.7															30
31	98.8	102.2	105.6	108.9															31
32	104.6	108.2	111.8	115.4	119.0	122.6	126.2	129.8											32
33	110.5	114.4	118.2	122.0	125.9	129.7	133.5	137.3											33
34	116.6	120.7	124.8	128.8	132.9	137.0	141.0	145.1											34
35	122.9	127.2	131.5	135.8	140.2	144.5	148.8	153.1											35
36	129.4	133.9	138.5	143.0	147.6	152.1	156.7	161.3											36
37	136.0	140.8	145.6	150.4	155.2	160.0	164.8	169.7											37
38	142.7	147.8	152.9	157.9	163.0	168.1	173.2	178.3	183.3	188.4									38
39	149.6	155.0	160.3	165.7	171.0	176.4	181.7	187.1	192.4	197.8									39
40	156.7	162.3	168.0	173.6	179.2	184.9	190.5	196.1	201.7	207.4									40
41	164.0	169.9	175.8	181.7	187.6	193.5	199.4	205.3	211.3	217.2									41
42	171.4	177.6	183.8	190.0	196.2	202.4	208.6	214.8	221.0	227.2									42
43	178.9	185.4	191.9	198.4	205.0	211.5	218.0	224.5	231.0	237.5									43
44	186.7	193.5	200.3	207.1	213.9	220.7	227.5	234.3	241.1	247.9									44
45	194.6	201.7	208.8	215.9	223.0	230.2	237.3	244.4	251.5	258.7									45
46	202.6	210.1	217.5	224.9	232.4	239.8	247.3	254.7	262.1	269.6									46
47	210.8	218.6	226.4	234.1	241.9	249.7	257.4	265.2	273.0	280.7									47
48	219.2	227.3	235.4	243.5	251.6	259.7	267.8	275.9	284.0	292.1									48
49	227.7	236.2	244.6	253.1	261.5	270.0	278.4	286.9	295.3	303.7									49
50	236.4	245.2	254.0	262.8	271.6	280.4	289.2	298.0	306.8	315.6									50
51	245.3	254.5	263.6	272.8	281.9	291.0	300.2	309.3	318.5	327.6									51
52	254.3	263.8	273.4	282.9	292.4	301.9	311.4	320.9	330.4	339.9									52
53	273.4	283.3	293.2	303.0	312.9	322.8	332.7	342.6	352.4										53
54	283.1	293.4	303.6	313.9	324.1	334.4	344.7	354.9	365.2										54
55	293.0	303.7	314.3	324.9	335.6	346.2	356.8	367.5	378.1										55
56	303.1	314.1	325.1	336.2	347.2	358.2	369.3	380.3	391.3										56
57	313.3	324.7	336.2	347.6	359.0	370.4	381.9	393.3	404.7										57
58	323.7	335.5	347.4	359.2	371.0	382.9	394.7	406.5	418.4										58
59	334.3	346.5	358.8	371.0	383.2	395.5	407.7	420.0	432.2										59
60	345.0	357.7	370.3	383.0	395.7	408.3	421.0	433.6	446.3										60
61	355.9	369.0	382.1	395.2	408.3	421.4	434.4	447.5	460.6										61
62	367.0	380.5	394.0	407.6	421.1	434.6	448.1	461.6	475.1										62
63			406.2	420.1	434.1	448.0	462.0	475.9	489.9										63
64			418.5	432.9	447.3	461.7	476.1	490.5	504.9										64
65			431.0	445.8	460.7	475.5	490.4	505.2	520.1										65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete bianco  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.1	0.1													5
6	0.1	0.1	0.1	0.1	0.1	0.2													6
7	0.1	0.1	0.1	0.1	0.1	0.2													7
8	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3											8
9	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3											9
10	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4											10
11	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5											11
12		0.3	0.3	0.4	0.4	0.5	0.5	0.6											12
13				0.4	0.5	0.5	0.6	0.7	0.7	0.8									13
14				0.5	0.6	0.6	0.7	0.8	0.8	0.9									14
15				0.6	0.6	0.7	0.8	0.9	1.0	1.0									15
16				0.6	0.7	0.8	0.9	1.0	1.1	1.2									16
17				0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7					17
18					0.9	1.0	1.1	1.3	1.4	1.5	1.6	1.7	1.8	1.9					18
19					1.0	1.1	1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.2					19
20						1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.3	2.4					20
21						1.4	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.7					21
22						1.5	1.7	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.4	3.6	22
23								2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.7	3.9	23
24								2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	24
25								2.4	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.2	4.4	4.7	25
26								2.7	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.8	5.0	26
27								2.9	3.1	3.4	3.6	3.9	4.2	4.4	4.7	4.9	5.2	5.4	27
28										3.6	3.9	4.2	4.5	4.8	5.0	5.3	5.6	5.9	28
29										3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	29
30										4.2	4.5	4.8	5.1	5.5	5.8	6.1	6.4	6.7	30
31										4.5	4.8	5.2	5.5	5.8	6.2	6.5	6.9	7.2	31
32										4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	7.7	32
33												5.9	6.2	6.6	7.0	7.4	7.8	8.2	33
34												6.2	6.6	7.0	7.5	7.9	8.3	8.7	34
35												6.6	7.0	7.5	7.9	8.3	8.8	9.2	35
36												7.0	7.5	7.9	8.4	8.8	9.3	9.7	36
37												7.4	7.9	8.4	8.9	9.3	9.8	10.3	37
38														8.8	9.3	9.9	10.4	10.9	38
39														9.3	9.8	10.4	10.9	11.5	39
40														9.8	10.4	10.9	11.5	12.1	40
41														10.3	10.9	11.5	12.1	12.7	41
42														10.8	11.4	12.1	12.7	13.3	42
43																12.7	13.3	14.0	43
44																13.3	13.9	14.6	44
45																13.9	14.6	15.3	45
46																14.5	15.3	16.0	46
47																15.2	15.9	16.7	47
48																		17.4	48
49																		18.2	49
50																		18.9	50
51																		19.7	51
52																		20.5	52
53																			53
54																			54
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete bianco  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	5.7	6.0	6.2	6.5															27
28	6.1	6.4	6.7	7.0															28
29	6.6	6.9	7.2	7.5															29
30	7.1	7.4	7.7	8.0															30
31	7.5	7.9	8.2	8.6															31
32	8.0	8.4	8.8	9.1	9.5	9.9	10.2	10.6											32
33	8.6	8.9	9.3	9.7	10.1	10.5	10.9	11.3											33
34	9.1	9.5	9.9	10.3	10.7	11.1	11.5	12.0											34
35	9.6	10.1	10.5	10.9	11.4	11.8	12.2	12.7											35
36	10.2	10.7	11.1	11.6	12.0	12.5	13.0	13.4											36
37	10.8	11.3	11.8	12.2	12.7	13.2	13.7	14.2											37
38	11.4	11.9	12.4	12.9	13.4	13.9	14.4	15.0	15.5	16.0									38
39	12.0	12.5	13.1	13.6	14.2	14.7	15.2	15.8	16.3	16.8									39
40	12.6	13.2	13.8	14.3	14.9	15.5	16.0	16.6	17.2	17.7									40
41	13.3	13.9	14.5	15.1	15.7	16.2	16.8	17.4	18.0	18.6									41
42	13.9	14.6	15.2	15.8	16.4	17.1	17.7	18.3	18.9	19.6									42
43	14.6	15.3	15.9	16.6	17.2	17.9	18.5	19.2	19.9	20.5									43
44	15.3	16.0	16.7	17.4	18.1	18.7	19.4	20.1	20.8	21.5									44
45	16.0	16.7	17.5	18.2	18.9	19.6	20.3	21.0	21.8	22.5									45
46	16.8	17.5	18.3	19.0	19.7	20.5	21.2	22.0	22.7	23.5									46
47	17.5	18.3	19.1	19.8	20.6	21.4	22.2	23.0	23.7	24.5									47
48	18.3	19.1	19.9	20.7	21.5	22.3	23.1	24.0	24.8	25.6									48
49	19.0	19.9	20.7	21.6	22.4	23.3	24.1	25.0	25.8	26.7									49
50	19.8	20.7	21.6	22.5	23.4	24.3	25.1	26.0	26.9	27.8									50
51	20.6	21.6	22.5	23.4	24.3	25.2	26.2	27.1	28.0	28.9									51
52	21.5	22.4	23.4	24.3	25.3	26.2	27.2	28.2	29.1	30.1									52
53		23.3	24.3	25.3	26.3	27.3	28.3	29.3	30.3	31.2									53
54		24.2	25.2	26.3	27.3	28.3	29.4	30.4	31.4	32.4									54
55		25.1	26.2	27.2	28.3	29.4	30.5	31.5	32.6	33.7									55
56		26.0	27.1	28.3	29.4	30.5	31.6	32.7	33.8	34.9									56
57		27.0	28.1	29.3	30.4	31.6	32.7	33.9	35.0	36.2									57
58		28.0	29.1	30.3	31.5	32.7	33.9	35.1	36.3	37.5									58
59		28.9	30.2	31.4	32.6	33.9	35.1	36.3	37.5	38.8									59
60		29.9	31.2	32.5	33.7	35.0	36.3	37.6	38.8	40.1									60
61		30.9	32.3	33.6	34.9	36.2	37.5	38.8	40.2	41.5									61
62		32.0	33.3	34.7	36.1	37.4	38.8	40.1	41.5	42.9									62
63				35.8	37.2	38.6	40.0	41.4	42.8	44.3									63
64				37.0	38.4	39.9	41.3	42.8	44.2	45.7									64
65				38.2	39.7	41.2	42.6	44.1	45.6	47.1									65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete bianco  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	5.7	6.1	6.6	7.0	7.5	7.9													5
6	7.8	8.4	9.1	9.7	10.4	11.0													6
7	10.1	11.0	11.8	12.7	13.6	14.5													7
8	12.5	13.7	14.9	16.0	17.2	18.3	19.5	20.7											8
9	15.2	16.7	18.1	19.6	21.1	22.5	24.0	25.5											9
10	18.0	19.8	21.6	23.5	25.3	27.1	28.9	30.7											10
11	21.0	23.2	25.4	27.6	29.8	32.0	34.2	36.4											11
12		26.8	29.4	32.0	34.7	37.3	39.9	42.5											12
13				36.8	39.8	42.9	46.0	49.0	52.1	55.2									13
14				41.8	45.4	48.9	52.5	56.0	59.6	63.1									14
15				47.1	51.2	55.3	59.4	63.4	67.5	71.6									15
16				52.7	57.4	62.0	66.6	71.3	75.9	80.6									16
17				58.6	63.9	69.1	74.3	79.6	84.8	90.0	95.3	100.5	105.8	111.0					17
18					70.7	76.5	82.4	88.3	94.2	100.0	105.9	111.8	117.7	123.5					18
19					77.8	84.4	90.9	97.4	104.0	110.5	117.1	123.6	130.2	136.7					19
20						92.5	99.8	107.0	114.3	121.5	128.8	136.0	143.3	150.5					20
21						101.1	109.1	117.1	125.1	133.1	141.0	149.0	157.0	165.0					21
22						110.0	118.8	127.5	136.3	145.1	153.8	162.6	171.4	180.2	188.9	197.7	206.5	215.3	22
23								138.4	148.0	157.6	167.2	176.8	186.4	196.0	205.5	215.1	224.7	234.3	23
24								149.8	160.2	170.6	181.1	191.5	202.0	212.4	222.8	233.3	243.7	254.2	24
25								161.5	172.8	184.2	195.5	206.8	218.2	229.5	240.8	252.1	263.5	274.8	25
26								173.7	186.0	198.2	210.5	222.7	235.0	247.2	259.5	271.7	284.0	296.2	26
27								186.4	199.6	212.8	226.0	239.2	252.4	265.6	278.9	292.1	305.3	318.5	27
28										227.9	242.1	256.3	270.5	284.7	298.9	313.1	327.3	341.5	28
29										243.4	258.7	273.9	289.2	304.4	319.6	334.9	350.1	365.4	29
30										259.5	275.8	292.1	308.4	324.8	341.1	357.4	373.7	390.0	30
31										276.1	293.5	310.9	328.3	345.8	363.2	380.6	398.0	415.4	31
32										293.2	311.7	330.3	348.9	367.4	386.0	404.5	423.1	441.7	32
33											350.3	370.0	389.7	409.5	429.2	449.0	468.7		33
34											370.8	391.8	412.7	433.7	454.6	475.6	496.5		34
35											391.9	414.1	436.3	458.5	480.7	502.9	525.1		35
36											413.6	437.1	460.6	484.1	507.6	531.1	554.6		36
37											435.9	460.7	485.5	510.3	535.2	560.0	584.8		37
38													511.1	537.3	563.4	589.6	615.8		38
39													537.3	564.9	592.5	620.0	647.6		39
40													564.2	593.2	622.2	651.2	680.2		40
41													591.8	622.2	652.7	683.2	713.6		41
42													619.9	651.9	683.9	715.9	747.8		42
43															715.8	749.3	782.8		43
44															748.5	783.5	818.6		44
45															781.8	818.5	855.2		45
46															815.9	854.3	892.6		46
47															850.7	890.8	930.8		47
48																	969.8		48
49																	1 009.6		49
50																	1 050.2		50
51																	1 091.6		51
52																	1 133.7		52
53																			53
54																			54
55																			55
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)



Abete bianco  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	331.7	344.9	358.1	371.3															27
28	355.7	370.0	384.2	398.4															28
29	380.6	395.9	411.1	426.3															29
30	406.3	422.6	438.9	455.3															30
31	432.9	450.3	467.7	485.1															31
32	460.2	478.8	497.3	515.9	534.5	553.0	571.6	590.1											32
33	488.4	508.2	527.9	547.6	567.4	587.1	606.9	626.6											33
34	517.5	538.4	559.4	580.3	601.3	622.2	643.2	664.1											34
35	547.3	569.5	591.8	614.0	636.2	658.4	680.6	702.8											35
36	578.1	601.5	625.0	648.5	672.0	695.5	719.0	742.5											36
37	609.6	634.4	659.2	684.0	708.8	733.7	758.5	783.3											37
38	642.0	668.1	694.3	720.5	746.7	772.8	799.0	825.2	851.3	877.5									38
39	675.2	702.7	730.3	757.9	785.4	813.0	840.6	868.2	895.7	923.3									39
40	709.2	738.2	767.2	796.2	825.2	854.2	883.2	912.2	941.2	970.2									40
41	744.1	774.6	805.0	835.5	866.0	896.4	926.9	957.4	987.8	1 018.3									41
42	779.8	811.8	843.7	875.7	907.7	939.7	971.6	1 003.6	1 035.6	1 067.6									42
43	816.3	849.9	883.4	916.9	950.4	983.9	1 017.4	1 050.9	1 084.5	1 118.0									43
44	853.7	888.8	923.9	959.0	994.1	1 029.2	1 064.3	1 099.4	1 134.4	1 169.5									44
45	891.9	928.6	965.3	1 002.0	1 038.7	1 075.4	1 112.2	1 148.9	1 185.6	1 222.3									45
46	931.0	969.3	1 007.7	1 046.0	1 084.4	1 122.7	1 161.1	1 199.4	1 237.8	1 276.2									46
47	970.9	1 010.9	1 050.9	1 091.0	1 131.0	1 171.0	1 211.1	1 251.1	1 291.2	1 331.2									47
48	1 011.6	1 053.3	1 095.1	1 136.8	1 178.6	1 220.4	1 262.1	1 303.9	1 345.6	1 387.4									48
49	1 053.1	1 096.6	1 140.2	1 183.7	1 227.2	1 270.7	1 314.2	1 357.7	1 401.3	1 444.8									49
50	1 095.5	1 140.8	1 186.1	1 231.4	1 276.7	1 322.1	1 367.4	1 412.7	1 458.0	1 503.3									50
51	1 138.7	1 185.9	1 233.0	1 280.1	1 327.3	1 374.4	1 421.6	1 468.7	1 515.9	1 563.0									51
52	1 182.8	1 231.8	1 280.8	1 329.8	1 378.8	1 427.8	1 476.8	1 525.8	1 574.8	1 623.8									52
53		1 278.5	1 329.5	1 380.4	1 431.3	1 482.2	1 533.1	1 584.0	1 634.9	1 685.9									53
54		1 326.2	1 379.1	1 431.9	1 484.8	1 537.6	1 590.5	1 643.3	1 696.2	1 749.0									54
55		1 374.7	1 429.6	1 484.4	1 539.2	1 594.0	1 648.9	1 703.7	1 758.5	1 813.4									55
56		1 424.1	1 481.0	1 537.8	1 594.6	1 651.5	1 708.3	1 765.2	1 822.0	1 878.8									56
57		1 474.4	1 533.3	1 592.2	1 651.0	1 709.9	1 768.8	1 827.7	1 886.6	1 945.5									57
58		1 525.5	1 586.5	1 647.5	1 708.4	1 769.4	1 830.4	1 891.4	1 952.3	2 013.3									58
59		1 577.5	1 640.6	1 703.7	1 766.8	1 829.9	1 893.0	1 956.1	2 019.2	2 082.3									59
60		1 630.4	1 695.6	1 760.9	1 826.1	1 891.4	1 956.6	2 021.9	2 087.1	2 152.4									60
61		1 684.1	1 751.6	1 819.0	1 886.5	1 953.9	2 021.4	2 088.8	2 156.2	2 223.7									61
62		1 738.8	1 808.4	1 878.1	1 947.8	2 017.4	2 087.1	2 156.8	2 226.5	2 296.1									62
63				1 938.1	2 010.1	2 082.0	2 153.9	2 225.9	2 297.8	2 369.7									63
64				1 999.1	2 073.3	2 147.6	2 221.8	2 296.0	2 370.3	2 444.5									64
65				2 061.0	2 137.5	2 214.1	2 290.7	2 367.3	2 443.9	2 520.4									65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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## ***Cupressus* spp.**

### **Cipressi**

*Cupressus arizonica* Greene  
Cipresso dell'arizona

*Cupressus sempervirens* L.  
Cipresso comune

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## Cipressi

### Volume del fusto e dei rami grossi

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.6735 \quad 3.6590 \cdot 10^{-2} \quad 6.4725 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 4.4096 & & \\ 2.3672 \cdot 10^{-3} & 2.4582 \cdot 10^{-6} & \\ -7.6599 \cdot 10^{-1} & -4.8528 \cdot 10^{-4} & 1.4173 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 2.4946 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.5288 \quad 1.7046 \cdot 10^{-2} \quad 6.7181 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.9597 & & \\ 1.0520 \cdot 10^{-3} & 1.0925 \cdot 10^{-6} & \\ -3.4042 \cdot 10^{-1} & -2.1567 \cdot 10^{-4} & 6.2987 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.1087 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.1740 \quad 7.0221 \cdot 10^{-3} \quad 6.6022 \cdot 10^{-1}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.7525 & & \\ 3.0881 \cdot 10^{-3} & 3.2069 \cdot 10^{-6} & \\ -9.9927 \cdot 10^{-1} & -6.3307 \cdot 10^{-4} & 1.8489 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.2544 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 45$

$p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-4.3163 \cdot 10^{-1} \quad 2.9100 \cdot 10^{-4} \quad 8.3616 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.1899 \cdot 10^{-2} & & \\ 1.1756 \cdot 10^{-5} & 1.2208 \cdot 10^{-8} & \\ -3.8041 \cdot 10^{-3} & -2.4100 \cdot 10^{-6} & 7.0386 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.2389 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 45$

$p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-4.1345 \quad 2.4359 \cdot 10^{-2} \quad 1.4156]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.9510 & & \\ 3.7315 \cdot 10^{-3} & 3.8750 \cdot 10^{-6} & \\ -1.2075 & -7.6496 \cdot 10^{-4} & 2.2341 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.9324 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Cipressi  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5																			5	
6	7.8	9.1	10.4	11.7															6	
7	10.8	12.6	14.4	16.2															7	
8	14.2	16.6	18.9	21.2	23.6	25.9													8	
9	18.0	20.9	23.9	26.9	29.8	32.8													9	
10	22.1	25.8	29.4	33.1	36.7	40.4													10	
11	26.6	31.0	35.4	39.9	44.3	48.7													11	
12		36.7	42.0	47.2	52.5	57.8													12	
13			49.0	55.2	61.4	67.6	73.8	79.9	86.1	92.3									13	
14			56.6	63.8	70.9	78.1	85.3	92.4	99.6	106.8									14	
15				72.9	81.1	89.4	97.6	105.8	114.1	122.3									15	
16				82.6	92.0	101.4	110.7	120.1	129.5	138.8									16	
17				92.9	103.5	114.1	124.6	135.2	145.8	156.4									17	
18					115.7	127.5	139.4	151.2	163.1	174.9	186.8	198.7	210.5	222.4					18	
19					128.5	141.7	154.9	168.1	181.3	194.6	207.8	221.0	234.2	247.4					19	
20						156.6	171.3	185.9	200.5	215.2	229.8	244.4	259.1	273.7					20	
21						172.3	188.4	204.6	220.7	236.8	253.0	269.1	285.2	301.4					21	
22						188.7	206.4	224.1	241.8	259.5	277.2	294.9	312.6	330.3					22	
23							225.1	244.5	263.8	283.2	302.6	321.9	341.3	360.6	380.0	399.3	418.7	438.0	23	
24							244.7	265.8	286.8	307.9	329.0	350.1	371.1	392.2	413.3	434.4	455.5	476.5	24	
25								287.9	310.8	333.7	356.5	379.4	402.3	425.1	448.0	470.9	493.8	516.6	25	
26								311.0	335.7	360.4	385.2	409.9	434.6	459.4	484.1	508.9	533.6	558.3	26	
27								334.9	361.6	388.2	414.9	441.6	468.3	494.9	521.6	548.3	575.0	601.6	27	
28										417.1	445.7	474.4	503.1	531.8	560.5	589.2	617.9	646.6	28	
29										446.9	477.7	508.5	539.2	570.0	600.8	631.5	662.3	693.1	29	
30										477.8	510.7	543.6	576.6	609.5	642.4	675.4	708.3	741.2	30	
31										509.7	544.8	580.0	615.2	650.3	685.5	720.7	755.8	791.0	31	
32										542.6	580.1	617.5	655.0	692.5	729.9	767.4	804.9	842.3	32	
33											656.2	696.1	735.9	775.8	815.6	855.5	895.3		33	
34											696.1	738.4	780.7	823.0	865.3	907.6	949.9		34	
35											737.1	782.0	826.8	871.6	916.4	961.3	1 006.1		35	
36											779.4	826.8	874.2	921.6	969.0	1 016.5	1 063.9		36	
37											822.7	872.8	922.9	973.0	1 023.1	1 073.2	1 123.3		37	
38													973.0	1 025.8	1 078.6	1 131.5	1 184.3		38	
39														1 024.3	1 080.0	1 135.6	1 191.3	1 246.9	39	
40															1 077.0	1 135.6	1 194.1	1 252.6	1 311.2	40
41																				41
42																				42
43																				43
44																				44
45																				45
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66																				66
67																				67
68																				68
69																				69
70																				70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Cipressi  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	457.4	476.8																	23
24	497.6	518.7																	24
25	539.5	562.4																	25
26	583.1	607.8																	26
27	628.3	655.0																	27
28	675.2	703.9	732.6	761.3															28
29	723.9	754.6	785.4	816.2															29
30	774.2	807.1	840.0	873.0															30
31	826.1	861.3	896.5	931.6															31
32	879.8	917.3	954.7	992.2															32
33	935.2	975.0	1 014.8	1 054.7															33
34	992.2	1 034.5	1 076.8	1 119.1															34
35	1 050.9	1 095.7	1 140.5	1 185.4															35
36	1 111.3	1 158.7	1 206.1	1 253.6															36
37	1 173.4	1 223.5	1 273.6	1 323.7															37
38	1 237.1	1 290.0	1 342.8	1 395.7															38
39	1 302.6	1 358.3	1 413.9	1 469.6															39
40	1 369.7	1 428.3	1 486.8	1 545.4															40
41																			41
42																			42
43																			43
44																			44
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Cipressi  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	4.6	5.2	5.8	6.4															6
7	6.4	7.2	8.0	8.9															7
8	8.3	9.4	10.5	11.6	12.7	13.8													8
9	10.4	11.8	13.2	14.6	15.9	17.3													9
10	12.7	14.4	16.1	17.8	19.5	21.2													10
11	15.2	17.2	19.3	21.4	23.4	25.5													11
12		20.3	22.7	25.2	27.6	30.1													12
13			26.4	29.3	32.1	35.0	37.9	40.8	43.7	46.5									13
14			30.3	33.6	36.9	40.3	43.6	47.0	50.3	53.7									14
15				38.2	42.1	45.9	49.7	53.6	57.4	61.2									15
16				43.1	47.5	51.9	56.2	60.6	64.9	69.3									16
17				48.3	53.2	58.2	63.1	68.0	72.9	77.9									17
18					59.3	64.8	70.3	75.8	81.4	86.9	92.4	97.9	103.5	109.0					18
19					65.6	71.8	77.9	84.1	90.2	96.4	102.5	108.7	114.8	121.0					19
20						79.1	85.9	92.7	99.5	106.4	113.2	120.0	126.8	133.6					20
21						86.8	94.3	101.8	109.3	116.8	124.3	131.9	139.4	146.9					21
22						94.8	103.0	111.3	119.5	127.8	136.0	144.3	152.5	160.8					22
23							112.1	121.1	130.1	139.2	148.2	157.2	166.2	175.2	184.3	193.3	202.3	211.3	23
24							121.6	131.4	141.2	151.1	160.9	170.7	180.5	190.3	200.1	210.0	219.8	229.6	24
25								142.1	152.8	163.4	174.1	184.7	195.4	206.0	216.7	227.3	238.0	248.6	25
26								153.2	164.7	176.3	187.8	199.3	210.8	222.4	233.9	245.4	256.9	268.4	26
27								164.7	177.2	189.6	202.0	214.4	226.9	239.3	251.7	264.1	276.6	289.0	27
28										203.4	216.7	230.1	243.5	256.8	270.2	283.6	296.9	310.3	28
29										217.7	232.0	246.3	260.7	275.0	289.3	303.7	318.0	332.3	29
30										232.4	247.7	263.1	278.4	293.8	309.1	324.5	339.8	355.1	30
31										247.6	264.0	280.4	296.8	313.2	329.5	345.9	362.3	378.7	31
32										263.3	280.8	298.3	315.7	333.2	350.6	368.1	385.5	403.0	32
33											316.7	335.2	353.8	372.3	390.9	409.5	428.0	446.5	33
34											335.6	355.3	375.0	394.7	414.4	434.1	453.8	473.5	34
35											355.1	376.0	396.8	417.7	438.6	459.5	480.4	501.3	35
36											375.1	397.2	419.3	441.4	463.5	485.6	507.7	529.8	36
37											395.7	419.0	442.4	465.7	489.0	512.4	535.7	559.0	37
38														466.1	490.7	515.3	539.9	564.5	38
39														490.4	516.3	542.2	568.1	594.1	39
40														515.3	542.5	569.8	597.1	624.4	40
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68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cipressi  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	220.3	229.3																	23
24	239.4	249.2																	24
25	259.3	270.0																	25
26	280.0	291.5																	26
27	301.4	313.8																	27
28	323.7	337.0	350.4	363.7															28
29	346.7	361.0	375.3	389.7															29
30	370.5	385.8	401.2	416.5															30
31	395.1	411.4	427.8	444.2															31
32	420.4	437.9	455.3	472.8															32
33	446.6	465.2	483.7	502.3															33
34	473.5	493.2	512.9	532.6															34
35	501.3	522.1	543.0	563.9															35
36	529.8	551.9	573.9	596.0															36
37	559.1	582.4	605.7	629.1															37
38	589.1	613.7	638.4	663.0															38
39	620.0	645.9	671.8	697.8															39
40	651.6	678.9	706.2	733.5															40
41																			41
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cipressi  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)												
5																			5												
6	4.1	4.3	4.6	4.8															6												
7	5.2	5.5	5.9	6.2															7												
8	6.4	6.8	7.3	7.7	8.2	8.6													8												
9	7.6	8.2	8.7	9.3	9.9	10.5													9												
10	8.9	9.6	10.3	11.0	11.7	12.5													10												
11	10.3	11.2	12.0	12.9	13.7	14.6													11												
12		12.8	13.8	14.8	15.8	16.9													12												
13			15.7	16.9	18.1	19.3	20.5	21.6	22.8	24.0									13												
14			17.7	19.1	20.5	21.8	23.2	24.6	26.0	27.3									14												
15				21.4	22.9	24.5	26.1	27.7	29.3	30.8									15												
16				23.8	25.6	27.4	29.2	31.0	32.8	34.6									16												
17				26.3	28.3	30.3	32.4	34.4	36.4	38.5									17												
18					31.2	33.5	35.7	38.0	40.3	42.6	44.8	47.1	49.4	51.7					18												
19					34.2	36.7	39.3	41.8	44.3	46.9	49.4	51.9	54.5	57.0					19												
20						40.1	42.9	45.7	48.5	51.4	54.2	57.0	59.8	62.6					20												
21							43.7	46.8	49.9	52.9	56.0	59.1	62.2	65.3	68.4				21												
22								47.3	50.7	54.1	57.5	60.9	64.3	67.7	71.1	74.5			22												
23									54.9	58.6	62.3	66.0	69.7	73.4	77.2	80.9	84.6	88.3	92.0	95.7	23										
24										59.2	63.2	67.3	71.3	75.3	79.4	83.4	87.5	91.5	95.6	99.6	103.7	24									
25											68.0	72.4	76.8	81.2	85.6	89.9	94.3	98.7	103.1	107.5	111.9	25									
26												73.0	77.7	82.4	87.2	91.9	96.7	101.4	106.2	110.9	115.7	120.4	26								
27													78.1	83.2	88.3	93.4	98.6	103.7	108.8	113.9	119.0	124.2	129.3	27							
28														94.4	99.9	105.4	110.9	116.4	121.9	127.4	132.9	138.4	28								
29															100.7	106.6	112.5	118.4	124.3	130.2	136.1	142.0	147.9	29							
30																107.1	113.4	119.8	126.1	132.4	138.7	145.0	151.4	157.7	30						
31																	113.8	120.5	127.3	134.0	140.8	147.5	154.3	161.0	167.8	31					
32																		120.6	127.8	135.0	142.2	149.4	156.6	163.8	171.0	178.1	32				
33																			143.0	150.6	158.3	165.9	173.6	181.2	188.8	33					
34																				151.2	159.3	167.4	175.5	183.6	191.7	199.9	34				
35																					159.6	168.2	176.8	185.4	194.0	202.6	211.2	35			
36																						168.2	177.3	186.4	195.5	204.6	213.7	222.8	36		
37																							177.1	186.7	196.3	205.9	215.5	225.1	234.7	37	
38																								206.4	216.6	226.7	236.9	247.0	38		
39																									216.8	227.5	238.2	248.9	259.5	39	
40																										227.5	238.7	249.9	261.2	272.4	40
41																													41		
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69																													69		
70																													70		
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)												

Cipressi  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	99.4	103.2																	23
24	107.7	111.7																	24
25	116.3	120.7																	25
26	125.2	129.9																	26
27	134.4	139.5																	27
28	143.9	149.4	154.9	160.5															28
29	153.8	159.7	165.6	171.5															29
30	164.0	170.3	176.6	182.9															30
31	174.5	181.3	188.0	194.7															31
32	185.3	192.5	199.7	206.9															32
33	196.5	204.1	211.8	219.4															33
34	208.0	216.1	224.2	232.3															34
35	219.8	228.4	237.0	245.6															35
36	231.9	241.0	250.1	259.2															36
37	244.4	254.0	263.6	273.2															37
38	257.1	267.3	277.4	287.6															38
39	270.2	280.9	291.6	302.3															39
40	283.6	294.9	306.1	317.4															40
41																			41
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cipressi  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.1	0.1	0.1	0.2															6
7	0.2	0.2	0.3	0.3															7
8	0.3	0.3	0.4	0.4	0.4	0.4													8
9	0.4	0.5	0.5	0.5	0.5	0.6													9
10	0.6	0.6	0.6	0.6	0.7	0.7													10
11	0.7	0.7	0.7	0.8	0.8	0.8													11
12		0.8	0.9	0.9	0.9	1.0													12
13			1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3									13
14			1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.5									14
15				1.3	1.4	1.5	1.5	1.6	1.7	1.7									15
16				1.5	1.6	1.7	1.7	1.8	1.9	1.9									16
17				1.7	1.7	1.8	1.9	2.0	2.1	2.2									17
18					1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8					18
19					2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0					19
20						2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3					20
21						2.6	2.7	2.9	3.0	3.1	3.2	3.4	3.5	3.6					21
22						2.8	3.0	3.1	3.2	3.4	3.5	3.7	3.8	3.9					22
23							3.2	3.3	3.5	3.6	3.8	4.0	4.1	4.3	4.4	4.6	4.7	4.9	23
24							3.4	3.6	3.8	3.9	4.1	4.3	4.4	4.6	4.8	4.9	5.1	5.3	24
25								3.8	4.0	4.2	4.4	4.6	4.8	4.9	5.1	5.3	5.5	5.7	25
26								4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	26
27								4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.9	6.1	6.3	6.5	27
28									5.1	5.3	5.6	5.8	6.0	6.2	6.5	6.7	6.9		28
29									5.4	5.7	5.9	6.2	6.4	6.6	6.9	7.1	7.4		29
30									5.7	6.0	6.3	6.5	6.8	7.1	7.3	7.6	7.8		30
31									6.1	6.4	6.6	6.9	7.2	7.5	7.8	8.0	8.3		31
32									6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8		32
33										7.4	7.7	8.0	8.3	8.7	9.0	9.3			33
34											7.8	8.1	8.5	8.8	9.1	9.5	9.8		34
35											8.2	8.6	8.9	9.3	9.6	10.0	10.3		35
36											8.6	9.0	9.4	9.7	10.1	10.5	10.9		36
37											9.0	9.4	9.8	10.2	10.6	11.0	11.4		37
38												10.3	10.7	11.1	11.6	12.0			38
39												10.8	11.2	11.7	12.1	12.6			39
40													11.3	11.8	12.2	12.7	13.2		40
41																			41
42																			42
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cipressi  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	5.0	5.2																	23
24	5.4	5.6																	24
25	5.8	6.0																	25
26	6.3	6.5																	26
27	6.7	6.9																	27
28	7.2	7.4	7.6	7.8															28
29	7.6	7.9	8.1	8.4															29
30	8.1	8.4	8.6	8.9															30
31	8.6	8.9	9.2	9.4															31
32	9.1	9.4	9.7	10.0															32
33	9.6	9.9	10.3	10.6															33
34	10.1	10.5	10.8	11.2															34
35	10.7	11.1	11.4	11.8															35
36	11.3	11.6	12.0	12.4															36
37	11.8	12.2	12.6	13.0															37
38	12.4	12.8	13.3	13.7															38
39	13.0	13.5	13.9	14.3															39
40	13.6	14.1	14.6	15.0															40
41																			41
42																			42
43																			43
44																			44
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cipressi  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)		
5																			5		
6	8.7	9.6	10.5	11.4															6		
7	11.7	12.9	14.1	15.3															7		
8	15.0	16.5	18.1	19.7	21.2	22.8													8		
9	18.5	20.4	22.4	24.4	26.4	28.3													9		
10	22.2	24.6	27.1	29.5	31.9	34.4													10		
11	26.2	29.1	32.1	35.0	38.0	40.9													11		
12		33.9	37.4	40.9	44.4	47.9													12		
13			43.1	47.2	51.3	55.4	59.6	63.7	67.8	71.9									13		
14			49.1	53.9	58.7	63.4	68.2	73.0	77.8	82.5									14		
15				60.9	66.4	71.9	77.4	82.9	88.3	93.8									15		
16				68.4	74.6	80.9	87.1	93.3	99.6	105.8									16		
17				76.2	83.3	90.3	97.4	104.4	111.4	118.5									17		
18					92.4	100.3	108.2	116.1	123.9	131.8	139.7	147.6	155.5	163.4					18		
19					101.9	110.7	119.5	128.3	137.1	145.9	154.7	163.5	172.3	181.0					19		
20						121.6	131.4	141.1	150.8	160.6	170.3	180.1	189.8	199.6					20		
21							133.0	143.8	154.5	165.2	176.0	186.7	197.5	208.2	219.0				21		
22							144.9	156.7	168.5	180.3	192.1	203.9	215.6	227.4	239.2				22		
23								170.2	183.1	195.9	208.8	221.7	234.6	247.5	260.4	273.3	286.1	299.0	311.9	23	
24								184.2	198.2	212.2	226.3	240.3	254.3	268.4	282.4	296.4	310.5	324.5	338.5	24	
25									213.9	229.2	244.4	259.6	274.8	290.1	305.3	320.5	335.7	351.0	366.2	25	
26									230.3	246.7	263.2	279.7	296.1	312.6	329.1	345.5	362.0	378.5	394.9	26	
27									247.2	264.9	282.7	300.5	318.2	336.0	353.7	371.5	389.2	407.0	424.8	27	
28											302.9	322.0	341.1	360.2	379.3	398.4	417.5	436.5	455.6	28	
29											323.7	344.2	364.7	385.2	405.7	426.2	446.6	467.1	487.6	29	
30											345.3	367.2	389.1	411.0	432.9	454.9	476.8	498.7	520.6	30	
31											367.5	390.9	414.3	437.7	461.1	484.5	507.9	531.3	554.7	31	
32											390.4	415.3	440.3	465.2	490.1	515.1	540.0	565.0	589.9	32	
33												467.0	493.5	520.1	546.6	573.1	599.6	626.2	652.7	33	
34												494.5	522.7	550.9	579.0	607.2	635.3	663.5	691.7	34	
35												522.8	552.7	582.5	612.4	642.2	672.0	701.9	731.7	35	
36												551.9	583.5	615.1	646.6	678.2	709.8	741.4	773.0	36	
37												581.8	615.1	648.5	681.8	715.2	748.5	781.9	815.2	37	
38														682.8	718.0	753.1	788.3	823.5	858.7	38	
39															718.0	755.0	792.1	829.1	866.2	39	
40																754.0	793.0	832.0	871.0	909.9	40
41																				41	
42																				42	
43																				43	
44																				44	
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67																				67	
68																				68	
69																				69	
70																				70	
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)		

Cipressi  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	324.8	337.7																	23
24	352.5	366.6																	24
25	381.4	396.6																	25
26	411.4	427.9																	26
27	442.5	460.3																	27
28	474.7	493.8	512.9	532.0															28
29	508.1	528.6	549.1	569.6															29
30	542.6	564.5	586.4	608.3															30
31	578.2	601.6	625.0	648.4															31
32	614.9	639.8	664.8	689.7															32
33	652.7	679.2	705.8	732.3															33
34	691.7	719.8	748.0	776.1															34
35	731.7	761.6	791.4	821.2															35
36	772.9	804.5	836.1	867.6															36
37	815.2	848.6	881.9	915.3															37
38	858.7	893.8	929.0	964.2															38
39	903.2	940.3	977.3	1 014.4															39
40	948.9	987.9	1 026.8	1 065.8															40
41																			41
42																			42
43																			43
44																			44
45																			45
46																			46
47																			47
48																			48
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50																			50
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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***Larix decidua* Mill.**

**Larice**

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## Larice

### Volume del fusto e dei rami grossi

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.6519 \cdot 10 \quad 2.9979 \cdot 10^{-2} \quad 3.1506]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.5507 \cdot 10 & & \\ 3.8552 \cdot 10^{-3} & 1.7974 \cdot 10^{-6} & \\ -2.2902 & -6.2774 \cdot 10^{-4} & 3.5019 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 2.4915 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.4433 \quad 1.5091 \cdot 10^{-2} \quad 6.2777 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 8.7004 & & \\ 2.1630 \cdot 10^{-3} & 1.0084 \cdot 10^{-6} & \\ -1.2850 & -3.5220 \cdot 10^{-4} & 1.9648 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.3979 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 45$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.0305 \cdot 10 \quad -4.3457 \cdot 10^{-4} \quad 2.3549]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.4028 \cdot 10 & & \\ 3.4875 \cdot 10^{-3} & 1.6259 \cdot 10^{-6} & \\ -2.0718 & -5.6787 \cdot 10^{-4} & 3.1679 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.2539 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 45$

$p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.3120 \quad 6.8577 \cdot 10^{-6} \quad 2.4822 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 9.9283 \cdot 10^{-2} & & \\ 2.4683 \cdot 10^{-5} & 1.1508 \cdot 10^{-8} & \\ -1.4663 \cdot 10^{-2} & -4.0191 \cdot 10^{-6} & 2.2421 \cdot 10^{-3} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.5952 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 45$

$p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.4060 \cdot 10 \quad 1.4664 \cdot 10^{-2} \quad 3.2309]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.5446 \cdot 10 & & \\ 6.3263 \cdot 10^{-3} & 2.9494 \cdot 10^{-6} & \\ -3.7582 & -1.0301 \cdot 10^{-3} & 5.7465 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 4.0885 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Larice  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	7.8	8.9	9.9	11.0															6
7	12.9	14.3	15.8	17.3															7
8	18.3	20.2	22.1	24.0	26.0	27.9	29.8	31.7											8
9	24.0	26.4	28.8	31.3	33.7	36.1	38.5	41.0											9
10	30.0	33.0	36.0	39.0	42.0	45.0	48.0	51.0											10
11	36.3	39.9	43.5	47.2	50.8	54.4	58.0	61.7											11
12	42.9	47.2	51.5	55.8	60.1	64.5	68.8	73.1	77.4	81.7	86.0	90.4							12
13				65.0	70.0	75.1	80.2	85.2	90.3	95.4	100.4	105.5							13
14				74.6	80.5	86.3	92.2	98.1	104.0	109.9	115.7	121.6							14
15				84.7	91.4	98.2	104.9	111.7	118.4	125.2	131.9	138.7							15
16				95.3	103.0	110.6	118.3	126.0	133.7	141.3	149.0	156.7							16
17				106.4	115.0	123.7	132.3	141.0	149.7	158.3	167.0	175.7	184.3	193.0	201.7	210.3			17
18						137.3	147.0	156.8	166.5	176.2	185.9	195.6	205.3	215.0	224.7	234.5			18
19						151.6	162.4	173.2	184.0	194.9	205.7	216.5	227.3	238.1	249.0	259.8			19
20						166.4	178.4	190.4	202.4	214.4	226.4	238.4	250.4	262.3	274.3	286.3			20
21						181.9	195.1	208.3	221.5	234.7	248.0	261.2	274.4	287.6	300.8	314.1			21
22						197.9	212.4	226.9	241.4	255.9	270.4	285.0	299.5	314.0	328.5	343.0			22
23						214.5	230.4	246.3	262.1	278.0	293.8	309.7	325.5	341.4	357.3	373.1	389.0	404.8	23
24						231.8	249.0	266.3	283.6	300.8	318.1	335.4	352.6	369.9	387.2	404.5	421.7	439.0	24
25								287.1	305.8	324.6	343.3	362.0	380.8	399.5	418.2	437.0	455.7	474.5	25
26								308.6	328.9	349.1	369.4	389.6	409.9	430.2	450.4	470.7	491.0	511.2	26
27								330.8	352.7	374.5	396.4	418.2	440.1	461.9	483.8	505.6	527.5	549.4	27
28										400.7	424.3	447.8	471.3	494.8	518.3	541.8	565.3	588.8	28
29										427.8	453.0	478.2	503.5	528.7	553.9	579.1	604.3	629.5	29
30										455.7	482.7	509.7	536.7	563.7	590.6	617.6	644.6	671.6	30
31										484.5	513.3	542.1	570.9	599.7	628.5	657.3	686.2	715.0	31
32										514.1	544.8	575.5	606.2	636.9	667.6	698.3	729.0	759.7	32
33												609.8	642.5	675.1	707.7	740.4	773.0	805.7	33
34												645.1	679.7	714.4	749.1	783.7	818.4	853.0	34
35												681.3	718.1	754.8	791.5	828.2	865.0	901.7	35
36												718.5	757.4	796.3	835.1	874.0	912.8	951.7	36
37												756.7	797.8	838.8	879.8	920.9	961.9	1 003.0	37
38														882.4	925.7	969.0	1 012.3	1 055.6	38
39														927.1	972.7	1 018.3	1 063.9	1 109.5	39
40														972.9	1 020.9	1 068.8	1 116.8	1 164.8	40
41														1 019.8	1 070.2	1 120.5	1 170.9	1 221.3	41
42														1 067.7	1 120.6	1 173.5	1 226.3	1 279.2	42
43																1 227.6	1 283.0	1 338.4	43
44																1 282.9	1 340.9	1 399.0	44
45																1 339.4	1 400.1	1 460.8	45
46																1 397.1	1 460.6	1 524.0	46
47																1 456.0	1 522.3	1 588.5	47
48																		1 654.3	48
49																		1 721.4	49
50																		1 789.9	50
51																		1 859.6	51
52																		1 930.7	52
53																			53
54																			54
55																			55
56																			56
57																			57
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Larice  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	420.7	436.6																	23
24	456.3	473.5																	24
25	493.2	511.9																	25
26	531.5	551.8																	26
27	571.2	593.1																	27
28	612.3	635.8	659.3	682.8															28
29	654.7	679.9	705.2	730.4															29
30	698.6	725.5	752.5	779.5															30
31	743.8	772.6	801.4	830.2															31
32	790.4	821.1	851.8	882.5															32
33	838.3	871.0	903.6	936.3	968.9	1 001.6													33
34	887.7	922.3	957.0	991.7	1 026.3	1 061.0													34
35	938.4	975.1	1 011.9	1 048.6	1 085.3	1 122.0													35
36	990.5	1 029.4	1 068.2	1 107.1	1 145.9	1 184.8													36
37	1 044.0	1 085.0	1 126.1	1 167.1	1 208.2	1 249.2													37
38	1 098.9	1 142.2	1 185.4	1 228.7	1 272.0	1 315.3	1 358.6	1 401.9											38
39	1 155.1	1 200.7	1 246.3	1 291.9	1 337.5	1 383.1	1 428.7	1 474.3											39
40	1 212.7	1 260.7	1 308.7	1 356.6	1 404.6	1 452.6	1 500.5	1 548.5											40
41	1 271.7	1 322.1	1 372.5	1 422.9	1 473.3	1 523.7	1 574.1	1 624.5											41
42	1 332.1	1 385.0	1 437.9	1 490.8	1 543.6	1 596.5	1 649.4	1 702.3											42
43	1 393.9	1 449.3	1 504.7	1 560.2	1 615.6	1 671.0	1 726.5	1 781.9	1 837.3	1 892.8									43
44	1 457.0	1 515.1	1 573.1	1 631.1	1 689.2	1 747.2	1 805.2	1 863.3	1 921.3	1 979.4									44
45	1 521.5	1 582.2	1 642.9	1 703.7	1 764.4	1 825.1	1 885.8	1 946.5	2 007.2	2 067.9									45
46	1 587.4	1 650.9	1 714.3	1 777.7	1 841.2	1 904.6	1 968.0	2 031.5	2 094.9	2 158.3									46
47	1 654.7	1 720.9	1 787.1	1 853.4	1 919.6	1 985.8	2 052.0	2 118.3	2 184.5	2 250.7									47
48	1 723.4	1 792.4	1 861.5	1 930.6	1 999.6	2 068.7	2 137.8	2 206.9	2 275.9	2 345.0	2 414.1	2 483.1							48
49	1 793.4	1 865.4	1 937.3	2 009.3	2 081.3	2 153.3	2 225.3	2 297.2	2 369.2	2 441.2	2 513.2	2 585.2							49
50	1 864.8	1 939.8	2 014.7	2 089.6	2 164.6	2 239.5	2 314.5	2 389.4	2 464.4	2 539.3	2 614.3	2 689.2							50
51	1 937.6	2 015.6	2 093.5	2 171.5	2 249.5	2 327.5	2 405.4	2 483.4	2 561.4	2 639.4	2 717.3	2 795.3							51
52	2 011.8	2 092.8	2 173.9	2 255.0	2 336.0	2 417.1	2 498.1	2 579.2	2 660.3	2 741.3	2 822.4	2 903.5							52
53		2 171.5	2 255.7	2 339.9	2 424.2	2 508.4	2 592.6	2 676.8	2 761.0	2 845.2	2 929.4	3 013.6							53
54		2 251.7	2 339.1	2 426.5	2 513.9	2 601.3	2 688.8	2 776.2	2 863.6	2 951.0	3 038.4	3 125.9							54
55		2 333.2	2 423.9	2 514.6	2 605.3	2 696.0	2 786.7	2 877.4	2 968.0	3 058.7	3 149.4	3 240.1							55
56		2 416.3	2 510.3	2 604.3	2 698.3	2 792.3	2 886.3	2 980.3	3 074.4	3 168.4	3 262.4	3 356.4							56
57		2 500.7	2 598.1	2 695.5	2 792.9	2 890.3	2 987.7	3 085.1	3 182.5	3 279.9	3 377.3	3 474.7							57
58		2 586.6	2 687.4	2 788.3	2 889.1	2 990.0	3 090.8	3 191.7	3 292.5	3 393.4	3 494.2	3 595.1	3 695.9	3 796.8					58
59		2 673.9	2 778.3	2 882.6	2 987.0	3 091.4	3 195.7	3 300.1	3 404.4	3 508.8	3 613.1	3 717.5	3 821.9	3 926.2					59
60		2 762.7	2 870.6	2 978.6	3 086.5	3 194.4	3 302.3	3 410.2	3 518.2	3 626.1	3 734.0	3 841.9	3 949.9	4 057.8					60
61		2 852.9	2 964.5	3 076.0	3 187.6	3 299.1	3 410.7	3 522.2	3 633.8	3 745.3	3 856.9	3 968.4	4 080.0	4 191.5					61
62		2 944.6	3 059.8	3 175.0	3 290.3	3 405.5	3 520.8	3 636.0	3 751.2	3 866.5	3 981.7	4 097.0	4 212.2	4 327.4					62
63				3 275.6	3 394.6	3 513.6	3 632.6	3 751.6	3 870.6	3 989.5	4 108.5	4 227.5	4 346.5	4 465.5					63
64				3 377.8	3 500.6	3 623.4	3 746.1	3 868.9	3 991.7	4 114.5	4 237.3	4 360.1	4 482.9	4 605.7					64
65				3 481.5	3 608.1	3 734.8	3 861.4	3 988.1	4 114.8	4 241.4	4 368.1	4 494.8	4 621.4	4 748.1					65
66				3 586.7	3 717.3	3 847.9	3 978.5	4 109.1	4 239.7	4 370.3	4 500.8	4 631.4	4 762.0	4 892.6					66
67				3 693.5	3 828.1	3 962.7	4 097.3	4 231.8	4 366.4	4 501.0	4 635.6	4 770.1	4 904.7	5 039.3					67
68				3 801.9	3 940.5	4 079.2	4 217.8	4 356.4	4 495.0	4 633.7	4 772.3	4 910.9	5 049.5	5 188.1					68
69				3 911.9	4 054.6	4 197.3	4 340.0	4 482.8	4 625.5	4 768.2	4 911.0	5 053.7	5 196.4	5 339.2					69
70				4 023.3	4 170.2	4 317.1	4 464.0	4 610.9	4 757.8	4 904.7	5 051.6	5 198.5	5 345.4	5 492.3					70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Larice  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5																			5	
6	4.0	4.6	5.1	5.7															6	
7	5.6	6.4	7.1	7.9															7	
8	7.4	8.4	9.3	10.3	11.3	12.2	13.2	14.2											8	
9	9.3	10.5	11.8	13.0	14.2	15.4	16.7	17.9											9	
10	11.4	12.9	14.4	15.9	17.4	18.9	20.4	21.9											10	
11	13.6	15.4	17.2	19.1	20.9	22.7	24.5	26.4											11	
12	16.0	18.1	20.3	22.5	24.6	26.8	29.0	31.2	33.3	35.5	37.7	39.9							12	
13				26.1	28.7	31.2	33.8	36.3	38.9	41.4	44.0	46.5							13	
14				30.0	33.0	35.9	38.9	41.8	44.8	47.8	50.7	53.7							14	
15				34.1	37.5	40.9	44.3	47.7	51.1	54.5	57.9	61.3							15	
16				38.5	42.4	46.2	50.1	54.0	57.8	61.7	65.6	69.4							16	
17				43.1	47.5	51.8	56.2	60.6	64.9	69.3	73.6	78.0	82.4	86.7	91.1	95.5			17	
18						57.8	62.6	67.5	72.4	77.3	82.2	87.1	92.0	96.9	101.8	106.6			18	
19						64.0	69.4	74.9	80.3	85.8	91.2	96.6	102.1	107.5	113.0	118.4			19	
20						70.5	76.5	82.5	88.6	94.6	100.7	106.7	112.7	118.8	124.8	130.8			20	
21						77.3	83.9	90.6	97.3	103.9	110.6	117.2	123.9	130.5	137.2	143.8			21	
22						84.4	91.7	99.0	106.3	113.6	120.9	128.2	135.5	142.8	150.1	157.4			22	
23						91.8	99.8	107.8	115.8	123.8	131.7	139.7	147.7	155.7	163.7	171.7	179.6	187.6	23	
24						99.5	108.2	116.9	125.6	134.3	143.0	151.7	160.4	169.1	177.8	186.5	195.2	203.9	24	
25									126.4	135.9	145.3	154.7	164.2	173.6	183.0	192.5	201.9	211.3	220.8	25
26									136.3	146.5	156.7	166.9	177.1	187.3	197.5	207.7	217.9	228.1	238.3	26
27									146.5	157.5	168.5	179.5	190.5	201.5	212.5	223.5	234.5	245.5	256.5	27
28											180.8	192.6	204.4	216.3	228.1	239.9	251.8	263.6	275.4	28
29											193.4	206.1	218.8	231.5	244.2	256.9	269.6	282.3	295.0	29
30											206.5	220.1	233.7	247.3	260.9	274.4	288.0	301.6	315.2	30
31											220.1	234.6	249.1	263.6	278.1	292.6	307.1	321.6	336.1	31
32											234.0	249.4	264.9	280.3	295.8	311.3	326.7	342.2	357.6	32
33											281.2	297.7	314.1	330.5	347.0	363.4	379.8	396.2	412.6	33
34											298.0	315.5	332.9	350.4	367.8	385.2	402.7	420.1	437.5	34
35											315.3	333.8	352.3	370.8	389.3	407.7	426.2	444.6	463.1	35
36											333.1	352.6	372.2	391.8	411.3	430.9	450.4	470.0	489.5	36
37											351.3	372.0	392.7	413.3	434.0	454.6	475.3	496.0	516.6	37
38													413.7	435.4	457.2	479.0	500.8	522.6	544.4	38
39													435.2	458.2	481.1	504.1	527.0	550.0	573.0	39
40													457.3	481.4	505.6	529.7	553.9	578.1	602.3	40
41													479.9	505.3	530.7	556.0	581.4	606.8	632.2	41
42													503.1	529.7	556.3	583.0	609.6	636.2	662.8	42
43															582.6	610.5	638.4	666.3	694.2	43
44															609.5	638.7	667.9	697.1	726.3	44
45															637.0	667.6	698.1	728.7	759.2	45
46															665.1	697.0	729.0	761.0	793.0	46
47															693.8	727.1	760.5	794.9	829.3	47
48																				48
49																				49
50																				50
51																				51
52																				52
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66																				66
67																				67
68																				68
69																				69
70																				70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Larice  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	195.6	203.6																	23
24	212.5	221.2																	24
25	230.2	239.6																	25
26	248.5	258.7																	26
27	267.5	278.5																	27
28	287.3	299.1	310.9	322.7															28
29	307.7	320.4	333.1	345.7															29
30	328.8	342.4	355.9	369.5															30
31	350.6	365.1	379.6	394.1															31
32	373.1	388.5	404.0	419.4															32
33	396.3	412.7	429.1	445.6	462.0	478.4													33
34	420.1	437.6	455.0	472.5	489.9	507.4													34
35	444.7	463.2	481.7	500.2	518.7	537.1													35
36	470.0	489.5	509.1	528.7	548.2	567.8													36
37	496.0	516.6	537.3	557.9	578.6	599.3													37
38	522.6	544.4	566.2	588.0	609.8	631.6	653.4	675.2											38
39	550.0	572.9	595.9	618.8	641.8	664.7	687.7	710.6											39
40	578.0	602.2	626.3	650.5	674.6	698.7	722.9	747.0											40
41	606.8	632.1	657.5	682.9	708.2	733.6	759.0	784.3											41
42	636.2	662.8	689.4	716.1	742.7	769.3	795.9	822.5											42
43	666.3	694.2	722.1	750.0	777.9	805.8	833.7	861.6	889.6	917.5									43
44	697.2	726.4	755.6	784.8	814.0	843.2	872.4	901.7	930.9	960.1									44
45	728.7	759.2	789.8	820.3	850.9	881.5	912.0	942.6	973.1	1 003.7									45
46	760.9	792.8	824.7	856.7	888.6	920.5	952.5	984.4	1 016.3	1 048.3									46
47	793.8	827.1	860.5	893.8	927.1	960.5	993.8	1 027.1	1 060.5	1 093.8									47
48	827.4	862.2	896.9	931.7	966.5	1 001.2	1 036.0	1 070.8	1 105.5	1 140.3	1 175.1	1 209.9							48
49	861.7	897.9	934.2	970.4	1 006.6	1 042.9	1 079.1	1 115.3	1 151.6	1 187.8	1 224.0	1 260.3							49
50	896.7	934.4	972.1	1 009.9	1 047.6	1 085.3	1 123.0	1 160.8	1 198.5	1 236.2	1 274.0	1 311.7							50
51	932.4	971.6	1 010.9	1 050.1	1 089.4	1 128.6	1 167.9	1 207.1	1 246.4	1 285.6	1 324.9	1 364.1							51
52	968.7	1 009.5	1 050.4	1 091.2	1 132.0	1 172.8	1 213.6	1 254.4	1 295.2	1 336.0	1 376.8	1 417.6							52
53	1 048.2	1 090.6	1 133.0	1 175.4	1 217.8	1 260.2	1 302.5	1 344.9	1 387.3	1 429.7	1 472.1								53
54	1 087.6	1 131.6	1 175.6	1 219.6	1 263.6	1 307.6	1 351.6	1 395.6	1 439.6	1 483.6	1 527.6								54
55	1 127.7	1 173.3	1 219.0	1 264.6	1 310.3	1 355.9	1 401.6	1 447.2	1 492.9	1 538.5	1 584.2								55
56	1 168.5	1 215.8	1 263.2	1 310.5	1 357.8	1 405.1	1 452.5	1 499.8	1 547.1	1 594.4	1 641.8								56
57	1 210.1	1 259.1	1 308.1	1 357.2	1 406.2	1 455.2	1 504.3	1 553.3	1 602.3	1 651.4	1 700.4								57
58	1 252.4	1 303.1	1 353.9	1 404.7	1 455.4	1 506.2	1 557.0	1 607.7	1 658.5	1 709.2	1 760.0	1 810.8	1 861.5						58
59	1 295.4	1 347.9	1 400.4	1 453.0	1 505.5	1 558.0	1 610.5	1 663.1	1 715.6	1 768.1	1 820.7	1 873.2	1 925.7						59
60	1 339.1	1 393.4	1 447.7	1 502.1	1 556.4	1 610.7	1 665.1	1 719.4	1 773.7	1 828.0	1 882.4	1 936.7	1 991.0						60
61	1 383.5	1 439.7	1 495.8	1 552.0	1 608.2	1 664.3	1 720.5	1 776.6	1 832.8	1 888.9	1 945.1	2 001.2	2 057.4						61
62	1 428.7	1 486.7	1 544.7	1 602.7	1 660.8	1 718.8	1 776.8	1 834.8	1 892.8	1 950.8	2 008.8	2 066.8	2 124.8						62
63			1 594.4	1 654.3	1 714.2	1 774.1	1 834.0	1 893.9	1 953.8	2 013.7	2 073.6	2 133.5	2 193.4						63
64			1 644.9	1 706.7	1 768.5	1 830.3	1 892.1	1 953.9	2 015.7	2 077.6	2 139.4	2 201.2	2 263.0						64
65			1 696.1	1 759.9	1 823.6	1 887.4	1 951.1	2 014.9	2 078.7	2 142.4	2 206.2	2 269.9	2 333.7						65
66			1 748.1	1 813.9	1 879.6	1 945.3	2 011.1	2 076.8	2 142.6	2 208.3	2 274.0	2 339.8	2 405.5						66
67			1 800.9	1 868.7	1 936.4	2 004.2	2 071.9	2 139.7	2 207.4	2 275.2	2 342.9	2 410.6	2 478.4						67
68			1 854.5	1 924.3	1 994.1	2 063.9	2 133.7	2 203.4	2 273.2	2 343.0	2 412.8	2 482.6	2 552.4						68
69			1 908.9	1 980.8	2 052.6	2 124.5	2 196.3	2 268.2	2 340.0	2 411.9	2 483.7	2 555.6	2 627.4						69
70			1 964.1	2 038.0	2 112.0	2 185.9	2 259.9	2 333.8	2 407.8	2 481.7	2 555.7	2 629.6	2 703.6						70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Larice  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	3.7	3.7	3.7	3.7															6
7	6.1	6.1	6.0	6.0															7
8	8.4	8.4	8.3	8.3	8.3	8.3	8.2	8.2											8
9	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5											9
10	13.0	13.0	12.9	12.9	12.9	12.8	12.8	12.7											10
11	15.3	15.3	15.2	15.2	15.1	15.1	15.0	15.0											11
12	17.6	17.6	17.5	17.5	17.4	17.3	17.3	17.2	17.1	17.1	17.0	17.0							12
13				19.7	19.6	19.6	19.5	19.4	19.4	19.3	19.2	19.1							13
14				22.0	21.9	21.8	21.7	21.6	21.6	21.5	21.4	21.3							14
15				24.2	24.1	24.0	23.9	23.8	23.7	23.6	23.6	23.5							15
16				26.5	26.4	26.3	26.1	26.0	25.9	25.8	25.7	25.6							16
17				28.7	28.6	28.5	28.3	28.2	28.1	28.0	27.8	27.7	27.6	27.5	27.3	27.2			17
18						30.7	30.5	30.4	30.3	30.1	30.0	29.8	29.7	29.5	29.4	29.3			18
19						32.9	32.7	32.6	32.4	32.2	32.1	31.9	31.8	31.6	31.5	31.3			19
20						35.1	34.9	34.7	34.5	34.4	34.2	34.0	33.8	33.7	33.5	33.3			20
21						37.2	37.0	36.8	36.7	36.5	36.3	36.1	35.9	35.7	35.5	35.3			21
22						39.4	39.2	39.0	38.8	38.6	38.3	38.1	37.9	37.7	37.5	37.3			22
23						41.6	41.3	41.1	40.9	40.6	40.4	40.2	39.9	39.7	39.5	39.3	39.0	38.8	23
24						43.7	43.5	43.2	43.0	42.7	42.5	42.2	42.0	41.7	41.5	41.2	41.0	40.7	24
25								45.3	45.0	44.8	44.5	44.2	44.0	43.7	43.4	43.1	42.9	42.6	25
26								47.4	47.1	46.8	46.5	46.2	45.9	45.6	45.3	45.0	44.8	44.5	26
27								49.5	49.2	48.8	48.5	48.2	47.9	47.6	47.3	46.9	46.6	46.3	27
28										50.9	50.5	50.2	49.8	49.5	49.2	48.8	48.5	48.1	28
29										52.9	52.5	52.1	51.8	51.4	51.0	50.7	50.3	49.9	29
30										54.9	54.5	54.1	53.7	53.3	52.9	52.5	52.1	51.7	30
31										56.9	56.4	56.0	55.6	55.2	54.8	54.3	53.9	53.5	31
32										58.8	58.4	57.9	57.5	57.0	56.6	56.2	55.7	55.3	32
33												59.8	59.4	58.9	58.4	57.9	57.5	57.0	33
34												61.7	61.2	60.7	60.2	59.7	59.2	58.7	34
35												63.6	63.1	62.5	62.0	61.5	60.9	60.4	35
36												65.5	64.9	64.3	63.8	63.2	62.6	62.1	36
37												67.3	66.7	66.1	65.5	64.9	64.3	63.7	37
38														67.9	67.3	66.6	66.0	65.4	38
39														69.6	69.0	68.3	67.7	67.0	39
40														71.4	70.7	70.0	69.3	68.6	40
41														73.1	72.4	71.6	70.9	70.2	41
42														74.8	74.0	73.3	72.5	71.7	42
43																74.9	74.1	73.3	43
44																76.5	75.6	74.8	44
45																78.1	77.2	76.3	45
46																79.6	78.7	77.8	46
47																81.2	80.2	79.3	47
48																		80.7	48
49																		82.1	49
50																		83.5	50
51																		84.9	51
52																		86.3	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Larice  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	38.6	38.3																	23
24	40.5	40.2																	24
25	42.3	42.0																	25
26	44.2	43.9																	26
27	46.0	45.7																	27
28	47.8	47.5	47.1	46.8															28
29	49.6	49.2	48.9	48.5															29
30	51.3	51.0	50.6	50.2															30
31	53.1	52.7	52.3	51.8															31
32	54.8	54.4	53.9	53.5															32
33	56.5	56.0	55.6	55.1	54.6	54.2													33
34	58.2	57.7	57.2	56.7	56.2	55.7													34
35	59.9	59.3	58.8	58.3	57.7	57.2													35
36	61.5	61.0	60.4	59.8	59.3	58.7													36
37	63.1	62.5	62.0	61.4	60.8	60.2													37
38	64.7	64.1	63.5	62.9	62.2	61.6	61.0	60.4											38
39	66.3	65.7	65.0	64.4	63.7	63.0	62.4	61.7											39
40	67.9	67.2	66.5	65.8	65.1	64.4	63.7	63.0											40
41	69.4	68.7	68.0	67.3	66.5	65.8	65.1	64.3											41
42	71.0	70.2	69.4	68.7	67.9	67.1	66.4	65.6											42
43	72.5	71.7	70.9	70.1	69.3	68.5	67.7	66.9	66.0	65.2									43
44	74.0	73.1	72.3	71.4	70.6	69.8	68.9	68.1	67.2	66.4									44
45	75.4	74.5	73.7	72.8	71.9	71.0	70.1	69.3	68.4	67.5									45
46	76.9	76.0	75.0	74.1	73.2	72.3	71.4	70.4	69.5	68.6									46
47	78.3	77.3	76.4	75.4	74.5	73.5	72.5	71.6	70.6	69.7									47
48	79.7	78.7	77.7	76.7	75.7	74.7	73.7	72.7	71.7	70.7	69.7	68.7							48
49	81.1	80.0	79.0	78.0	76.9	75.9	74.8	73.8	72.7	71.7	70.7	69.6							49
50	82.5	81.4	80.3	79.2	78.1	77.0	75.9	74.8	73.8	72.7	71.6	70.5							50
51	83.8	82.7	81.5	80.4	79.3	78.1	77.0	75.9	74.8	73.6	72.5	71.4							51
52	85.1	83.9	82.8	81.6	80.4	79.2	78.1	76.9	75.7	74.5	73.4	72.2							52
53	85.2	84.0	82.8	81.5	80.3	79.1	77.9	76.7	75.4	74.2	73.0								53
54	86.4	85.2	83.9	82.6	81.4	80.1	78.8	77.6	76.3	75.0	73.8								54
55	87.7	86.4	85.0	83.7	82.4	81.1	79.8	78.5	77.1	75.8	74.5								55
56	88.9	87.5	86.1	84.8	83.4	82.0	80.7	79.3	78.0	76.6	75.2								56
57	90.0	88.6	87.2	85.8	84.4	83.0	81.6	80.2	78.7	77.3	75.9								57
58	91.2	89.7	88.3	86.8	85.3	83.9	82.4	81.0	79.5	78.0	76.6	75.1	73.7						58
59	92.3	90.8	89.3	87.8	86.3	84.8	83.3	81.7	80.2	78.7	77.2	75.7	74.2						59
60	93.4	91.9	90.3	88.7	87.2	85.6	84.1	82.5	80.9	79.4	77.8	76.2	74.7						60
61	94.5	92.9	91.3	89.7	88.1	86.4	84.8	83.2	81.6	80.0	78.4	76.7	75.1						61
62	95.6	93.9	92.3	90.6	88.9	87.3	85.6	83.9	82.2	80.6	78.9	77.2	75.6						62
63				93.2	91.5	89.8	88.0	86.3	84.6	82.9	81.1	79.4	77.7	76.0					63
64				94.1	92.3	90.6	88.8	87.0	85.2	83.4	81.7	79.9	78.1	76.3					64
65				95.0	93.2	91.4	89.5	87.7	85.8	84.0	82.2	80.3	78.5	76.7					65
66				95.9	94.0	92.1	90.2	88.3	86.4	84.5	82.6	80.8	78.9	77.0					66
67				96.8	94.8	92.9	90.9	88.9	87.0	85.0	83.1	81.1	79.2	77.2					67
68				97.6	95.6	93.6	91.6	89.5	87.5	85.5	83.5	81.5	79.5	77.5					68
69				98.4	96.3	94.3	92.2	90.1	88.0	86.0	83.9	81.8	79.8	77.7					69
70				99.2	97.0	94.9	92.8	90.7	88.5	86.4	84.3	82.1	80.0	77.9					70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Larice  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.2	0.2	0.2	0.2															6
7	0.4	0.4	0.4	0.4															7
8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7											8
9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9											9
10	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2											10
11	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4											11
12	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7								12
13				1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9							13
14				2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2						14
15				2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4						15
16				2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7						16
17				2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9			17
18						3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2			18
19						3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5			19
20						3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7			20
21						3.9	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.0	4.0	4.0			21
22						4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2			22
23						4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	23
24						4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	24
25								4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	25
26								5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	26
27								5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	27
28									5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.8	28
29									6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	29
30									6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	30
31									6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	31
32									6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	32
33										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	33
34											7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	34
35											7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	35
36											7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	36
37											8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.1	37
38												8.3	8.3	8.3	8.3	8.3	8.3	8.3	38
39												8.6	8.6	8.6	8.6	8.6	8.6	8.6	39
40												8.8	8.8	8.8	8.8	8.8	8.8	8.9	40
41													9.1	9.1	9.1	9.1	9.1	9.1	41
42													9.3	9.3	9.4	9.4	9.4	9.4	42
43															9.6	9.6	9.6	9.6	43
44															9.9	9.9	9.9	9.9	44
45															10.1	10.1	10.2	10.2	45
46															10.4	10.4	10.4	10.4	46
47															10.7	10.7	10.7	10.7	47
48																		11.0	48
49																		11.2	49
50																		11.5	50
51																		11.7	51
52																		12.0	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Larice  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	4.5	4.5																	23
24	4.7	4.7																	24
25	5.0	5.0																	25
26	5.2	5.3																	26
27	5.5	5.5																	27
28	5.8	5.8	5.8	5.8															28
29	6.0	6.0	6.0	6.0															29
30	6.3	6.3	6.3	6.3															30
31	6.5	6.5	6.5	6.6															31
32	6.8	6.8	6.8	6.8															32
33	7.1	7.1	7.1	7.1	7.1	7.1													33
34	7.3	7.3	7.3	7.3	7.3	7.3													34
35	7.6	7.6	7.6	7.6	7.6	7.6													35
36	7.8	7.8	7.8	7.9	7.9	7.9													36
37	8.1	8.1	8.1	8.1	8.1	8.1													37
38	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4											38
39	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7										39
40	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9										40
41	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2											41
42	9.4	9.4	9.4	9.4	9.4	9.5	9.5	9.5											42
43	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8	9.8									43
44	9.9	9.9	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0									44
45	10.2	10.2	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3									45
46	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.6	10.6									46
47	10.7	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8									47
48	11.0	11.0	11.0	11.0	11.0	11.0	11.1	11.1	11.1	11.1	11.1	11.1							48
49	11.2	11.2	11.3	11.3	11.3	11.3	11.3	11.3	11.4	11.4	11.4	11.4							49
50	11.5	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6	11.6	11.7	11.7							50
51	11.8	11.8	11.8	11.8	11.8	11.8	11.9	11.9	11.9	11.9	11.9	12.0							51
52	12.0	12.0	12.1	12.1	12.1	12.1	12.1	12.2	12.2	12.2	12.2	12.2							52
53		12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.5	12.5	12.5						53
54		12.6	12.6	12.6	12.6	12.7	12.7	12.7	12.7	12.7	12.8	12.8							54
55		12.8	12.9	12.9	12.9	12.9	12.9	13.0	13.0	13.0	13.0	13.0							55
56		13.1	13.1	13.1	13.2	13.2	13.2	13.2	13.3	13.3	13.3	13.3							56
57		13.4	13.4	13.4	13.4	13.5	13.5	13.5	13.5	13.5	13.6	13.6							57
58		13.6	13.7	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.8	13.9	13.9	13.9					58
59		13.9	13.9	14.0	14.0	14.0	14.0	14.0	14.1	14.1	14.1	14.1	14.2	14.2					59
60		14.2	14.2	14.2	14.2	14.3	14.3	14.3	14.3	14.4	14.4	14.4	14.4	14.5					60
61		14.4	14.5	14.5	14.5	14.5	14.6	14.6	14.6	14.6	14.7	14.7	14.7	14.7					61
62		14.7	14.7	14.8	14.8	14.8	14.8	14.9	14.9	14.9	14.9	15.0	15.0	15.0					62
63				15.0	15.1	15.1	15.1	15.1	15.2	15.2	15.2	15.3	15.3	15.3					63
64				15.3	15.3	15.4	15.4	15.4	15.4	15.5	15.5	15.5	15.6	15.6					64
65				15.6	15.6	15.6	15.7	15.7	15.7	15.7	15.8	15.8	15.8	15.9					65
66				15.8	15.9	15.9	15.9	16.0	16.0	16.0	16.1	16.1	16.1	16.1					66
67				16.1	16.1	16.2	16.2	16.2	16.3	16.3	16.3	16.4	16.4	16.4					67
68				16.4	16.4	16.5	16.5	16.5	16.5	16.6	16.6	16.6	16.7	16.7					68
69				16.7	16.7	16.7	16.8	16.8	16.8	16.9	16.9	16.9	17.0	17.0					69
70				16.9	17.0	17.0	17.0	17.1	17.1	17.1	17.2	17.2	17.2	17.3					70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Larice  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	8.0	8.5	9.0	9.5															6
7	12.1	12.9	13.6	14.3															7
8	16.5	17.4	18.4	19.3	20.2	21.2	22.1	23.0											8
9	21.0	22.1	23.3	24.5	25.7	26.9	28.1	29.3											9
10	25.6	27.0	28.5	30.0	31.4	32.9	34.4	35.8											10
11	30.4	32.1	33.9	35.7	37.4	39.2	41.0	42.8											11
12	35.3	37.4	39.5	41.6	43.7	45.8	47.9	50.1	52.2	54.3	56.4	58.5							12
13				47.8	50.2	52.7	55.2	57.7	60.2	62.6	65.1	67.6							13
14				54.2	57.0	59.9	62.8	65.7	68.5	71.4	74.3	77.2							14
15				60.8	64.1	67.4	70.7	74.0	77.3	80.6	83.9	87.2							15
16				67.7	71.4	75.2	78.9	82.7	86.4	90.2	93.9	97.7							16
17				74.8	79.0	83.2	87.5	91.7	96.0	100.2	104.4	108.7	112.9	117.1	121.4	125.6			17
18						91.6	96.4	101.1	105.9	110.6	115.4	120.1	124.9	129.6	134.4	139.1			18
19						100.3	105.6	110.9	116.1	121.4	126.7	132.0	137.3	142.6	147.9	153.2			19
20						109.2	115.1	120.9	126.8	132.7	138.5	144.4	150.3	156.1	162.0	167.9			20
21						118.5	124.9	131.4	137.9	144.3	150.8	157.3	163.7	170.2	176.7	183.1			21
22						128.0	135.1	142.2	149.3	156.4	163.5	170.6	177.7	184.8	191.9	199.0			22
23						137.8	145.6	153.3	161.1	168.9	176.6	184.4	192.1	199.9	207.6	215.4	223.2	230.9	23
24						147.9	156.4	164.8	173.3	181.7	190.2	198.6	207.1	215.5	224.0	232.4	240.9	249.3	24
25								176.7	185.9	195.0	204.2	213.4	222.5	231.7	240.8	250.0	259.2	268.3	25
26								188.9	198.8	208.7	218.6	228.5	238.5	248.4	258.3	268.2	278.1	288.0	26
27								201.5	212.1	222.8	233.5	244.2	254.9	265.6	276.3	287.0	297.7	308.4	27
28										237.4	248.9	260.4	271.8	283.3	294.8	306.3	317.8	329.3	28
29										252.3	264.6	277.0	289.3	301.6	314.0	326.3	338.6	350.9	29
30										267.6	280.8	294.0	307.2	320.4	333.6	346.8	360.0	373.2	30
31										283.4	297.5	311.6	325.7	339.8	353.8	367.9	382.0	396.1	31
32										299.6	314.6	329.6	344.6	359.6	374.6	389.6	404.7	419.7	32
33											348.1	364.0	380.0	411.9	427.9	443.9	459.9	475.9	33
34											367.0	384.0	400.9	417.9	434.8	451.8	468.7	485.7	34
35											386.4	404.4	422.4	440.3	458.3	476.3	494.2	512.2	35
36											406.3	425.3	444.3	463.3	482.3	501.3	520.4	539.4	36
37											426.7	446.8	466.8	486.9	507.0	527.1	547.1	567.2	37
38													489.9	511.0	532.2	553.4	574.6	595.8	38
39													513.4	535.7	558.0	580.3	602.6	624.9	39
40													537.5	561.0	584.4	607.9	631.3	654.8	40
41														562.1	586.8	611.4	636.1	660.7	41
42														587.2	613.1	639.0	664.9	690.7	42
43																667.1	694.3	721.4	43
44																695.9	724.3	752.7	44
45																725.2	754.9	784.6	45
46																755.1	786.2	817.2	46
47																785.6	818.0	850.4	47
48																		884.3	48
49																		918.8	49
50																		954.0	50
51																		989.8	51
52																		1 026.3	52
53																			53
54																			54
55																			55
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Larice  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	238.7	246.4																	23
24	257.8	266.2																	24
25	277.5	286.7																	25
26	297.9	307.9																	26
27	319.0	329.7																	27
28	340.8	352.3	363.8	375.3															28
29	363.3	375.6	387.9	400.3															29
30	386.4	399.6	412.8	426.0															30
31	410.2	424.3	438.4	452.5															31
32	434.7	449.7	464.7	479.7															32
33	459.8	475.8	491.8	507.8	523.7	539.7													33
34	485.7	502.6	519.6	536.5	553.5	570.4													34
35	512.2	530.1	548.1	566.1	584.0	602.0													35
36	539.4	558.4	577.4	596.4	615.4	634.4													36
37	567.2	587.3	607.4	627.4	647.5	667.6													37
38	595.7	616.9	638.1	659.3	680.4	701.6	722.8	744.0											38
39	624.9	647.2	669.5	691.8	714.2	736.5	758.8	781.1											39
40	654.8	678.3	701.7	725.2	748.7	772.1	795.6	819.0											40
41	685.4	710.0	734.7	759.3	784.0	808.6	833.3	857.9											41
42	716.6	742.5	768.3	794.2	820.1	845.9	871.8	897.7											42
43	748.5	775.6	802.7	829.8	856.9	884.1	911.2	938.3	965.4	992.5									43
44	781.1	809.4	837.8	866.2	894.6	923.0	951.4	979.8	1 008.2	1 036.6									44
45	814.3	844.0	873.7	903.4	933.1	962.8	992.5	1 022.2	1 051.9	1 081.6									45
46	848.2	879.3	910.3	941.3	972.3	1 003.4	1 034.4	1 065.4	1 096.5	1 127.5									46
47	882.8	915.2	947.6	980.0	1 012.4	1 044.8	1 077.2	1 109.6	1 142.0	1 174.4									47
48	918.1	951.9	985.7	1 019.5	1 053.2	1 087.0	1 120.8	1 154.6	1 188.4	1 222.2	1 256.0	1 289.7							48
49	954.0	989.3	1 024.5	1 059.7	1 094.9	1 130.1	1 165.3	1 200.5	1 235.7	1 270.9	1 306.1	1 341.3							49
50	990.7	1 027.3	1 064.0	1 100.6	1 137.3	1 174.0	1 210.6	1 247.3	1 283.9	1 320.6	1 357.3	1 393.9							50
51	1 028.0	1 066.1	1 104.2	1 142.4	1 180.5	1 218.7	1 256.8	1 294.9	1 333.1	1 371.2	1 409.4	1 447.5							51
52	1 065.9	1 105.6	1 145.2	1 184.9	1 224.5	1 264.2	1 303.8	1 343.5	1 383.1	1 422.8	1 462.4	1 502.1							52
53	1 105.8	1 147.0	1 188.1	1 229.3	1 270.5	1 311.7	1 352.9	1 394.1	1 435.3	1 476.5	1 517.7	1 558.9							53
54	1 146.8	1 189.6	1 232.4	1 275.2	1 318.0	1 360.8	1 403.6	1 446.4	1 489.2	1 532.0	1 574.8	1 617.6							54
55	1 188.8	1 232.6	1 276.4	1 320.2	1 364.0	1 407.8	1 451.6	1 495.4	1 539.2	1 583.0	1 626.8	1 670.6							55
56	1 231.8	1 276.6	1 321.4	1 366.2	1 411.0	1 455.8	1 500.6	1 545.4	1 590.2	1 635.0	1 679.8	1 724.6							56
57	1 275.8	1 321.6	1 367.4	1 413.2	1 458.9	1 504.7	1 550.5	1 596.3	1 642.1	1 687.9	1 733.7	1 779.5							57
58	1 320.8	1 367.6	1 414.4	1 461.2	1 507.9	1 554.7	1 601.5	1 648.3	1 695.1	1 741.9	1 788.7	1 835.5							58
59	1 366.8	1 414.6	1 462.4	1 510.2	1 558.0	1 605.8	1 653.6	1 701.4	1 749.2	1 797.0	1 844.8	1 892.6							59
60	1 413.8	1 462.6	1 511.4	1 560.2	1 609.0	1 657.8	1 706.6	1 755.4	1 804.2	1 853.0	1 901.8	1 950.6							60
61	1 461.8	1 511.6	1 561.4	1 611.2	1 661.0	1 710.8	1 760.6	1 810.4	1 860.2	1 910.0	1 960.0	2 009.8							61
62	1 510.8	1 561.6	1 612.4	1 663.2	1 714.0	1 764.8	1 815.6	1 866.4	1 917.2	1 968.0	2 018.8	2 069.6							62
63	1 560.8	1 612.6	1 664.4	1 716.2	1 768.0	1 820.0	1 872.0	1 924.0	1 976.0	2 028.0	2 080.0	2 132.0							63
64	1 611.8	1 664.6	1 717.4	1 770.2	1 823.0	1 876.0	1 929.0	1 982.0	2 035.0	2 088.0	2 141.0	2 194.0							64
65	1 663.8	1 717.6	1 771.4	1 825.2	1 879.0	1 933.0	1 987.0	2 041.0	2 095.0	2 149.0	2 203.0	2 257.0							65
66	1 716.8	1 771.6	1 826.4	1 881.2	1 936.0	1 991.0	2 046.0	2 101.0	2 156.0	2 211.0	2 266.0	2 321.0							66
67	1 770.8	1 826.6	1 882.4	1 938.2	1 994.0	2 050.0	2 106.0	2 162.0	2 218.0	2 274.0	2 330.0	2 386.0							67
68	1 825.8	1 882.6	1 939.4	1 996.2	2 053.0	2 110.0	2 167.0	2 224.0	2 281.0	2 338.0	2 395.0	2 452.0							68
69	1 881.8	1 939.6	1 997.4	2 055.2	2 113.0	2 171.0	2 229.0	2 287.0	2 345.0	2 403.0	2 461.0	2 519.0							69
70	1 938.8	1 997.6	2 056.4	2 115.2	2 174.0	2 233.0	2 292.0	2 351.0	2 410.0	2 469.0	2 528.0	2 587.0							70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Picea abies* K.**

**Abete rosso**



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## Abete rosso

### Volume del fusto e dei rami grossi

$n = 93$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-9.1298 \quad 3.4866 \cdot 10^{-2} \quad 1.4633]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 3.2511 \cdot 10 & & & \\ 3.3399 \cdot 10^{-3} & 6.7078 \cdot 10^{-7} & & \\ -3.5567 & -4.0850 \cdot 10^{-4} & 4.0476 \cdot 10^{-1} & \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.9436 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 93$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-5.9426 \quad 1.3210 \cdot 10^{-2} \quad 7.8369 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.0567 \cdot 10 & & & \\ 1.0856 \cdot 10^{-3} & 2.1803 \cdot 10^{-7} & & \\ -1.1561 \cdot 10 & -1.3278 \cdot 10^{-4} & 1.3156 \cdot 10^{-1} & \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 6.3173 \cdot 10^{-6}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 93$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [5.9459 \quad 4.0669 \cdot 10^{-3} \quad -2.1054 \cdot 10^{-1}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 7.6732 \\ 7.8829 \cdot 10^{-4} & 1.5832 \cdot 10^{-7} \\ -8.3945 \cdot 10^{-1} & -9.6413 \cdot 10^{-5} & 9.5532 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 4.5872 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 93$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.3818 \cdot 10^{-1} \quad 3.4318 \cdot 10^{-4} \quad -1.1062 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 5.4221 \cdot 10^{-2} \\ 5.5703 \cdot 10^{-6} & 1.1187 \cdot 10^{-9} \\ -5.9318 \cdot 10^{-3} & -6.8129 \cdot 10^{-7} & 6.7506 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 3.2415 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 93$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.4146 \cdot 10^{-1} \quad 1.7620 \cdot 10^{-2} \quad 5.6209 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 1.4387 \cdot 10 \\ 1.4780 \cdot 10^{-3} & 2.9684 \cdot 10^{-7} \\ -1.5739 & -1.8077 \cdot 10^{-4} & 1.7912 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 8.6008 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Abete rosso**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	5.9	7.2	8.4	9.7	10.9	12.2													6
7	9.7	11.4	13.1	14.8	16.5	18.2													7
8	13.7	16.0	18.2	20.4	22.7	24.9	27.1	29.4											8
9	18.2	21.0	23.8	26.6	29.5	32.3	35.1	37.9											9
10	22.9	26.4	29.9	33.4	36.9	40.4	43.9	47.3											10
11	28.1	32.3	36.5	40.7	44.9	49.2	53.4	57.6											11
12		38.6	43.6	48.6	53.6	58.6	63.7	68.7	73.7										12
13				57.0	62.9	68.8	74.7	80.6	86.5	92.4	98.3	104.2							13
14				66.0	72.9	79.7	86.5	93.4	100.2	107.0	113.9	120.7							14
15				75.6	83.4	91.3	99.1	107.0	114.8	122.6	130.5	138.3							15
16				85.7	94.6	103.5	112.5	121.4	130.3	139.2	148.2	157.1	166.0	174.9	183.9	192.8			16
17				96.4	106.4	116.5	126.6	136.7	146.7	156.8	166.9	177.0	187.0	197.1	207.2	217.3			17
18						130.2	141.5	152.8	164.1	175.4	186.7	198.0	209.3	220.5	231.8	243.1			18
19						144.5	157.1	169.7	182.3	194.9	207.5	220.1	232.6	245.2	257.8	270.4			19
20						159.6	173.5	187.5	201.4	215.4	229.3	243.3	257.2	271.2	285.1	299.1	313.0		20
21						175.4	190.7	206.1	221.5	236.9	252.2	267.6	283.0	298.4	313.7	329.1	344.5		21
22						191.8	208.7	225.6	242.4	259.3	276.2	293.1	309.9	326.8	343.7	360.6	377.4		22
23								245.9	264.3	282.7	301.2	319.6	338.1	356.5	375.0	393.4	411.9	430.3	23
24								267.0	287.1	307.1	327.2	347.3	367.4	387.5	407.6	427.6	447.7	467.8	24
25								288.9	310.7	332.5	354.3	376.1	397.9	419.7	441.5	463.3	485.1	506.9	25
26								311.7	335.3	358.9	382.5	406.0	429.6	453.2	476.7	500.3	523.9	547.4	26
27								335.4	360.8	386.2	411.6	437.1	462.5	487.9	513.3	538.7	564.1	589.6	27
28										414.5	441.9	469.2	496.5	523.9	551.2	578.5	605.9	633.2	28
29										443.8	473.1	502.5	531.8	561.1	590.4	619.8	649.1	678.4	29
30										474.1	505.5	536.8	568.2	599.6	631.0	662.4	693.7	725.1	30
31										505.3	538.8	572.3	605.8	639.3	672.9	706.4	739.9	773.4	31
32										537.5	573.2	608.9	644.6	680.3	716.0	751.8	787.5	823.2	32
33														722.6	760.6	798.5	836.5	874.5	33
34														766.1	806.4	846.7	887.0	927.3	34
35														810.9	853.6	896.3	939.0	981.7	35
36														856.9	902.1	947.3	992.5	1 037.6	36
37														904.2	951.9	999.6	1 047.4	1 095.1	37
38															1 053.4	1 103.8	1 154.1	1 204.5	38
39															1 108.6	1 161.6	1 214.6	1 267.7	39
40															1 165.1	1 220.9	1 276.7	1 332.5	40
41															1 223.1	1 281.7	1 340.3	1 398.9	41
42															1 282.4	1 343.9	1 405.4	1 466.9	42
43																	1 472.1	1 533.6	43
44																	1 540.3	1 602.8	44
45																	1 610.0	1 672.5	45
46																	1 681.3	1 743.8	46
47																	1 754.1	1 816.6	47
48																	1 828.4	1 890.9	48
49																	1 904.3	1 966.8	49
50																	1 981.7	2 044.2	50
51																	2 060.6	2 123.1	51
52																	2 141.1	2 203.6	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
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63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Abete rosso**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	448.7	467.2																	23
24	487.9	508.0																	24
25	528.7	550.4																	25
26	571.0	594.6																	26
27	615.0	640.4																	27
28	660.5	687.9	715.2	742.6	769.9	797.2													28
29	707.7	737.0	766.4	795.7	825.0	854.3													29
30	756.5	787.9	819.3	850.6	882.0	913.4													30
31	806.9	840.4	873.9	907.4	940.9	974.4													31
32	858.9	894.6	930.3	966.0	1 001.7	1 037.4	1 073.1	1 108.8	1 144.5										32
33	912.4	950.4	988.4	1 026.4	1 064.3	1 102.3	1 140.3	1 178.2	1 216.2	1 254.2									33
34	967.6	1 007.9	1 048.2	1 088.6	1 128.9	1 169.2	1 209.5	1 249.8	1 290.1	1 330.4									34
35	1 024.4	1 067.1	1 109.9	1 152.6	1 195.3	1 238.0	1 280.7	1 323.4	1 366.1	1 408.8									35
36	1 082.8	1 128.0	1 173.2	1 218.4	1 263.6	1 308.8	1 354.0	1 399.1	1 444.3	1 489.5									36
37	1 142.8	1 190.6	1 238.3	1 286.0	1 333.8	1 381.5	1 429.2	1 477.0	1 524.7	1 572.4									37
38	1 204.4	1 254.8	1 305.1	1 355.5	1 405.8	1 456.2	1 506.5	1 556.9	1 607.2	1 657.6	1 707.9	1 758.3							38
39	1 267.7	1 320.7	1 373.7	1 426.7	1 479.8	1 532.8	1 585.8	1 638.9	1 691.9	1 744.9	1 798.0	1 851.0							39
40	1 332.5	1 388.3	1 444.0	1 499.8	1 555.6	1 611.4	1 667.2	1 723.0	1 778.8	1 834.5	1 890.3	1 946.1							40
41	1 398.9	1 457.5	1 516.1	1 574.7	1 633.3	1 691.9	1 750.5	1 809.2	1 867.8	1 926.4	1 985.0	2 043.6							41
42	1 466.9	1 528.4	1 589.9	1 651.4	1 712.9	1 774.4	1 835.9	1 897.4	1 958.9	2 020.4	2 081.9	2 143.5							42
43	1 536.5	1 601.0	1 665.5	1 729.9	1 794.4	1 858.9	1 923.3	1 987.8	2 052.3	2 116.7	2 181.2	2 245.7	2 310.1	2 374.6					43
44	1 607.8	1 675.3	1 742.8	1 810.3	1 877.8	1 945.3	2 012.8	2 080.3	2 147.8	2 215.3	2 282.8	2 350.3	2 417.8	2 485.3					44
45	1 680.6	1 751.2	1 821.8	1 892.4	1 963.0	2 033.6	2 104.2	2 174.8	2 245.4	2 316.0	2 386.6	2 457.2	2 527.8	2 598.5					45
46	1 755.0	1 828.8	1 902.6	1 976.4	2 050.1	2 123.9	2 197.7	2 271.5	2 345.3	2 419.0	2 492.8	2 566.6	2 640.4	2 714.1					46
47	1 831.1	1 908.1	1 985.1	2 062.1	2 139.2	2 216.2	2 293.2	2 370.2	2 447.2	2 524.3	2 601.3	2 678.3	2 755.3	2 832.3					47
48	1 908.7	1 989.1	2 069.4	2 149.7	2 230.1	2 310.4	2 390.7	2 471.0	2 551.4	2 631.7	2 712.0	2 792.4	2 872.7	2 953.0	3 033.4	3 113.7			48
49	1 988.0	2 071.7	2 155.4	2 239.1	2 322.8	2 406.5	2 490.3	2 574.0	2 657.7	2 741.4	2 825.1	2 908.8	2 992.5	3 076.2	3 160.0	3 243.7			49
50	2 068.8	2 156.0	2 243.2	2 330.3	2 417.5	2 504.7	2 591.8	2 679.0	2 766.2	2 853.3	2 940.5	3 027.6	3 114.8	3 202.0	3 289.1	3 376.3			50
51	2 151.3	2 242.0	2 332.7	2 423.3	2 514.0	2 604.7	2 695.4	2 786.1	2 876.8	2 967.5	3 058.2	3 148.8	3 239.5	3 330.2	3 420.9	3 511.6			51
52	2 235.3	2 329.6	2 423.9	2 518.2	2 612.5	2 706.7	2 801.0	2 895.3	2 989.6	3 083.8	3 178.1	3 272.4	3 366.7	3 461.0	3 555.2	3 649.5			52
53	2 419.0	2 516.9	2 614.8	2 712.8	2 810.7	2 908.6	3 006.6	3 104.5	3 202.5	3 300.4	3 398.3	3 496.3	3 594.2	3 692.2	3 790.1	3 888.0	3 986.0		53
54	2 510.0	2 611.6	2 713.3	2 815.0	2 916.6	3 018.3	3 120.0	3 221.6	3 323.3	3 425.0	3 526.6	3 628.3	3 730.0	3 831.7	3 933.3	4 035.0	4 136.7		54
55	2 602.6	2 708.1	2 813.6	2 919.0	3 024.5	3 130.0	3 235.4	3 340.9	3 446.4	3 551.9	3 657.3	3 762.8	3 868.3	3 973.7	4 079.2	4 184.7	4 290.1		55
56	2 697.0	2 806.3	2 915.6	3 025.0	3 134.3	3 243.7	3 353.0	3 462.3	3 571.7	3 681.0	3 790.4	3 899.7	4 009.0	4 118.4	4 227.7	4 337.1	4 446.4		56
57	2 793.0	2 906.3	3 019.5	3 132.8	3 246.1	3 359.4	3 472.7	3 585.9	3 699.2	3 812.5	3 925.8	4 039.1	4 152.3	4 265.6	4 378.9	4 492.2	4 605.5		57
58	2 890.7	3 008.0	3 125.3	3 242.6	3 359.8	3 477.1	3 594.4	3 711.7	3 829.0	3 946.3	4 063.6	4 180.9	4 298.2	4 415.4	4 532.7	4 650.0	4 767.3		58
59	2 990.1	3 111.4	3 232.8	3 354.2	3 475.5	3 596.9	3 718.3	3 839.6	3 961.0	4 082.4	4 203.7	4 325.1	4 446.5	4 567.8	4 689.2	4 810.6	4 931.9		59
60	3 091.1	3 216.6	3 342.1	3 467.6	3 593.2	3 718.7	3 844.2	3 969.7	4 095.2	4 220.7	4 346.3	4 471.8	4 597.3	4 722.8	4 848.3	4 973.9	5 099.4		60
61	3 193.8	3 323.5	3 453.3	3 583.0	3 712.8	3 842.5	3 972.2	4 102.0	4 231.7	4 361.4	4 491.2	4 620.9	4 750.6	4 880.4	5 010.1	5 139.9	5 269.6		61
62	3 298.2	3 432.2	3 566.2	3 700.3	3 834.3	3 968.3	4 102.3	4 236.4	4 370.4	4 504.4	4 638.4	4 772.5	4 906.5	5 040.5	5 174.5	5 308.6	5 442.6		62
63			3 681.0	3 819.4	3 957.8	4 096.2	4 234.6	4 372.9	4 511.3	4 649.7	4 788.1	4 926.5	5 064.9	5 203.2	5 341.6	5 480.0	5 618.4		63
64			3 797.6	3 940.4	4 083.2	4 226.0	4 368.9	4 511.7	4 654.5	4 797.3	4 940.1	5 082.9	5 225.7	5 368.5	5 511.3	5 654.2	5 797.0		64
65			3 916.0	4 063.3	4 210.6	4 357.9	4 505.3	4 652.6	4 799.9	4 947.2	5 094.5	5 241.8	5 389.1	5 536.4	5 683.7	5 831.0	5 978.3		65
66			4 036.2	4 188.1	4 340.0	4 491.9	4 643.7	4 795.6	4 947.5	5 099.4	5 251.2	5 403.1	5 555.0	5 706.9	5 858.7	6 010.6	6 162.5		66
67			4 158.3	4 314.8	4 471.3	4 627.8	4 784.3	4 940.8	5 097.3	5 253.9	5 410.4	5 566.9	5 723.4	5 879.9	6 036.4	6 192.9	6 349.5		67
68			4 282.1	4 443.3	4 604.5	4 765.8	4 927.0	5 088.2	5 249.4	5 410.6	5 571.9	5 733.1	5 894.3	6 055.5	6 216.7	6 378.0	6 539.2		68
69			4 407.8	4 573.8	4 739.8	4 905.8	5 071.7	5 237.7	5 403.7	5 569.7	5 735.7	5 901.7	6 067.7	6 233.7	6 399.7	6 565.7	6 731.7		69
70			4 535.2	4 706.1	4 876.9	5 047.8	5 218.6	5 389.4	5 560.3	5 731.1	5 902.0	6 072.8	6 243.7	6 414.5	6 585.4	6 756.2	6 927.0		70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Abete rosso**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	1.1	1.6	2.1	2.6	3.0	3.5													6
7	2.8	3.4	4.1	4.7	5.4	6.0													7
8	4.6	5.4	6.2	7.1	7.9	8.8	9.6	10.5											8
9	6.5	7.5	8.6	9.7	10.7	11.8	12.9	14.0											9
10	8.5	9.8	11.1	12.5	13.8	15.1	16.4	17.7											10
11	10.7	12.3	13.9	15.5	17.1	18.7	20.3	21.9											11
12		14.9	16.8	18.7	20.6	22.5	24.4	26.3	28.2										12
13				22.1	24.3	26.6	28.8	31.0	33.3	35.5	37.7	40.0							13
14				25.7	28.3	30.9	33.5	36.1	38.7	41.3	43.9	46.5							14
15				29.6	32.6	35.5	38.5	41.5	44.5	47.4	50.4	53.4							15
16				33.7	37.0	40.4	43.8	47.2	50.6	53.9	57.3	60.7	64.1	67.5	70.8	74.2			16
17				37.9	41.7	45.6	49.4	53.2	57.0	60.8	64.6	68.5	72.3	76.1	79.9	83.7			17
18						51.0	55.2	59.5	63.8	68.1	72.4	76.6	80.9	85.2	89.5	93.8			18
19						56.6	61.4	66.2	70.9	75.7	80.5	85.2	90.0	94.8	99.6	104.3			19
20						62.6	67.9	73.1	78.4	83.7	89.0	94.3	99.6	104.8	110.1	115.4	120.7		20
21						68.8	74.6	80.4	86.2	92.1	97.9	103.7	109.6	115.4	121.2	127.0	132.9		21
22						75.2	81.6	88.0	94.4	100.8	107.2	113.6	120.0	126.4	132.8	139.2	145.6		22
23								95.9	102.9	109.9	116.9	123.9	130.9	137.9	144.9	151.8	158.8	165.8	23
24								104.2	111.8	119.4	127.0	134.6	142.2	149.8	157.4	165.0	172.7	180.3	24
25								112.7	121.0	129.2	137.5	145.7	154.0	162.3	170.5	178.8	187.0	195.3	25
26								121.6	130.5	139.5	148.4	157.3	166.2	175.2	184.1	193.0	202.0	210.9	26
27								130.8	140.4	150.0	159.7	169.3	178.9	188.6	198.2	207.8	217.4	227.1	27
28										161.0	171.4	181.7	192.1	202.4	212.8	223.1	233.5	243.8	28
29										172.3	183.4	194.5	205.6	216.8	227.9	239.0	250.1	261.2	29
30										184.0	195.9	207.8	219.7	231.6	243.5	255.3	267.2	279.1	30
31										196.1	208.8	221.5	234.2	246.9	259.6	272.2	284.9	297.6	31
32										208.5	222.0	235.6	249.1	262.6	276.1	289.7	303.2	316.7	32
33														278.9	293.2	307.6	322.0	336.4	33
34														295.6	310.8	326.1	341.4	356.7	34
35														312.8	328.9	345.1	361.3	377.5	35
36														330.4	347.6	364.7	381.8	398.9	36
37														348.6	366.7	384.7	402.8	420.9	37
38																405.3	424.4	443.5	38
39																426.5	446.6	466.7	39
40																448.1	469.3	490.4	40
41																470.3	492.5	514.7	41
42																493.0	516.3	539.6	42
43																		565.1	43
44																		591.2	44
45																		617.8	45
46																		645.1	46
47																		672.9	47
48																		701.3	48
49																		730.2	49
50																		759.8	50
51																		789.9	51
52																		820.6	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
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62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Abete rosso**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	172.8	179.8																	23
24	187.9	195.5																	24
25	203.5	211.8																	25
26	219.8	228.8																	26
27	236.7	246.3																	27
28	254.2	264.6	274.9	285.3	295.6	306.0													28
29	272.3	283.4	294.5	305.6	316.7	327.9													29
30	291.0	302.9	314.8	326.7	338.6	350.5													30
31	310.3	323.0	335.7	348.4	361.1	373.8													31
32	330.3	343.8	357.3	370.8	384.4	397.9	411.4	424.9	438.5										32
33	350.8	365.2	379.6	393.9	408.3	422.7	437.1	451.5	465.9	480.3									33
34	371.9	387.2	402.5	417.7	433.0	448.3	463.6	478.8	494.1	509.4									34
35	393.7	409.9	426.0	442.2	458.4	474.6	490.8	507.0	523.1	539.3									35
36	416.0	433.2	450.3	467.4	484.5	501.6	518.8	535.9	553.0	570.1									36
37	439.0	457.1	475.2	493.3	511.3	529.4	547.5	565.6	583.7	601.8									37
38	462.6	481.6	500.7	519.8	538.9	557.9	577.0	596.1	615.2	634.2	653.3	672.4							38
39	486.7	506.8	526.9	547.0	567.1	587.2	607.3	627.4	647.5	667.6	687.7	707.8							39
40	511.5	532.7	553.8	574.9	596.1	617.2	638.3	659.5	680.6	701.8	722.9	744.0							40
41	536.9	559.1	581.3	603.5	625.8	648.0	670.2	692.4	714.6	736.8	759.0	781.2							41
42	562.9	586.2	609.5	632.8	656.1	679.4	702.7	726.0	749.3	772.7	796.0	819.3							42
43	589.5	614.0	638.4	662.8	687.2	711.7	736.1	760.5	784.9	809.4	833.8	858.2	882.6	907.1					43
44	616.8	642.3	667.9	693.5	719.1	744.6	770.2	795.8	821.4	846.9	872.5	898.1	923.6	949.2					44
45	644.6	671.3	698.1	724.8	751.6	778.3	805.1	831.8	858.6	885.3	912.1	938.8	965.6	992.3					45
46	673.0	701.0	728.9	756.9	784.8	812.8	840.7	868.7	896.6	924.6	952.5	980.5	1008.4	1036.4					46
47	702.1	731.2	760.4	789.6	818.8	848.0	877.1	906.3	935.5	964.7	993.9	1023.0	1052.2	1081.4					47
48	731.7	762.1	792.6	823.0	853.4	883.9	914.3	944.7	975.2	1005.6	1036.1	1066.5	1096.9	1127.4	1157.8	1188.2			48
49	762.0	793.7	825.4	857.1	888.8	920.5	952.3	984.0	1015.7	1047.4	1079.1	1110.8	1142.6	1174.3	1206.0	1237.7			49
50	792.8	825.8	858.9	891.9	924.9	957.9	991.0	1024.0	1057.0	1090.0	1123.1	1156.1	1189.1	1222.1	1255.2	1288.2			50
51	824.3	858.6	893.0	927.4	961.7	996.1	1030.4	1064.8	1099.2	1133.5	1167.9	1202.2	1236.6	1271.0	1305.3	1339.7			51
52	856.4	892.1	927.8	963.5	999.2	1035.0	1070.7	1106.4	1142.1	1177.8	1213.6	1249.3	1285.0	1320.7	1356.4	1392.2			52
53	926.2	963.3	1000.4	1037.5	1074.6	1111.7	1148.8	1185.9	1223.0	1260.1	1297.2	1334.3	1371.4	1408.5	1445.7	1482.8	1519.9		53
54	960.9	999.4	1037.9	1076.4	1114.9	1153.5	1192.0	1230.5	1269.0	1307.5	1346.1	1384.6	1423.1	1461.6	1500.2	1538.7	1577.2		54
55	996.2	1036.2	1076.1	1116.1	1156.0	1196.0	1236.0	1275.9	1315.9	1355.8	1395.8	1435.8	1475.7	1515.7	1555.6	1595.6	1635.6		55
56	1032.2	1073.6	1115.0	1156.5	1197.9	1239.3	1280.7	1322.2	1363.6	1405.0	1446.4	1487.9	1529.3	1570.7	1612.2	1653.6	1695.0		56
57	1068.8	1111.7	1154.6	1197.5	1240.5	1283.4	1326.3	1369.2	1412.1	1455.1	1498.0	1540.9	1583.8	1626.7	1669.7	1712.6	1755.5		57
58	1106.0	1150.5	1194.9	1239.3	1283.8	1328.2	1372.7	1417.1	1461.5	1506.0	1550.4	1594.9	1639.3	1683.7	1728.2	1772.6	1817.0		58
59	1143.9	1189.9	1235.9	1281.9	1327.8	1373.8	1419.8	1465.8	1511.8	1557.8	1603.8	1649.7	1695.7	1741.7	1787.7	1833.7	1879.7		59
60	1182.4	1230.0	1277.5	1325.1	1372.6	1420.2	1467.8	1515.3	1562.9	1610.4	1658.0	1705.5	1753.1	1800.7	1848.2	1895.8	1943.3		60
61	1221.6	1270.7	1319.9	1369.0	1418.2	1467.3	1516.5	1565.6	1614.8	1664.0	1713.1	1762.3	1811.4	1860.6	1909.7	1958.9	2008.0		61
62	1261.3	1312.1	1362.9	1413.7	1464.5	1515.2	1566.0	1616.8	1667.6	1718.4	1769.1	1819.9	1870.7	1921.5	1972.3	2023.0	2073.8		62
63			1406.6	1459.1	1511.5	1563.9	1616.3	1668.8	1721.2	1773.6	1826.1	1878.5	1930.9	1983.4	2035.8	2088.2	2140.6		63
64			1451.0	1505.1	1559.2	1613.4	1667.5	1721.6	1775.7	1829.8	1883.9	1938.0	1992.1	2046.2	2100.3	2154.4	2208.5		64
65			1496.1	1551.9	1607.7	1663.6	1719.4	1775.2	1831.0	1886.8	1942.6	1998.4	2054.2	2110.1	2165.9	2221.7	2277.5		65
66			1541.9	1599.4	1657.0	1714.5	1772.1	1829.6	1887.1	1944.7	2002.2	2059.8	2117.3	2174.9	2232.4	2289.9	2347.5		66
67			1588.4	1647.7	1707.0	1766.3	1825.6	1884.9	1944.2	2003.5	2062.8	2122.1	2181.4	2240.7	2300.0	2359.3	2418.6		67
68			1635.5	1696.6	1757.7	1818.8	1879.9	1940.9	2002.0	2063.1	2124.2	2185.3	2246.3	2307.4	2368.5	2429.6	2490.7		68
69			1683.3	1746.2	1809.1	1872.0	1934.9	1997.8	2060.7	2123.6	2186.5	2249.4	2312.3	2375.2	2438.1	2501.0	2563.8		69
70			1731.9	1796.6	1861.3	1926.1	1990.8	2055.5	2120.2	2185.0	2249.7	2314.4	2379.2	2443.9	2508.6	2573.3	2638.1		70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete rosso  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	5.4	5.6	5.7	5.9	6.0	6.1													6
7	5.5	5.7	5.9	6.1	6.3	6.5													7
8	5.6	5.8	6.1	6.3	6.6	6.9	7.1	7.4											8
9	5.7	6.0	6.4	6.7	7.0	7.3	7.7	8.0											9
10	5.9	6.3	6.7	7.1	7.5	7.9	8.3	8.7											10
11	6.1	6.6	7.1	7.6	8.1	8.6	9.0	9.5											11
12		6.9	7.5	8.1	8.7	9.3	9.9	10.4	11.0										12
13				8.7	9.4	10.1	10.8	11.5	12.1	12.8	13.5	14.2							13
14				9.4	10.2	11.0	11.8	12.6	13.4	14.2	15.0	15.8							14
15				10.1	11.0	11.9	12.9	13.8	14.7	15.6	16.5	17.4							15
16				10.9	11.9	13.0	14.0	15.1	16.1	17.2	18.2	19.2	20.3	21.3	22.4	23.4			16
17				11.8	12.9	14.1	15.3	16.5	17.6	18.8	20.0	21.2	22.3	23.5	24.7	25.9			17
18						15.3	16.7	18.0	19.3	20.6	21.9	23.2	24.6	25.9	27.2	28.5			18
19						16.6	18.1	19.6	21.0	22.5	24.0	25.4	26.9	28.4	29.8	31.3			19
20						18.0	19.6	21.3	22.9	24.5	26.1	27.8	29.4	31.0	32.6	34.3	35.9		20
21						19.5	21.3	23.0	24.8	26.6	28.4	30.2	32.0	33.8	35.6	37.4	39.2		21
22						21.0	23.0	24.9	26.9	28.9	30.8	32.8	34.8	36.7	38.7	40.7	42.6		22
23								26.9	29.1	31.2	33.4	35.5	37.7	39.8	42.0	44.1	46.3	48.4	23
24								29.0	31.3	33.7	36.0	38.4	40.7	43.1	45.4	47.7	50.1	52.4	24
25								31.2	33.7	36.3	38.8	41.4	43.9	46.4	49.0	51.5	54.1	56.6	25
26								33.5	36.2	39.0	41.7	44.5	47.2	50.0	52.7	55.5	58.2	61.0	26
27								35.8	38.8	41.8	44.7	47.7	50.7	53.6	56.6	59.6	62.5	65.5	27
28										44.7	47.9	51.1	54.3	57.4	60.6	63.8	67.0	70.2	28
29										47.7	51.1	54.6	58.0	61.4	64.8	68.2	71.7	75.1	29
30										50.9	54.5	58.2	61.9	65.5	69.2	72.8	76.5	80.2	30
31										54.1	58.0	62.0	65.9	69.8	73.7	77.6	81.5	85.4	31
32										57.5	61.7	65.8	70.0	74.2	78.3	82.5	86.7	90.8	32
33														78.7	83.1	87.6	92.0	96.4	33
34														83.4	88.1	92.8	97.5	102.2	34
35														88.3	93.2	98.2	103.2	108.2	35
36														93.2	98.5	103.8	109.1	114.3	36
37														98.4	103.9	109.5	115.1	120.6	37
38																115.4	121.3	127.1	38
39																121.4	127.6	133.8	39
40																127.7	134.2	140.7	40
41																134.0	140.9	147.7	41
42																140.6	147.8	154.9	42
43																		162.3	43
44																		169.9	44
45																		177.7	45
46																		185.6	46
47																		193.7	47
48																		202.0	48
49																		210.5	49
50																		219.1	50
51																		227.9	51
52																		236.9	52
53																			53
54																			54
55																			55
56																			56
57																			57
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete rosso  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	50.6	52.7																	23
24	54.8	57.1																	24
25	59.1	61.7																	25
26	63.7	66.5																	26
27	68.5	71.4																	27
28	73.4	76.6	79.8	83.0	86.1	89.3													28
29	78.5	81.9	85.3	88.8	92.2	95.6													29
30	83.8	87.5	91.1	94.8	98.5	102.1													30
31	89.3	93.2	97.1	101.0	104.9	108.9													31
32	95.0	99.2	103.3	107.5	111.7	115.8	120.0	124.1	128.3										32
33	100.9	105.3	109.7	114.1	118.6	123.0	127.4	131.9	136.3	140.7									33
34	106.9	111.6	116.3	121.0	125.7	130.4	135.1	139.8	144.5	149.2									34
35	113.2	118.1	123.1	128.1	133.1	138.1	143.1	148.0	153.0	158.0									35
36	119.6	124.9	130.1	135.4	140.7	145.9	151.2	156.5	161.8	167.0									36
37	126.2	131.8	137.3	142.9	148.5	154.0	159.6	165.2	170.8	176.3									37
38	133.0	138.9	144.8	150.6	156.5	162.4	168.3	174.1	180.0	185.9	191.7	197.6							38
39	140.0	146.2	152.4	158.6	164.8	170.9	177.1	183.3	189.5	195.7	201.9	208.1							39
40	147.2	153.7	160.2	166.7	173.2	179.7	186.2	192.7	199.2	205.7	212.3	218.8							40
41	154.6	161.4	168.2	175.1	181.9	188.7	195.6	202.4	209.2	216.1	222.9	229.8							41
42	162.1	169.3	176.5	183.6	190.8	198.0	205.1	212.3	219.5	226.7	233.8	241.0							42
43	169.8	177.4	184.9	192.4	199.9	207.4	215.0	222.5	230.0	237.5	245.0	252.6	260.1	267.6					43
44	177.8	185.6	193.5	201.4	209.3	217.1	225.0	232.9	240.8	248.6	256.5	264.4	272.3	280.1					44
45	185.9	194.1	202.4	210.6	218.8	227.1	235.3	243.5	251.8	260.0	268.2	276.5	284.7	292.9					45
46	194.2	202.8	211.4	220.0	228.6	237.2	245.8	254.4	263.0	271.6	280.2	288.9	297.5	306.1					46
47	202.7	211.7	220.6	229.6	238.6	247.6	256.6	265.6	274.5	283.5	292.5	301.5	310.5	319.5					47
48	211.4	220.7	230.1	239.5	248.8	258.2	267.6	276.9	286.3	295.7	305.1	314.4	323.8	333.2	342.5	351.9			48
49	220.2	230.0	239.7	249.5	259.3	269.0	278.8	288.6	298.3	308.1	317.9	327.6	337.4	347.2	356.9	366.7			49
50	229.3	239.4	249.6	259.8	269.9	280.1	290.3	300.4	310.6	320.8	330.9	341.1	351.3	361.4	371.6	381.8			50
51	238.5	249.1	259.7	270.2	280.8	291.4	302.0	312.5	323.1	333.7	344.3	354.9	365.4	376.0	386.6	397.2			51
52	247.9	258.9	269.9	280.9	291.9	302.9	313.9	324.9	335.9	346.9	357.9	368.9	379.9	390.9	401.9	412.9			52
53	257.4	269.0	280.4	291.8	303.2	314.7	326.1	337.5	348.9	360.4	371.8	383.2	394.6	406.0	417.5	428.9	440.3	451.7	53
54	267.2	279.2	291.1	302.9	314.8	326.6	338.5	350.3	362.2	374.1	385.9	397.8	409.6	421.5	433.4	445.2	457.1	468.9	54
55	277.2	289.6	301.9	314.2	326.5	338.8	351.1	363.4	375.7	388.0	400.3	412.6	424.9	437.3	449.6	461.9	474.2	486.5	55
56	287.4	300.2	313.0	325.8	338.5	351.3	364.0	376.8	389.5	402.3	415.0	427.8	440.5	453.3	466.0	478.8	491.6	504.3	56
57	297.8	311.1	324.3	337.5	350.7	363.9	377.1	390.3	403.6	416.8	430.0	443.2	456.4	469.6	482.8	496.1	509.3	522.5	57
58	308.4	322.1	335.8	349.4	363.1	376.8	390.5	404.2	417.8	431.5	445.2	458.9	472.6	486.3	499.9	513.6	527.3	541.0	58
59	319.2	333.3	347.4	361.6	375.8	389.9	404.1	418.2	432.4	446.5	460.7	474.9	489.0	503.2	517.3	531.5	545.6	559.8	59
60	330.2	344.7	359.3	374.0	388.6	403.3	417.9	432.5	447.2	461.8	476.5	491.1	505.7	520.4	535.0	549.7	564.3	578.9	60
61	341.4	356.3	371.4	386.6	401.7	416.8	432.0	447.1	462.2	477.4	492.5	507.6	522.8	537.9	553.0	568.2	583.3	598.4	61
62	352.8	368.1	383.7	399.4	415.0	430.6	446.3	461.9	477.5	493.2	508.8	524.4	540.1	555.7	571.3	587.0	602.6	618.2	62
63	364.4			412.4	428.5	444.6	460.8	476.9	493.1	509.2	525.4	541.5	557.6	573.8	589.9	606.1	622.2	638.3	63
64	376.2			425.6	442.2	458.9	475.6	492.2	508.9	525.5	542.2	558.8	575.5	592.2	608.8	625.5	642.1	658.8	64
65	388.2			439.0	456.2	473.4	490.6	507.7	524.9	542.1	559.3	576.5	593.7	610.8	628.0	645.2	662.4	679.6	65
66	400.4			452.7	470.4	488.1	505.8	523.5	541.2	558.9	576.7	594.4	612.1	629.8	647.5	665.2	683.0	700.7	66
67	412.8			466.5	484.8	503.0	521.3	539.5	557.8	576.0	594.3	612.6	630.8	649.1	667.3	685.6	703.8	722.1	67
68	425.4			480.6	499.4	518.2	537.0	555.8	574.6	593.4	612.2	631.0	649.8	668.6	687.4	706.2	725.0	743.8	68
69	438.2			494.8	514.2	533.6	552.9	572.3	591.7	611.0	630.4	649.7	669.1	688.5	707.8	727.2	746.6	765.9	69
70	451.2			509.3	529.3	549.2	569.1	589.0	609.0	628.9	648.8	668.8	688.7	708.6	728.5	748.5	768.4	788.3	70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Abete rosso  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.1	0.1	0.2	0.2	0.2	0.2													6
7	0.1	0.2	0.2	0.2	0.2	0.2													7
8	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3											8
9	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4											9
10	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4											10
11	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5											11
12		0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6										12
13				0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9							13
14				0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.1							14
15				0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.1	1.2							15
16				0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.7			16
17				0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9			17
18						1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2			18
19						1.2	1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.2	2.3	2.4			19
20						1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.3	2.4	2.5	2.7	2.8		20
21						1.4	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9	3.1		21
22						1.6	1.7	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.1	3.2	3.4		22
23								2.1	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	3.9	23
24								2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	24
25								2.4	2.6	2.9	3.1	3.3	3.5	3.7	3.9	4.2	4.4	4.6	25
26								2.6	2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	4.7	5.0	26
27								2.8	3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.8	5.1	5.3	27
28										3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.5	5.7	28
29										3.9	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	29
30										4.1	4.4	4.7	5.1	5.4	5.7	6.0	6.3	6.6	30
31										4.4	4.7	5.1	5.4	5.7	6.1	6.4	6.7	7.1	31
32										4.7	5.1	5.4	5.8	6.1	6.5	6.8	7.2	7.5	32
33														6.5	6.9	7.2	7.6	8.0	33
34														6.9	7.3	7.7	8.1	8.5	34
35														7.3	7.7	8.2	8.6	9.0	35
36														7.7	8.2	8.6	9.1	9.5	36
37														8.2	8.7	9.1	9.6	10.1	37
38																9.6	10.1	10.6	38
39																10.1	10.7	11.2	39
40																10.7	11.2	11.8	40
41																11.2	11.8	12.4	41
42																11.8	12.4	13.0	42
43																		13.6	43
44																		14.3	44
45																		14.9	45
46																		15.6	46
47																		16.3	47
48																		17.0	48
49																		17.7	49
50																		18.5	50
51																		19.2	51
52																		20.0	52
53																			53
54																			54
55																			55
56																			56
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete rosso  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	4.1	4.2																	23
24	4.4	4.6																	24
25	4.8	5.0																	25
26	5.2	5.4																	26
27	5.6	5.8																	27
28	6.0	6.3	6.6	6.8	7.1	7.4													28
29	6.5	6.7	7.0	7.3	7.6	7.9													29
30	6.9	7.2	7.5	7.8	8.1	8.5													30
31	7.4	7.7	8.0	8.4	8.7	9.0													31
32	7.9	8.2	8.6	8.9	9.3	9.6	10.0	10.3	10.7										32
33	8.4	8.7	9.1	9.5	9.9	10.2	10.6	11.0	11.4	11.7									33
34	8.9	9.3	9.7	10.1	10.5	10.9	11.3	11.7	12.1	12.5									34
35	9.4	9.8	10.3	10.7	11.1	11.5	11.9	12.4	12.8	13.2									35
36	10.0	10.4	10.9	11.3	11.7	12.2	12.6	13.1	13.5	14.0									36
37	10.5	11.0	11.5	11.9	12.4	12.9	13.4	13.8	14.3	14.8									37
38	11.1	11.6	12.1	12.6	13.1	13.6	14.1	14.6	15.1	15.6	16.1	16.6							38
39	11.7	12.2	12.8	13.3	13.8	14.3	14.8	15.4	15.9	16.4	16.9	17.5							39
40	12.3	12.9	13.4	14.0	14.5	15.1	15.6	16.2	16.7	17.3	17.8	18.4							40
41	13.0	13.5	14.1	14.7	15.3	15.8	16.4	17.0	17.6	18.1	18.7	19.3							41
42	13.6	14.2	14.8	15.4	16.0	16.6	17.2	17.8	18.4	19.0	19.7	20.3							42
43	14.3	14.9	15.5	16.2	16.8	17.4	18.1	18.7	19.3	20.0	20.6	21.2	21.9	22.5					43
44	14.9	15.6	16.3	16.9	17.6	18.3	18.9	19.6	20.2	20.9	21.6	22.2	22.9	23.6					44
45	15.6	16.3	17.0	17.7	18.4	19.1	19.8	20.5	21.2	21.9	22.6	23.3	24.0	24.7					45
46	16.3	17.1	17.8	18.5	19.2	20.0	20.7	21.4	22.1	22.9	23.6	24.3	25.0	25.8					46
47	17.1	17.8	18.6	19.3	20.1	20.8	21.6	22.4	23.1	23.9	24.6	25.4	26.2	26.9					47
48	17.8	18.6	19.4	20.2	21.0	21.7	22.5	23.3	24.1	24.9	25.7	26.5	27.3	28.1	28.9	29.7			48
49	18.5	19.4	20.2	21.0	21.8	22.7	23.5	24.3	25.1	26.0	26.8	27.6	28.4	29.3	30.1	30.9			49
50	19.3	20.2	21.0	21.9	22.7	23.6	24.5	25.3	26.2	27.0	27.9	28.8	29.6	30.5	31.3	32.2			50
51	20.1	21.0	21.9	22.8	23.7	24.6	25.5	26.4	27.2	28.1	29.0	29.9	30.8	31.7	32.6	33.5			51
52	20.9	21.8	22.8	23.7	24.6	25.5	26.5	27.4	28.3	29.3	30.2	31.1	32.0	33.0	33.9	34.8			52
53		22.7	23.7	24.6	25.6	26.5	27.5	28.5	29.4	30.4	31.4	32.3	33.3	34.3	35.2	36.2	37.1	38.1	53
54		23.6	24.6	25.6	26.6	27.6	28.6	29.6	30.6	31.6	32.6	33.6	34.6	35.6	36.6	37.6	38.6	39.6	54
55		24.4	25.5	26.5	27.6	28.6	29.6	30.7	31.7	32.7	33.8	34.8	35.9	36.9	37.9	39.0	40.0	41.1	55
56		25.3	26.4	27.5	28.6	29.7	30.7	31.8	32.9	34.0	35.0	36.1	37.2	38.3	39.3	40.4	41.5	42.6	56
57		26.3	27.4	28.5	29.6	30.7	31.8	33.0	34.1	35.2	36.3	37.4	38.5	39.6	40.8	41.9	43.0	44.1	57
58		27.2	28.4	29.5	30.7	31.8	33.0	34.1	35.3	36.4	37.6	38.7	39.9	41.1	42.2	43.4	44.5	45.7	58
59		28.2	29.4	30.5	31.7	32.9	34.1	35.3	36.5	37.7	38.9	40.1	41.3	42.5	43.7	44.9	46.1	47.3	59
60		29.1	30.4	31.6	32.8	34.1	35.3	36.5	37.8	39.0	40.2	41.5	42.7	44.0	45.2	46.4	47.7	48.9	60
61		30.1	31.4	32.7	33.9	35.2	36.5	37.8	39.0	40.3	41.6	42.9	44.2	45.4	46.7	48.0	49.3	50.5	61
62		31.1	32.4	33.8	35.1	36.4	37.7	39.0	40.3	41.7	43.0	44.3	45.6	46.9	48.3	49.6	50.9	52.2	62
63				34.9	36.2	37.6	38.9	40.3	41.7	43.0	44.4	45.8	47.1	48.5	49.8	51.2	52.6	53.9	63
64				36.0	37.4	38.8	40.2	41.6	43.0	44.4	45.8	47.2	48.6	50.0	51.4	52.8	54.3	55.7	64
65				37.1	38.6	40.0	41.5	42.9	44.4	45.8	47.3	48.7	50.2	51.6	53.1	54.5	56.0	57.4	65
66				38.3	39.8	41.3	42.8	44.3	45.7	47.2	48.7	50.2	51.7	53.2	54.7	56.2	57.7	59.2	66
67				39.5	41.0	42.5	44.1	45.6	47.2	48.7	50.2	51.8	53.3	54.9	56.4	57.9	59.5	61.0	67
68				40.6	42.2	43.8	45.4	47.0	48.6	50.2	51.8	53.3	54.9	56.5	58.1	59.7	61.3	62.9	68
69				41.9	43.5	45.1	46.8	48.4	50.0	51.7	53.3	54.9	56.6	58.2	59.8	61.5	63.1	64.7	69
70				43.1	44.8	46.4	48.1	49.8	51.5	53.2	54.9	56.5	58.2	59.9	61.6	63.3	64.9	66.6	70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Abete rosso  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	6.7	7.3	8.0	8.6	9.2	9.9													6
7	8.4	9.3	10.1	11.0	11.8	12.7													7
8	10.3	11.4	12.5	13.7	14.8	15.9	17.0	18.2											8
9	12.3	13.8	15.2	16.6	18.0	19.5	20.9	22.3											9
10	14.6	16.3	18.1	19.9	21.6	23.4	25.1	26.9											10
11	17.0	19.1	21.2	23.4	25.5	27.6	29.8	31.9											11
12		22.1	24.6	27.2	29.7	32.3	34.8	37.3	39.9										12
13				31.3	34.2	37.2	40.2	43.2	46.2	49.1	52.1	55.1							13
14				35.6	39.1	42.5	46.0	49.5	52.9	56.4	59.8	63.3							14
15				40.3	44.3	48.2	52.2	56.1	60.1	64.1	68.0	72.0							15
16				45.2	49.7	54.2	58.8	63.3	67.8	72.3	76.8	81.3	85.8	90.3	94.8	99.3			16
17				50.4	55.5	60.6	65.7	70.8	75.9	81.0	86.1	91.2	96.3	101.4	106.4	111.5			17
18						67.3	73.1	78.8	84.5	90.2	95.9	101.6	107.3	113.0	118.7	124.4			18
19						74.4	80.8	87.2	93.5	99.9	106.2	112.6	119.0	125.3	131.7	138.0			19
20						81.9	88.9	96.0	103.0	110.1	117.1	124.2	131.2	138.2	145.3	152.3	159.4		20
21						89.6	97.4	105.2	113.0	120.7	128.5	136.3	144.0	151.8	159.6	167.4	175.1		21
22						97.8	106.3	114.8	123.4	131.9	140.4	149.0	157.5	166.0	174.5	183.1	191.6		22
23								124.9	134.2	143.6	152.9	162.2	171.5	180.8	190.2	199.5	208.8	218.1	23
24								135.4	145.6	155.7	165.9	176.0	186.2	196.3	206.5	216.6	226.8	236.9	24
25								146.3	157.4	168.4	179.4	190.4	201.4	212.4	223.4	234.4	245.5	256.5	25
26								157.7	169.6	181.5	193.4	205.3	217.2	229.2	241.1	253.0	264.9	276.8	26
27								169.5	182.3	195.1	208.0	220.8	233.7	246.5	259.4	272.2	285.1	297.9	27
28										209.3	223.1	236.9	250.7	264.5	278.3	292.2	306.0	319.8	28
29										223.9	238.7	253.5	268.4	283.2	298.0	312.8	327.6	342.4	29
30										239.0	254.9	270.7	286.6	302.4	318.3	334.2	350.0	365.9	30
31										254.6	271.6	288.5	305.4	322.4	339.3	356.2	373.2	390.1	31
32										270.7	288.8	306.8	324.9	342.9	360.9	379.0	397.0	415.1	32
33														364.1	383.3	402.5	421.6	440.8	33
34														385.9	406.3	426.6	447.0	467.4	34
35														408.3	429.9	451.5	473.1	494.7	35
36														431.4	454.3	477.1	499.9	522.8	36
37														455.1	479.3	503.4	527.5	551.6	37
38																530.4	555.8	581.3	38
39																558.1	584.9	611.7	39
40																586.5	614.7	642.8	40
41																615.6	645.2	674.8	41
42																645.4	676.5	707.5	42
43																		741.1	43
44																		775.3	44
45																		810.4	45
46																		846.2	46
47																		882.9	47
48																		920.2	48
49																		958.4	49
50																		997.3	50
51																		1 037.1	51
52																		1 077.5	52
53																			53
54																			54
55																			55
56																			56
57																			57
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Abete rosso  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	227.5	236.8																	23
24	247.1	257.2																	24
25	267.5	278.5																	25
26	288.7	300.6																	26
27	310.8	323.6																	27
28	333.6	347.4	361.2	375.0	388.9	402.7													28
29	357.3	372.1	386.9	401.7	416.5	431.4													29
30	381.7	397.6	413.5	429.3	445.2	461.0													30
31	407.0	424.0	440.9	457.8	474.8	491.7													31
32	433.1	451.2	469.2	487.2	505.3	523.3	541.4	559.4	577.5										32
33	460.0	479.2	498.4	517.6	536.8	556.0	575.1	594.3	613.5	632.7									33
34	487.7	508.1	528.5	548.8	569.2	589.6	609.9	630.3	650.7	671.1									34
35	516.3	537.8	559.4	581.0	602.6	624.2	645.8	667.3	688.9	710.5									35
36	545.6	568.4	591.3	614.1	636.9	659.8	682.6	705.4	728.3	751.1									36
37	575.7	599.9	624.0	648.1	672.2	696.3	720.5	744.6	768.7	792.8									37
38	606.7	632.1	657.6	683.0	708.5	733.9	759.4	784.8	810.2	835.7	861.1	886.6							38
39	638.5	665.3	692.1	718.9	745.7	772.5	799.3	826.1	852.9	879.7	906.5	933.3							39
40	671.0	699.2	727.4	755.6	783.8	812.0	840.2	868.4	896.6	924.8	953.0	981.2							40
41	704.4	734.0	763.7	793.3	822.9	852.5	882.1	911.8	941.4	971.0	1 000.6	1 030.2							41
42	738.6	769.7	800.8	831.9	863.0	894.0	925.1	956.2	987.3	1 018.4	1 049.4	1 080.5							42
43	773.6	806.2	838.8	871.4	904.0	936.5	969.1	1 001.7	1 034.3	1 066.9	1 099.4	1 132.0	1 164.6	1 197.2					43
44	809.5	843.6	877.7	911.8	945.9	980.0	1 014.1	1 048.2	1 082.4	1 116.5	1 150.6	1 184.7	1 218.8	1 252.9					44
45	846.1	881.8	917.4	953.1	988.8	1 024.5	1 060.2	1 095.9	1 131.5	1 167.2	1 202.9	1 238.6	1 274.3	1 309.9					45
46	883.5	920.8	958.1	995.4	1 032.7	1 069.9	1 107.2	1 144.5	1 181.8	1 219.1	1 256.4	1 293.7	1 330.9	1 368.2					46
47	921.8	960.7	999.6	1 038.5	1 077.5	1 116.4	1 155.3	1 194.2	1 233.2	1 272.1	1 311.0	1 349.9	1 388.8	1 427.8					47
48	960.8	1 001.4	1 042.0	1 082.6	1 123.2	1 163.8	1 204.4	1 245.0	1 285.6	1 326.2	1 366.8	1 407.4	1 448.0	1 488.6	1 529.2	1 569.8			48
49	1 000.7	1 043.0	1 085.3	1 127.6	1 169.9	1 212.2	1 254.5	1 296.9	1 339.2	1 381.5	1 423.8	1 466.1	1 508.4	1 550.7	1 593.0	1 635.3			49
50	1 041.4	1 085.4	1 129.5	1 173.5	1 217.6	1 261.6	1 305.7	1 349.7	1 393.8	1 437.8	1 481.9	1 525.9	1 570.0	1 614.0	1 658.1	1 702.1			50
51	1 082.9	1 128.7	1 174.5	1 220.4	1 266.2	1 312.0	1 357.9	1 403.7	1 449.5	1 495.4	1 541.2	1 587.0	1 632.8	1 678.7	1 724.5	1 770.3			51
52	1 125.2	1 172.8	1 220.5	1 268.1	1 315.8	1 363.4	1 411.1	1 458.7	1 506.3	1 554.0	1 601.6	1 649.3	1 696.9	1 744.6	1 792.2	1 839.9			52
53	1 217.8	1 267.3	1 316.8	1 366.3	1 415.8	1 465.3	1 514.8	1 564.3	1 613.8	1 663.3	1 712.7	1 762.2	1 811.7	1 861.2	1 910.7	1 960.2	2 009.7		53
54	1 263.6	1 315.0	1 366.4	1 417.8	1 469.1	1 520.5	1 571.9	1 623.3	1 674.7	1 726.0	1 777.4	1 828.8	1 880.2	1 931.6	1 982.9	2 034.3	2 085.7		54
55	1 310.3	1 363.6	1 416.9	1 470.2	1 523.5	1 576.8	1 630.1	1 683.4	1 736.7	1 790.0	1 843.3	1 896.6	1 949.9	2 003.2	2 056.5	2 109.8	2 163.1		55
56	1 357.8	1 413.0	1 468.3	1 523.5	1 578.8	1 634.1	1 689.3	1 744.6	1 799.8	1 855.1	1 910.3	1 965.6	2 020.8	2 076.1	2 131.4	2 186.6	2 241.9		56
57	1 406.1	1 463.4	1 520.6	1 577.9	1 635.1	1 692.4	1 749.6	1 806.8	1 864.1	1 921.3	1 978.6	2 035.8	2 093.1	2 150.3	2 207.6	2 264.8	2 322.1		57
58	1 455.3	1 514.6	1 573.9	1 633.1	1 692.4	1 751.7	1 811.0	1 870.2	1 929.5	1 988.8	2 048.0	2 107.3	2 166.6	2 225.9	2 285.1	2 344.4	2 403.7		58
59	1 505.4	1 566.7	1 628.0	1 689.4	1 750.7	1 812.0	1 873.4	1 934.7	1 996.0	2 057.4	2 118.7	2 180.0	2 241.4	2 302.7	2 364.0	2 425.4	2 486.7		59
60	1 556.2	1 619.7	1 683.1	1 746.5	1 810.0	1 873.4	1 936.8	2 000.3	2 063.7	2 127.1	2 190.6	2 254.0	2 317.4	2 380.9	2 444.3	2 507.7	2 571.1		60
61	1 608.0	1 673.5	1 739.1	1 804.7	1 870.2	1 935.8	2 001.3	2 066.9	2 132.5	2 198.0	2 263.6	2 329.2	2 394.7	2 460.3	2 525.9	2 591.4	2 657.0		61
62	1 660.5	1 728.3	1 796.0	1 863.7	1 931.5	1 999.2	2 066.9	2 134.7	2 202.4	2 270.1	2 337.9	2 405.6	2 473.3	2 541.0	2 608.8	2 676.5	2 744.2		62
63			1 853.8	1 923.8	1 993.7	2 063.6	2 133.6	2 203.5	2 273.4	2 343.4	2 413.3	2 483.2	2 553.2	2 623.1	2 693.0	2 763.0	2 832.9		63
64			1 912.6	1 984.7	2 056.9	2 129.1	2 201.3	2 273.4	2 345.6	2 417.8	2 489.9	2 562.1	2 634.3	2 706.5	2 778.6	2 850.8	2 923.0		64
65			1 972.2	2 046.7	2 121.1	2 195.6	2 270.0	2 344.5	2 418.9	2 493.3	2 567.8	2 642.2	2 716.7	2 791.1	2 865.6	2 940.0	3 014.5		65
66			2 032.8	2 109.6	2 186.3	2 263.1	2 339.8	2 416.6	2 493.3	2 570.1	2 646.8	2 723.6	2 800.3	2 877.1	2 953.8	3 030.6	3 107.3		66
67			2 094.3	2 173.4	2 252.5	2 331.6	2 410.7	2 489.8	2 568.9	2 648.0	2 727.1	2 806.2	2 885.3	2 964.4	3 043.5	3 122.6	3 201.6		67
68			2 156.7	2 238.2	2 319.7	2 401.1	2 482.6	2 564.1	2 645.6	2 727.0	2 808.5	2 890.0	2 971.5	3 052.9	3 134.4	3 215.9	3 297.4		68
69			2 220.0	2 303.9	2 387.8	2 471.7	2 555.6	2 639.5	2 723.4	2 807.3	2 891.1	2 975.0	3 058.9	3 142.8	3 226.7	3 310.6	3 394.5		69
70			2 284.3	2 370.6	2 457.0	2 543.3	2 629.6	2 716.0	2 802.3	2 888.6	2 975.0	3 061.3	3 147.7	3 234.0	3 320.3	3 406.7	3 493.0		70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pinus cembra* L.**

**Pino cembro**

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## Pino cembro

### Volume del fusto e dei rami grossi

$n = 22$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.8521 \quad 3.9504 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.9427 & \\ -1.2789 \cdot 10^{-3} & 1.6550 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 2.7282 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 22$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.3499 \quad 1.5191 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.1413 \cdot 10^{-1} & \\ -1.9921 \cdot 10^{-4} & 2.5779 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 4.2496 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 22$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.8461 \quad 3.1879 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.3532 \cdot 10^{-1} & \\ -1.0877 \cdot 10^{-4} & 1.4075 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.3203 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 22$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.1130 \cdot 10^{-1} \quad 4.6896 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.5874 \cdot 10^{-2} & \\ -5.1493 \cdot 10^{-6} & 6.6633 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.0985 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 22$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [3.3073 \quad 1.8848 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.3318 & \\ -4.3200 \cdot 10^{-4} & 5.5902 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 9.2154 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$



Pino cembro  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	7.8	8.8	9.8	10.8	11.7	12.7													5
6	10.0	11.4	12.8	14.2	15.7	17.1													6
7	12.5	14.5	16.4	18.3	20.3	22.2													7
8	15.5	18.0	20.5	23.1	25.6	28.1	30.7	33.2											8
9	18.9	22.1	25.3	28.5	31.7	34.9	38.1	41.2											9
10	22.6	26.6	30.5	34.5	38.4	42.4	46.3	50.3											10
11	26.8	31.5	36.3	41.1	45.9	50.7	55.4	60.2											11
12	31.3	37.0	42.7	48.4	54.0	59.7	65.4	71.1											12
13				56.3	62.9	69.6	76.3	83.0	89.6	96.3									13
14				64.8	72.5	80.3	88.0	95.8	103.5	111.3									14
15				74.0	82.8	91.7	100.6	109.5	118.4	127.3									15
16				83.8	93.9	104.0	114.1	124.2	134.3	144.4									16
17				94.2	105.6	117.0	128.4	139.9	151.3	162.7									17
18						130.8	143.6	156.4	169.2	182.0	194.8	207.6							18
19						145.5	159.7	174.0	188.2	202.5	216.8	231.0							19
20						160.9	176.7	192.5	208.3	224.1	239.9	255.7							20
21						177.1	194.5	211.9	229.3	246.7	264.2	281.6							21
22						194.1	213.2	232.3	251.4	270.5	289.7	308.8							22
23								253.6	274.5	295.4	316.3	337.2	358.1	379.0	399.9	420.8			23
24								275.9	298.7	321.4	344.2	366.9	389.7	412.4	435.2	457.9			24
25								299.1	323.8	348.5	373.2	397.9	422.6	447.3	472.0	496.7			25
26								323.3	350.0	376.7	403.4	430.1	456.8	483.5	510.2	536.9			26
27								348.4	377.2	406.0	434.8	463.6	492.4	521.2	550.0	578.8			27
28								374.5	405.5	436.4	467.4	498.4	529.4	560.3	591.3	622.3	653.2	684.2	28
29								401.5	434.7	468.0	501.2	534.4	567.6	600.9	634.1	667.3	700.5	733.8	29
30								429.5	465.0	500.6	536.2	571.7	607.3	642.8	678.4	713.9	749.5	785.0	30
31								458.4	496.4	534.3	572.3	610.3	648.2	686.2	724.2	762.1	800.1	838.0	31
32								488.3	528.7	569.2	609.6	650.1	690.5	731.0	771.4	811.9	852.3	892.8	32
33									605.1	648.1	691.2	734.2	777.2	820.2	863.2	906.3	949.3		33
34									642.2	687.9	733.5	779.2	824.9	870.5	916.2	961.9	1 007.5		34
35									680.3	728.7	777.1	825.5	873.9	922.3	970.7	1 019.1	1 067.5		35
36									719.6	770.8	822.0	873.2	924.4	975.6	1 026.8	1 078.0	1 129.2		36
37									760.0	814.1	868.1	922.2	976.3	1 030.4	1 084.5	1 138.6	1 192.6		37
38									801.5	858.5	915.6	972.6	1 029.6	1 086.7	1 143.7	1 200.8	1 257.8		38
39									844.1	904.1	964.2	1 024.3	1 084.4	1 144.5	1 204.6	1 264.6	1 324.7		39
40									887.7	950.9	1 014.2	1 077.4	1 140.6	1 203.8	1 267.0	1 330.2	1 393.4		40
41									932.5	998.9	1 065.4	1 131.8	1 198.2	1 264.6	1 331.0	1 397.4	1 463.8		41
42									978.4	1 048.1	1 117.8	1 187.5	1 257.2	1 326.9	1 396.6	1 466.2	1 535.9		42
43											1 171.5	1 244.6	1 317.6	1 390.7	1 463.7	1 536.8	1 609.8		43
44											1 226.5	1 303.0	1 379.5	1 456.0	1 532.4	1 608.9	1 685.4		44
45											1 282.8	1 362.8	1 442.8	1 522.8	1 602.8	1 682.8	1 762.8		45
46											1 340.3	1 423.9	1 507.5	1 591.1	1 674.7	1 758.3	1 841.8		46
47											1 399.1	1 486.3	1 573.6	1 660.9	1 748.1	1 835.4	1 922.7		47
48														1 641.2	1 732.2	1 823.2	1 914.2	2 005.2	48
49														1 710.1	1 805.0	1 899.8	1 994.7	2 089.5	49
50														1 780.5	1 879.3	1 978.1	2 076.8	2 175.6	50
51														1 852.4	1 955.1	2 057.9	2 160.6	2 263.3	51
52														1 925.6	2 032.4	2 139.2	2 246.0	2 352.9	52
53														2 000.3	2 111.2	2 222.2	2 333.2	2 444.1	53
54														2 076.3	2 191.5	2 306.7	2 421.9	2 537.1	54
55														2 153.8	2 273.3	2 392.8	2 512.3	2 631.8	55
56														2 232.8	2 356.7	2 480.5	2 604.4	2 728.3	56
57														2 313.1	2 441.5	2 569.8	2 698.2	2 826.5	57
58															2 660.7	2 793.6	2 926.5		58
59															2 753.1	2 890.6	3 028.1		59
60															2 847.1	2 989.4	3 131.6		60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino cembro  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	992.3	1 035.3																	33
34	1 053.2	1 098.9																	34
35	1 115.9	1 164.3																	35
36	1 180.4	1 231.6																	36
37	1 246.7	1 300.8																	37
38	1 314.9	1 371.9																	38
39	1 384.8	1 444.9																	39
40	1 456.6	1 519.8																	40
41	1 530.2	1 596.6																	41
42	1 605.6	1 675.3																	42
43	1 682.8	1 755.9																	43
44	1 761.9	1 838.4																	44
45	1 842.8	1 922.7																	45
46	1 925.4	2 009.0																	46
47	2 009.9	2 097.2																	47
48	2 096.2	2 187.3																	48
49	2 184.4	2 279.2																	49
50	2 274.3	2 373.1																	50
51	2 366.1	2 468.8																	51
52	2 459.7	2 566.5																	52
53	2 555.1	2 666.1																	53
54	2 652.3	2 767.5																	54
55	2 751.3	2 870.8																	55
56	2 852.2	2 976.1																	56
57	2 954.9	3 083.2																	57
58	3 059.4	3 192.2																	58
59	3 165.7	3 303.2																	59
60	3 273.8	3 416.0																	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino cembro  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.2	3.6	4.0	4.4	4.8	5.1													5
6	4.1	4.6	5.2	5.7	6.3	6.8													6
7	5.1	5.8	6.6	7.3	8.0	8.8													7
8	6.2	7.2	8.2	9.1	10.1	11.1	12.0	13.0											8
9	7.5	8.7	10.0	11.2	12.4	13.7	14.9	16.1											9
10	8.9	10.5	12.0	13.5	15.0	16.5	18.1	19.6											10
11	10.5	12.4	14.2	16.1	17.9	19.7	21.6	23.4											11
12	12.3	14.5	16.7	18.8	21.0	23.2	25.4	27.6											12
13				21.9	24.5	27.0	29.6	32.2	34.7	37.3									13
14				25.2	28.1	31.1	34.1	37.1	40.1	43.0									14
15				28.7	32.1	35.5	38.9	42.4	45.8	49.2									15
16				32.5	36.3	40.2	44.1	48.0	51.9	55.8									16
17				36.5	40.9	45.3	49.6	54.0	58.4	62.8									17
18						50.6	55.5	60.4	65.3	70.3	75.2	80.1							18
19						56.2	61.7	67.2	72.6	78.1	83.6	89.1							19
20						62.1	68.2	74.3	80.3	86.4	92.5	98.6							20
21						68.3	75.0	81.7	88.4	95.1	101.8	108.5							21
22						74.9	82.2	89.6	96.9	104.3	111.6	119.0							22
23								97.8	105.8	113.9	121.9	129.9	138.0	146.0	154.0	162.1			23
24								106.4	115.1	123.9	132.6	141.4	150.1	158.9	167.6	176.4			24
25								115.3	124.8	134.3	143.8	153.3	162.8	172.2	181.7	191.2			25
26								124.6	134.8	145.1	155.4	165.7	175.9	186.2	196.5	206.7			26
27								134.2	145.3	156.4	167.5	178.5	189.6	200.7	211.8	222.8			27
28								144.3	156.2	168.1	180.0	191.9	203.8	215.7	227.6	239.5	251.5	263.4	28
29								154.7	167.4	180.2	193.0	205.8	218.5	231.3	244.1	256.9	269.6	282.4	29
30								165.4	179.1	192.8	206.4	220.1	233.8	247.4	261.1	274.8	288.5	302.1	30
31								176.5	191.1	205.7	220.3	234.9	249.5	264.1	278.7	293.3	307.9	322.5	31
32								188.0	203.6	219.1	234.7	250.2	265.8	281.4	296.9	312.5	328.0	343.6	32
33									233.0	249.5	266.0	282.6	299.1	315.7	332.2	348.8	365.3		33
34									247.2	264.8	282.3	299.9	317.4	335.0	352.6	370.1	387.7		34
35									261.9	280.5	299.1	317.7	336.3	354.9	373.5	392.1	410.7		35
36									277.0	296.7	316.4	336.0	355.7	375.4	395.1	414.8	434.5		36
37									292.5	313.3	334.1	354.9	375.7	396.5	417.3	438.1	458.9		37
38									308.5	330.4	352.3	374.3	396.2	418.1	440.1	462.0	483.9		38
39									324.8	347.9	371.0	394.1	417.2	440.4	463.5	486.6	509.7		39
40									341.6	365.9	390.2	414.5	438.9	463.2	487.5	511.8	536.1		40
41									358.9	384.4	409.9	435.5	461.0	486.5	512.1	537.6	563.1		41
42									376.5	403.3	430.1	456.9	483.7	510.5	537.3	564.1	590.9		42
43											450.8	478.8	506.9	535.0	563.1	591.2	619.3		43
44											471.9	501.3	530.7	560.1	589.5	619.0	648.4		44
45											493.5	524.3	555.1	585.8	616.6	647.3	678.1		45
46											515.7	547.8	579.9	612.1	644.2	676.4	708.5		46
47											538.3	571.8	605.4	638.9	672.5	706.0	739.6		47
48														631.4	666.4	701.4	736.4	771.4	48
49														657.9	694.3	730.8	767.3	803.8	49
50														684.9	722.9	760.9	798.9	836.9	50
51														712.6	752.1	791.6	831.1	870.6	51
52														740.7	781.8	822.9	864.0	905.0	52
53														769.4	812.1	854.8	897.5	940.1	53
54														798.7	843.0	887.3	931.6	975.9	54
55														828.5	874.5	920.4	966.4	1 012.3	55
56														858.9	906.5	954.1	1 001.8	1 049.4	56
57														889.7	939.1	988.5	1 037.8	1 087.2	57
58																1 023.4	1 074.5	1 125.6	58
59																1 058.9	1 111.8	1 164.7	59
60																1 095.1	1 149.8	1 204.5	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino cembro  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	381.8	398.4																	33
34	405.2	422.8																	34
35	429.4	448.0																	35
36	454.2	473.9																	36
37	479.7	500.5																	37
38	505.9	527.8																	38
39	532.8	555.9																	39
40	560.4	584.7																	40
41	588.7	614.2																	41
42	617.7	644.5																	42
43	647.4	675.5																	43
44	677.8	707.2																	44
45	708.9	739.6																	45
46	740.7	772.8																	46
47	773.2	806.7																	47
48	806.4	841.4																	48
49	840.2	876.7																	49
50	874.8	912.8																	50
51	910.1	949.6																	51
52	946.1	987.2																	52
53	982.8	1 025.5																	53
54	1 020.2	1 064.5																	54
55	1 058.3	1 104.2																	55
56	1 097.0	1 144.7																	56
57	1 136.5	1 185.9																	57
58	1 176.7	1 227.8																	58
59	1 217.6	1 270.5																	59
60	1 259.2	1 313.9																	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino cembro  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.2	2.3	2.4	2.5	2.6	2.6													5
6	2.4	2.5	2.6	2.8	2.9	3.0													6
7	2.6	2.8	2.9	3.1	3.3	3.4													7
8	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3											8
9	3.1	3.4	3.7	3.9	4.2	4.4	4.7	4.9											9
10	3.4	3.8	4.1	4.4	4.7	5.0	5.4	5.7											10
11	3.8	4.2	4.5	4.9	5.3	5.7	6.1	6.5											11
12	4.1	4.6	5.1	5.5	6.0	6.4	6.9	7.4											12
13				6.2	6.7	7.2	7.8	8.3	8.8	9.4									13
14				6.8	7.5	8.1	8.7	9.3	10.0	10.6									14
15				7.6	8.3	9.0	9.7	10.5	11.2	11.9									15
16				8.4	9.2	10.0	10.8	11.6	12.5	13.3									16
17				9.2	10.1	11.1	12.0	12.9	13.8	14.7									17
18						12.2	13.2	14.2	15.3	16.3	17.3	18.4							18
19						13.4	14.5	15.7	16.8	18.0	19.1	20.3							19
20						14.6	15.9	17.1	18.4	19.7	21.0	22.2							20
21						15.9	17.3	18.7	20.1	21.5	22.9	24.3							21
22						17.3	18.8	20.4	21.9	23.4	25.0	26.5							22
23								22.1	23.8	25.5	27.1	28.8	30.5	32.2	33.9	35.6			23
24								23.9	25.7	27.6	29.4	31.2	33.1	34.9	36.7	38.6			24
25								25.8	27.7	29.7	31.7	33.7	35.7	37.7	39.7	41.7			25
26								27.7	29.9	32.0	34.2	36.3	38.5	40.6	42.8	44.9			26
27								29.7	32.1	34.4	36.7	39.0	41.4	43.7	46.0	48.3			27
28								31.8	34.3	36.8	39.3	41.8	44.3	46.8	49.3	51.8	54.3	56.8	28
29								34.0	36.7	39.4	42.1	44.7	47.4	50.1	52.8	55.5	58.1	60.8	29
30								36.3	39.1	42.0	44.9	47.8	50.6	53.5	56.4	59.2	62.1	65.0	30
31								38.6	41.7	44.7	47.8	50.9	53.9	57.0	60.1	63.1	66.2	69.2	31
32								41.0	44.3	47.5	50.8	54.1	57.3	60.6	63.9	67.1	70.4	73.7	32
33									50.4	53.9	57.4	60.9	64.3	67.8	71.3	74.8	78.2	81.7	33
34									53.4	57.1	60.8	64.5	68.2	71.9	75.6	79.2	82.9	86.6	34
35									56.5	60.4	64.3	68.2	72.1	76.0	79.9	83.9	87.8	91.7	35
36									59.7	63.8	68.0	72.1	76.2	80.3	84.5	88.6	92.7	96.8	36
37									62.9	67.3	71.7	76.0	80.4	84.8	89.1	93.5	97.9	102.3	37
38									66.3	70.9	75.5	80.1	84.7	89.3	93.9	98.5	103.1	107.7	38
39									69.7	74.6	79.4	84.3	89.1	94.0	98.8	103.7	108.5	113.4	39
40									73.3	78.4	83.5	88.6	93.7	98.8	103.9	109.0	114.1	119.2	40
41									76.9	82.2	87.6	92.9	98.3	103.7	109.0	114.4	119.7	125.1	41
42									80.6	86.2	91.8	97.4	103.1	108.7	114.3	119.9	125.6	131.2	42
43											96.2	102.1	107.9	113.8	119.7	125.6	131.5	137.4	43
44											100.6	106.8	112.9	119.1	125.3	131.5	137.6	143.8	44
45											105.1	111.6	118.0	124.5	131.0	137.4	143.9	150.2	45
46											109.8	116.5	123.3	130.0	136.8	143.5	150.2	156.8	46
47											114.5	121.6	128.6	135.6	142.7	149.7	156.8	163.8	47
48													134.1	141.4	148.7	156.1	163.4	170.7	48
49													139.6	147.3	154.9	162.6	170.2	177.9	49
50													145.3	153.3	161.2	169.2	177.2	185.1	50
51													151.1	159.4	167.7	176.0	184.3	192.6	51
52													157.0	165.6	174.2	182.9	191.5	200.1	52
53													163.0	172.0	180.9	189.9	198.9	207.9	53
54													169.2	178.5	187.8	197.1	206.4	215.7	54
55													175.4	185.1	194.7	204.4	214.0	223.7	55
56													181.8	191.8	201.8	211.8	221.8	231.8	56
57													188.3	198.6	209.0	219.4	229.7	239.9	57
58															216.3	227.1	237.8	248.5	58
59															223.8	234.9	246.0	257.1	59
60															231.4	242.9	254.3	265.7	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino cembro  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	81.7	85.2																	33
34	86.6	90.3																	34
35	91.7	95.6																	35
36	96.9	101.0																	36
37	102.2	106.6																	37
38	107.7	112.3																	38
39	113.4	118.2																	39
40	119.2	124.3																	40
41	125.1	130.5																	41
42	131.2	136.8																	42
43	137.4	143.3																	43
44	143.8	150.0																	44
45	150.3	156.8																	45
46	157.0	163.7																	46
47	163.8	170.9																	47
48	170.8	178.1																	48
49	177.9	185.5																	49
50	185.2	193.1																	50
51	192.6	200.8																	51
52	200.1	208.7																	52
53	207.8	216.8																	53
54	215.7	224.9																	54
55	223.6	233.3																	55
56	231.8	241.8																	56
57	240.1	250.4																	57
58	248.5	259.2																	58
59	257.1	268.2																	59
60	265.8	277.3																	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino cembro  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.2	0.2	0.2	0.2													5
6	0.2	0.2	0.2	0.2	0.3	0.3													6
7	0.2	0.2	0.3	0.3	0.3	0.3													7
8	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5											8
9	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6											9
10	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7											10
11	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8											11
12	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.9											12
13				0.7	0.8	0.9	1.0	1.1	1.1	1.2									13
14				0.8	0.9	1.0	1.1	1.2	1.3	1.4									14
15				1.0	1.1	1.2	1.3	1.4	1.5	1.6									15
16				1.1	1.2	1.3	1.4	1.6	1.7	1.8									16
17				1.2	1.3	1.5	1.6	1.7	1.9	2.0									17
18						1.6	1.8	1.9	2.1	2.2	2.4	2.5							18
19						1.8	2.0	2.1	2.3	2.5	2.7	2.8							19
20						2.0	2.2	2.4	2.5	2.7	2.9	3.1							20
21						2.2	2.4	2.6	2.8	3.0	3.2	3.4							21
22						2.4	2.6	2.8	3.1	3.3	3.5	3.7							22
23								3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.8	5.1			23
24								3.4	3.6	3.9	4.2	4.4	4.7	5.0	5.2	5.5			24
25								3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0			25
26								3.9	4.2	4.5	4.9	5.2	5.5	5.8	6.1	6.5			26
27								4.2	4.6	4.9	5.2	5.6	5.9	6.3	6.6	6.9			27
28								4.5	4.9	5.3	5.6	6.0	6.4	6.7	7.1	7.5	7.8	8.2	28
29								4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0	8.4	8.8	29
30								5.2	5.6	6.0	6.4	6.9	7.3	7.7	8.1	8.6	9.0	9.4	30
31								5.5	6.0	6.4	6.9	7.3	7.8	8.2	8.7	9.1	9.6	10.0	31
32								5.9	6.4	6.8	7.3	7.8	8.3	8.8	9.2	9.7	10.2	10.7	32
33									7.3	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.3		33
34									7.7	8.2	8.8	9.3	9.9	10.4	11.0	11.5	12.0		34
35									8.2	8.7	9.3	9.9	10.5	11.0	11.6	12.2	12.7		35
36									8.6	9.2	9.8	10.4	11.1	11.7	12.3	12.9	13.5		36
37									9.1	9.7	10.4	11.0	11.7	12.3	13.0	13.6	14.2		37
38									9.6	10.3	10.9	11.6	12.3	13.0	13.7	14.3	15.0		38
39									10.1	10.8	11.5	12.2	13.0	13.7	14.4	15.1	15.8		39
40									10.6	11.4	12.1	12.9	13.6	14.4	15.1	15.9	16.6		40
41									11.1	11.9	12.7	13.5	14.3	15.1	15.9	16.7	17.5		41
42									11.7	12.5	13.3	14.2	15.0	15.8	16.7	17.5	18.3		42
43											14.0	14.9	15.7	16.6	17.5	18.3	19.2		43
44											14.6	15.5	16.5	17.4	18.3	19.2	20.1		44
45											15.3	16.3	17.2	18.2	19.1	20.1	21.0		45
46											16.0	17.0	18.0	19.0	20.0	21.0	21.9		46
47											16.7	17.7	18.8	19.8	20.8	21.9	22.9		47
48													19.6	20.6	21.7	22.8	23.9		48
49													20.4	21.5	22.6	23.8	24.9		49
50													21.2	22.4	23.6	24.7	25.9		50
51													22.1	23.3	24.5	25.7	26.9		51
52													22.9	24.2	25.5	26.7	28.0		52
53													23.8	25.1	26.5	27.8	29.1		53
54													24.7	26.1	27.5	28.8	30.2		54
55													25.6	27.1	28.5	29.9	31.3		55
56													26.6	28.1	29.5	31.0	32.5		56
57													27.5	29.1	30.6	32.1	33.6		57
58															31.7	33.2	34.8		58
59															32.8	34.4	36.0		59
60															33.9	35.6	37.3		60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino cembro  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	11.9	12.4																	33
34	12.6	13.1																	34
35	13.3	13.9																	35
36	14.1	14.7																	36
37	14.9	15.5																	37
38	15.7	16.4																	38
39	16.5	17.2																	39
40	17.4	18.1																	40
41	18.2	19.0																	41
42	19.1	20.0																	42
43	20.1	20.9																	43
44	21.0	21.9																	44
45	22.0	22.9																	45
46	22.9	23.9																	46
47	23.9	25.0																	47
48	25.0	26.0																	48
49	26.0	27.1																	49
50	27.1	28.2																	50
51	28.2	29.4																	51
52	29.3	30.5																	52
53	30.4	31.7																	53
54	31.6	32.9																	54
55	32.7	34.2																	55
56	33.9	35.4																	56
57	35.2	36.7																	57
58	36.4	38.0																	58
59	37.7	39.3																	59
60	38.9	40.6																	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino cembro  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	5.7	6.1	6.6	7.1	7.5	8.0													5
6	6.7	7.4	8.1	8.7	9.4	10.1													6
7	7.9	8.8	9.8	10.7	11.6	12.5													7
8	9.3	10.5	11.8	13.0	14.2	15.4	16.6	17.8											8
9	10.9	12.5	14.0	15.5	17.0	18.6	20.1	21.6											9
10	12.7	14.6	16.5	18.4	20.3	22.2	24.0	25.9											10
11	14.7	17.0	19.3	21.6	23.8	26.1	28.4	30.7											11
12	16.9	19.6	22.3	25.0	27.7	30.4	33.2	35.9											12
13				28.8	32.0	35.2	38.3	41.5	44.7	47.9									13
14				32.9	36.6	40.2	43.9	47.6	51.3	55.0									14
15				37.2	41.5	45.7	50.0	54.2	58.4	62.7									15
16				41.9	46.7	51.6	56.4	61.2	66.0	70.9									16
17				46.9	52.3	57.8	63.2	68.7	74.1	79.6									17
18						64.4	70.5	76.6	82.7	88.8	94.9	101.0							18
19						71.3	78.2	85.0	91.8	98.6	105.4	112.2							19
20						78.7	86.2	93.8	101.3	108.9	116.4	123.9							20
21						86.4	94.7	103.1	111.4	119.7	128.0	136.3							21
22						94.5	103.7	112.8	121.9	131.0	140.1	149.3							22
23								123.0	132.9	142.9	152.9	162.8	172.8	182.8	192.7	202.7			23
24								133.6	144.4	155.3	166.2	177.0	187.9	198.7	209.6	220.4			24
25								144.7	156.4	168.2	180.0	191.8	203.6	215.3	227.1	238.9			25
26								156.2	168.9	181.7	194.4	207.2	219.9	232.6	245.4	258.1			26
27								168.2	181.9	195.7	209.4	223.2	236.9	250.6	264.4	278.1			27
28								180.6	195.4	210.2	225.0	239.7	254.5	269.3	284.1	298.8	313.6	328.4	28
29								193.5	209.4	225.2	241.1	256.9	272.8	288.6	304.5	320.3	336.2	352.0	29
30								206.9	223.8	240.8	257.8	274.7	291.7	308.6	325.6	342.6	359.5	376.5	30
31								220.7	238.8	256.9	275.0	293.1	311.2	329.3	347.5	365.6	383.7	401.8	31
32								234.9	254.2	273.5	292.8	312.1	331.4	350.7	370.0	389.3	408.6	427.9	32
33								290.7	311.2	331.7	352.2	372.8	393.3	413.8	434.3	454.9			33
34								308.3	330.1	351.9	373.7	395.5	417.3	439.1	460.9	482.6			34
35								326.6	349.6	372.7	395.8	418.9	442.0	465.1	488.2	511.3			35
36								345.3	369.7	394.1	418.6	443.0	467.4	491.8	516.3	540.7			36
37								364.5	390.4	416.2	442.0	467.8	493.6	519.4	545.2	571.0			37
38								384.3	411.6	438.8	466.0	493.2	520.4	547.6	574.9	602.1			38
39								404.7	433.3	462.0	490.7	519.3	548.0	576.7	605.3	634.0			39
40								425.5	455.7	485.8	516.0	546.1	576.3	606.4	636.6	666.8			40
41								446.9	478.6	510.2	541.9	573.6	605.3	637.0	668.7	700.3			41
42								468.8	502.0	535.3	568.5	601.8	635.0	668.3	701.5	734.8			42
43										560.9	595.8	630.6	665.5	700.3	735.2	770.0			43
44										587.1	623.6	660.1	696.6	733.1	769.6	806.1			44
45										614.0	652.1	690.3	728.5	766.7	804.8	843.0			45
46										641.4	681.3	721.2	761.1	801.0	840.8	880.7			46
47										669.5	711.1	752.7	794.4	836.0	877.6	919.3			47
48												785.0	828.4	871.8	915.2	958.7			48
49												817.9	863.1	908.4	953.6	998.9			49
50												851.5	898.6	945.7	992.8	1 039.9			50
51												885.7	934.8	983.8	1 032.8	1 081.8			51
52												920.7	971.6	1 022.6	1 073.6	1 124.5			52
53												956.3	1 009.2	1 062.2	1 115.1	1 168.1			53
54												992.6	1 047.6	1 102.5	1 157.5	1 212.4			54
55												1 029.6	1 086.6	1 143.6	1 200.6	1 257.6			55
56												1 067.2	1 126.3	1 185.5	1 244.6	1 303.7			56
57												1 105.6	1 166.8	1 228.1	1 289.3	1 350.5			57
58														1 271.4	1 334.8	1 398.2			58
59														1 315.5	1 381.1	1 446.7			59
60														1 360.4	1 428.2	1 496.1			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino cembro  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	475.4	495.9																	33
34	504.4	526.2																	34
35	534.3	557.4																	35
36	565.1	589.6																	36
37	596.8	622.6																	37
38	629.3	656.5																	38
39	662.7	691.3																	39
40	696.9	727.1																	40
41	732.0	763.7																	41
42	768.0	801.3																	42
43	804.9	839.7																	43
44	842.6	879.1																	44
45	881.2	919.3																	45
46	920.6	960.5																	46
47	960.9	1 002.6																	47
48	1 002.1	1 045.5																	48
49	1 044.2	1 089.4																	49
50	1 087.1	1 134.2																	50
51	1 130.9	1 179.9																	51
52	1 175.5	1 226.5																	52
53	1 221.0	1 274.0																	53
54	1 267.4	1 322.4																	54
55	1 314.7	1 371.7																	55
56	1 362.8	1 421.9																	56
57	1 411.8	1 473.0																	57
58	1 461.6	1 525.0																	58
59	1 512.3	1 577.9																	59
60	1 563.9	1 631.8																	60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pinus halepensis* Mill.**

**Pino d'Aleppo**

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## Pino d'Aleppo

### Volume del fusto e dei rami grossi

$n = 31$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.2508 \cdot 10^{-1} \quad 3.1518 \cdot 10^{-2} \quad 2.3748]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 2.7006 \cdot 10 & & \\ 9.8004 \cdot 10^{-3} & 7.0573 \cdot 10^{-6} & \\ -4.3224 & -1.7844 \cdot 10^{-3} & 7.2371 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 6.3262 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 31$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-5.4055 \quad 1.6165 \cdot 10^{-2} \quad 9.6893 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 7.9049 & & \\ 2.8687 \cdot 10^{-3} & 2.0657 \cdot 10^{-6} & \\ -1.2652 & -5.2231 \cdot 10^{-4} & 2.1184 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.8517 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 31$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.5230 \quad 5.0702 \cdot 10^{-3} \quad 1.2722]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.1027 \cdot 10 & & \\ 4.0018 \cdot 10^{-3} & 2.8817 \cdot 10^{-6} & \\ -1.7650 & -7.2861 \cdot 10^{-4} & 2.9551 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.5832 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 31$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.7268 \cdot 10^{-1} \quad 3.2346 \cdot 10^{-4} \quad 1.7969 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.2515 \cdot 10^{-2} & & \\ 4.5416 \cdot 10^{-6} & 3.2704 \cdot 10^{-9} & \\ -2.0031 \cdot 10^{-3} & -8.2689 \cdot 10^{-7} & 3.3538 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.9316 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 31$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-8.1012 \quad 2.1559 \cdot 10^{-2} \quad 2.2591]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.7677 \cdot 10 & & \\ 1.0044 \cdot 10^{-2} & 7.2326 \cdot 10^{-6} & \\ -4.4298 & -1.8287 \cdot 10^{-3} & 7.4169 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 6.4833 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Pino d'Aleppo  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	29.0	31.0	33.0	35.0	37.0	39.0	41.1	43.1											8
9	34.0	36.6	39.1	41.7	44.2	46.8	49.3	51.9											9
10		42.5	45.7	48.8	52.0	55.1	58.3	61.4											10
11			52.7	56.5	60.3	64.1	67.9	71.8											11
12			60.1	64.7	69.2	73.8	78.3	82.8											12
13			68.0	73.4	78.7	84.0	89.3	94.7	100.0	105.3	110.6	116.0							13
14				82.5	88.7	94.9	101.1	107.3	113.4	119.6	125.8	132.0							14
15				92.2	99.3	106.4	113.5	120.6	127.7	134.8	141.9	149.0							15
16				102.4	110.5	118.6	126.6	134.7	142.8	150.8	158.9	167.0							16
17					122.2	131.3	140.4	149.6	158.7	167.8	176.9	186.0							17
18					134.5	144.7	155.0	165.2	175.4	185.6	195.8	206.0	216.2	226.4					18
19					147.4	158.8	170.2	181.5	192.9	204.3	215.7	227.0	238.4	249.8					19
20						173.4	186.1	198.7	211.3	223.9	236.5	249.1	261.7	274.3					20
21						188.7	202.6	216.5	230.4	244.3	258.2	272.1	286.0	299.9					21
22						204.7	219.9	235.2	250.4	265.7	280.9	296.2	311.5	326.7					22
23						221.2	237.9	254.6	271.2	287.9	304.6	321.3	337.9	354.6	371.3	388.0			23
24						238.4	256.6	274.7	292.9	311.0	329.2	347.3	365.5	383.6	401.8	420.0			24
25							275.9	295.6	315.3	335.0	354.7	374.4	394.1	413.8	433.5	453.2			25
26							296.0	317.3	338.6	359.9	381.2	402.5	423.8	445.1	466.4	487.7			26
27							316.7	339.7	362.7	385.7	408.6	431.6	454.6	477.6	500.6	523.5			27
28							338.2	362.9	387.6	412.3	437.0	461.7	486.4	511.2	535.9	560.6	585.3	610.0	28
29								386.8	413.3	439.8	466.3	492.9	519.4	545.9	572.4	598.9	625.4	651.9	29
30								411.5	439.9	468.2	496.6	525.0	553.3	581.7	610.1	638.4	666.8	695.2	30
31								437.0	467.2	497.5	527.8	558.1	588.4	618.7	649.0	679.3	709.6	739.8	31
32								463.2	495.4	527.7	560.0	592.3	624.5	656.8	689.1	721.4	753.6	785.9	32
33								558.8	593.1	627.4	661.7	696.1	730.4	764.7	799.0	833.4			33
34								590.7	627.1	663.6	700.0	736.4	772.9	809.3	845.7	882.2			34
35								623.5	662.1	700.7	739.4	778.0	816.6	855.2	893.8	932.4			35
36								657.2	698.1	738.9	779.8	820.6	861.5	902.3	943.2	984.0			36
37								691.8	735.0	778.1	821.3	864.4	907.6	950.7	993.9	1 037.0			37
38									772.8	818.3	863.8	909.3	954.8	1 000.4	1 045.9	1 091.4			38
39									811.6	859.5	907.5	955.4	1 003.3	1 051.3	1 099.2	1 147.1			39
40									851.3	901.7	952.2	1 002.6	1 053.0	1 103.4	1 153.9	1 204.3			40
41									892.0	944.9	997.9	1 050.9	1 103.9	1 156.9	1 209.9	1 262.8			41
42									933.6	989.2	1 044.8	1 100.4	1 156.0	1 211.6	1 267.2	1 322.8			42
43										1 034.4	1 092.7	1 151.0	1 209.3	1 267.5	1 325.8	1 384.1			43
44										1 080.7	1 141.7	1 202.7	1 263.7	1 324.7	1 385.8	1 446.8			44
45										1 127.9	1 191.7	1 255.6	1 319.4	1 383.2	1 447.0	1 510.9			45
46										1 176.2	1 242.9	1 309.6	1 376.3	1 443.0	1 509.6	1 576.3			46
47										1 225.5	1 295.1	1 364.7	1 434.3	1 504.0	1 573.6	1 643.2			47
48										1 275.7	1 348.4	1 421.0	1 493.6	1 566.2	1 638.8	1 711.4			48
49											1 402.7	1 478.4	1 554.1	1 629.7	1 705.4	1 781.1			49
50											1 458.1	1 536.9	1 615.7	1 694.5	1 773.3	1 852.1			50
51												1 514.6	1 596.6	1 678.6	1 760.6	1 842.5	1 924.5		51
52														1 742.6	1 827.9	1 913.1	1 998.3		52
53														1 807.9	1 896.4	1 985.0	2 073.5		53
54															1 874.3	1 966.2	2 058.2	2 150.1	54
55															1 942.0	2 037.3	2 132.7	2 228.0	55
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino d'Aleppo  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino d'Aleppo  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)				
5																			5				
6																			6				
7																			7				
8	7.5	8.6	9.6	10.6	11.7	12.7	13.7	14.8											8				
9	9.9	11.2	12.5	13.8	15.1	16.4	17.7	19.0											9				
10		14.0	15.6	17.2	18.8	20.4	22.1	23.7											10				
11			18.9	20.9	22.9	24.8	26.8	28.7											11				
12				22.5	24.8	27.2	29.5	31.8	34.2										12				
13				26.3	29.0	31.8	34.5	37.2	40.0	42.7	45.4	48.2	50.9						13				
14					33.5	36.7	39.8	43.0	46.2	49.3	52.5	55.7	58.9						14				
15					38.2	41.9	45.5	49.1	52.8	56.4	60.0	63.7	67.3						15				
16					43.2	47.3	51.5	55.6	59.8	63.9	68.0	72.2	76.3						16				
17						53.1	57.8	62.5	67.1	71.8	76.5	81.1	85.8						17				
18						59.2	64.4	69.6	74.9	80.1	85.4	90.6	95.8	101.1	106.3				18				
19						65.5	71.4	77.2	83.0	88.9	94.7	100.5	106.4	112.2	118.0				19				
20							78.6	85.1	91.6	98.0	104.5	111.0	117.4	123.9	130.4				20				
21							86.2	93.4	100.5	107.6	114.7	121.9	129.0	136.1	143.3				21				
22							94.1	102.0	109.8	117.6	125.4	133.3	141.1	148.9	156.7				22				
23							102.4	110.9	119.5	128.0	136.6	145.1	153.7	162.3	170.8	179.4	187.9		23				
24							111.0	120.3	129.6	138.9	148.2	157.5	166.8	176.1	185.4	194.8	204.1		24				
25								130.0	140.1	150.2	160.3	170.4	180.5	190.6	200.7	210.8	220.9		25				
26								140.0	150.9	161.8	172.8	183.7	194.6	205.6	216.5	227.4	238.3		26				
27								150.4	162.2	174.0	185.7	197.5	209.3	221.1	232.9	244.7	256.4		27				
28								161.1	173.8	186.5	199.2	211.8	224.5	237.2	249.8	262.5	275.2	287.9	300.5	28			
29									185.8	199.4	213.0	226.6	240.2	253.8	267.4	281.0	294.6	308.2	321.8	29			
30									198.2	212.8	227.3	241.9	256.4	271.0	285.5	300.1	314.6	329.2	343.7	30			
31									211.0	226.6	242.1	257.6	273.2	288.7	304.3	319.8	335.3	350.9	366.4	31			
32									224.2	240.8	257.3	273.9	290.4	307.0	323.6	340.1	356.7	373.2	389.8	32			
33										273.0	290.6	308.2	325.8	343.4	361.0	378.6	396.2	413.9	431.5	33			
34										289.2	307.8	326.5	345.2	363.9	382.6	401.3	420.0	438.6	457.3	34			
35										305.7	325.5	345.3	365.1	384.9	404.7	424.5	444.4	464.2	484.0	35			
36										322.8	343.7	364.7	385.6	406.6	427.5	448.5	469.4	490.4	511.3	36			
37										340.3	362.4	384.5	406.7	428.8	450.9	473.0	495.2	517.3	539.4	37			
38											381.5	404.9	428.2	451.6	474.9	498.3	521.6	544.9	568.2	38			
39											401.2	425.8	450.4	474.9	499.5	524.1	548.7	573.3	597.8	39			
40											421.3	447.2	473.0	498.9	524.8	550.6	576.5	602.4	628.3	40			
41											441.9	469.1	496.3	523.4	550.6	577.8	605.0	632.1	659.3	41			
42											463.0	491.5	520.0	548.6	577.1	605.6	634.1	662.6	691.1	42			
43												514.5	544.4	574.3	604.2	634.0	663.9	693.8	723.7	43			
44												538.0	569.2	600.5	631.8	663.1	694.4	725.7	756.9	44			
45												561.9	594.7	627.4	660.1	692.9	725.6	758.3	791.0	45			
46												586.4	620.7	654.9	689.1	723.3	757.5	791.7	825.9	46			
47												611.5	647.2	682.9	718.6	754.3	790.0	825.7	861.4	47			
48												637.0	674.3	711.5	748.7	786.0	823.2	860.5	897.7	48			
49													701.9	740.7	779.5	818.3	857.1	895.9	934.7	49			
50														730.1	770.5	810.9	851.3	891.7	932.1	972.5	50		
51															758.8	800.8	842.9	884.9	927.0	969.0	51		
52																875.5	919.2	962.9	1 006.6	1 049.3	52		
53																908.7	954.1	999.5	1 044.9	1 090.3	53		
54																	942.5	989.7	1 036.8	1 083.9	1 131.0	54	
55																		977.0	1 025.9	1 074.8	1 123.7	1 172.6	55
56																						56	
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)				

Pino d'Aleppo  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino d'Aleppo  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)			
5																			5			
6																			6			
7																			7			
8	9.3	9.6	9.9	10.3	10.6	10.9	11.2	11.5											8			
9	11.0	11.4	11.8	12.2	12.6	13.0	13.4	13.9											9			
10		13.2	13.7	14.3	14.8	15.3	15.8	16.3											10			
11			15.8	16.4	17.0	17.6	18.2	18.8											11			
12			17.9	18.6	19.3	20.0	20.8	21.5											12			
13			20.0	20.9	21.7	22.6	23.4	24.3	25.2	26.0	26.9	27.7							13			
14				23.2	24.2	25.2	26.2	27.2	28.2	29.2	30.2	31.2							14			
15				25.7	26.8	28.0	29.1	30.2	31.4	32.5	33.7	34.8							15			
16				28.2	29.5	30.8	32.1	33.4	34.7	36.0	37.3	38.6							16			
17					32.3	33.8	35.2	36.7	38.2	39.6	41.1	42.5							17			
18					35.2	36.8	38.4	40.1	41.7	43.4	45.0	46.7	48.3	49.9					18			
19					38.1	40.0	41.8	43.6	45.4	47.3	49.1	50.9	52.8	54.6					19			
20						43.2	45.2	47.3	49.3	51.3	53.3	55.4	57.4	59.4					20			
21						46.6	48.8	51.0	53.3	55.5	57.7	60.0	62.2	64.4					21			
22						50.0	52.5	54.9	57.4	59.8	62.3	64.7	67.2	69.6					22			
23						53.6	56.2	58.9	61.6	64.3	67.0	69.7	72.3	75.0	77.7	80.4			23			
24						57.2	60.1	63.1	66.0	68.9	71.8	74.7	77.7	80.6	83.5	86.4			24			
25							64.1	67.3	70.5	73.6	76.8	80.0	83.2	86.3	89.5	92.7			25			
26							68.3	71.7	75.1	78.5	82.0	85.4	88.8	92.2	95.7	99.1			26			
27							72.5	76.2	79.9	83.6	87.3	91.0	94.7	98.4	102.1	105.7			27			
28							76.8	80.8	84.8	88.7	92.7	96.7	100.7	104.6	108.6	112.6	116.6	120.5	28			
29								85.5	89.8	94.1	98.3	102.6	106.9	111.1	115.4	119.7	123.9	128.2	29			
30								90.4	95.0	99.5	104.1	108.7	113.2	117.8	122.3	126.9	131.5	136.0	30			
31								95.4	100.3	105.1	110.0	114.9	119.7	124.6	129.5	134.4	139.2	144.1	31			
32								100.5	105.7	110.9	116.1	121.3	126.4	131.6	136.8	142.0	147.2	152.4	32			
33									116.8	122.3	127.8	133.3	138.8	144.4	149.9	155.4	160.9		33			
34									122.8	128.6	134.5	140.4	146.2	152.1	158.0	163.8	169.7		34			
35									129.0	135.2	141.4	147.6	153.8	160.0	166.2	172.4	178.6		35			
36									135.3	141.8	148.4	155.0	161.6	168.1	174.7	181.3	187.8		36			
37									141.7	148.7	155.6	162.5	169.5	176.4	183.4	190.3	197.3		37			
38										155.6	163.0	170.3	177.6	184.9	192.2	199.6	206.9		38			
39										162.8	170.5	178.2	185.9	193.6	201.3	209.0	216.8		39			
40										170.0	178.2	186.3	194.4	202.5	210.6	218.7	226.8		40			
41										177.5	186.0	194.5	203.1	211.6	220.1	228.6	237.1		41			
42										185.1	194.0	203.0	211.9	220.8	229.8	238.7	247.7		42			
43											202.2	211.6	220.9	230.3	239.7	249.1	258.4		43			
44											210.5	220.3	230.1	240.0	249.8	259.6	269.4		44			
45											219.0	229.3	239.5	249.8	260.1	270.3	280.6		45			
46											227.7	238.4	249.1	259.8	270.6	281.3	292.0		46			
47											236.5	247.7	258.9	270.1	281.3	292.5	303.7		47			
48											245.5	257.1	268.8	280.5	292.2	303.9	315.5		48			
49												266.8	278.9	291.1	303.3	315.5	327.6		49			
50												276.6	289.2	301.9	314.6	327.3	339.9		50			
51													286.5	299.7	312.9	326.1	339.3	352.5	51			
52														310.4	324.1	337.8	351.5	365.2	52			
53															321.3	335.5	349.7	364.0	378.2	53		
54																332.3	347.1	361.9	376.7	391.4	54	
55																	343.5	358.9	374.2	389.5	404.9	55
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70																						70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)			

Pino d'Aleppo  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino d'Aleppo  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2											8
9	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3											9
10		0.2	0.2	0.3	0.3	0.3	0.4	0.4											10
11			0.3	0.3	0.4	0.4	0.5	0.5											11
12			0.4	0.4	0.5	0.5	0.6	0.6											12
13			0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9							13
14				0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1							14
15				0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3							15
16				0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.4							16
17					1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.6							17
18					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0					18
19					1.2	1.3	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3					19
20						1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4	2.5					20
21						1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6	2.8					21
22						1.8	1.9	2.1	2.3	2.4	2.6	2.7	2.9	3.0					22
23						2.0	2.1	2.3	2.5	2.6	2.8	3.0	3.1	3.3	3.5	3.7			23
24						2.1	2.3	2.5	2.7	2.9	3.1	3.2	3.4	3.6	3.8	4.0			24
25							2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3			25
26							2.7	2.9	3.1	3.4	3.6	3.8	4.0	4.2	4.4	4.7			26
27							2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.8	5.0			27
28							3.1	3.4	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.7	5.9	28
29								3.6	3.9	4.2	4.4	4.7	5.0	5.2	5.5	5.8	6.1	6.3	29
30								3.9	4.2	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	30
31								4.1	4.4	4.7	5.0	5.4	5.7	6.0	6.3	6.6	6.9	7.2	31
32								4.4	4.7	5.0	5.4	5.7	6.0	6.4	6.7	7.0	7.4	7.7	32
33									5.4	5.7	6.1	6.4	6.8	7.1	7.5	7.8	8.2	8.3	33
34									5.7	6.0	6.4	6.8	7.2	7.5	7.9	8.3	8.7	8.7	34
35									6.0	6.4	6.8	7.2	7.6	8.0	8.4	8.8	9.2	9.2	35
36									6.3	6.8	7.2	7.6	8.0	8.4	8.9	9.3	9.7	9.7	36
37									6.7	7.1	7.6	8.0	8.5	8.9	9.3	9.8	10.2	10.2	37
38										7.5	8.0	8.5	8.9	9.4	9.9	10.3	10.8	10.8	38
39										7.9	8.4	8.9	9.4	9.9	10.4	10.9	11.4	11.4	39
40										8.3	8.8	9.3	9.9	10.4	10.9	11.4	11.9	11.9	40
41										8.7	9.3	9.8	10.4	10.9	11.4	12.0	12.5	12.5	41
42										9.1	9.7	10.3	10.9	11.4	12.0	12.6	13.1	13.1	42
43											10.2	10.8	11.4	12.0	12.6	13.2	13.8	13.8	43
44											10.6	11.3	11.9	12.5	13.1	13.8	14.4	14.4	44
45											11.1	11.8	12.4	13.1	13.7	14.4	15.0	15.0	45
46											11.6	12.3	13.0	13.7	14.3	15.0	15.7	15.7	46
47											12.1	12.8	13.5	14.2	15.0	15.7	16.4	16.4	47
48											12.6	13.4	14.1	14.8	15.6	16.3	17.1	17.1	48
49												13.9	14.7	15.5	16.2	17.0	17.8	17.8	49
50												14.5	15.3	16.1	16.9	17.7	18.5	18.5	50
51													15.0	15.9	16.7	17.6	18.4	19.3	51
52														17.4	18.3	19.1	20.0	20.0	52
53														18.0	19.0	19.9	20.8	20.8	53
54														18.7	19.7	20.6	21.5	21.5	54
55														19.4	20.4	21.4	22.3	22.3	55
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino d'Aleppo  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino d'Aleppo  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	16.9	18.3	19.6	21.0	22.4	23.8	25.1	26.5											8
9	21.0	22.7	24.5	26.2	27.9	29.7	31.4	33.2											9
10		27.4	29.6	31.7	33.9	36.0	38.2	40.4											10
11			35.0	37.6	40.2	42.8	45.4	48.1											11
12			40.7	43.8	46.9	50.1	53.2	56.3											12
13			46.8	50.4	54.1	57.7	61.3	65.0	68.6	72.3	75.9	79.6							13
14				57.3	61.6	65.8	70.0	74.2	78.5	82.7	86.9	91.1							14
15				64.6	69.4	74.3	79.1	84.0	88.8	93.7	98.5	103.4							15
16				72.2	77.7	83.2	88.8	94.3	99.8	105.3	110.8	116.4							16
17					86.4	92.6	98.8	105.1	111.3	117.5	123.8	130.0							17
18					95.4	102.4	109.4	116.4	123.4	130.4	137.3	144.3	151.3	158.3					18
19					104.9	112.6	120.4	128.2	136.0	143.8	151.6	159.3	167.1	174.9					19
20						123.3	131.9	140.6	149.2	157.8	166.4	175.1	183.7	192.3					20
21						134.4	143.9	153.4	162.9	172.4	182.0	191.5	201.0	210.5					21
22						145.9	156.4	166.8	177.2	187.7	198.1	208.6	219.0	229.4					22
23						157.9	169.3	180.7	192.1	203.5	214.9	226.3	237.7	249.1	260.5	272.0			23
24						170.3	182.7	195.1	207.6	220.0	232.4	244.8	257.2	269.6	282.1	294.5			24
25							196.6	210.1	223.5	237.0	250.5	264.0	277.4	290.9	304.4	317.9			25
26							210.9	225.5	240.1	254.7	269.2	283.8	298.4	313.0	327.5	342.1			26
27							225.8	241.5	257.2	272.9	288.6	304.4	320.1	335.8	351.5	367.2			27
28							241.1	258.0	274.9	291.8	308.7	325.6	342.5	359.4	376.3	393.2	410.1	427.0	28
29								275.0	293.1	311.2	329.4	347.5	365.6	383.8	401.9	420.0	438.2	456.3	29
30								292.5	311.9	331.3	350.7	370.1	389.5	408.9	428.3	447.7	467.1	486.5	30
31								310.5	331.3	352.0	372.7	393.4	414.1	434.9	455.6	476.3	497.0	517.7	31
32								329.1	351.2	373.3	395.3	417.4	439.5	461.6	483.6	505.7	527.8	549.9	32
33									395.1	418.6	442.1	465.6	489.0	512.5	536.0	559.5	583.0		33
34									417.6	442.5	467.5	492.4	517.3	542.2	567.2	592.1	617.0		34
35									440.7	467.1	493.5	519.9	546.3	572.8	599.2	625.6	652.0		35
36									464.4	492.3	520.3	548.2	576.2	604.1	632.0	660.0	687.9		36
37									488.7	518.2	547.7	577.2	606.7	636.3	665.8	695.3	724.8		37
38										544.7	575.8	607.0	638.1	669.2	700.4	731.5	762.6		38
39										571.9	604.7	637.5	670.2	703.0	735.8	768.6	801.4		39
40										599.7	634.2	668.7	703.2	737.7	772.2	806.6	841.1		40
41										628.1	664.4	700.6	736.9	773.1	809.3	845.6	881.8		41
42										657.2	695.3	733.3	771.3	809.4	847.4	885.4	923.4		42
43											726.8	766.7	806.6	846.4	886.3	926.2	966.0		43
44											759.1	800.8	842.6	884.3	926.1	967.8	1 009.5		44
45											792.1	835.7	879.4	923.0	966.7	1 010.4	1 054.0		45
46											825.7	871.3	917.0	962.6	1 008.2	1 053.8	1 099.4		46
47											860.1	907.7	955.3	1 002.9	1 050.6	1 098.2	1 145.8		47
48											895.1	944.8	994.4	1 044.1	1 093.8	1 143.4	1 193.1		48
49												982.6	1 034.3	1 086.1	1 137.9	1 189.6	1 241.4		49
50												1 021.1	1 075.0	1 128.9	1 182.8	1 236.7	1 290.6		50
51												1 060.4	1 116.5	1 172.5	1 228.6	1 284.7	1 340.8		51
52													1 217.0	1 275.3	1 333.6	1 391.9		52	
53													1 262.3	1 322.8	1 383.4	1 443.9		53	
54													1 308.3	1 371.2	1 434.1	1 496.9		54	
55													1 355.3	1 420.5	1 485.7	1 550.9		55	
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68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino d'Aleppo  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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***Pinus laricio* Poiret**

**Pino laricio**

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## Pino laricio

### Volume del fusto e dei rami grossi

$$n = 50 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [6.4383 \quad 3.8594 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.2482 \\ -7.5710 \cdot 10^{-4} & 3.0428 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 6.3906 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$$n = 50 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.4558 \quad 1.4464 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.5819 \\ -6.0180 \cdot 10^{-4} & 2.4186 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 5.0798 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$$n = 50 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [6.5094 \cdot 10^{-3} \quad 1.4374 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.9142 \cdot 10^{-2} & \\ -9.1233 \cdot 10^{-6} & 3.6667 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 7.7010 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 50$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [7.8209 \cdot 10^{-2} \quad 3.5188 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 7.3547 \cdot 10^{-3} & \\ -1.7143 \cdot 10^{-6} & 6.8896 \cdot 10^{-10} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.4470 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 50$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.5405 \quad 1.6253 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.7611 & \\ -6.4357 \cdot 10^{-4} & 2.5865 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.4324 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Pino laricio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5	11.3	12.2	13.2	14.2	15.1	16.1													5	
6	13.4	14.8	16.2	17.6	18.9	20.3													6	
7	15.9	17.8	19.7	21.6	23.5	25.3													7	
8				26.2	28.7	31.1	33.6	36.1	38.5	41.0									8	
9				31.4	34.6	37.7	40.8	44.0	47.1	50.2									9	
10				37.3	41.2	45.0	48.9	52.8	56.6	60.5	64.3	68.2							10	
11				43.8	48.5	53.1	57.8	62.5	67.1	71.8	76.5	81.2							11	
12				50.9	56.5	62.0	67.6	73.1	78.7	84.2	89.8	95.4							12	
13					71.7	78.2	84.7	91.2	97.8	104.3	110.8	117.3	123.8						13	
14						82.1	89.6	97.2	104.8	112.3	119.9	127.5	135.0	142.6					14	
15							93.3	102.0	110.6	119.3	128.0	136.7	145.4	154.1	162.7				15	
16							105.2	115.1	125.0	134.9	144.8	154.6	164.5	174.4	184.3				16	
17							118.0	129.1	140.3	151.4	162.6	173.7	184.9	196.1	207.2				17	
18									156.5	169.0	181.5	194.0	206.5	219.0	231.5	244.0	256.5		18	
19									173.6	187.6	201.5	215.4	229.4	243.3	257.2	271.2	285.1		19	
20									191.7	207.1	222.6	238.0	253.4	268.9	284.3	299.8	315.2		20	
21									210.7	227.7	244.7	261.7	278.8	295.8	312.8	329.8	346.8		21	
22									230.6	249.3	268.0	286.6	305.3	324.0	342.7	361.3	380.0		22	
23											292.3	312.7	333.1	353.5	373.9	394.3	414.8	435.2	455.6	23
24											317.7	339.9	362.1	384.4	406.6	428.8	451.0	473.3	495.5	24
25											344.1	368.3	392.4	416.5	440.6	464.7	488.9	513.0	537.1	25
26											371.7	397.8	423.9	450.0	476.1	502.1	528.2	554.3	580.4	26
27											400.3	428.5	456.6	484.7	512.9	541.0	569.1	597.3	625.4	27
28													490.6	520.8	551.1	581.3	611.6	641.8	672.1	28
29													525.8	558.2	590.7	623.1	655.6	688.0	720.5	29
30													562.2	596.9	631.7	666.4	701.1	735.9	770.6	30
31													599.9	636.9	674.0	711.1	748.2	785.3	822.4	31
32													638.8	678.3	717.8	757.3	796.8	836.4	875.9	32
33													678.9	720.9	763.0	805.0	847.0	889.0	931.1	33
34													720.3	764.9	809.5	854.1	898.7	943.3	988.0	34
35													762.9	810.2	857.4	904.7	952.0	999.3	1 046.5	35
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70																				70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Pino laricio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino laricio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.3	3.6	4.0	4.3	4.7	5.1													5
6	4.1	4.6	5.1	5.6	6.1	6.7													6
7	5.0	5.7	6.4	7.1	7.8	8.5													7
8				8.9	9.8	10.7	11.6	12.6	13.5	14.4									8
9				10.8	12.0	13.2	14.3	15.5	16.7	17.9									9
10				13.0	14.5	15.9	17.4	18.8	20.3	21.7	23.2	24.6							10
11				15.5	17.2	19.0	20.7	22.5	24.2	26.0	27.7	29.5							11
12				18.1	20.2	22.3	24.4	26.4	28.5	30.6	32.7	34.8							12
13					25.9	28.3	30.8	33.2	35.7	38.1	40.6	43.0	45.5						13
14					29.8	32.6	35.5	38.3	41.1	44.0	46.8	49.6	52.5						14
15					34.0	37.3	40.5	43.8	47.0	50.3	53.5	56.8	60.0						15
16					38.5	42.2	45.9	49.6	53.3	57.0	60.7	64.4	68.1						16
17					43.3	47.4	51.6	55.8	60.0	64.2	68.3	72.5	76.7						17
18							57.7	62.4	67.1	71.8	76.4	81.1	85.8	90.5	95.2				18
19							64.1	69.3	74.6	79.8	85.0	90.2	95.4	100.7	105.9				19
20							70.9	76.7	82.5	88.2	94.0	99.8	105.6	111.4	117.2				20
21							78.0	84.4	90.8	97.1	103.5	109.9	116.3	122.6	129.0				21
22							85.5	92.5	99.5	106.5	113.5	120.5	127.5	134.5	141.5				22
23									108.6	116.2	123.9	131.5	139.2	146.8	154.5	162.1	169.8		23
24									118.1	126.4	134.8	143.1	151.4	159.7	168.1	176.4	184.7		24
25									128.0	137.1	146.1	155.1	164.2	173.2	182.3	191.3	200.3		25
26									138.3	148.1	157.9	167.7	177.5	187.2	197.0	206.8	216.6		26
27									149.1	159.6	170.2	180.7	191.3	201.8	212.3	222.9	233.4		27
28										182.9	194.2	205.6	216.9	228.3	239.6	250.9			28
29										196.1	208.2	220.4	232.6	244.7	256.9	269.1			29
30										209.7	222.8	235.8	248.8	261.8	274.8	287.8			30
31										223.9	237.8	251.7	265.6	279.5	293.4	307.3			31
32										238.4	253.2	268.1	282.9	297.7	312.5	327.3			32
33										253.5	269.2	285.0	300.7	316.5	332.2	348.0			33
34										269.0	285.7	302.4	319.1	335.9	352.6	369.3			34
35										285.0	302.7	320.4	338.1	355.8	373.5	391.3			35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino laricio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino laricio  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.3	0.3	0.3	0.4													5
6	0.3	0.3	0.4	0.4	0.5	0.5													6
7	0.4	0.4	0.5	0.6	0.6	0.7													7
8				0.7	0.8	0.9	1.0	1.1	1.2	1.3									8
9				0.9	1.1	1.2	1.3	1.4	1.5	1.6									9
10				1.2	1.3	1.4	1.6	1.7	1.9	2.0	2.2	2.3							10
11				1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.8							11
12				1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.3							12
13						2.4	2.7	2.9	3.2	3.4	3.7	3.9	4.1	4.4					13
14						2.8	3.1	3.4	3.7	4.0	4.2	4.5	4.8	5.1					14
15						3.2	3.6	3.9	4.2	4.5	4.9	5.2	5.5	5.8					15
16						3.7	4.1	4.4	4.8	5.2	5.5	5.9	6.3	6.6					16
17						4.2	4.6	5.0	5.4	5.8	6.2	6.7	7.1	7.5					17
18								5.6	6.1	6.5	7.0	7.5	7.9	8.4	8.9	9.3			18
19								6.2	6.8	7.3	7.8	8.3	8.8	9.3	9.9	10.4			19
20								6.9	7.5	8.1	8.6	9.2	9.8	10.4	10.9	11.5			20
21								7.6	8.2	8.9	9.5	10.1	10.8	11.4	12.1	12.7			21
22								8.4	9.1	9.7	10.4	11.1	11.8	12.5	13.2	13.9			22
23										10.7	11.4	12.2	12.9	13.7	14.5	15.2	16.0	16.7	23
24										11.6	12.4	13.3	14.1	14.9	15.7	16.6	17.4	18.2	24
25										12.6	13.5	14.4	15.3	16.2	17.1	18.0	18.9	19.8	25
26										13.6	14.6	15.6	16.5	17.5	18.5	19.4	20.4	21.4	26
27										14.7	15.7	16.8	17.8	18.9	19.9	21.0	22.0	23.1	27
28												18.0	19.2	20.3	21.4	22.5	23.7	24.8	28
29												19.3	20.6	21.8	23.0	24.2	25.4	26.6	29
30												20.7	22.0	23.3	24.6	25.9	27.2	28.5	30
31												22.1	23.5	24.9	26.3	27.6	29.0	30.4	31
32												23.6	25.0	26.5	28.0	29.4	30.9	32.4	32
33												25.1	26.6	28.2	29.7	31.3	32.9	34.4	33
34												26.6	28.3	29.9	31.6	33.2	34.9	36.6	34
35												28.2	29.9	31.7	33.5	35.2	37.0	38.7	35
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino laricio  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino laricio  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.2	0.2													5
6	0.1	0.2	0.2	0.2	0.2	0.2													6
7	0.2	0.2	0.2	0.2	0.2	0.2	0.3												7
8				0.3	0.3	0.3	0.3	0.3	0.4	0.4									8
9				0.3	0.3	0.4	0.4	0.4	0.4	0.5									9
10				0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6							10
11				0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8							11
12				0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9							12
13						0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1					13
14						0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.3					14
15						0.9	0.9	1.0	1.1	1.2	1.3	1.3	1.4	1.5					15
16						1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7					16
17						1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9					17
18								1.4	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.4			18
19								1.6	1.7	1.9	2.0	2.1	2.2	2.4	2.5	2.6			19
20								1.8	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9			20
21								1.9	2.1	2.3	2.4	2.6	2.7	2.9	3.0	3.2			21
22								2.1	2.3	2.5	2.6	2.8	3.0	3.1	3.3	3.5			22
23									2.7	2.9	3.1	3.2	3.4	3.6	3.8	4.0	4.2		23
24									2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5		24
25									3.2	3.4	3.6	3.8	4.0	4.3	4.5	4.7	4.9		25
26									3.4	3.6	3.9	4.1	4.4	4.6	4.8	5.1	5.3		26
27									3.7	3.9	4.2	4.4	4.7	5.0	5.2	5.5	5.7		27
28											4.5	4.8	5.0	5.3	5.6	5.9	6.1		28
29											4.8	5.1	5.4	5.7	6.0	6.3	6.6		29
30											5.1	5.5	5.8	6.1	6.4	6.7	7.0		30
31											5.5	5.8	6.2	6.5	6.8	7.2	7.5		31
32											5.8	6.2	6.6	6.9	7.3	7.6	8.0		32
33											6.2	6.6	7.0	7.4	7.7	8.1	8.5		33
34											6.6	7.0	7.4	7.8	8.2	8.6	9.0		34
35											7.0	7.4	7.8	8.3	8.7	9.1	9.6		35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino laricio  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino laricio  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.6	4.0	4.4	4.8	5.2	5.6													5
6	4.5	5.1	5.6	6.2	6.8	7.4													6
7	5.5	6.3	7.1	7.9	8.7	9.5													7
8				9.9	10.9	11.9	13.0	14.0	15.1	16.1									8
9				12.1	13.4	14.7	16.0	17.3	18.7	20.0									9
10				14.5	16.2	17.8	19.4	21.0	22.7	24.3	25.9	27.5							10
11				17.3	19.2	21.2	23.2	25.1	27.1	29.1	31.0	33.0							11
12				20.3	22.6	24.9	27.3	29.6	32.0	34.3	36.6	39.0							12
13					29.0	31.8	34.5	37.2	40.0	42.7	45.5	48.2	51.0						13
14						33.4	36.6	39.8	43.0	46.1	49.3	52.5	55.7	58.9					14
15							38.1	41.8	45.4	49.1	52.7	56.4	60.1	63.7	67.4				15
16							43.1	47.3	51.5	55.6	59.8	64.0	68.1	72.3	76.4				16
17							48.5	53.2	57.9	62.6	67.3	72.0	76.7	81.4	86.1				17
18								64.7	70.0	75.3	80.5	85.8	91.1	96.3	101.6	106.9			18
19								71.9	77.8	83.7	89.6	95.4	101.3	107.2	113.0	118.9			19
20								79.6	86.1	92.6	99.1	105.6	112.1	118.6	125.1	131.6			20
21								87.6	94.7	101.9	109.1	116.2	123.4	130.6	137.7	144.9			21
22								95.9	103.8	111.7	119.5	127.4	135.3	143.1	151.0	158.9			22
23										121.9	130.5	139.1	147.7	156.3	164.9	173.5	182.1	190.7	23
24										132.6	142.0	151.3	160.7	170.1	179.4	188.8	198.1	207.5	24
25										143.8	153.9	164.1	174.2	184.4	194.5	204.7	214.9	225.0	25
26										155.4	166.3	177.3	188.3	199.3	210.3	221.3	232.3	243.3	26
27										167.4	179.3	191.1	203.0	214.8	226.7	238.5	250.4	262.2	27
28												205.4	218.2	230.9	243.6	256.4	269.1	281.9	28
29												220.2	233.9	247.6	261.2	274.9	288.6	302.3	29
30												235.6	250.2	264.8	279.5	294.1	308.7	323.3	30
31												251.4	267.1	282.7	298.3	313.9	329.5	345.2	31
32												267.8	284.5	301.1	317.8	334.4	351.0	367.7	32
33												284.7	302.4	320.1	337.8	355.5	373.2	390.9	33
34												302.2	320.9	339.7	358.5	377.3	396.1	414.9	34
35												320.1	340.0	359.9	379.8	399.7	419.6	439.6	35
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino laricio  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pinus nigra* Arn.**

**Pino nero**



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## Pino nero

### Volume del fusto e dei rami grossi

$n = 63$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.1480 \cdot 10 \quad 3.3448 \cdot 10^{-2} \quad 2.9088]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 2.9797 \cdot 10 & & \\ 4.5880 \cdot 10^{-3} & 1.3001 \cdot 10^{-6} & \\ -3.0604 & -5.4676 \cdot 10^{-4} & 3.3202 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.7090 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 63$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.2732 \cdot 10 \quad 1.4692 \cdot 10^{-2} \quad 1.5988]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.2231 \cdot 10 & & \\ 1.8832 \cdot 10^{-3} & 5.3364 \cdot 10^{-7} & \\ -1.2562 & -2.2443 \cdot 10^{-4} & 1.3628 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 7.0148 \cdot 10^{-6}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 63$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.0573 \cdot 10 \quad 2.5163 \cdot 10^{-3} \quad 2.4937]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.1801 \cdot 10^{-3} & & \\ 3.3568 \cdot 10^{-3} & 9.5121 \cdot 10^{-7} & \\ -2.2391 & -4.0004 \cdot 10^{-4} & 2.4292 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.2504 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 63$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-6.6688 \cdot 10^{-1} \quad 1.5495 \cdot 10^{-4} \quad 9.8741 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.2142 \cdot 10^{-2} & & \\ 8.0285 \cdot 10^{-6} & 2.2750 \cdot 10^{-9} & \\ -5.3553 \cdot 10^{-3} & -9.5677 \cdot 10^{-7} & 5.8100 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.9906 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 63$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-3.3972 \cdot 10 \quad 1.7363 \cdot 10^{-2} \quad 4.1912]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 4.9203 \cdot 10^{-3} & & \\ 7.5759 \cdot 10^{-3} & 2.1468 \cdot 10^{-6} & \\ -5.0534 & -9.0284 \cdot 10^{-4} & 5.4825 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.8220 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Pino nero  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	12.5	14.6	16.8	18.9	21.1	23.2	25.3	27.5											8
9	18.2	21.0	23.7	26.4	29.1	31.8	34.5	37.2											9
10	24.3	27.7	31.0	34.4	37.7	41.1	44.4	47.7											10
11	30.8	34.8	38.8	42.9	46.9	51.0	55.0	59.1											11
12	37.5	42.3	47.1	52.0	56.8	61.6	66.4	71.2											12
13	44.6	50.3	55.9	61.6	67.2	72.9	78.5	84.2	89.8	95.5									13
14				71.7	78.2	84.8	91.4	97.9	104.5	111.0									14
15				82.4	89.9	97.4	104.9	112.5	120.0	127.5									15
16				93.6	102.1	110.7	119.3	127.8	136.4	144.9									16
17				105.3	115.0	124.6	134.3	144.0	153.6	163.3									17
18				117.6	128.4	139.2	150.1	160.9	171.8	182.6	193.4	204.3							18
19				130.4	142.5	154.5	166.6	178.7	190.8	202.8	214.9	227.0							19
20					170.5	183.9	197.2	210.6	224.0	237.4	250.8								20
21					187.1	201.9	216.6	231.4	246.1	260.9	275.6								21
22					204.4	220.6	236.8	253.0	269.2	285.3	301.5								22
23							257.8	275.4	293.1	310.8	328.5	346.2	363.9						23
24							279.5	298.8	318.1	337.3	356.6	375.9	395.1						24
25							302.1	323.0	343.9	364.8	385.7	406.6	427.5						25
26							325.5	348.1	370.7	393.3	415.9	438.5	461.1						26
27							349.7	374.0	398.4	422.8	447.2	471.6	496.0						27
28							374.6	400.9	427.1	453.3	479.5	505.8	532.0	558.2	584.4	610.7	636.9		28
29							400.4	428.6	456.7	484.8	513.0	541.1	569.2	597.3	625.5	653.6	681.7		29
30							427.0	457.1	487.2	517.3	547.4	577.5	607.6	637.7	667.8	698.0	728.1		30
31							454.4	486.6	518.7	550.8	583.0	615.1	647.3	679.4	711.6	743.7	775.9		31
32							482.6	516.9	551.1	585.4	619.6	653.9	688.1	722.4	756.6	790.9	825.1		32
33							511.1	546.4	581.7	616.9	652.1	687.3	722.5	757.7	792.9	828.1	863.3		33
34							540.4	576.7	613.0	649.2	685.4	721.6	757.8	793.9	830.1	866.3	902.5		34
35							570.7	607.9	645.1	682.2	719.3	756.4	793.5	830.6	867.7	904.8	941.9		35
36							602.0	639.9	677.8	715.7	753.6	791.5	829.4	867.3	905.2	943.1	981.0		36
37							634.3	672.9	711.5	750.1	788.6	827.2	865.7	904.3	942.8	981.4	1020.0		37
38							667.6	706.9	746.2	785.5	824.8	864.1	903.4	942.7	982.0	1021.3	1060.6		38
39							702.0	742.1	782.1	822.1	862.1	902.1	942.1	982.1	1022.1	1062.1	1102.1		39
40							737.5	778.3	819.0	859.7	900.4	941.1	981.8	1022.5	1063.2	1103.9	1144.6		40
41							774.1	815.6	857.1	898.6	940.1	981.6	1023.1	1064.6	1106.1	1147.6	1189.1		41
42							811.8	854.1	896.4	938.7	981.0	1023.3	1065.6	1107.9	1150.2	1192.5	1234.8		42
43							850.6	893.7	936.8	979.9	1023.0	1066.1	1109.2	1152.3	1195.4	1238.5	1281.6		43
44							890.5	934.4	978.3	1022.2	1066.1	1110.0	1153.9	1197.8	1241.7	1285.6	1329.5		44
45							931.5	976.2	1020.9	1065.6	1110.3	1155.0	1200.0	1245.0	1290.0	1335.0	1380.0		45
46							973.6	1019.1	1064.6	1110.1	1155.6	1201.1	1246.6	1292.1	1337.6	1383.1	1428.6		46
47							1016.8	1063.1	1109.4	1155.7	1202.0	1248.3	1294.6	1340.9	1387.2	1433.5	1479.8		47
48							1061.1	1108.2	1155.3	1202.4	1249.5	1296.6	1343.7	1390.8	1437.9	1485.0	1532.1		48
49							1106.5	1154.4	1202.3	1250.2	1298.1	1346.0	1393.9	1441.8	1489.7	1537.6	1585.5		49
50							1153.0	1201.7	1250.4	1299.1	1347.8	1396.5	1445.2	1493.9	1542.6	1591.3	1640.0		50
51							1200.5	1250.1	1300.0	1350.0	1400.0	1450.0	1500.0	1550.0	1600.0	1650.0	1700.0		51
52							1249.1	1299.6	1350.1	1400.6	1451.1	1501.6	1552.1	1602.6	1653.1	1703.6	1754.1		52
53							1298.8	1349.9	1401.0	1452.1	1503.2	1554.3	1605.4	1656.5	1707.6	1758.7	1809.8		53
54							1349.5	1401.3	1453.1	1504.9	1556.7	1608.5	1660.3	1712.1	1763.9	1815.7	1867.5		54
55							1401.3	1454.0	1506.7	1559.4	1612.1	1664.8	1717.5	1770.2	1822.9	1875.6	1928.3		55
56							1454.2	1507.7	1561.2	1614.7	1668.2	1721.7	1775.2	1828.7	1882.2	1935.7	1989.2		56
57							1508.2	1562.5	1616.8	1671.1	1725.4	1779.7	1834.0	1888.3	1942.6	1996.9	2051.2		57
58							1563.3	1618.5	1673.7	1728.9	1784.1	1839.3	1894.5	1949.7	2004.9	2060.1	2115.3		58
59							1619.5	1675.5	1731.5	1787.5	1843.5	1899.5	1955.5	2011.5	2067.5	2123.5	2179.5		59
60							1676.8	1733.6	1790.4	1847.2	1904.0	1960.8	2017.6	2074.4	2131.2	2188.0	2244.8		60
61							1735.2	1792.8	1850.4	1908.0	1965.6	2023.2	2080.8	2138.4	2196.0	2253.6	2311.2		61
62							1794.7	1853.1	1911.5	1970.0	2028.4	2086.8	2145.2	2203.6	2262.0	2320.4	2378.8		62
63							1855.3	1914.5	1973.7	2032.9	2092.1	2151.3	2210.5	2269.7	2328.9	2388.1	2447.3		63
64							1917.0	1977.0	2037.0	2097.0	2157.0	2217.0	2277.0	2337.0	2397.0	2457.0	2517.0		64
65							1979.8	2039.6	2099.4	2159.2	2219.0	2278.8	2338.6	2398.4	2458.2	2518.0	2577.8		65
66							2043.7	2104.3	2164.9	2225.5	2286.1	2346.7	2407.3	2467.9	2528.5	2589.1	2649.7		66
67							2108.7	2169.9	2231.1	2292.3	2353.5	2414.7	2475.9	2537.1	2598.3	2659.5	2720.7		67
68							2174.8	2236.7	2298.6	2360.5	2422.4	2484.3	2546.2	2608.1	2670.0	2731.9	2793.8		68
69							2242.0	2304.6	2367.2	2429.8	2492.4	2555.0	2617.6	2680.2	2742.8	2805.4	2868.0		69
70							2310.3	2373.6	2436.9	2499.2	2561.5	2623.8	2686.1	2748.4	2810.7	2873.0	2935.3		70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino nero  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	912.3	948.7	985.1	1 021.6															33
34	966.7	1 005.4	1 044.1	1 082.7															34
35	1 022.7	1 063.7	1 104.7	1 145.6															35
36	1 080.3	1 123.6	1 167.0	1 210.3															36
37	1 139.3	1 185.1	1 230.9	1 276.7															37
38	1 199.9	1 248.2	1 296.5	1 344.8	1 393.1	1 441.4	1 489.7	1 538.0											38
39	1 262.1	1 312.9	1 363.8	1 414.7	1 465.6	1 516.4	1 567.3	1 618.2											39
40	1 325.8	1 379.3	1 432.8	1 486.3	1 539.8	1 593.3	1 646.9	1 700.4											40
41	1 391.0	1 447.2	1 503.4	1 559.7	1 615.9	1 672.1	1 728.3	1 784.6											41
42	1 457.7	1 516.7	1 575.7	1 634.7	1 693.8	1 752.8	1 811.8	1 870.8											42
43	1 526.0	1 587.9	1 649.7	1 711.6	1 773.4	1 835.3	1 897.1	1 959.0	2 020.8	2 082.6									43
44	1 595.9	1 660.6	1 725.4	1 790.1	1 854.9	1 919.7	1 984.4	2 049.2	2 113.9	2 178.7									44
45	1 667.3	1 735.0	1 802.7	1 870.5	1 938.2	2 005.9	2 073.6	2 141.4	2 209.1	2 276.8									45
46	1 740.2	1 810.9	1 881.7	1 952.5	2 023.3	2 094.1	2 164.8	2 235.6	2 306.4	2 377.2									46
47	1 814.6	1 888.5	1 962.4	2 036.3	2 110.2	2 184.1	2 257.9	2 331.8	2 405.7	2 479.6									47
48	1 890.6	1 967.7	2 044.7	2 121.8	2 198.9	2 275.9	2 353.0	2 430.1	2 507.1	2 584.2	2 661.3	2 738.3							48
49	1 968.2	2 048.5	2 128.8	2 209.1	2 289.4	2 369.7	2 450.0	2 530.3	2 610.6	2 690.9	2 771.2	2 851.5							49
50	2 047.2	2 130.8	2 214.5	2 298.1	2 381.7	2 465.3	2 548.9	2 632.6	2 716.2	2 799.8	2 883.4	2 967.0							50
51	2 127.8	2 214.8	2 301.8	2 388.8	2 475.8	2 562.8	2 649.8	2 736.8	2 823.8	2 910.8	2 997.8	3 084.8							51
52	2 210.0	2 300.4	2 390.9	2 481.3	2 571.7	2 662.2	2 752.6	2 843.1	2 933.5	3 024.0	3 114.4	3 204.9							52
53	2 293.7	2 387.6	2 481.6	2 575.5	2 669.5	2 763.4	2 857.4	2 951.3	3 045.3	3 139.3	3 233.2	3 327.2							53
54	2 378.9	2 476.4	2 574.0	2 671.5	2 769.0	2 866.6	2 964.1	3 061.6	3 159.2	3 256.7	3 354.2	3 451.8							54
55	2 465.6	2 566.8	2 668.0	2 769.2	2 870.4	2 971.5	3 072.7	3 173.9	3 275.1	3 376.3	3 477.5	3 578.6							55
56	2 554.0	2 658.8	2 763.7	2 868.6	2 973.5	3 078.4	3 183.3	3 288.2	3 393.1	3 498.0	3 602.9	3 707.8							56
57	2 643.8	2 752.5	2 861.1	2 969.8	3 078.5	3 187.2	3 295.8	3 404.5	3 513.2	3 621.8	3 730.5	3 839.2							57
58		2 847.7	2 960.2	3 072.7	3 185.2	3 297.8	3 410.3	3 522.8	3 635.3	3 747.8	3 860.4	3 972.9							58
59		2 944.5	3 061.0	3 177.4	3 293.8	3 410.2	3 526.7	3 643.1	3 759.5	3 876.0	3 992.4	4 108.8							59
60		3 043.0	3 163.4	3 283.8	3 404.2	3 524.6	3 645.0	3 765.4	3 885.8	4 006.3	4 126.7	4 247.1							60
61		3 143.0	3 267.5	3 391.9	3 516.4	3 640.8	3 765.3	3 889.8	4 014.2	4 138.7	4 263.1	4 387.6							61
62		3 244.6	3 373.2	3 501.8	3 630.4	3 758.9	3 887.5	4 016.1	4 144.7	4 273.2	4 401.8	4 530.4							62
63				3 613.4	3 746.2	3 878.9	4 011.7	4 144.4	4 277.2	4 409.9	4 542.7	4 675.4							63
64				3 726.8	3 863.8	4 000.8	4 137.8	4 274.8	4 411.8	4 548.8	4 685.8	4 822.8							64
65				3 841.9	3 983.2	4 124.5	4 265.8	4 407.1	4 548.4	4 689.8	4 831.1	4 972.4							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino nero  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	4.8	5.7	6.6	7.6	8.5	9.5	10.4	11.3											8
9	7.6	8.8	10.0	11.2	12.4	13.6	14.7	15.9											9
10	10.6	12.1	13.5	15.0	16.5	17.9	19.4	20.9											10
11	13.7	15.5	17.3	19.1	20.9	22.6	24.4	26.2											11
12	17.0	19.1	21.3	23.4	25.5	27.6	29.7	31.8											12
13	20.5	23.0	25.4	27.9	30.4	32.9	35.4	37.8	40.3	42.8									13
14				32.7	35.6	38.4	41.3	44.2	47.1	50.0									14
15				37.7	41.0	44.3	47.6	50.9	54.2	57.5									15
16				42.9	46.7	50.5	54.2	58.0	61.7	65.5									16
17				48.4	52.7	56.9	61.2	65.4	69.6	73.9									17
18				54.1	58.9	63.6	68.4	73.2	77.9	82.7	87.4	92.2							18
19				60.1	65.4	70.7	76.0	81.3	86.6	91.9	97.2	102.5							19
20						78.0	83.9	89.8	95.6	101.5	107.4	113.3							20
21						85.6	92.1	98.6	105.1	111.6	118.0	124.5							21
22						93.6	100.7	107.8	114.9	122.0	129.1	136.2							22
23								117.3	125.1	132.8	140.6	148.4	156.2	163.9					23
24								127.2	135.7	144.1	152.6	161.0	169.5	178.0					24
25								137.4	146.6	155.8	165.0	174.2	183.3	192.5					25
26								148.0	158.0	167.9	177.8	187.7	197.7	207.6					26
27								159.0	169.7	180.4	191.1	201.8	212.5	223.2					27
28								170.3	181.8	193.3	204.8	216.3	227.8	239.4	250.9	262.4	273.9	285.4	28
29								181.9	194.3	206.6	219.0	231.3	243.7	256.0	268.4	280.8	293.1	305.5	29
30								193.9	207.1	220.4	233.6	246.8	260.0	273.2	286.5	299.7	312.9	326.1	30
31								206.3	220.4	234.5	248.6	262.7	276.9	291.0	305.1	319.2	333.3	347.4	31
32								219.0	234.0	249.1	264.1	279.1	294.2	309.2	324.3	339.3	354.4	369.4	32
33								264.0	280.0	296.0	312.0	328.0	344.0	360.0	376.0	392.0	408.0	424.0	33
34								279.4	296.4	313.4	330.4	347.3	364.3	381.3	398.3	415.3	432.3	449.3	34
35								295.2	313.2	331.2	349.2	367.2	385.2	403.2	421.2	439.2	457.2	475.2	35
36								311.4	330.4	349.5	368.5	387.6	406.6	425.6	444.7	463.7	482.7	501.7	36
37								328.0	348.1	368.2	388.4	408.5	428.6	448.7	468.8	488.9	508.9	528.9	37
38										387.5	408.7	429.9	451.1	472.3	493.5	514.8	536.0	557.2	38
39										407.2	429.5	451.9	474.2	496.6	518.9	541.2	563.5	585.8	39
40										427.3	450.8	474.3	497.9	521.4	544.9	568.4	591.8	615.2	40
41										448.0	472.7	497.4	522.1	546.8	571.5	596.2	620.9	645.6	41
42										469.1	495.0	520.9	546.8	572.8	598.7	624.6	650.5	676.4	42
43												545.0	572.2	599.3	626.5	653.7	680.8	707.9	43
44												569.6	598.0	626.5	654.9	683.4	711.8	740.2	44
45												594.7	624.5	654.2	684.0	713.7	743.4	773.1	45
46												620.4	651.5	682.6	713.7	744.8	775.9	806.9	46
47												646.6	679.0	711.5	744.0	776.4	808.8	841.2	47
48														741.0	774.9	808.7	842.5	876.3	48
49														771.1	806.4	841.7	876.9	912.1	49
50														801.8	838.5	875.3	912.0	948.7	50
51														833.1	871.3	909.5	947.6	985.7	51
52														864.9	904.7	944.4	984.1	1023.8	52
53																979.9	1029.6	1079.3	53
54																	1 016.1	1 065.8	54
55																	1 053.0	1 102.7	55
56																	1 090.4	1 140.1	56
57																	1 128.6	1 178.3	57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino nero  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
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26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	408.0	424.0	440.0	456.0															33
34	432.3	449.2	466.2	483.2															34
35	457.2	475.2	493.2	511.2															35
36	482.8	501.8	520.8	539.9															36
37	509.0	529.1	549.3	569.4															37
38	536.0	557.2	578.4	599.6	620.8	642.0	663.3	684.5											38
39	563.6	585.9	608.3	630.6	653.0	675.3	697.7	720.0											39
40	591.9	615.4	638.9	662.4	685.9	709.4	732.9	756.4											40
41	620.9	645.6	670.3	694.9	719.6	744.3	769.0	793.7											41
42	650.5	676.4	702.3	728.3	754.2	780.1	806.0	831.9											42
43	680.8	708.0	735.2	762.3	789.5	816.7	843.8	871.0	898.1	925.3									43
44	711.8	740.3	768.7	797.2	825.6	854.0	882.5	910.9	939.4	967.8									44
45	743.5	773.2	803.0	832.7	862.5	892.3	922.0	951.8	981.5	1 011.3									45
46	775.8	806.9	838.0	869.1	900.2	931.3	962.4	993.5	1 024.5	1 055.6									46
47	808.9	841.3	873.8	906.2	938.7	971.1	1 003.6	1 036.1	1 068.5	1 101.0									47
48	842.6	876.4	910.3	944.1	978.0	1 011.8	1 045.7	1 079.5	1 113.4	1 147.2	1 181.1	1 214.9							48
49	876.9	912.2	947.5	982.8	1 018.0	1 053.3	1 088.6	1 123.9	1 159.1	1 194.4	1 229.7	1 265.0							49
50	912.0	948.7	985.5	1 022.2	1 058.9	1 095.6	1 132.4	1 169.1	1 205.8	1 242.6	1 279.3	1 316.0							50
51	947.7	985.9	1 024.2	1 062.4	1 100.6	1 138.8	1 177.0	1 215.2	1 253.4	1 291.7	1 329.9	1 368.1							51
52	984.1	1 023.9	1 063.6	1 103.3	1 143.0	1 182.8	1 222.5	1 262.2	1 301.9	1 341.7	1 381.4	1 421.1							52
53	1 021.2	1 062.5	1 103.8	1 145.0	1 186.3	1 227.6	1 268.8	1 310.1	1 351.4	1 392.6	1 433.9	1 475.2							53
54	1 059.0	1 101.8	1 144.7	1 187.5	1 230.3	1 273.2	1 316.0	1 358.9	1 401.7	1 444.5	1 487.4	1 530.2							54
55	1 097.4	1 141.8	1 186.3	1 230.7	1 275.2	1 319.6	1 364.1	1 408.5	1 452.9	1 497.4	1 541.8	1 586.3							55
56	1 136.5	1 182.6	1 228.7	1 274.7	1 320.8	1 366.9	1 413.0	1 459.0	1 505.1	1 551.2	1 597.2	1 643.3							56
57	1 176.3	1 224.0	1 271.8	1 319.5	1 367.2	1 415.0	1 462.7	1 510.4	1 558.2	1 605.9	1 653.6	1 701.4							57
58		1 266.2	1 315.6	1 365.0	1 414.4	1 463.9	1 513.3	1 562.7	1 612.1	1 661.6	1 711.0	1 760.4							58
59		1 309.0	1 360.2	1 411.3	1 462.5	1 513.6	1 564.7	1 615.9	1 667.0	1 718.2	1 769.3	1 820.5							59
60		1 352.6	1 405.5	1 458.4	1 511.3	1 564.1	1 617.0	1 669.9	1 722.8	1 775.7	1 828.6	1 881.5							60
61		1 396.8	1 451.5	1 506.2	1 560.9	1 615.5	1 670.2	1 724.9	1 779.5	1 834.2	1 888.9	1 943.5							61
62		1 441.8	1 498.3	1 554.8	1 611.2	1 667.7	1 724.2	1 780.7	1 837.2	1 893.6	1 950.1	2 006.6							62
63				1 604.1	1 662.4	1 720.7	1 779.1	1 837.4	1 895.7	1 954.0	2 012.3	2 070.6							63
64				1 654.2	1 714.4	1 774.6	1 834.8	1 894.9	1 955.1	2 015.3	2 075.5	2 135.7							64
65				1 705.1	1 767.2	1 829.3	1 891.3	1 953.4	2 015.5	2 077.5	2 139.6	2 201.7							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino nero  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	0.2	0.3	0.5	0.7	0.8	1.0	1.1	1.3											8
9	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3											9
10	5.6	5.9	6.1	6.4	6.6	6.9	7.1	7.4											10
11	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5											11
12	11.2	11.5	11.9	12.3	12.6	13.0	13.3	13.7											12
13	14.0	14.4	14.8	15.2	15.7	16.1	16.5	16.9	17.4	17.8									13
14				18.3	18.8	19.3	19.8	20.3	20.8	21.2									14
15				21.4	21.9	22.5	23.1	23.6	24.2	24.8									15
16				24.5	25.1	25.8	26.4	27.1	27.7	28.3									16
17				27.6	28.4	29.1	29.8	30.5	31.3	32.0									17
18				30.8	31.7	32.5	33.3	34.1	34.9	35.7	36.5	37.4							18
19				34.1	35.0	35.9	36.8	37.7	38.6	39.5	40.4	41.3							19
20					39.4	40.4	41.4	42.4	43.4	44.4	45.4								20
21					42.9	44.0	45.1	46.2	47.3	48.4	49.5								21
22					46.5	47.7	48.9	50.1	51.3	52.6	53.8								22
23								52.8	54.1	55.4	56.7	58.1	59.4	60.7					23
24								56.7	58.1	59.6	61.0	62.5	63.9	65.4					24
25								60.6	62.2	63.8	65.4	66.9	68.5	70.1					25
26								64.7	66.4	68.1	69.8	71.5	73.2	74.9					26
27								68.8	70.6	72.4	74.3	76.1	77.9	79.8					27
28								72.9	74.9	76.9	78.8	80.8	82.8	84.8	86.7	88.7	90.7	92.7	28
29								77.1	79.3	81.4	83.5	85.6	87.7	89.8	92.0	94.1	96.2	98.3	29
30								81.4	83.7	85.9	88.2	90.5	92.7	95.0	97.3	99.5	101.8	104.1	30
31								85.7	88.2	90.6	93.0	95.4	97.8	100.3	102.7	105.1	107.5	109.9	31
32								90.1	92.7	95.3	97.9	100.5	103.0	105.6	108.2	110.8	113.3	115.9	32
33										100.1	102.8	105.6	108.3	111.0	113.8	116.5	119.3	122.0	33
34										104.9	107.8	110.8	113.7	116.6	119.5	122.4	125.3	128.2	34
35										109.9	112.9	116.0	119.1	122.2	125.3	128.4	131.4	134.5	35
36										114.9	118.1	121.4	124.6	127.9	131.2	134.4	137.7	140.9	36
37										119.9	123.4	126.8	130.3	133.7	137.1	140.6	144.0	147.5	37
38												132.3	136.0	139.6	143.2	146.9	150.5	154.1	38
39												137.9	141.7	145.6	149.4	153.2	157.1	160.9	39
40												143.6	147.6	151.6	155.7	159.7	163.7	167.7	40
41												149.3	153.6	157.8	162.0	166.3	170.5	174.7	41
42												155.2	159.6	164.1	168.5	172.9	177.4	181.8	42
43														170.4	175.1	179.7	184.4	189.0	43
44														176.8	181.7	186.6	191.5	196.3	44
45														183.4	188.5	193.6	198.6	203.7	45
46														190.0	195.3	200.6	206.0	211.3	46
47														196.7	202.2	207.8	213.4	218.9	47
48																215.1	220.9	226.7	48
49																222.5	228.5	234.5	49
50																229.9	236.2	242.5	50
51																237.5	244.0	250.6	51
52																245.2	252.0	258.8	52
53																		267.1	53
54																		275.5	54
55																		284.0	55
56																		292.7	56
57																		301.4	57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino nero  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	124.7	127.5	130.2	133.0															33
34	131.1	134.0	136.9	139.8															34
35	137.6	140.7	143.8	146.9															35
36	144.2	147.5	150.7	154.0															36
37	150.9	154.4	157.8	161.3															37
38	157.8	161.4	165.0	168.7	172.3	175.9	179.6	183.2											38
39	164.7	168.5	172.4	176.2	180.0	183.8	187.7	191.5											39
40	171.8	175.8	179.8	183.9	187.9	191.9	195.9	200.0											40
41	179.0	183.2	187.4	191.6	195.9	200.1	204.3	208.6											41
42	186.3	190.7	195.1	199.6	204.0	208.4	212.9	217.3											42
43	193.7	198.3	203.0	207.6	212.3	216.9	221.6	226.2	230.9	235.5									43
44	201.2	206.1	210.9	215.8	220.7	225.6	230.4	235.3	240.2	245.0									44
45	208.8	213.9	219.0	224.1	229.2	234.3	239.4	244.5	249.6	254.7									45
46	216.6	221.9	227.2	232.6	237.9	243.2	248.5	253.9	259.2	264.5									46
47	224.5	230.0	235.6	241.2	246.7	252.3	257.8	263.4	268.9	274.5									47
48	232.5	238.3	244.1	249.9	255.7	261.5	267.3	273.1	278.8	284.6	290.4	296.2							48
49	240.6	246.6	252.7	258.7	264.7	270.8	276.8	282.9	288.9	295.0	301.0	307.0							49
50	248.8	255.1	261.4	267.7	274.0	280.3	286.5	292.8	299.1	305.4	311.7	318.0							50
51	257.1	263.7	270.2	276.8	283.3	289.9	296.4	303.0	309.5	316.0	322.6	329.1							51
52	265.6	272.4	279.2	286.0	292.8	299.6	306.4	313.2	320.0	326.8	333.6	340.4							52
53	274.2	281.2	288.3	295.4	302.4	309.5	316.6	323.6	330.7	337.8	344.8	351.9							53
54	282.9	290.2	297.5	304.9	312.2	319.5	326.9	334.2	341.6	348.9	356.2	363.6							54
55	291.7	299.3	306.9	314.5	322.1	329.7	337.3	344.9	352.5	360.2	367.8	375.4							55
56	300.6	308.5	316.4	324.2	332.1	340.0	347.9	355.8	363.7	371.6	379.5	387.4							56
57	309.6	317.8	326.0	334.1	342.3	350.5	358.7	366.8	375.0	383.2	391.4	399.5							57
58		327.2	335.7	344.1	352.6	361.1	369.5	378.0	386.5	394.9	403.4	411.9							58
59		336.8	345.5	354.3	363.1	371.8	380.6	389.3	398.1	406.9	415.6	424.4							59
60		346.5	355.5	364.6	373.6	382.7	391.8	400.8	409.9	418.9	428.0	437.0							60
61		356.3	365.6	375.0	384.3	393.7	403.1	412.4	421.8	431.2	440.5	449.9							61
62		366.2	375.9	385.5	395.2	404.9	414.5	424.2	433.9	443.6	453.2	462.9							62
63				396.2	406.2	416.2	426.2	436.1	446.1	456.1	466.1	476.1							63
64				407.0	417.3	427.6	437.9	448.2	458.5	468.8	479.1	489.5							64
65				417.9	428.6	439.2	449.8	460.5	471.1	481.7	492.4	503.0							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino nero  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2											8
9	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4											9
10	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5											10
11	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6											11
12	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8											12
13	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0									13
14				1.0	1.0	1.0	1.0	1.1	1.1	1.1									14
15				1.1	1.1	1.2	1.2	1.2	1.3	1.3									15
16				1.2	1.3	1.3	1.3	1.4	1.4	1.5									16
17				1.4	1.4	1.5	1.5	1.5	1.6	1.6									17
18				1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9							18
19				1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1							19
20					1.9	2.0	2.1	2.1	2.2	2.2	2.3								20
21						2.1	2.2	2.2	2.3	2.4	2.4	2.5							21
22						2.3	2.3	2.4	2.5	2.6	2.6	2.7							22
23								2.6	2.7	2.8	2.8	2.9	3.0	3.1					23
24								2.8	2.9	3.0	3.0	3.1	3.2	3.3					24
25								3.0	3.1	3.2	3.3	3.4	3.4	3.5					25
26								3.2	3.3	3.4	3.5	3.6	3.7	3.8					26
27								3.4	3.5	3.6	3.7	3.8	3.9	4.0					27
28								3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.5	4.6	4.8	28
29								3.8	3.9	4.0	4.2	4.3	4.4	4.5	4.7	4.8	4.9	5.1	29
30								4.0	4.1	4.2	4.4	4.5	4.7	4.8	4.9	5.1	5.2	5.4	30
31								4.2	4.3	4.5	4.6	4.8	4.9	5.1	5.2	5.4	5.5	5.7	31
32								4.4	4.6	4.7	4.9	5.0	5.2	5.3	5.5	5.7	5.8	6.0	32
33										5.0	5.1	5.3	5.5	5.6	5.8	6.0	6.1	6.3	33
34										5.2	5.4	5.6	5.7	5.9	6.1	6.3	6.5	6.6	34
35										5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	35
36										5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	36
37										6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.7	37
38											6.7	6.9	7.1	7.3	7.6	7.8	8.0		38
39											7.0	7.2	7.4	7.7	7.9	8.1	8.4		39
40											7.2	7.5	7.7	8.0	8.2	8.5	8.7		40
41											7.5	7.8	8.1	8.3	8.6	8.9	9.1		41
42											7.9	8.1	8.4	8.7	8.9	9.2	9.5		42
43													8.7	9.0	9.3	9.6	9.9		43
44														9.1	9.4	9.7	10.0	10.3	44
45														9.4	9.7	10.1	10.4	10.7	45
46														9.8	10.1	10.4	10.8	11.1	46
47														10.1	10.5	10.8	11.2	11.5	47
48																11.2	11.6	11.9	48
49																11.6	12.0	12.4	49
50																12.0	12.4	12.8	50
51																12.4	12.8	13.2	51
52																12.8	13.3	13.7	52
53																		14.1	53
54																		14.6	54
55																		15.1	55
56																		15.6	56
57																		16.0	57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino nero  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	6.5	6.6	6.8	7.0															33
34	6.8	7.0	7.2	7.3															34
35	7.2	7.3	7.5	7.7															35
36	7.5	7.7	7.9	8.1															36
37	7.9	8.1	8.3	8.5															37
38	8.2	8.5	8.7	8.9	9.1	9.4	9.6	9.8											38
39	8.6	8.8	9.1	9.3	9.5	9.8	10.0	10.3											39
40	9.0	9.2	9.5	9.7	10.0	10.2	10.5	10.7											40
41	9.4	9.6	9.9	10.2	10.4	10.7	10.9	11.2											41
42	9.8	10.0	10.3	10.6	10.9	11.1	11.4	11.7											42
43	10.2	10.5	10.7	11.0	11.3	11.6	11.9	12.2	12.5	12.7									43
44	10.6	10.9	11.2	11.5	11.8	12.1	12.4	12.7	13.0	13.3									44
45	11.0	11.3	11.6	11.9	12.2	12.6	12.9	13.2	13.5	13.8									45
46	11.4	11.7	12.1	12.4	12.7	13.1	13.4	13.7	14.0	14.4									46
47	11.8	12.2	12.5	12.9	13.2	13.6	13.9	14.2	14.6	14.9									47
48	12.3	12.6	13.0	13.4	13.7	14.1	14.4	14.8	15.1	15.5	15.9	16.2							48
49	12.7	13.1	13.5	13.8	14.2	14.6	15.0	15.3	15.7	16.1	16.4	16.8							49
50	13.2	13.6	14.0	14.3	14.7	15.1	15.5	15.9	16.3	16.7	17.1	17.4							50
51	13.6	14.0	14.4	14.8	15.3	15.7	16.1	16.5	16.9	17.3	17.7	18.1							51
52	14.1	14.5	14.9	15.4	15.8	16.2	16.6	17.0	17.5	17.9	18.3	18.7							52
53	14.6	15.0	15.4	15.9	16.3	16.8	17.2	17.6	18.1	18.5	18.9	19.4							53
54	15.1	15.5	16.0	16.4	16.9	17.3	17.8	18.2	18.7	19.1	19.6	20.0							54
55	15.5	16.0	16.5	17.0	17.4	17.9	18.4	18.8	19.3	19.8	20.2	20.7							55
56	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.4	19.9	20.4	20.9	21.4							56
57	16.5	17.0	17.5	18.1	18.6	19.1	19.6	20.1	20.6	21.1	21.6	22.1							57
58		17.6	18.1	18.6	19.1	19.7	20.2	20.7	21.2	21.7	22.3	22.8							58
59		18.1	18.6	19.2	19.7	20.3	20.8	21.3	21.9	22.4	23.0	23.5							59
60		18.6	19.2	19.8	20.3	20.9	21.4	22.0	22.6	23.1	23.7	24.2							60
61		19.2	19.8	20.3	20.9	21.5	22.1	22.7	23.2	23.8	24.4	25.0							61
62		19.8	20.3	20.9	21.5	22.1	22.7	23.3	23.9	24.5	25.1	25.7							62
63				21.5	22.2	22.8	23.4	24.0	24.6	25.2	25.8	26.5							63
64				22.2	22.8	23.4	24.1	24.7	25.3	26.0	26.6	27.2							64
65				22.8	23.4	24.1	24.7	25.4	26.0	26.7	27.4	28.0							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino nero  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8	5.1	6.2	7.3	8.4	9.6	10.7	11.8	12.9											8
9	10.8	12.2	13.6	15.0	16.4	17.8	19.2	20.6											9
10	16.6	18.4	20.1	21.8	23.6	25.3	27.0	28.8											10
11	22.6	24.7	26.8	28.9	31.0	33.1	35.2	37.3											11
12	28.8	31.3	33.8	36.3	38.8	41.3	43.8	46.3											12
13	35.2	38.1	41.1	44.0	46.9	49.9	52.8	55.7	58.7	61.6									13
14				51.9	55.3	58.7	62.1	65.5	68.9	72.3									14
15				60.1	64.1	68.0	71.9	75.8	79.7	83.6									15
16				68.6	73.1	77.5	82.0	86.4	90.9	95.3									16
17				77.4	82.4	87.5	92.5	97.5	102.5	107.5									17
18				86.5	92.1	97.7	103.4	109.0	114.6	120.2	125.9	131.5							18
19				95.8	102.1	108.3	114.6	120.9	127.1	133.4	139.7	145.9							19
20					119.3	126.2	133.2	140.1	147.1	154.0	161.0								20
21						130.6	138.3	145.9	153.6	161.2	168.9	176.6							21
22						142.3	150.7	159.1	167.5	175.9	184.3	192.7							22
23								172.6	181.8	191.0	200.2	209.4	218.6	227.8					23
24								186.6	196.6	206.6	216.6	226.6	236.6	246.6					24
25								201.0	211.9	222.7	233.6	244.4	255.3	266.1					25
26								215.8	227.6	239.3	251.1	262.8	274.5	286.3					26
27								231.1	243.7	256.4	269.1	281.7	294.4	307.0					27
28								246.7	260.3	274.0	287.6	301.2	314.8	328.4	342.0	355.6	369.2	382.9	28
29								262.8	277.4	292.0	306.6	321.2	335.8	350.4	365.0	379.6	394.2	408.8	29
30								279.3	294.9	310.5	326.2	341.8	357.4	373.0	388.7	404.3	419.9	435.6	30
31								296.2	312.9	329.6	346.2	362.9	379.6	396.3	413.0	429.7	446.4	463.0	31
32								313.5	331.3	349.1	366.8	384.6	402.4	420.2	438.0	455.7	473.5	491.3	32
33								369.1	388.0	406.9	425.8	444.7	463.6	482.5	501.4	520.3			33
34								389.5	409.6	429.7	449.7	469.8	489.9	510.0	530.0	550.1			34
35								410.5	431.8	453.0	474.3	495.6	516.8	538.1	559.4	580.7			35
36								431.9	454.4	477.0	499.5	522.0	544.5	567.0	589.5	612.0			36
37								453.9	477.7	501.4	525.2	549.0	572.7	596.5	620.3	644.0			37
38										526.4	551.5	576.6	601.7	626.7	651.8	676.9			38
39										552.0	578.4	604.8	631.3	657.7	684.1	710.5			39
40										578.2	605.9	633.7	661.5	689.3	717.1	744.9			40
41										604.9	634.0	663.2	692.4	721.6	750.8	780.0			41
42										632.1	662.7	693.4	724.0	754.6	785.3	815.9			42
43												724.1	756.2	788.3	820.4	852.5			43
44												755.5	789.1	822.7	856.4	890.0			44
45												787.5	822.7	857.8	893.0	928.2			45
46												820.1	856.9	893.6	930.4	967.1			46
47												853.4	891.8	930.1	968.5	1 006.8			47
48															967.3	1 007.3	1 047.3		48
49															1 005.2	1 046.9	1 088.5		49
50															1 043.7	1 087.1	1 130.6		50
51															1 083.0	1 128.2	1 173.3		51
52															1 123.0	1 169.9	1 216.9		52
53																	1 261.2		53
54																	1 306.2		54
55																	1 352.1		55
56																	1 398.6		56
57																	1 446.0		57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino nero  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	539.2	558.1	577.0	596.0															33
34	570.2	590.2	610.3	630.4															34
35	601.9	623.2	644.5	665.7															35
36	634.5	657.0	679.5	702.0															36
37	667.8	691.6	715.4	739.1															37
38	702.0	727.0	752.1	777.2	802.2	827.3	852.4	877.5											38
39	736.9	763.3	789.7	816.1	842.5	868.9	895.3	921.8											39
40	772.6	800.4	828.2	856.0	883.8	911.5	939.3	967.1											40
41	809.2	838.4	867.5	896.7	925.9	955.1	984.3	1 013.5											41
42	846.5	877.1	907.8	938.4	969.0	999.7	1 030.3	1 060.9											42
43	884.6	916.8	948.9	981.0	1 013.1	1 045.2	1 077.3	1 109.4	1 141.5	1 173.6									43
44	923.6	957.2	990.8	1 024.4	1 058.0	1 091.7	1 125.3	1 158.9	1 192.5	1 226.1									44
45	963.3	998.5	1 033.6	1 068.8	1 104.0	1 139.1	1 174.3	1 209.4	1 244.6	1 279.8									45
46	1 003.8	1 040.6	1 077.3	1 114.1	1 150.8	1 187.5	1 224.3	1 261.0	1 297.8	1 334.5									46
47	1 045.2	1 083.5	1 121.9	1 160.2	1 198.6	1 237.0	1 275.3	1 313.7	1 352.0	1 390.4									47
48	1 087.3	1 127.3	1 167.3	1 207.3	1 247.3	1 287.3	1 327.3	1 367.3	1 407.3	1 447.3	1 487.3	1 527.4							48
49	1 130.2	1 171.9	1 213.6	1 255.3	1 297.0	1 338.7	1 380.4	1 422.1	1 463.7	1 505.4	1 547.1	1 588.8							49
50	1 174.0	1 217.4	1 260.8	1 304.2	1 347.6	1 391.0	1 434.4	1 477.8	1 521.2	1 564.6	1 608.0	1 651.4							50
51	1 218.5	1 263.6	1 308.8	1 354.0	1 399.1	1 444.3	1 489.5	1 534.6	1 579.8	1 624.9	1 670.1	1 715.3							51
52	1 263.8	1 310.8	1 357.7	1 404.7	1 451.6	1 498.6	1 545.5	1 592.5	1 639.4	1 686.4	1 733.3	1 780.3							52
53	1 309.9	1 358.7	1 407.5	1 456.3	1 505.0	1 553.8	1 602.6	1 651.3	1 700.1	1 748.9	1 797.7	1 846.4							53
54	1 356.9	1 407.5	1 458.1	1 508.7	1 559.4	1 610.0	1 660.6	1 711.3	1 761.9	1 812.5	1 863.2	1 913.8							54
55	1 404.6	1 457.1	1 509.6	1 562.1	1 614.7	1 667.2	1 719.7	1 772.2	1 824.8	1 877.3	1 929.8	1 982.3							55
56	1 453.1	1 507.5	1 562.0	1 616.4	1 670.9	1 725.3	1 779.8	1 834.2	1 888.7	1 943.1	1 997.6	2 052.0							56
57	1 502.4	1 558.8	1 615.2	1 671.6	1 728.1	1 784.5	1 840.9	1 897.3	1 953.7	2 010.1	2 066.5	2 122.9							57
58		1 610.9	1 669.3	1 727.8	1 786.2	1 844.6	1 903.0	1 961.4	2 019.8	2 078.2	2 136.6	2 195.0							58
59		1 663.9	1 724.3	1 784.8	1 845.2	1 905.6	1 966.1	2 026.5	2 087.0	2 147.4	2 207.8	2 268.3							59
60		1 717.7	1 780.2	1 842.7	1 905.2	1 967.7	2 030.2	2 092.7	2 155.2	2 217.7	2 280.2	2 342.7							60
61		1 772.3	1 836.9	1 901.5	1 966.1	2 030.7	2 095.3	2 159.9	2 224.5	2 289.1	2 353.7	2 418.4							61
62		1 827.7	1 894.5	1 961.2	2 028.0	2 094.7	2 161.4	2 228.2	2 294.9	2 361.7	2 428.4	2 495.2							62
63			2 021.8	2 090.7	2 159.7	2 228.6	2 297.5	2 366.4	2 435.3	2 504.2	2 573.1								63
64			2 083.4	2 154.5	2 225.6	2 296.7	2 367.8	2 438.9	2 510.1	2 581.2	2 652.3								64
65			2 145.8	2 219.1	2 292.5	2 365.9	2 439.2	2 512.6	2 585.9	2 659.3	2 732.7								65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pinus pinaster* Ait.**

**Pino marittimo**

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## Pino marittimo

### Volume del fusto e dei rami grossi

$n = 26$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.9963 \quad 3.8302 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 2.6524 \cdot 10^{-1} & \\ -1.2270 \cdot 10^{-4} & 5.9640 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.4031 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 26$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [6.3157 \cdot 10^{-1} \quad 1.5840 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 8.8841 \cdot 10^{-2} & \\ -4.1097 \cdot 10^{-5} & 1.9976 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 4.6996 \cdot 10^{-6}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 26$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.2558 \quad 4.7109 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 4.8948 \cdot 10^{-2} & \\ -2.2643 \cdot 10^{-5} & 1.1006 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.5893 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 26$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [6.6497 \cdot 10^{-2} \quad 2.5933 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.5845 \cdot 10^{-4} & \\ -1.6582 \cdot 10^{-7} & 8.0600 \cdot 10^{-10} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.8962 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 26$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.9539 \quad 2.0810 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.0184 \cdot 10^{-1} & \\ -4.7112 \cdot 10^{-5} & 2.2900 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.3874 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$



Pino marittimo  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	7.8	8.7	9.7	10.7	11.6	12.6													5
6	9.9	11.3	12.6	14.0	15.4	16.8													6
7	12.4	14.3	16.1	18.0	19.9	21.8													7
8				22.6	25.1	27.5	30.0	32.4											8
9				27.8	30.9	34.0	37.1	40.2											9
10				33.6	37.5	41.3	45.1	49.0											10
11				40.1	44.7	49.3	54.0	58.6											11
12				47.1	52.6	58.2	63.7	69.2											12
13					67.7	74.2	80.7	87.1	93.6	100.1	106.6								13
14					78.1	85.6	93.1	100.6	108.1	115.6	123.1								14
15					89.2	97.8	106.4	115.0	123.6	132.3	140.9								15
16					101.0	110.9	120.7	130.5	140.3	150.1	159.9								16
17					113.7	124.8	135.8	146.9	158.0	169.0	180.1								17
18					127.1	139.5	151.9	164.3	176.7	189.1	201.6	214.0	226.4						18
19					141.3	155.1	168.9	182.7	196.6	210.4	224.2	238.1	251.9						19
20					156.2	171.5	186.8	202.2	217.5	232.8	248.1	263.4	278.8						20
21					171.9	188.8	205.7	222.6	239.5	256.4	273.3	290.1	307.0						21
22					188.4	206.9	225.5	244.0	262.5	281.1	299.6	318.1	336.7						22
23					205.6	225.9	246.1	266.4	286.7	306.9	327.2	347.4	367.7	388.0	408.2	428.5	448.8		23
24					223.6	245.7	267.7	289.8	311.9	333.9	356.0	378.0	400.1	422.2	444.2	466.3	488.4		24
25						266.3	290.3	314.2	338.1	362.1	386.0	410.0	433.9	457.8	481.8	505.7	529.6		25
26						287.8	313.7	339.6	365.5	391.4	417.3	443.2	469.1	494.9	520.8	546.7	572.6		26
27						310.1	338.1	366.0	393.9	421.8	449.8	477.7	505.6	533.5	561.4	589.4	617.3		27
28						333.3	363.3	393.4	423.4	453.4	483.5	513.5	543.5	573.5	603.6	633.6	663.6		28
29							389.5	421.8	454.0	486.2	518.4	550.6	582.8	615.0	647.2	679.4	711.7		29
30							416.7	451.1	485.6	520.1	554.5	589.0	623.5	658.0	692.4	726.9	761.4		30
31							444.7	481.5	518.3	555.1	591.9	628.7	665.5	702.4	739.2	776.0	812.8		31
32							473.7	512.9	552.1	591.3	630.5	669.8	709.0	748.2	787.4	826.6	865.9		32
33							586.9	628.7	670.4	712.1	753.8	795.5	837.2	878.9	920.6				33
34							622.9	667.2	711.4	755.7	800.0	844.3	888.5	932.8	977.1				34
35							659.9	706.8	753.7	800.6	847.6	894.5	941.4	988.3	1 035.2				35
36							697.9	747.6	797.2	846.9	896.5	946.1	995.8	1 045.4	1 095.1				36
37							737.1	789.5	842.0	894.4	946.8	999.3	1 051.7	1 104.1	1 156.6				37
38								832.6	887.9	943.2	998.5	1 053.8	1 109.2	1 164.5	1 219.8				38
39								876.9	935.1	993.4	1 051.6	1 109.9	1 168.1	1 226.4	1 284.7				39
40								922.2	983.5	1 044.8	1 106.1	1 167.4	1 228.7	1 289.9	1 351.2				40
41								968.8	1 033.2	1 097.6	1 161.9	1 226.3	1 290.7	1 355.1	1 419.5				41
42								1 084.0	1 151.6	1 219.2	1 286.7	1 354.3	1 421.9	1 489.4					42
43								1 136.1	1 206.9	1 277.8	1 348.6	1 419.4	1 490.2	1 561.0					43
44								1 189.4	1 263.6	1 337.7	1 411.9	1 486.0	1 560.2	1 634.4					44
45								1 244.0	1 321.5	1 399.1	1 476.7	1 554.2	1 631.8	1 709.4					45
46								1 380.8	1 461.8	1 542.9	1 623.9	1 705.0	1 786.0						46
47								1 441.4	1 526.0	1 610.6	1 695.2	1 779.8	1 864.4						47
48								1 503.2	1 591.5	1 679.7	1 768.0	1 856.2	1 944.4						48
49									1 658.3	1 750.3	1 842.3	1 934.2	2 026.2						49
50									1 726.6	1 822.3	1 918.1	2 013.9	2 109.6						50
51									1 796.2	1 895.8	1 995.5	2 095.1	2 194.7						51
52									1 867.2	1 970.8	2 074.4	2 177.9	2 281.5						52
53									1 939.6	2 047.2	2 154.8	2 262.4	2 370.0						53
54									2 013.4	2 125.1	2 236.8	2 348.5	2 460.1						54
55									2 088.5	2 204.4	2 320.3	2 436.1	2 552.0						55
56									2 165.1	2 285.2	2 405.3	2 525.4	2 645.5						56
57									2 243.0	2 367.4	2 491.9	2 616.3	2 740.7						57
58												2 580.0	2 708.8	2 837.7					58
59												2 669.6	2 802.9	2 936.2					59
60												2 760.7	2 898.6	3 036.5					60
61												2 853.4	2 996.0	3 138.5					61
62												2 947.7	3 094.9	3 242.1					62
63												3 043.4	3 195.4	3 347.5					63
64												3 140.7	3 297.6	3 454.5					64
65												3 239.5	3 401.3	3 563.2					65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino marittimo  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	962.3	1 004.1																	33
34	1 021.4	1 065.6																	34
35	1 082.2	1 129.1																	35
36	1 144.7	1 194.3																	36
37	1 209.0	1 261.4																	37
38	1 275.1	1 330.4																	38
39	1 342.9	1 401.2																	39
40	1 412.5	1 473.8																	40
41	1 483.9	1 548.3																	41
42	1 557.0	1 624.5																	42
43	1 631.9	1 702.7																	43
44	1 708.5	1 782.7																	44
45	1 786.9	1 864.5																	45
46	1 867.1	1 948.1																	46
47	1 949.0	2 033.6																	47
48	2 032.7	2 120.9																	48
49	2 118.1	2 210.1																	49
50	2 205.4	2 301.1																	50
51	2 294.3	2 394.0																	51
52	2 385.1	2 488.6																	52
53	2 477.6	2 585.2																	53
54	2 571.8	2 683.5																	54
55	2 667.9	2 783.7																	55
56	2 765.6	2 885.8																	56
57	2 865.2	2 989.6																	57
58	2 966.5	3 095.3																	58
59	3 069.6	3 202.9																	59
60	3 174.4	3 312.3																	60
61	3 281.0	3 423.5																	61
62	3 389.4	3 536.6																	62
63	3 499.5	3 651.5																	63
64	3 611.4	3 768.2																	64
65	3 725.0	3 886.8																	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino marittimo  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5	2.6	3.0	3.4	3.8	4.2	4.6													5	
6	3.5	4.1	4.6	5.2	5.8	6.3													6	
7	4.5	5.3	6.1	6.8	7.6	8.4													7	
8				8.7	9.8	10.8	11.8	12.8											8	
9				10.9	12.2	13.5	14.7	16.0											9	
10				13.3	14.9	16.5	18.1	19.6											10	
11				16.0	17.9	19.8	21.7	23.6											11	
12				18.9	21.2	23.4	25.7	28.0											12	
13						27.4	30.1	32.8	35.4	38.1	40.8	43.5							13	
14						31.7	34.8	37.9	41.0	44.1	47.2	50.3							14	
15						36.3	39.8	43.4	47.0	50.5	54.1	57.7							15	
16						41.2	45.2	49.3	53.3	57.4	61.5	65.5							16	
17						46.4	51.0	55.6	60.1	64.7	69.3	73.9							17	
18						52.0	57.1	62.2	67.3	72.5	77.6	82.7	87.9	93.0					18	
19						57.8	63.5	69.3	75.0	80.7	86.4	92.1	97.8	103.6					19	
20						64.0	70.3	76.7	83.0	89.3	95.7	102.0	108.3	114.7					20	
21						70.5	77.5	84.5	91.4	98.4	105.4	112.4	119.4	126.4					21	
22						77.3	85.0	92.6	100.3	108.0	115.6	123.3	131.0	138.6					22	
23						84.4	92.8	101.2	109.6	117.9	126.3	134.7	143.1	151.5	159.8	168.2	176.6	185.0	23	
24						91.9	101.0	110.1	119.2	128.4	137.5	146.6	155.7	164.9	174.0	183.1	192.2	201.4	24	
25							109.5	119.4	129.3	139.2	149.1	159.0	168.9	178.8	188.7	198.6	208.5	218.4	25	
26							118.4	129.1	139.8	150.5	161.2	172.0	182.7	193.4	204.1	214.8	225.5	236.2	26	
27							127.7	139.2	150.7	162.3	173.8	185.4	196.9	208.5	220.0	231.6	243.1	254.7	27	
28							137.2	149.7	162.1	174.5	186.9	199.3	211.7	224.2	236.6	249.0	261.4	273.8	28	
29								160.5	173.8	187.1	200.5	213.8	227.1	240.4	253.7	267.1	280.4	293.7	29	
30								171.7	186.0	200.2	214.5	228.7	243.0	257.2	271.5	285.8	300.0	314.3	30	
31								183.3	198.5	213.7	229.0	244.2	259.4	274.6	289.9	305.1	320.3	335.5	31	
32								195.3	211.5	227.7	243.9	260.2	276.4	292.6	308.8	325.0	341.3	357.5	32	
33									242.1	259.4	276.6	293.9	311.1	328.4	345.6	362.9	380.1		33	
34									257.0	275.3	293.6	311.9	330.2	348.5	366.9	385.2	403.5		34	
35									272.3	291.7	311.1	330.5	349.9	369.3	388.7	408.1	427.5		35	
36									288.0	308.6	329.1	349.6	370.1	390.7	411.2	431.7	452.3		36	
37									304.2	325.9	347.6	369.3	391.0	412.6	434.3	456.0	477.7		37	
38										343.7	366.6	389.5	412.3	435.2	458.1	481.0	503.8		38	
39										362.0	386.1	410.2	434.3	458.4	482.5	506.6	530.7		39	
40										380.8	406.1	431.5	456.8	482.2	507.5	532.9	558.2		40	
41										400.0	426.7	453.3	479.9	506.5	533.2	559.8	586.4		41	
42											447.7	475.6	503.6	531.5	559.5	587.4	615.4		42	
43											469.2	498.5	527.8	557.1	586.4	615.7	645.0		43	
44											491.3	522.0	552.6	583.3	614.0	644.6	675.3		44	
45											513.8	545.9	578.0	610.1	642.2	674.2	706.3		45	
46												570.4	603.9	637.5	671.0	704.5	738.0		46	
47													595.5	630.5	665.5	700.4	735.4	770.4	47	
48														621.1	657.5	694.0	730.5	767.0	803.5	48
49															685.2	723.2	761.3	799.3	837.3	49
50															713.4	753.0	792.6	832.2	871.8	50
51															742.2	783.4	824.6	865.8	907.0	51
52															771.6	814.4	857.3	900.1	942.9	52
53															801.5	846.0	890.5	935.0	979.5	53
54															832.0	878.2	924.4	970.6	1 016.8	54
55															863.1	911.0	959.0	1 006.9	1 054.8	55
56															894.8	944.4	994.1	1 043.8	1 093.5	56
57															927.0	978.5	1 029.9	1 081.4	1 132.8	57
58																1 066.3	1 119.6	1 172.9		58
59																1 103.4	1 158.6	1 213.7		59
60																1 141.1	1 198.1	1 255.2		60
61																1 179.4	1 238.4	1 297.3		61
62																1 218.4	1 279.3	1 340.2		62
63																1 258.0	1 320.9	1 383.7		63
64																1 298.2	1 363.1	1 428.0		64
65																1 339.1	1 406.0	1 473.0		65
66																				66
67																				67
68																				68
69																				69
70																				70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Pino marittimo  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	397.4	414.6																	33
34	421.8	440.1																	34
35	446.9	466.3																	35
36	472.8	493.3																	36
37	499.4	521.1																	37
38	526.7	549.6																	38
39	554.8	578.9																	39
40	583.5	608.9																	40
41	613.1	639.7																	41
42	643.3	671.2																	42
43	674.3	703.5																	43
44	706.0	736.6																	44
45	738.4	770.5																	45
46	771.5	805.1																	46
47	805.4	840.4																	47
48	840.0	876.5																	48
49	875.4	913.4																	49
50	911.4	951.0																	50
51	948.2	989.4																	51
52	985.8	1 028.6																	52
53	1 024.0	1 068.5																	53
54	1 063.0	1 109.2																	54
55	1 102.7	1 150.6																	55
56	1 143.1	1 192.8																	56
57	1 184.3	1 235.8																	57
58	1 226.2	1 279.5																	58
59	1 268.8	1 324.0																	59
60	1 312.2	1 369.2																	60
61	1 356.3	1 415.2																	61
62	1 401.1	1 462.0																	62
63	1 446.6	1 509.5																	63
64	1 492.9	1 557.8																	64
65	1 539.9	1 606.8																	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino marittimo  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)		
5	1.8	2.0	2.1	2.2	2.3	2.4													5		
6	2.1	2.3	2.4	2.6	2.8	3.0													6		
7	2.4	2.6	2.9	3.1	3.3	3.6													7		
8				3.7	4.0	4.3	4.6	4.9											8		
9				4.3	4.7	5.1	5.5	5.8											9		
10				5.0	5.5	6.0	6.4	6.9											10		
11				5.8	6.4	7.0	7.5	8.1											11		
12				6.7	7.4	8.0	8.7	9.4											12		
13					9.2	10.0	10.8	11.6	12.4	13.2	14.0								13		
14						10.5	11.4	12.3	13.3	14.2	15.1	16.0							14		
15							11.9	12.9	14.0	15.0	16.1	17.2	18.2						15		
16								13.3	14.5	15.7	16.9	18.1	19.3	20.6					16		
17								14.9	16.2	17.6	19.0	20.3	21.7	23.0					17		
18								16.5	18.0	19.6	21.1	22.6	24.2	25.7	27.2	28.7			18		
19								18.3	20.0	21.7	23.4	25.1	26.8	28.5	30.2	31.9			19		
20								20.1	22.0	23.9	25.8	27.6	29.5	31.4	33.3	35.2			20		
21								22.0	24.1	26.2	28.3	30.3	32.4	34.5	36.6	38.7			21		
22								24.1	26.3	28.6	30.9	33.2	35.5	37.7	40.0	42.3			22		
23								26.2	28.7	31.2	33.7	36.1	38.6	41.1	43.6	46.1	48.6	51.1	53.6	56.1	23
24								28.4	31.1	33.8	36.5	39.2	42.0	44.7	47.4	50.1	52.8	55.5	58.2	61.0	24
25									33.6	36.6	39.5	42.5	45.4	48.4	51.3	54.3	57.2	60.1	63.1	66.0	25
26									36.3	39.5	42.7	45.8	49.0	52.2	55.4	58.6	61.8	64.9	68.1	71.3	26
27									39.0	42.5	45.9	49.3	52.8	56.2	59.6	63.1	66.5	69.9	73.4	76.8	27
28									41.9	45.6	49.3	53.0	56.7	60.3	64.0	67.7	71.4	75.1	78.8	82.5	28
29									48.8	52.8	56.7	60.7	64.6	68.6	72.6	76.5	80.5	84.5	88.4	29	
30									52.1	56.4	60.6	64.9	69.1	73.3	77.6	81.8	86.1	90.3	94.5	30	
31									55.6	60.1	64.6	69.2	73.7	78.2	82.7	87.3	91.8	96.3	100.9	31	
32									59.1	64.0	68.8	73.6	78.4	83.3	88.1	92.9	97.7	102.6	107.4	32	
33										73.1	78.2	83.3	88.5	93.6	98.7	103.9	109.0	114.1	33		
34										77.5	82.9	88.4	93.8	99.3	104.7	110.2	115.6	121.1	34		
35										82.0	87.8	93.6	99.4	105.1	110.9	116.7	122.4	128.2	35		
36										86.7	92.8	98.9	105.0	111.2	117.3	123.4	129.5	135.6	36		
37										91.5	98.0	104.4	110.9	117.3	123.8	130.2	136.7	143.1	37		
38											103.3	110.1	116.9	123.7	130.5	137.3	144.1	150.9	38		
39											108.7	115.9	123.1	130.2	137.4	144.6	151.7	158.9	39		
40											114.3	121.9	129.4	136.9	144.5	152.0	159.5	167.1	40		
41											120.0	128.0	135.9	143.8	151.7	159.6	167.6	175.5	41		
42												134.2	142.5	150.8	159.1	167.5	175.8	184.1	42		
43												140.6	149.3	158.0	166.8	175.5	184.2	192.9	43		
44												147.2	156.3	165.4	174.5	183.7	192.8	201.9	44		
45												153.9	163.4	173.0	182.5	192.0	201.6	211.1	45		
46													170.7	180.7	190.7	200.6	210.6	220.6	46		
47													178.2	188.6	199.0	209.4	219.8	230.2	47		
48													185.8	196.6	207.5	218.3	229.2	240.0	48		
49														204.9	216.2	227.5	238.8	250.1	49		
50														213.2	225.0	236.8	248.6	260.4	50		
51														221.8	234.1	246.3	258.6	270.8	51		
52														230.5	243.3	256.0	268.8	281.5	52		
53														239.4	252.7	265.9	279.1	292.4	53		
54														248.5	262.3	276.0	289.7	303.5	54		
55														257.8	272.0	286.3	300.5	314.8	55		
56														267.2	282.0	296.7	311.5	326.3	56		
57														276.8	292.1	307.4	322.7	338.0	57		
58																318.2	334.1	349.9	58		
59																329.2	345.6	362.0	59		
60																340.4	357.4	374.4	60		
61																351.8	369.4	386.9	61		
62																363.4	381.5	399.6	62		
63																375.2	393.9	412.6	63		
64																387.2	406.5	425.8	64		
65																399.3	419.2	439.1	65		
66																			66		
67																			67		
68																			68		
69																			69		
70																			70		
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)		

Pino marittimo  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	119.2	124.4																	33
34	126.5	132.0																	34
35	134.0	139.8																	35
36	141.7	147.8																	36
37	149.6	156.0																	37
38	157.7	164.5																	38
39	166.1	173.2																	39
40	174.6	182.2																	40
41	183.4	191.3																	41
42	192.4	200.7																	42
43	201.6	210.3																	43
44	211.0	220.1																	44
45	220.7	230.2																	45
46	230.5	240.5																	46
47	240.6	251.0																	47
48	250.9	261.7																	48
49	261.4	272.7																	49
50	272.1	283.9																	50
51	283.1	295.3																	51
52	294.2	307.0																	52
53	305.6	318.8																	53
54	317.2	330.9																	54
55	329.0	343.3																	55
56	341.0	355.8																	56
57	353.3	368.6																	57
58	365.7	381.6																	58
59	378.4	394.8																	59
60	391.3	408.3																	60
61	404.4	422.0																	61
62	417.8	435.9																	62
63	431.3	450.0																	63
64	445.1	464.4																	64
65	459.0	478.9																	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino marittimo  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.1	0.1													5
6	0.1	0.1	0.1	0.1	0.2	0.2													6
7	0.1	0.1	0.2	0.2	0.2	0.2													7
8				0.2	0.2	0.2	0.2	0.3											8
9				0.2	0.3	0.3	0.3	0.3											9
10				0.3	0.3	0.3	0.4	0.4											10
11				0.3	0.3	0.4	0.4	0.4											11
12				0.4	0.4	0.4	0.5	0.5											12
13					0.5	0.5	0.6	0.6	0.7	0.7	0.8								13
14					0.6	0.6	0.7	0.7	0.8	0.8	0.9								14
15					0.6	0.7	0.8	0.8	0.9	0.9	1.0								15
16					0.7	0.8	0.9	0.9	1.0	1.1	1.1								16
17					0.8	0.9	1.0	1.0	1.1	1.2	1.3								17
18					0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6						18
19					1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8						19
20					1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9						20
21					1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.1						21
22					1.3	1.4	1.6	1.7	1.8	1.9	2.1	2.2	2.3						22
23					1.4	1.6	1.7	1.8	2.0	2.1	2.3	2.4	2.5	2.7	2.8	2.9	3.1		23
24					1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9	3.1	3.2	3.4		24
25						1.8	2.0	2.2	2.3	2.5	2.7	2.8	3.0	3.1	3.3	3.5	3.6		25
26						2.0	2.2	2.3	2.5	2.7	2.9	3.0	3.2	3.4	3.6	3.7	3.9		26
27						2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.8	4.0	4.2		27
28						2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5		28
29							2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.2	4.4	4.6	4.9		29
30							2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	4.7	5.0	5.2		30
31							3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.8	5.1	5.3	5.5		31
32							3.3	3.5	3.8	4.0	4.3	4.6	4.8	5.1	5.4	5.6	5.9		32
33								4.0	4.3	4.6	4.9	5.1	5.4	5.7	6.0	6.3			33
34								4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7			34
35								4.5	4.8	5.1	5.5	5.8	6.1	6.4	6.7	7.1			35
36								4.8	5.1	5.4	5.8	6.1	6.5	6.8	7.1	7.5			36
37								5.0	5.4	5.7	6.1	6.5	6.8	7.2	7.5	7.9			37
38									5.7	6.1	6.4	6.8	7.2	7.6	7.9	8.3			38
39									6.0	6.4	6.8	7.2	7.6	8.0	8.3	8.7			39
40									6.3	6.7	7.1	7.5	8.0	8.4	8.8	9.2			40
41									6.6	7.0	7.5	7.9	8.3	8.8	9.2	9.7			41
42										7.4	7.8	8.3	8.8	9.2	9.7	10.1			42
43										7.7	8.2	8.7	9.2	9.7	10.1	10.6			43
44										8.1	8.6	9.1	9.6	10.1	10.6	11.1			44
45										8.5	9.0	9.5	10.0	10.6	11.1	11.6			45
46											9.4	9.9	10.5	11.0	11.6	12.1			46
47											9.8	10.4	11.0	11.5	12.1	12.7			47
48											10.2	10.8	11.4	12.0	12.6	13.2			48
49												11.3	11.9	12.5	13.1	13.8			49
50												11.7	12.4	13.0	13.7	14.3			50
51												12.2	12.9	13.6	14.2	14.9			51
52												12.7	13.4	14.1	14.8	15.5			52
53												13.2	13.9	14.6	15.4	16.1			53
54												13.7	14.4	15.2	15.9	16.7			54
55												14.2	15.0	15.8	16.5	17.3			55
56												14.7	15.5	16.3	17.1	18.0			56
57												15.2	16.1	16.9	17.8	18.6			57
58													17.5	18.4	19.3				58
59													18.1	19.0	19.9				59
60													18.7	19.7	20.6				60
61													19.4	20.3	21.3				61
62													20.0	21.0	22.0				62
63													20.7	21.7	22.7				63
64													21.3	22.4	23.4				64
65													22.0	23.1	24.2				65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino marittimo  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	6.6	6.8																	33
34	7.0	7.3																	34
35	7.4	7.7																	35
36	7.8	8.1																	36
37	8.2	8.6																	37
38	8.7	9.1																	38
39	9.1	9.5																	39
40	9.6	10.0																	40
41	10.1	10.5																	41
42	10.6	11.0																	42
43	11.1	11.6																	43
44	11.6	12.1																	44
45	12.1	12.7																	45
46	12.7	13.2																	46
47	13.2	13.8																	47
48	13.8	14.4																	48
49	14.4	15.0																	49
50	15.0	15.6																	50
51	15.6	16.3																	51
52	16.2	16.9																	52
53	16.8	17.5																	53
54	17.5	18.2																	54
55	18.1	18.9																	55
56	18.8	19.6																	56
57	19.4	20.3																	57
58	20.1	21.0																	58
59	20.8	21.7																	59
60	21.5	22.5																	60
61	22.3	23.2																	61
62	23.0	24.0																	62
63	23.7	24.8																	63
64	24.5	25.6																	64
65	25.3	26.4																	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino marittimo  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.6	5.1	5.6	6.1	6.6	7.2													5
6	5.7	6.4	7.2	7.9	8.7	9.4													6
7	7.1	8.1	9.1	10.1	11.1	12.2													7
8				12.6	13.9	15.3	16.6	17.9											8
9				15.4	17.1	18.8	20.5	22.2											9
10				18.6	20.7	22.8	24.8	26.9											10
11				22.1	24.6	27.1	29.7	32.2											11
12				25.9	28.9	31.9	34.9	37.9											12
13						37.1	40.6	44.2	47.7	51.2	54.7	58.2							13
14						42.7	46.8	50.9	55.0	59.1	63.1	67.2							14
15						48.8	53.5	58.1	62.8	67.5	72.2	76.9							15
16						55.2	60.6	65.9	71.2	76.5	81.9	87.2							16
17						62.1	68.1	74.1	80.1	86.2	92.2	98.2							17
18						69.4	76.1	82.9	89.6	96.3	103.1	109.8	116.6	123.3					18
19						77.1	84.6	92.1	99.6	107.1	114.6	122.2	129.7	137.2					19
20						85.2	93.5	101.8	110.2	118.5	126.8	135.1	143.5	151.8					20
21						93.7	102.9	112.1	121.3	130.4	139.6	148.8	158.0	167.1					21
22						102.7	112.7	122.8	132.9	143.0	153.0	163.1	173.2	183.3					22
23						112.0	123.0	134.1	145.1	156.1	167.1	178.1	189.1	200.1	211.1	222.1	233.1	244.1	23
24						121.8	133.8	145.8	157.8	169.8	181.8	193.7	205.7	217.7	229.7	241.7	253.7	265.7	24
25							145.0	158.0	171.0	184.0	197.0	210.1	223.1	236.1	249.1	262.1	275.1	288.1	25
26							156.7	170.8	184.8	198.9	213.0	227.0	241.1	255.2	269.2	283.3	297.4	311.4	26
27							168.8	184.0	199.2	214.3	229.5	244.7	259.9	275.0	290.2	305.4	320.5	335.7	27
28							181.4	197.7	214.0	230.4	246.7	263.0	279.3	295.6	311.9	328.3	344.6	360.9	28
29								212.0	229.5	247.0	264.5	282.0	299.5	317.0	334.5	352.0	369.5	387.0	29
30								226.7	245.4	264.2	282.9	301.6	320.3	339.1	357.8	376.5	395.3	414.0	30
31								241.9	261.9	281.9	301.9	321.9	341.9	361.9	381.9	401.9	421.9	441.9	31
32								257.7	279.0	300.3	321.6	342.9	364.2	385.5	406.8	428.1	449.5	470.8	32
33								319.2	341.9	364.5	387.2	409.9	432.5	455.2	477.9	500.5	523.2	545.9	33
34								338.7	362.8	386.9	410.9	435.0	459.0	483.1	507.1	531.2	555.3	579.4	34
35								358.8	384.3	409.8	435.3	460.8	486.3	511.8	537.3	562.8	588.3	613.8	35
36								379.5	406.5	433.5	460.4	487.4	514.4	541.3	568.3	595.3	622.3	649.3	36
37								400.8	429.3	457.8	486.3	514.8	543.2	571.7	600.2	628.7	657.2	685.7	37
38									452.7	482.7	512.8	542.8	572.9	602.9	633.0	663.0	693.0	723.0	38
39									476.7	508.4	540.0	571.7	603.3	635.0	666.6	698.3	730.0	761.7	39
40									501.4	534.7	568.0	601.3	634.6	667.9	701.2	734.5	767.8	801.1	40
41									526.7	561.7	596.6	631.6	666.6	701.6	736.6	771.5	806.5	841.5	41
42										589.3	626.0	662.7	699.4	736.1	772.8	809.5	846.2	882.9	42
43										617.6	656.1	694.6	733.0	771.5	810.0	848.5	887.0	925.5	43
44										646.6	686.9	727.1	767.4	807.7	848.0	888.3	928.6	968.9	44
45										676.2	718.3	760.5	802.6	844.8	886.9	929.0	971.1	1013.2	45
46										750.5	794.6	838.6	882.6	926.7	970.7	1014.8	1058.9	1103.0	46
47										783.4	829.4	875.4	921.3	967.3	1013.3	1059.3	1105.3	1151.3	47
48										817.0	865.0	912.9	960.9	1008.8	1056.8	1104.8	1152.8	1200.8	48
49											901.3	951.3	1001.3	1051.2	1101.2	1151.2	1201.2	1251.2	49
50											938.4	990.4	1042.5	1094.5	1146.5	1198.5	1250.5	1302.5	50
51											976.2	1030.4	1084.5	1138.6	1192.7	1246.8	1300.9	1355.0	51
52											1014.8	1071.1	1127.4	1183.6	1239.9	1296.2	1352.5	1408.8	52
53											1054.1	1112.6	1171.1	1229.5	1288.0	1346.5	1405.0	1463.5	53
54											1094.2	1154.9	1215.6	1276.3	1337.0	1397.7	1458.4	1519.1	54
55											1135.1	1198.0	1261.0	1323.9	1386.9	1449.8	1512.8	1575.7	55
56											1176.6	1241.9	1307.2	1372.4	1437.7	1503.0	1568.3	1633.6	56
57											1219.0	1286.6	1354.2	1421.8	1489.4	1557.0	1624.6	1692.2	57
58												1402.1	1472.1	1542.1	1612.1	1682.1	1752.1	1822.1	58
59												1450.7	1523.2	1595.6	1668.0	1740.4	1812.8	1885.2	59
60												1500.3	1575.2	1650.1	1725.0	1800.0	1875.0	1950.0	60
61												1550.6	1628.1	1705.5	1783.0	1860.5	1938.0	2015.5	61
62												1601.8	1681.8	1761.8	1841.8	1921.8	2001.8	2081.8	62
63												1653.9	1736.4	1819.0	1901.5	1984.0	2066.5	2149.0	63
64												1706.7	1791.9	1877.2	1962.4	2047.7	2133.0	2218.3	64
65												1760.4	1848.3	1936.2	2024.1	2112.0	2200.0	2288.0	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino marittimo  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28																			28
29																			29
30																			30
31																			31
32																			32
33	523.2	545.8																	33
34	555.3	579.3																	34
35	588.3	613.8																	35
36	622.3	649.2																	36
37	657.2	685.7																	37
38	693.1	723.1																	38
39	730.0	761.6																	39
40	767.8	801.1																	40
41	806.5	841.5																	41
42	846.3	883.0																	42
43	886.9	925.4																	43
44	928.6	968.9																	44
45	971.2	1 013.3																	45
46	1 014.7	1 058.8																	46
47	1 059.2	1 105.2																	47
48	1 104.7	1 152.7																	48
49	1 151.1	1 201.1																	49
50	1 198.5	1 250.6																	50
51	1 246.9	1 301.0																	51
52	1 296.2	1 352.4																	52
53	1 346.4	1 404.9																	53
54	1 397.6	1 458.3																	54
55	1 449.8	1 512.8																	55
56	1 502.9	1 568.2																	56
57	1 557.0	1 624.6																	57
58	1 612.1	1 682.1																	58
59	1 668.1	1 740.5																	59
60	1 725.0	1 799.9																	60
61	1 782.9	1 860.4																	61
62	1 841.8	1 921.8																	62
63	1 901.6	1 984.2																	63
64	1 962.4	2 047.7																	64
65	2 024.2	2 112.1																	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pinus pinea* L.**

**Pino domestico**

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## Pino domestico

### Volume del fusto e dei rami grossi

$n = 23$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-4.0404 \cdot 10^{-1} \quad 4.1113 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 9.5764 \cdot 10 & \\ -1.1675 \cdot 10^{-2} & 3.5189 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 4.8196 \cdot 10^{-5}$$

$$s_{f_i}^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 23$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.4475 \quad 1.8207 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 2.0237 \cdot 10 & \\ -2.4672 \cdot 10^{-3} & 7.4361 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.0185 \cdot 10^{-5}$$

$$s_{f_i}^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 23$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.7416 \quad 6.5397 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 7.9551 \\ -9.6988 \cdot 10^{-4} & 2.9232 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 4.0036 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 23$

$p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.6474 \cdot 10^{-1} \quad 4.2966 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.0050 \cdot 10^{-1} \\ -1.2253 \cdot 10^{-5} & 3.6931 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.0581 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 23$

$p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [4.5885 \cdot 10^{-1} \quad 2.5176 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.8432 \cdot 10 \\ -3.4664 \cdot 10^{-3} & 1.0447 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.4309 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Pino domestico  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.7	5.8	6.8	7.8															5
6	7.0	8.5	10.0	11.4															6
7	9.7	11.7	13.7	15.7															7
8	12.8	15.4	18.0	20.6	23.3	25.9													8
9	16.2	19.6	22.9	26.2	29.6	32.9													9
10	20.2	24.3	28.4	32.5	36.6	40.7													10
11	24.5	29.4	34.4	39.4	44.4	49.3													11
12	29.2	35.1	41.0	47.0	52.9	58.8													12
13				55.2	62.1	69.1	76.0	83.0											13
14				64.1	72.1	80.2	88.2	96.3											14
15				73.6	82.8	92.1	101.4	110.6											15
16				83.8	94.3	104.8	115.4	125.9											16
17				94.6	106.5	118.4	130.3	142.2											17
18				106.2	119.5	132.8	146.1	159.4	172.8	186.1									18
19				118.3	133.2	148.0	162.9	177.7	192.5	207.4									19
20				131.2	147.6	164.0	180.5	196.9	213.4	229.8									20
21				144.6	162.8	180.9	199.0	217.2	235.3	253.4									21
22				158.8	178.7	198.6	218.5	238.4	258.3	278.2									22
23						217.1	238.8	260.6	282.3	304.1	325.8	347.6							23
24						236.4	260.1	283.8	307.5	331.1	354.8	378.5							24
25						256.6	282.2	307.9	333.6	359.3	385.0	410.7							25
26						277.5	305.3	333.1	360.9	388.7	416.5	444.3							26
27						299.3	329.3	359.3	389.2	419.2	449.2	479.1							27
28						321.9	354.2	386.4	418.6	450.9	483.1	515.3	547.6	579.8					28
29						345.4	379.9	414.5	449.1	483.7	518.2	552.8	587.4	622.0					29
30						369.6	406.6	443.6	480.6	517.6	554.6	591.6	628.6	665.6					30
31						394.7	434.2	473.7	513.2	552.7	592.2	631.7	671.3	710.8					31
32						420.6	462.7	504.8	546.9	589.0	631.1	673.2	715.3	757.4					32
33						447.3	492.1	536.9	581.6	626.4	671.2	715.9	760.7	805.5					33
34						474.9	522.4	569.9	617.4	665.0	712.5	760.0	807.5	855.1					34
35						503.2	553.6	604.0	654.3	704.7	755.0	805.4	855.8	906.1					35
36							585.7	639.0	692.3	745.6	798.8	852.1	905.4	958.7					36
37							618.7	675.0	731.3	787.6	843.9	900.1	956.4	1 012.7					37
38								712.0	771.4	830.7	890.1	949.5	1 008.8	1 068.2					38
39								750.0	812.5	875.1	937.6	1 000.1	1 062.7	1 125.2					39
40								789.0	854.7	920.5	986.3	1 052.1	1 117.9	1 183.7					40
41								828.9	898.0	967.1	1 036.3	1 105.4	1 174.5	1 243.6					41
42								869.9	942.4	1 014.9	1 087.4	1 160.0	1 232.5	1 305.0					42
43									987.8	1 063.8	1 139.9	1 215.9	1 291.9	1 367.9					43
44									1 034.3	1 113.9	1 193.5	1 273.1	1 352.7	1 432.3					44
45									1 081.9	1 165.1	1 248.4	1 331.7	1 414.9	1 498.2					45
46									1 130.5	1 217.5	1 304.5	1 391.5	1 478.5	1 565.5					46
47									1 180.2	1 271.1	1 361.9	1 452.7	1 543.5	1 634.3					47
48									1 231.0	1 325.7	1 420.5	1 515.2	1 609.9	1 704.6					48
49										1 381.6	1 480.3	1 579.0	1 677.7	1 776.4					49
50										1 438.6	1 541.3	1 644.1	1 746.9	1 849.7					50
51										1 496.7	1 603.6	1 710.6	1 817.5	1 924.4					51
52										1 556.0	1 667.1	1 778.3	1 889.5	2 000.6					52
53										1 616.4	1 731.9	1 847.4	1 962.9	2 078.4					53
54										1 678.0	1 797.9	1 917.8	2 037.6	2 157.5					54
55										1 740.7	1 865.1	1 989.5	2 113.8	2 238.2					55
56										1 804.6	1 933.6	2 062.5	2 191.4	2 320.3					56
57										1 869.7	2 003.2	2 136.8	2 270.4	2 404.0					57
58										1 935.9	2 074.2	2 212.5	2 350.8	2 489.1					58
59										2 003.2	2 146.3	2 289.4	2 432.5	2 575.7					59
60										2 071.7	2 219.7	2 367.7	2 515.7	2 663.7					60
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino domestico  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino domestico  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.8	1.3	1.7	2.2															5
6	1.8	2.5	3.1	3.8															6
7	3.0	3.9	4.8	5.7															7
8	4.4	5.5	6.7	7.9	9.0	10.2													8
9	5.9	7.4	8.9	10.4	11.8	13.3													9
10	7.7	9.5	11.3	13.1	14.9	16.8													10
11	9.6	11.8	14.0	16.2	18.4	20.6													11
12	11.7	14.3	16.9	19.5	22.1	24.8													12
13				23.2	26.2	29.3	32.4	35.5											13
14				27.1	30.7	34.2	37.8	41.4											14
15				31.3	35.4	39.5	43.6	47.7											15
16				35.8	40.5	45.2	49.8	54.5											16
17				40.6	45.9	51.2	56.4	61.7											17
18				45.7	51.6	57.5	63.4	69.3	75.2	81.1									18
19				51.1	57.7	64.3	70.9	77.4	84.0	90.6									19
20				56.8	64.1	71.4	78.7	85.9	93.2	100.5									20
21				62.8	70.8	78.8	86.9	94.9	102.9	111.0									21
22				69.1	77.9	86.7	95.5	104.3	113.1	121.9									22
23						94.9	104.5	114.1	123.8	133.4	143.0	152.7							23
24						103.4	113.9	124.4	134.9	145.4	155.9	166.3							24
25						112.3	123.7	135.1	146.5	157.9	169.2	180.6							25
26						121.6	133.9	146.2	158.6	170.9	183.2	195.5							26
27						131.3	144.6	157.8	171.1	184.4	197.6	210.9							27
28						141.3	155.6	169.8	184.1	198.4	212.7	226.9	241.2	255.5					28
29						151.7	167.0	182.3	197.6	212.9	228.2	243.5	258.9	274.2					29
30						162.4	178.8	195.2	211.6	228.0	244.3	260.7	277.1	293.5					30
31						173.5	191.0	208.5	226.0	243.5	261.0	278.5	296.0	313.5					31
32						185.0	203.6	222.3	240.9	259.6	278.2	296.9	315.5	334.1					32
33						196.8	216.7	236.5	256.3	276.1	296.0	315.8	335.6	355.4					33
34						209.0	230.1	251.1	272.2	293.2	314.3	335.3	356.4	377.4					34
35						221.6	243.9	266.2	288.5	310.8	333.1	355.4	377.7	400.0					35
36							258.1	281.7	305.3	328.9	352.5	376.1	399.7	423.3					36
37							272.7	297.7	322.6	347.5	372.4	397.4	422.3	447.2					37
38								314.0	340.3	366.6	392.9	419.2	445.5	471.8					38
39								330.9	358.6	386.3	413.9	441.6	469.3	497.0					39
40								348.1	377.3	406.4	435.5	464.7	493.8	522.9					40
41								365.8	396.4	427.0	457.6	488.2	518.9	549.5					41
42								384.0	416.1	448.2	480.3	512.4	544.5	576.7					42
43									436.2	469.9	503.5	537.2	570.9	604.5					43
44									456.8	492.0	527.3	562.5	597.8	633.0					44
45									477.9	514.7	551.6	588.5	625.3	662.2					45
46									499.4	537.9	576.4	615.0	653.5	692.0					46
47									521.4	561.6	601.8	642.1	682.3	722.5					47
48									543.9	585.8	627.8	669.7	711.7	753.6					48
49										610.6	654.3	698.0	741.7	785.4					49
50										635.8	681.3	726.8	772.4	817.9					50
51										661.5	708.9	756.3	803.6	851.0					51
52										687.8	737.0	786.3	835.5	884.7					52
53										714.6	765.7	816.8	868.0	919.1					53
54										741.8	794.9	848.0	901.1	954.2					54
55										769.6	824.7	879.8	934.8	989.9					55
56										797.9	855.0	912.1	969.2	1 026.3					56
57										826.7	885.9	945.0	1 004.2	1 063.3					57
58										856.0	917.3	978.5	1 039.8	1 101.0					58
59										885.9	949.2	1 012.6	1 076.0	1 139.4					59
60										916.2	981.7	1 047.3	1 112.8	1 178.4					60
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino domestico  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino domestico  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.6	2.7	2.9	3.0															5
6	2.9	3.2	3.4	3.6															6
7	3.3	3.7	4.0	4.3															7
8	3.8	4.3	4.7	5.1	5.5	5.9													8
9	4.4	4.9	5.4	6.0	6.5	7.0													9
10	5.0	5.7	6.3	7.0	7.6	8.3													10
11	5.7	6.5	7.3	8.1	8.9	9.7													11
12	6.5	7.4	8.3	9.3	10.2	11.2													12
13				10.6	11.7	12.8	13.9	15.0											13
14				12.0	13.3	14.6	15.8	17.1											14
15				13.5	15.0	16.5	17.9	19.4											15
16				15.1	16.8	18.5	20.2	21.8											16
17				16.9	18.8	20.6	22.5	24.4											17
18				18.7	20.8	22.9	25.0	27.2	29.3	31.4									18
19				20.6	23.0	25.3	27.7	30.1	32.4	34.8									19
20				22.7	25.3	27.9	30.5	33.1	35.7	38.4									20
21				24.8	27.7	30.6	33.5	36.3	39.2	42.1									21
22				27.1	30.2	33.4	36.6	39.7	42.9	46.1									22
23						36.3	39.8	43.3	46.7	50.2	53.6	57.1							23
24						39.4	43.2	46.9	50.7	54.5	58.2	62.0							24
25						42.6	46.7	50.8	54.9	59.0	63.1	67.1							25
26						45.9	50.4	54.8	59.2	63.6	68.1	72.5							26
27						49.4	54.2	59.0	63.7	68.5	73.3	78.0							27
28						53.0	58.1	63.3	68.4	73.5	78.6	83.8	88.9	94.0					28
29						56.7	62.2	67.7	73.2	78.7	84.2	89.7	95.2	100.7					29
30						60.6	66.5	72.4	78.3	84.1	90.0	95.9	101.8	107.7					30
31						64.6	70.9	77.2	83.4	89.7	96.0	102.3	108.6	114.9					31
32						68.7	75.4	82.1	88.8	95.5	102.2	108.9	115.6	122.3					32
33						73.0	80.1	87.2	94.3	101.4	108.6	115.7	122.8	129.9					33
34						77.3	84.9	92.5	100.0	107.6	115.1	122.7	130.3	137.8					34
35						81.9	89.9	97.9	105.9	113.9	121.9	129.9	137.9	145.9					35
36							95.0	103.4	111.9	120.4	128.9	137.3	145.8	154.3					36
37							100.2	109.2	118.1	127.1	136.0	145.0	153.9	162.9					37
38								115.1	124.5	133.9	143.4	152.8	162.3	171.7					38
39								121.1	131.1	141.0	150.9	160.9	170.8	180.8					39
40								127.3	137.8	148.2	158.7	169.2	179.6	190.1					40
41								133.7	144.7	155.6	166.6	177.6	188.6	199.6					41
42								140.2	151.7	163.2	174.8	186.3	197.9	209.4					42
43									158.9	171.0	183.1	195.2	207.3	219.4					43
44									166.3	179.0	191.7	204.3	217.0	229.6					44
45									173.9	187.1	200.4	213.6	226.9	240.1					45
46									181.6	195.5	209.3	223.1	237.0	250.8					46
47									189.5	204.0	218.4	232.9	247.3	261.8					47
48										212.7	227.8	242.8	257.9	273.0					48
49										221.6	237.3	253.0	268.7	284.4					49
50										230.6	247.0	263.3	279.7	296.0					50
51										239.9	256.9	273.9	290.9	307.9					51
52										249.3	267.0	284.7	302.4	320.0					52
53										258.9	277.3	295.7	314.0	332.4					53
54										268.7	287.8	306.9	325.9	345.0					54
55										278.7	298.5	318.3	338.0	357.8					55
56										288.9	309.4	329.9	350.4	370.9					56
57										299.2	320.5	341.7	362.9	384.2					57
58										309.7	331.7	353.7	375.7	397.7					58
59										320.4	343.2	366.0	388.7	411.5					59
60										331.3	354.9	378.4	402.0	425.5					60
61																			61
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino domestico  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino domestico  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.2	0.3															5
6	0.2	0.3	0.3	0.3															6
7	0.3	0.3	0.3	0.3															7
8	0.3	0.3	0.4	0.4	0.4	0.4													8
9	0.3	0.4	0.4	0.4	0.5	0.5													9
10	0.4	0.4	0.5	0.5	0.6	0.6													10
11	0.4	0.5	0.5	0.6	0.6	0.7													11
12	0.5	0.5	0.6	0.7	0.7	0.8													12
13				0.7	0.8	0.9	1.0	1.0											13
14				0.8	0.9	1.0	1.1	1.2											14
15				0.9	1.0	1.1	1.2	1.3											15
16				1.0	1.2	1.3	1.4	1.5											16
17				1.2	1.3	1.4	1.5	1.7											17
18				1.3	1.4	1.6	1.7	1.8	2.0	2.1									18
19				1.4	1.6	1.7	1.9	2.0	2.2	2.3									19
20				1.5	1.7	1.9	2.1	2.2	2.4	2.6									20
21				1.7	1.9	2.1	2.2	2.4	2.6	2.8									21
22				1.8	2.0	2.2	2.5	2.7	2.9	3.1									22
23						2.4	2.7	2.9	3.1	3.3	3.6	3.8							23
24						2.6	2.9	3.1	3.4	3.6	3.9	4.1							24
25						2.9	3.1	3.4	3.7	3.9	4.2	4.5							25
26						3.1	3.4	3.7	3.9	4.2	4.5	4.8							26
27						3.3	3.6	3.9	4.2	4.5	4.9	5.2							27
28						3.5	3.9	4.2	4.5	4.9	5.2	5.6	5.9	6.2					28
29						3.8	4.1	4.5	4.9	5.2	5.6	5.9	6.3	6.7					29
30						4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.7	7.1					30
31						4.3	4.7	5.1	5.5	5.9	6.4	6.8	7.2	7.6					31
32						4.6	5.0	5.4	5.9	6.3	6.8	7.2	7.6	8.1					32
33						4.8	5.3	5.8	6.2	6.7	7.2	7.7	8.1	8.6					33
34						5.1	5.6	6.1	6.6	7.1	7.6	8.1	8.6	9.1					34
35						5.4	6.0	6.5	7.0	7.5	8.1	8.6	9.1	9.6					35
36							6.3	6.8	7.4	8.0	8.5	9.1	9.6	10.2					36
37							6.6	7.2	7.8	8.4	9.0	9.6	10.2	10.8					37
38								7.6	8.2	8.9	9.5	10.1	10.7	11.3					38
39								8.0	8.7	9.3	10.0	10.6	11.3	11.9					39
40								8.4	9.1	9.8	10.5	11.2	11.9	12.5					40
41								8.8	9.6	10.3	11.0	11.7	12.4	13.2					41
42									10.0	10.8	11.5	12.3	13.0	13.8					42
43									10.5	11.3	12.1	12.9	13.7	14.5					43
44									11.0	11.8	12.6	13.5	14.3	15.1					44
45									11.5	12.3	13.2	14.1	15.0	15.8					45
46									12.0	12.9	13.8	14.7	15.6	16.5					46
47									12.5	13.5	14.4	15.4	16.3	17.2					47
48									13.0	14.0	15.0	16.0	17.0	18.0					48
49										14.6	15.6	16.7	17.7	18.7					49
50										15.2	16.3	17.4	18.4	19.5					50
51										15.8	16.9	18.0	19.2	20.3					51
52										16.4	17.6	18.8	19.9	21.1					52
53										17.1	18.3	19.5	20.7	21.9					53
54										17.7	19.0	20.2	21.5	22.7					54
55										18.4	19.7	21.0	22.3	23.6					55
56										19.0	20.4	21.7	23.1	24.4					56
57										19.7	21.1	22.5	23.9	25.3					57
58										20.4	21.8	23.3	24.7	26.2					58
59										21.1	22.6	24.1	25.6	27.1					59
60										21.8	23.4	24.9	26.5	28.0					60
61																			61
62																			62
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino domestico  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino domestico  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.6	4.2	4.9	5.5															5
6	5.0	5.9	6.8	7.7															6
7	6.6	7.9	9.1	10.3															7
8	8.5	10.1	11.7	13.3	15.0	16.6													8
9	10.7	12.7	14.7	16.8	18.8	20.9													9
10	13.0	15.6	18.1	20.6	23.1	25.6													10
11	15.7	18.7	21.8	24.8	27.9	30.9													11
12	18.6	22.2	25.8	29.5	33.1	36.7													12
13				34.5	38.8	43.0	47.3	51.5											13
14				39.9	44.9	49.8	54.7	59.7											14
15				45.8	51.4	57.1	62.8	68.4											15
16				52.0	58.5	64.9	71.4	77.8											16
17				58.7	65.9	73.2	80.5	87.8											17
18				65.7	73.9	82.0	90.2	98.3	106.5	114.7									18
19				73.2	82.3	91.3	100.4	109.5	118.6	127.7									19
20				81.0	91.1	101.2	111.2	121.3	131.4	141.4									20
21				89.3	100.4	111.5	122.6	133.7	144.8	155.9									21
22				97.9	110.1	122.3	134.5	146.7	158.9	171.1									22
23						133.6	147.0	160.3	173.6	186.9	200.2	213.5							23
24						145.5	160.0	174.5	189.0	203.5	218.0	232.5							24
25						157.8	173.5	189.3	205.0	220.7	236.5	252.2							25
26						170.6	187.7	204.7	221.7	238.7	255.7	272.8							26
27						184.0	202.3	220.7	239.1	257.4	275.8	294.1							27
28						197.8	217.6	237.3	257.1	276.8	296.5	316.3	336.0	355.7					28
29						212.2	233.4	254.5	275.7	296.9	318.1	339.2	360.4	381.6					29
30						227.0	249.7	272.4	295.0	317.7	340.3	363.0	385.7	408.3					30
31						242.4	266.6	290.8	315.0	339.2	363.4	387.6	411.8	436.0					31
32						258.3	284.0	309.8	335.6	361.4	387.2	412.9	438.7	464.5					32
33						274.6	302.0	329.5	356.9	384.3	411.7	439.1	466.5	494.0					33
34						291.5	320.6	349.7	378.8	407.9	437.0	466.1	495.2	524.3					34
35						308.9	339.7	370.5	401.4	432.2	463.1	493.9	524.7	555.6					35
36							359.4	392.0	424.6	457.3	489.9	522.5	555.1	587.8					36
37							379.6	414.1	448.5	483.0	517.4	551.9	586.4	620.8					37
38								436.7	473.1	509.4	545.8	582.1	618.5	654.8					38
39								460.0	498.3	536.6	574.8	613.1	651.4	689.7					39
40								483.8	524.1	564.4	604.7	645.0	685.2	725.5					40
41								508.3	550.6	593.0	635.3	677.6	719.9	762.2					41
42								533.4	577.8	622.2	666.6	711.0	755.4	799.8					42
43								605.6	652.2	698.7	745.3	791.8	838.4						43
44								634.1	682.8	731.6	780.3	829.1	877.8						44
45								663.2	714.2	765.2	816.2	867.1	918.1						45
46								693.0	746.3	799.5	852.8	906.1	959.4						46
47								723.4	779.1	834.7	890.3	945.9	1 001.5						47
48								754.5	812.5	870.5	928.5	986.6	1 044.6						48
49									846.7	907.2	967.6	1 028.1	1 088.5						49
50									881.6	944.6	1 007.5	1 070.4	1 133.4						50
51									917.2	982.7	1 048.2	1 113.7	1 179.1						51
52									953.5	1 021.6	1 089.7	1 157.7	1 225.8						52
53									990.5	1 061.2	1 132.0	1 202.7	1 273.4						53
54									1 028.2	1 101.7	1 175.1	1 248.5	1 321.9						54
55									1 066.7	1 142.8	1 219.0	1 295.1	1 371.3						55
56									1 105.8	1 184.7	1 263.7	1 342.6	1 421.6						56
57									1 145.6	1 227.4	1 309.2	1 391.0	1 472.8						57
58									1 186.1	1 270.8	1 355.5	1 440.2	1 524.9						58
59									1 227.4	1 315.0	1 402.7	1 490.3	1 577.9						59
60									1 269.3	1 360.0	1 450.6	1 541.2	1 631.9						60
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino domestico  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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***Pinus sylvestris* L.**

**Pino silvestre**

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## Pino silvestre

### Volume del fusto e dei rami grossi

$n = 43$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [3.1803 \quad 3.9899 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_x^2 = \begin{bmatrix} 4.8940 & \\ -1.9401 \cdot 10^{-3} & 1.7687 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_x^2 = 4.2984 \cdot 10^{-5}$$

$$s_i^2 = s_x^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 43$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [6.5786 \cdot 10^{-1} \quad 1.7176 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_x^2 = \begin{bmatrix} 1.6422 & \\ -6.5101 \cdot 10^{-4} & 5.9351 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_x^2 = 1.4423 \cdot 10^{-5}$$

$$s_i^2 = s_x^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 43$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.1336 \quad 4.5864 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})\mathbf{s}_*^2 = \begin{bmatrix} 9.8416 \cdot 10^{-1} & \\ -3.9014 \cdot 10^{-4} & 3.5568 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 8.6438 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 43$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [9.3354 \cdot 10^{-2} \quad 3.1809 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} \mathbf{s}_*^2 = \begin{bmatrix} 3.5671 \cdot 10^{-3} & \\ -1.4141 \cdot 10^{-6} & 1.2892 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.1329 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 43$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [2.8848 \quad 2.2080 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} \mathbf{s}_*^2 = \begin{bmatrix} 3.5358 & \\ -1.4017 \cdot 10^{-3} & 1.2779 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.1055 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

Pino silvestre  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	8.2	9.2	10.2	11.2	12.2	13.2													5
6	10.4	11.8	13.2	14.7	16.1	17.5													6
7	13.0	14.9	16.9	18.8	20.8	22.7													7
8	15.9	18.5	21.1	23.6	26.2	28.7	31.3	33.8											8
9	19.3	22.6	25.8	29.0	32.3	35.5	38.7	42.0											9
10	23.1	27.1	31.1	35.1	39.1	43.1	47.1	51.1											10
11	27.3	32.1	37.0	41.8	46.6	51.5	56.3	61.1											11
12	31.9	37.7	43.4	49.1	54.9	60.6	66.4	72.1	77.9	83.6	89.4	95.1							12
13			50.4	57.1	63.9	70.6	77.4	84.1	90.8	97.6	104.3	111.1							13
14			57.9	65.7	73.6	81.4	89.2	97.0	104.8	112.7	120.5	128.3							14
15			66.0	75.0	84.0	93.0	101.9	110.9	119.9	128.9	137.8	146.8							15
16				84.9	95.1	105.3	115.5	125.8	136.0	146.2	156.4	166.6							16
17				95.4	107.0	118.5	130.0	141.6	153.1	164.6	176.1	187.7							17
18				106.6	119.5	132.5	145.4	158.3	171.2	184.2	197.1	210.0	222.9	235.9					18
19				118.4	132.8	147.2	161.6	176.0	190.4	204.8	219.2	233.6	248.0	262.4					19
20				130.9	146.8	162.8	178.7	194.7	210.7	226.6	242.6	258.5	274.5	290.5					20
21				143.9	161.5	179.1	196.7	214.3	231.9	249.5	267.1	284.7	302.3	319.9					21
22				157.7	177.0	196.3	215.6	234.9	254.2	273.5	292.8	312.2	331.5	350.8					22
23								256.5	277.6	298.7	319.8	340.9	362.0	383.1	404.2	425.3			23
24								279.0	301.9	324.9	347.9	370.9	393.9	416.9	439.8	462.8			24
25								302.4	327.4	352.3	377.2	402.2	427.1	452.0	477.0	501.9			25
26								326.8	353.8	380.8	407.8	434.7	461.7	488.7	515.6	542.6			26
27								352.2	381.3	410.4	439.5	468.6	497.6	526.7	555.8	584.9			27
28									409.8	441.1	472.4	503.7	535.0	566.2	597.5	628.8	660.1	691.4	28
29									439.4	473.0	506.5	540.1	573.6	607.2	640.7	674.3	707.8	741.4	29
30									470.0	505.9	541.8	577.7	613.6	649.5	685.5	721.4	757.3	793.2	30
31										540.0	578.3	616.7	655.0	693.4	731.7	770.0	808.4	846.7	31
32										575.2	616.0	656.9	697.7	738.6	779.5	820.3	861.2	902.0	32
33										654.9	698.4	741.8	785.3	828.7	872.2	915.6	959.1		33
34										695.0	741.2	787.3	833.4	879.5	925.6	971.8	1 017.9		34
35											785.2	834.1	883.0	931.8	980.7	1 029.6	1 078.5		35
36											830.5	882.2	933.9	985.7	1 037.4	1 089.1	1 140.8		36
37											877.1	931.7	986.4	1 041.0	1 095.6	1 150.2	1 204.9		37
38													1 040.2	1 097.8	1 155.5	1 213.1	1 270.7		38
39													1 095.5	1 156.2	1 216.9	1 277.6	1 338.3		39
40													1 152.3	1 216.1	1 279.9	1 343.8	1 407.6		40
41													1 210.4	1 277.5	1 344.6	1 411.7	1 478.7		41
42													1 270.1	1 340.4	1 410.8	1 481.2	1 551.6		42
43															1 478.6	1 552.4	1 626.2		43
44															1 548.1	1 625.3	1 702.6		44
45															1 619.1	1 699.9	1 780.7		45
46																			46
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino silvestre  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	722.6	753.9																	28
29	774.9	808.5																	29
30	829.1	865.0																	30
31	885.1	923.4																	31
32	942.9	983.7																	32
33	1 002.5	1 046.0	1 089.4	1 132.9															33
34	1 064.0	1 110.1	1 156.3	1 202.4															34
35	1 127.3	1 176.2	1 225.1	1 274.0															35
36	1 192.5	1 244.2	1 295.9	1 347.6															36
37	1 259.5	1 314.1	1 368.7	1 423.3															37
38	1 328.3	1 385.9	1 443.5	1 501.1	1 558.8	1 616.4													38
39	1 399.0	1 459.7	1 520.3	1 581.0	1 641.7	1 702.4													39
40	1 471.5	1 535.3	1 599.1	1 663.0	1 726.8	1 790.7													40
41	1 545.8	1 612.9	1 679.9	1 747.0	1 814.1	1 881.1													41
42	1 622.0	1 692.3	1 762.7	1 833.1	1 903.5	1 973.9													42
43	1 700.0	1 773.7	1 847.5	1 921.3	1 995.1	2 068.8	2 142.6	2 216.4											43
44	1 779.8	1 857.0	1 934.3	2 011.5	2 088.8	2 166.0	2 243.3	2 320.5											44
45	1 861.5	1 942.3	2 023.1	2 103.9	2 184.7	2 265.5	2 346.2	2 427.0											45
46																			46
47																			47
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino silvestre  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.8	3.2	3.7	4.1	4.5	5.0													5
6	3.7	4.4	5.0	5.6	6.2	6.8													6
7	4.9	5.7	6.5	7.4	8.2	9.1													7
8	6.2	7.3	8.4	9.5	10.6	11.7	12.7	13.8											8
9	7.6	9.0	10.4	11.8	13.2	14.6	16.0	17.4											9
10	9.2	11.0	12.7	14.4	16.1	17.8	19.6	21.3											10
11	11.0	13.1	15.2	17.3	19.4	21.4	23.5	25.6											11
12	13.0	15.5	18.0	20.4	22.9	25.4	27.9	30.3	32.8	35.3	37.8	40.2							12
13			21.0	23.9	26.8	29.7	32.6	35.5	38.4	41.3	44.2	47.1							13
14			24.2	27.6	31.0	34.3	37.7	41.1	44.4	47.8	51.2	54.5							14
15			27.7	31.6	35.4	39.3	43.2	47.0	50.9	54.8	58.6	62.5							15
16				35.8	40.2	44.6	49.0	53.4	57.8	62.2	66.6	71.0							16
17				40.4	45.3	50.3	55.3	60.2	65.2	70.2	75.1	80.1							17
18				45.2	50.7	56.3	61.9	67.4	73.0	78.6	84.1	89.7	95.3	100.8					18
19				50.3	56.5	62.7	68.9	75.1	81.3	87.5	93.7	99.9	106.1	112.3					19
20				55.6	62.5	69.4	76.2	83.1	90.0	96.8	103.7	110.6	117.5	124.3					20
21				61.3	68.8	76.4	84.0	91.6	99.1	106.7	114.3	121.9	129.4	137.0					21
22				67.2	75.5	83.8	92.1	100.4	108.7	117.0	125.4	133.7	142.0	150.3					22
23								109.7	118.8	127.9	136.9	146.0	155.1	164.2	173.3	182.4			23
24								119.4	129.3	139.2	149.1	159.0	168.8	178.7	188.6	198.5			24
25								129.5	140.2	150.9	161.7	172.4	183.2	193.9	204.6	215.4			25
26								140.0	151.6	163.2	174.8	186.4	198.0	209.7	221.3	232.9			26
27								150.9	163.4	176.0	188.5	201.0	213.5	226.0	238.6	251.1			27
28									175.7	189.2	202.6	216.1	229.6	243.0	256.5	270.0	283.4	296.9	28
29									188.4	202.9	217.3	231.8	246.2	260.7	275.1	289.6	304.0	318.4	29
30									201.6	217.1	232.5	248.0	263.5	278.9	294.4	309.8	325.3	340.7	30
31										231.7	248.2	264.8	281.3	297.8	314.3	330.8	347.3	363.8	31
32										246.9	264.5	282.1	299.7	317.2	334.8	352.4	370.0	387.6	32
33										281.2	299.9	318.6	337.3	356.0	374.8	393.5	412.2	430.9	33
34										298.5	318.3	338.2	358.1	377.9	397.8	417.6	437.5	457.4	34
35											337.3	358.3	379.4	400.4	421.5	442.5	463.6	484.6	35
36											356.8	379.1	401.3	423.6	445.9	468.1	490.4	512.7	36
37											376.9	400.4	423.9	447.4	470.9	494.5	518.0	541.5	37
38													447.1	471.9	496.7	521.5	546.3	571.1	38
39													470.9	497.0	523.2	549.3	575.4	601.5	39
40													495.3	522.8	550.3	577.8	605.3	632.8	40
41													520.4	549.2	578.1	607.0	635.9	664.8	41
42													546.0	576.3	606.6	636.9	667.2	697.5	42
43															635.8	667.6	699.3	731.1	43
44															665.7	699.0	732.2	765.5	44
45															696.3	731.1	765.8	800.5	45
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino silvestre  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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27																			27
28	310.4	323.8																	28
29	332.9	347.3																	29
30	356.2	371.7																	30
31	380.3	396.8																	31
32	405.2	422.8																	32
33	430.9	449.6	468.3	487.0															33
34	457.3	477.2	497.0	516.9															34
35	484.6	505.6	526.7	547.7															35
36	512.6	534.9	557.2	579.4															36
37	541.5	565.0	588.5	612.0															37
38	571.1	595.9	620.7	645.5	670.3	695.1													38
39	601.5	627.7	653.8	679.9	706.0	732.1													39
40	632.7	660.2	687.7	715.2	742.7	770.1													40
41	664.7	693.6	722.5	751.4	780.2	809.1													41
42	697.5	727.8	758.1	788.4	818.7	849.0													42
43	731.1	762.9	794.6	826.4	858.1	889.9	921.7	953.4											43
44	765.5	798.7	832.0	865.2	898.5	931.7	965.0	998.2											44
45	800.6	835.4	870.2	905.0	939.8	974.5	1 009.3	1 044.1											45
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pino silvestre  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.7	2.8	2.9	3.1	3.2	3.3													5
6	3.0	3.1	3.3	3.5	3.6	3.8													6
7	3.3	3.5	3.7	3.9	4.2	4.4													7
8	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7											8
9	4.0	4.4	4.7	5.1	5.5	5.8	6.2	6.6											9
10	4.4	4.9	5.3	5.8	6.3	6.7	7.2	7.6											10
11	4.9	5.5	6.0	6.6	7.1	7.7	8.2	8.8											11
12	5.4	6.1	6.8	7.4	8.1	8.7	9.4	10.1	10.7	11.4	12.0	12.7							12
13			7.6	8.3	9.1	9.9	10.7	11.4	12.2	13.0	13.8	14.5							13
14			8.4	9.3	10.2	11.1	12.0	12.9	13.8	14.7	15.6	16.5							14
15			9.4	10.4	11.4	12.5	13.5	14.5	15.5	16.6	17.6	18.6							15
16				11.5	12.7	13.9	15.0	16.2	17.4	18.6	19.7	20.9							16
17				12.7	14.1	15.4	16.7	18.0	19.4	20.7	22.0	23.3							17
18				14.0	15.5	17.0	18.5	20.0	21.5	22.9	24.4	25.9	27.4	28.9					18
19				15.4	17.0	18.7	20.3	22.0	23.7	25.3	27.0	28.6	30.3	31.9					19
20				16.8	18.6	20.5	22.3	24.1	26.0	27.8	29.7	31.5	33.3	35.2					20
21				18.3	20.3	22.4	24.4	26.4	28.4	30.5	32.5	34.5	36.5	38.5					21
22				19.9	22.1	24.3	26.6	28.8	31.0	33.2	35.4	37.7	39.9	42.1					22
23								31.2	33.7	36.1	38.5	41.0	43.4	45.8	48.2	50.7			23
24								33.8	36.5	39.1	41.8	44.4	47.0	49.7	52.3	55.0			24
25								36.5	39.4	42.3	45.1	48.0	50.9	53.7	56.6	59.5			25
26								39.3	42.4	45.5	48.6	51.7	54.8	57.9	61.0	64.1			26
27								42.3	45.6	48.9	52.3	55.6	59.0	62.3	65.7	69.0			27
28									48.9	52.5	56.1	59.7	63.3	66.9	70.5	74.0	77.6	81.2	28
29									52.3	56.1	60.0	63.8	67.7	71.6	75.4	79.3	83.1	87.0	29
30									55.8	59.9	64.1	68.2	72.3	76.4	80.6	84.7	88.8	92.9	30
31										63.8	68.2	72.7	77.1	81.5	85.9	90.3	94.7	99.1	31
32										67.9	72.6	77.3	82.0	86.7	91.4	96.1	100.8	105.5	32
33											77.1	82.0	87.0	92.0	97.0	102.0	107.0	112.0	33
34											81.7	87.0	92.3	97.6	102.9	108.2	113.5	118.8	34
35												92.0	97.6	103.3	108.9	114.5	120.1	125.7	35
36												97.2	103.2	109.1	115.1	121.0	127.0	132.9	36
37												102.6	108.9	115.2	121.4	127.7	134.0	140.3	37
38														121.3	128.0	134.6	141.2	147.8	38
39														127.7	134.7	141.7	148.6	155.6	39
40														134.2	141.6	148.9	156.2	163.6	40
41														140.9	148.6	156.3	164.0	171.7	41
42														147.8	155.9	163.9	172.0	180.1	42
43																171.7	180.2	188.7	43
44																179.7	188.6	197.5	44
45																187.9	197.2	206.5	45
46																			46
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino silvestre  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
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26																			26
27																			27
28	84.8	88.4																	28
29	90.8	94.7																	29
30	97.1	101.2																	30
31	103.5	107.9																	31
32	110.2	114.8																	32
33	117.0	122.0	127.0	132.0															33
34	124.1	129.4	134.7	140.0															34
35	131.4	137.0	142.6	148.2															35
36	138.8	144.8	150.7	156.7															36
37	146.5	152.8	159.1	165.4															37
38	154.5	161.1	167.7	174.3	180.9	187.6													38
39	162.6	169.6	176.5	183.5	190.5	197.5													39
40	170.9	178.3	185.6	192.9	200.3	207.6													40
41	179.5	187.2	194.9	202.6	210.3	218.0													41
42	188.2	196.3	204.4	212.5	220.6	228.7													42
43	197.2	205.7	214.1	222.6	231.1	239.6	248.1	256.5											43
44	206.4	215.2	224.1	233.0	241.9	250.8	259.6	268.5											44
45	215.7	225.0	234.3	243.6	252.9	262.2	271.5	280.8											45
46																			46
47																			47
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino silvestre  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.2	0.2	0.2													5
6	0.2	0.2	0.2	0.2	0.2	0.2													6
7	0.2	0.2	0.2	0.2	0.2	0.2													7
8	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3											8
9	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4											9
10	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5											10
11	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6											11
12	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8							12
13			0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0							13
14			0.5	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1							14
15			0.6	0.7	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.2							15
16				0.7	0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4							16
17				0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6							17
18				0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9					18
19				1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2					19
20				1.1	1.2	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4					20
21				1.2	1.4	1.5	1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6					21
22				1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4	2.6	2.7	2.9					22
23								2.1	2.3	2.4	2.6	2.8	3.0	3.1	3.3	3.5			23
24								2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8			24
25								2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1			25
26								2.7	2.9	3.1	3.3	3.5	3.7	4.0	4.2	4.4			26
27								2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	4.7			27
28									3.3	3.6	3.8	4.1	4.3	4.6	4.8	5.1	5.3	5.6	28
29									3.6	3.8	4.1	4.4	4.6	4.9	5.2	5.4	5.7	6.0	29
30									3.8	4.1	4.4	4.7	5.0	5.2	5.5	5.8	6.1	6.4	30
31										4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	31
32										4.7	5.0	5.3	5.6	6.0	6.3	6.6	6.9	7.3	32
33											5.3	5.6	6.0	6.3	6.7	7.0	7.4	7.7	33
34											5.6	6.0	6.3	6.7	7.1	7.4	7.8	8.2	34
35												6.3	6.7	7.1	7.5	7.9	8.3	8.7	35
36												6.7	7.1	7.5	7.9	8.3	8.8	9.2	36
37												7.1	7.5	7.9	8.4	8.8	9.2	9.7	37
38													8.4	8.8	9.3	9.7	10.2	38	
39													8.8	9.3	9.8	10.3	10.7	39	
40													9.3	9.8	10.3	10.8	11.3	40	
41														9.7	10.3	10.8	11.3	11.9	41
42														10.2	10.8	11.3	11.9	12.4	42
43															11.9	12.4	13.0	43	
44																12.4	13.0	13.6	44
45																13.0	13.6	14.3	45
46																			46
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pino silvestre  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	5.8	6.1																	28
29	6.2	6.5																	29
30	6.7	7.0																	30
31	7.1	7.4																	31
32	7.6	7.9																	32
33	8.1	8.4	8.8	9.1															33
34	8.6	8.9	9.3	9.7															34
35	9.1	9.4	9.8	10.2															35
36	9.6	10.0	10.4	10.8															36
37	10.1	10.5	11.0	11.4															37
38	10.7	11.1	11.6	12.0	12.5	13.0													38
39	11.2	11.7	12.2	12.7	13.2	13.6													39
40	11.8	12.3	12.8	13.3	13.8	14.3													40
41	12.4	12.9	13.5	14.0	14.5	15.1													41
42	13.0	13.6	14.1	14.7	15.2	15.8													42
43	13.6	14.2	14.8	15.4	16.0	16.6	17.1	17.7											43
44	14.3	14.9	15.5	16.1	16.7	17.3	18.0	18.6											44
45	14.9	15.6	16.2	16.8	17.5	18.1	18.8	19.4											45
46																			46
47																			47
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pino silvestre  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)								
5	5.6	6.2	6.7	7.3	7.9	8.4													5								
6	6.9	7.7	8.4	9.2	10.0	10.8													6								
7	8.3	9.4	10.5	11.5	12.6	13.7													7								
8	10.0	11.4	12.8	14.2	15.6	17.0	18.4	19.8											8								
9	11.8	13.6	15.4	17.2	19.0	20.8	22.6	24.3											9								
10	13.9	16.1	18.3	20.5	22.8	25.0	27.2	29.4											10								
11	16.2	18.9	21.6	24.3	26.9	29.6	32.3	34.9											11								
12	18.8	22.0	25.1	28.3	31.5	34.7	37.9	41.0	44.2	47.4	50.6	53.8							12								
13			29.0	32.7	36.5	40.2	43.9	47.7	51.4	55.1	58.9	62.6							13								
14			33.2	37.5	41.8	46.2	50.5	54.8	59.1	63.5	67.8	72.1							14								
15			37.7	42.6	47.6	52.6	57.5	62.5	67.5	72.4	77.4	82.4							15								
16				48.1	53.8	59.4	65.1	70.7	76.4	82.0	87.7	93.3							16								
17				53.9	60.3	66.7	73.1	79.5	85.8	92.2	98.6	105.0							17								
18				60.1	67.3	74.4	81.6	88.7	95.9	103.0	110.2	117.3	124.5	131.7					18								
19				66.7	74.6	82.6	90.6	98.5	106.5	114.5	122.4	130.4	138.4	146.4					19								
20				73.5	82.4	91.2	100.0	108.9	117.7	126.5	135.4	144.2	153.0	161.9					20								
21				80.8	90.5	100.3	110.0	119.7	129.5	139.2	148.9	158.7	168.4	178.2					21								
22				88.4	99.1	109.8	120.4	131.1	141.8	152.5	163.2	173.9	184.6	195.2					22								
23								143.0	154.7	166.4	178.1	189.8	201.5	213.1	224.8	236.5			23								
24								155.5	168.2	180.9	193.7	206.4	219.1	231.8	244.5	257.2			24								
25								168.5	182.3	196.1	209.9	223.7	237.5	251.3	265.1	278.9			25								
26								182.0	196.9	211.8	226.8	241.7	256.6	271.6	286.5	301.4			26								
27								196.0	212.1	228.2	244.3	260.4	276.5	292.6	308.7	324.8			27								
28									227.9	245.2	262.5	279.9	297.2	314.5	331.8	349.1	366.4	383.7	28								
29									244.3	262.9	281.4	300.0	318.6	337.1	355.7	374.3	392.8	411.4	29								
30									261.2	281.1	301.0	320.8	340.7	360.6	380.5	400.3	420.2	440.1	30								
31										299.9	321.2	342.4	363.6	384.8	406.0	427.3	448.5	469.7	31								
32										319.4	342.0	364.6	387.3	409.9	432.5	455.1	477.7	500.3	32								
33											363.6	387.6	411.7	435.7	459.7	483.8	507.8	531.9	33								
34												385.8	411.3	436.8	462.3	487.8	513.4	538.9	564.4	34							
35													435.7	462.7	489.7	516.8	543.8	570.9	597.9	35							
36														460.7	489.4	518.0	546.6	575.2	603.8	632.4	36						
37															486.5	516.8	547.0	577.2	607.4	637.7	667.9	37					
38																576.8	608.7	640.6	672.4	704.3	736.2	38					
39																	607.4	641.0	674.6	708.1	741.7	775.3	39				
40																		638.8	674.1	709.4	744.8	780.1	815.5	40			
41																			671.0	708.1	745.2	782.3	819.4	856.5	41		
42																				704.0	742.9	781.9	820.8	859.8	898.8	42	
43																						819.4	860.2	901.1	942.0	983.0	43
44																							857.8	900.6	943.3	986.1	44
45																								897.1	941.8	986.5	45
46																											46
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69																											69
70																											70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)								

Pino silvestre  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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25																			25
26																			26
27																			27
28	401.0	418.3																	28
29	430.0	448.5																	29
30	459.9	479.8																	30
31	490.9	512.1																	31
32	522.9	545.5																	32
33	555.9	580.0	604.0	628.1															33
34	589.9	615.5	641.0	666.5															34
35	625.0	652.0	679.1	706.1															35
36	661.0	689.7	718.3	746.9															36
37	698.1	728.3	758.6	788.8															37
38	736.2	768.1	800.0	831.9	863.7	895.6													38
39	775.3	808.9	842.5	876.1	909.6	943.2													39
40	815.4	850.8	886.1	921.4	956.7	992.1													40
41	856.6	893.7	930.8	967.9	1 005.0	1 042.1													41
42	898.7	937.7	976.6	1 015.6	1 054.5	1 093.5													42
43	941.9	982.7	1 023.5	1 064.4	1 105.2	1 146.0	1 186.8	1 227.7											43
44	986.1	1 028.8	1 071.6	1 114.3	1 157.1	1 199.8	1 242.5	1 285.3											44
45	1 031.3	1 076.0	1 120.7	1 165.4	1 210.1	1 254.8	1 299.5	1 344.2											45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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## **Pini esotici**

*Pinus strobus* L.  
Pino strobo

*Pinus radiata* D. Don  
Pino insigne



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## Pini esotici

### Volume del fusto e dei rami grossi

$n = 24$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.6279 \quad 3.3389 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.2304 & \\ -4.4729 \cdot 10^{-4} & 5.3529 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 8.9446 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 24$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [7.4835 \cdot 10^{-1} \quad 1.2202 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.9131 \cdot 10^{-1} & \\ -1.4225 \cdot 10^{-4} & 1.7024 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 2.8446 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 24$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [4.7155 \quad 3.5007 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.8874 \cdot 10^{-1} & \\ -2.5037 \cdot 10^{-4} & 2.9963 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.0068 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 24$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.5180 \cdot 10^{-1} \quad 2.3621 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.5664 \cdot 10^{-3} & \\ -5.6941 \cdot 10^{-7} & 6.8144 \cdot 10^{-10} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.1387 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 24$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [5.6156 \quad 1.5939 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 7.3875 \cdot 10^{-1} & \\ -2.6855 \cdot 10^{-4} & 3.2139 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.3703 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Pini esotici  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	6.8	7.6	8.5	9.3															5
6	8.6	9.8	11.0	12.2															6
7	10.8	12.4	14.1	15.7															7
8	13.3	15.4	17.6	19.7	21.9	24.0													8
9	16.2	18.9	21.6	24.3	27.0	29.7													9
10	19.3	22.7	26.0	29.3	32.7	36.0													10
11	22.8	26.9	30.9	34.9	39.0	43.0													11
12	26.7	31.5	36.3	41.1	45.9	50.7													12
13				47.8	53.4	59.1	64.7	70.3	76.0	81.6									13
14				55.0	61.5	68.1	74.6	81.2	87.7	94.2									14
15				62.7	70.2	77.8	85.3	92.8	100.3	107.8									15
16				71.0	79.6	88.1	96.7	105.2	113.7	122.3									16
17				79.8	89.5	99.1	108.8	118.4	128.1	137.7									17
18						110.8	121.6	132.4	143.3	154.1	164.9	175.7	186.5	197.4					18
19						123.2	135.2	147.3	159.3	171.4	183.4	195.5	207.5	219.6					19
20						136.2	149.5	162.9	176.3	189.6	203.0	216.3	229.7	243.0					20
21						149.9	164.6	179.3	194.0	208.8	223.5	238.2	252.9	267.7					21
22						164.2	180.4	196.6	212.7	228.9	245.0	261.2	277.4	293.5					22
23								214.6	232.2	249.9	267.6	285.2	302.9	320.6	338.2	355.9	373.5	391.2	23
24								233.4	252.6	271.9	291.1	310.3	329.6	348.8	368.0	387.3	406.5	425.7	24
25								253.0	273.9	294.8	315.6	336.5	357.4	378.3	399.1	420.0	440.9	461.7	25
26								273.5	296.1	318.6	341.2	363.8	386.3	408.9	431.5	454.0	476.6	499.2	26
27								294.7	319.1	343.4	367.7	392.1	416.4	440.8	465.1	489.4	513.8	538.1	27
28										369.1	395.3	421.5	447.6	473.8	500.0	526.2	552.3	578.5	28
29										395.7	423.8	451.9	480.0	508.1	536.2	564.2	592.3	620.4	29
30										423.3	453.4	483.4	513.5	543.5	573.6	603.6	633.7	663.7	30
31										451.8	483.9	516.0	548.1	580.2	612.3	644.4	676.5	708.5	31
32										481.3	515.5	549.7	583.9	618.1	652.2	686.4	720.6	754.8	32
33											584.4	620.8	657.1	693.5	729.8	766.2	802.6	839.0	33
34											620.2	658.8	697.4	736.0	774.6	813.2	851.8	890.4	34
35											657.1	698.0	738.9	779.8	820.7	861.6	902.5	943.4	35
36											695.0	738.3	781.5	824.8	868.1	911.3	954.6	997.9	36
37											734.0	779.7	825.4	871.1	916.8	962.5	1 008.2	1 053.9	37
38													870.5	918.7	966.9	1 015.1	1 063.3	1 111.5	38
39													916.8	967.5	1 018.3	1 069.1	1 119.9	1 170.7	39
40													964.2	1 017.7	1 071.1	1 124.5	1 177.9	1 231.3	40
41														1 012.9	1 069.0	1 125.2	1 181.3	1 237.4	41
42														1 062.8	1 121.7	1 180.6	1 239.5	1 298.4	42
43															1 237.4	1 299.1	1 360.8	1 422.5	43
44															1 295.4	1 360.1	1 424.7	1 489.4	44
45															1 354.9	1 422.5	1 490.1	1 557.7	45
46															1 415.7	1 486.3	1 557.0	1 627.7	46
47															1 477.8	1 551.5	1 625.3	1 699.0	47
48																	1 695.0	1 768.7	48
49																	1 766.3	1 840.0	49
50																	1 839.0	1 912.7	50
51																	1 913.2	1 986.9	51
52																	1 988.9	2 062.6	52
53																			53
54																			54
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pini esotici  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	604.7	630.9	657.1	683.2															28
29	648.5	676.6	704.6	732.7															29
30	693.8	723.8	753.9	783.9															30
31	740.6	772.7	804.8	836.9															31
32	789.0	823.2	857.4	891.6															32
33	838.9	875.3	911.6	948.0	984.4	1 020.7	1 057.1	1 093.4											33
34	890.4	929.0	967.6	1 006.2	1 044.8	1 083.4	1 122.0	1 160.6											34
35	943.4	984.3	1 025.2	1 066.1	1 107.0	1 147.9	1 188.8	1 229.7											35
36	997.9	1 041.2	1 084.4	1 127.7	1 171.0	1 214.2	1 257.5	1 300.8											36
37	1 053.9	1 099.7	1 145.4	1 191.1	1 236.8	1 282.5	1 328.2	1 373.9											37
38	1 111.5	1 159.8	1 208.0	1 256.2	1 304.4	1 352.6	1 400.8	1 449.0											38
39	1 170.7	1 221.5	1 272.2	1 323.0	1 373.8	1 424.6	1 475.4	1 526.2											39
40	1 231.3	1 284.8	1 338.2	1 391.6	1 445.0	1 498.5	1 551.9	1 605.3											40
41	1 293.5	1 349.7	1 405.8	1 461.9	1 518.1	1 574.2	1 630.3	1 686.4											41
42	1 357.3	1 416.2	1 475.1	1 534.0	1 592.9	1 651.8	1 710.7	1 769.6											42
43	1 422.6	1 484.3	1 546.0	1 607.8	1 669.5	1 731.2	1 793.0	1 854.7											43
44	1 489.4	1 554.0	1 618.7	1 683.3	1 747.9	1 812.6	1 877.2	1 941.9											44
45	1 557.7	1 625.3	1 692.9	1 760.6	1 828.2	1 895.8	1 963.4	2 031.0											45
46	1 627.6	1 698.3	1 768.9	1 839.6	1 910.2	1 980.9	2 051.5	2 122.2											46
47	1 699.0	1 772.8	1 846.5	1 920.3	1 994.0	2 067.8	2 141.6	2 215.3											47
48	1 772.0	1 848.9	1 925.8	2 002.8	2 079.7	2 156.6	2 233.5	2 310.5											48
49	1 846.5	1 926.6	2 006.8	2 087.0	2 167.1	2 247.3	2 327.5	2 407.6											49
50	1 922.5	2 006.0	2 089.4	2 172.9	2 256.4	2 339.9	2 423.3	2 506.8											50
51	2 000.1	2 086.9	2 173.7	2 260.6	2 347.4	2 434.3	2 521.1	2 608.0											51
52	2 079.2	2 169.4	2 259.7	2 350.0	2 440.3	2 530.6	2 620.9	2 711.1											52
53		2 253.6	2 347.4	2 441.2	2 534.9	2 628.7	2 722.5	2 816.3											53
54		2 339.3	2 436.7	2 534.0	2 631.4	2 728.8	2 826.1	2 923.5											54
55		2 426.7	2 527.7	2 628.7	2 729.7	2 830.7	2 931.7	3 032.7											55
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pini esotici  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.3	2.6	2.9	3.2															5
6	2.9	3.4	3.8	4.3															6
7	3.7	4.3	4.9	5.5															7
8	4.7	5.4	6.2	7.0	7.8	8.6													8
9	5.7	6.7	7.7	8.7	9.6	10.6													9
10	6.8	8.1	9.3	10.5	11.7	13.0													10
11	8.1	9.6	11.1	12.6	14.0	15.5													11
12	9.5	11.3	13.0	14.8	16.6	18.3													12
13				17.2	19.3	21.4	23.4	25.5	27.6	29.6									13
14				19.9	22.3	24.7	27.1	29.4	31.8	34.2									14
15				22.7	25.5	28.2	30.9	33.7	36.4	39.2									15
16				25.7	28.9	32.0	35.1	38.2	41.4	44.5									16
17				29.0	32.5	36.0	39.5	43.1	46.6	50.1									17
18						40.3	44.2	48.2	52.1	56.1	60.1	64.0	68.0	71.9					18
19						44.8	49.2	53.6	58.0	62.4	66.8	71.2	75.6	80.0					19
20						49.6	54.4	59.3	64.2	69.1	74.0	78.8	83.7	88.6					20
21						54.6	59.9	65.3	70.7	76.1	81.5	86.8	92.2	97.6					21
22						59.8	65.7	71.6	77.5	83.4	89.3	95.2	101.1	107.1					22
23								78.2	84.7	91.1	97.6	104.0	110.5	116.9	123.4	129.8	136.3	142.8	23
24								85.1	92.1	99.1	106.2	113.2	120.2	127.3	134.3	141.3	148.3	155.4	24
25								92.3	99.9	107.5	115.1	122.8	130.4	138.0	145.6	153.3	160.9	168.5	25
26								99.7	108.0	116.2	124.5	132.7	141.0	149.2	157.5	165.7	174.0	182.2	26
27								107.5	116.4	125.3	134.2	143.1	152.0	160.9	169.8	178.7	187.5	196.4	27
28										134.7	144.2	153.8	163.4	172.9	182.5	192.1	201.6	211.2	28
29										144.4	154.7	164.9	175.2	185.5	195.7	206.0	216.2	226.5	29
30										154.5	165.5	176.5	187.4	198.4	209.4	220.4	231.4	242.3	30
31										164.9	176.6	188.4	200.1	211.8	223.5	235.3	247.0	258.7	31
32										175.7	188.2	200.7	213.2	225.7	238.2	250.6	263.1	275.6	32
33											213.4	226.6	239.9	253.2	266.5	279.8	293.1		33
34											226.4	240.5	254.6	268.8	282.9	297.0	311.1		34
35											239.9	254.9	269.8	284.7	299.7	314.6	329.6		35
36											253.8	269.6	285.4	301.2	317.0	332.8	348.7		36
37											268.0	284.7	301.4	318.1	334.8	351.5	368.2		37
38													317.9	335.5	353.1	370.8	388.4		38
39													334.8	353.4	371.9	390.5	409.1		39
40													352.2	371.7	391.2	410.7	430.3		40
41													370.0	390.5	411.0	431.5	452.0		41
42													388.2	409.7	431.2	452.8	474.3		42
43															452.0	474.5	497.1		43
44															473.2	496.8	520.5		44
45															494.9	519.6	544.3		45
46															517.1	543.0	568.8		46
47															539.8	566.8	593.7		47
48																		619.2	48
49																		645.3	49
50																		671.9	50
51																		699.0	51
52																		726.6	52
53																			53
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pini esotici  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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24																			24
25																			25
26																			26
27																			27
28	220.8	230.3	239.9	249.5															28
29	236.8	247.0	257.3	267.6															29
30	253.3	264.3	275.3	286.3															30
31	270.4	282.2	293.9	305.6															31
32	288.1	300.6	313.1	325.6															32
33	306.4	319.7	332.9	346.2	359.5	372.8	386.1	399.4											33
34	325.2	339.3	353.4	367.5	381.6	395.7	409.8	423.9											34
35	344.5	359.5	374.4	389.4	404.3	419.3	434.2	449.2											35
36	364.5	380.3	396.1	411.9	427.7	443.5	459.3	475.2											36
37	385.0	401.7	418.4	435.1	451.8	468.5	485.2	501.9											37
38	406.0	423.6	441.2	458.9	476.5	494.1	511.7	529.3											38
39	427.6	446.2	464.7	483.3	501.8	520.4	539.0	557.5											39
40	449.8	469.3	488.8	508.4	527.9	547.4	566.9	586.4											40
41	472.5	493.0	513.5	534.0	554.6	575.1	595.6	616.1											41
42	495.8	517.3	538.9	560.4	581.9	603.4	625.0	646.5											42
43	519.7	542.2	564.8	587.3	609.9	632.5	655.0	677.6											43
44	544.1	567.7	591.3	614.9	638.6	662.2	685.8	709.4											44
45	569.1	593.8	618.5	643.2	667.9	692.6	717.3	742.0											45
46	594.6	620.4	646.2	672.1	697.9	723.7	749.5	775.3											46
47	620.7	647.6	674.6	701.6	728.5	755.5	782.4	809.4											47
48	647.4	675.5	703.6	731.7	759.8	787.9	816.0	844.2											48
49	674.6	703.9	733.2	762.5	791.8	821.1	850.4	879.7											49
50	702.4	732.9	763.4	793.9	824.4	854.9	885.4	915.9											50
51	730.7	762.4	794.2	825.9	857.7	889.4	921.1	952.9											51
52	759.6	792.6	825.6	858.6	891.6	924.6	957.6	990.6											52
53	823.4	857.6	891.9	926.2	960.5	994.7	1 029.0												53
54	854.7	890.3	925.9	961.4	997.0	1 032.6	1 068.2												54
55	886.6	923.5	960.4	997.3	1 034.3	1 071.2	1 108.1												55
56																			56
57																			57
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pini esotici  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	5.2	5.2	5.3	5.4															5
6	5.3	5.5	5.6	5.7															6
7	5.6	5.7	5.9	6.1															7
8	5.8	6.1	6.3	6.5	6.7	7.0													8
9	6.1	6.4	6.7	7.0	7.3	7.6													9
10	6.5	6.8	7.2	7.5	7.9	8.2													10
11	6.8	7.3	7.7	8.1	8.5	9.0													11
12	7.2	7.7	8.2	8.7	9.3	9.8													12
13				9.4	10.0	10.6	11.2	11.8	12.4	13.0									13
14				10.2	10.9	11.6	12.3	12.9	13.6	14.3									14
15				11.0	11.8	12.6	13.4	14.2	15.0	15.7									15
16				11.9	12.8	13.7	14.6	15.5	16.4	17.3									16
17				12.8	13.8	14.8	15.8	16.9	17.9	18.9									17
18						16.1	17.2	18.3	19.5	20.6	21.7	22.9	24.0	25.1					18
19						17.4	18.6	19.9	21.1	22.4	23.7	24.9	26.2	27.5					19
20						18.7	20.1	21.5	22.9	24.3	25.7	27.1	28.5	29.9					20
21						20.2	21.7	23.2	24.8	26.3	27.9	29.4	31.0	32.5					21
22						21.7	23.4	25.0	26.7	28.4	30.1	31.8	33.5	35.2					22
23								26.9	28.8	30.6	32.5	34.3	36.2	38.0	39.9	41.8	43.6	45.5	23
24								28.9	30.9	32.9	35.0	37.0	39.0	41.0	43.0	45.0	47.1	49.1	24
25								31.0	33.2	35.3	37.5	39.7	41.9	44.1	46.3	48.5	50.7	52.9	25
26								33.1	35.5	37.8	40.2	42.6	44.9	47.3	49.7	52.0	54.4	56.8	26
27								35.3	37.9	40.4	43.0	45.5	48.1	50.7	53.2	55.8	58.3	60.9	27
28										43.1	45.9	48.6	51.4	54.1	56.9	59.6	62.4	65.1	28
29										45.9	48.9	51.8	54.8	57.7	60.7	63.6	66.5	69.5	29
30										48.8	52.0	55.1	58.3	61.4	64.6	67.7	70.9	74.0	30
31										51.8	55.2	58.5	61.9	65.3	68.6	72.0	75.4	78.7	31
32										54.9	58.5	62.1	65.7	69.2	72.8	76.4	80.0	83.6	32
33											65.7	69.5	73.3	77.1	81.0	84.8	88.6		33
34											69.5	73.5	77.6	81.6	85.7	89.7	93.7		34
35											73.3	77.6	81.9	86.2	90.5	94.8	99.1		35
36											77.3	81.8	86.4	90.9	95.5	100.0	104.5		36
37											81.4	86.2	91.0	95.8	100.6	105.4	110.1		37
38												95.7	100.8	105.8	110.9	115.9			38
39												100.6	105.9	111.2	116.5	121.9			39
40												105.5	111.1	116.7	122.3	127.9			40
41												110.6	116.5	122.4	128.3	134.2			41
42												115.9	122.0	128.2	134.4	140.6			42
43													134.2	140.6	147.1				43
44													140.3	147.0	153.8				44
45													146.5	153.6	160.7				45
46													152.9	160.3	167.7				46
47													159.4	167.1	174.8				47
48																		182.2	48
49																		189.6	49
50																		197.3	50
51																		205.0	51
52																		213.0	52
53																			53
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pini esotici  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
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22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	67.8	70.6	73.3	76.1															28
29	72.4	75.4	78.3	81.3															29
30	77.2	80.3	83.5	86.6															30
31	82.1	85.5	88.8	92.2															31
32	87.2	90.7	94.3	97.9															32
33	92.4	96.2	100.0	103.8	107.6	111.5	115.3	119.1											33
34	97.8	101.8	105.9	109.9	114.0	118.0	122.1	126.1											34
35	103.3	107.6	111.9	116.2	120.5	124.8	129.1	133.4											35
36	109.1	113.6	118.1	122.7	127.2	131.7	136.3	140.8											36
37	114.9	119.7	124.5	129.3	134.1	138.9	143.7	148.5											37
38	121.0	126.0	131.1	136.1	141.2	146.3	151.3	156.4											38
39	127.2	132.5	137.8	143.2	148.5	153.8	159.1	164.5											39
40	133.5	139.1	144.7	150.3	155.9	161.5	167.1	172.7											40
41	140.1	145.9	151.8	157.7	163.6	169.5	175.4	181.3											41
42	146.7	152.9	159.1	165.3	171.4	177.6	183.8	190.0											42
43	153.6	160.1	166.5	173.0	179.5	186.0	192.4	198.9											43
44	160.6	167.4	174.1	180.9	187.7	194.5	201.3	208.0											44
45	167.8	174.8	181.9	189.0	196.1	203.2	210.3	217.4											45
46	175.1	182.5	189.9	197.3	204.7	212.1	219.5	226.9											46
47	182.6	190.3	198.0	205.8	213.5	221.2	229.0	236.7											47
48	190.2	198.3	206.4	214.4	222.5	230.6	238.6	246.7											48
49	198.0	206.4	214.8	223.3	231.7	240.1	248.5	256.9											49
50	206.0	214.8	223.5	232.3	241.0	249.8	258.5	267.3											50
51	214.1	223.2	232.3	241.5	250.6	259.7	268.8	277.9											51
52	222.4	231.9	241.4	250.8	260.3	269.8	279.2	288.7											52
53		240.7	250.6	260.4	270.2	280.1	289.9	299.7											53
54		249.7	259.9	270.1	280.3	290.5	300.7	311.0											54
55		258.9	269.5	280.0	290.6	301.2	311.8	322.4											55
56																			56
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Pini esotici  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.2	0.2															5
6	0.2	0.2	0.2	0.2															6
7	0.2	0.2	0.2	0.2															7
8	0.2	0.2	0.3	0.3	0.3	0.3													8
9	0.2	0.3	0.3	0.3	0.3	0.3													9
10	0.3	0.3	0.3	0.3	0.4	0.4													10
11	0.3	0.3	0.4	0.4	0.4	0.4													11
12	0.3	0.4	0.4	0.4	0.5	0.5													12
13				0.5	0.5	0.6	0.6	0.6	0.7	0.7									13
14				0.5	0.6	0.6	0.7	0.7	0.8	0.8									14
15				0.6	0.6	0.7	0.7	0.8	0.8	0.9									15
16				0.6	0.7	0.8	0.8	0.9	0.9	1.0									16
17				0.7	0.8	0.8	0.9	1.0	1.0	1.1									17
18						0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.5					18
19						1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.7					19
20						1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9					20
21						1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0					21
22						1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.1	2.2					22
23								1.7	1.8	1.9	2.0	2.2	2.3	2.4	2.5	2.7	2.8	2.9	23
24								1.8	1.9	2.1	2.2	2.3	2.5	2.6	2.7	2.9	3.0	3.1	24
25								1.9	2.1	2.2	2.4	2.5	2.7	2.8	3.0	3.1	3.3	3.4	25
26								2.1	2.2	2.4	2.5	2.7	2.9	3.0	3.2	3.3	3.5	3.7	26
27								2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.4	3.6	3.8	3.9	27
28										2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.0	4.2	28
29										2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	29
30										3.1	3.3	3.6	3.8	4.0	4.2	4.4	4.6	4.8	30
31										3.3	3.6	3.8	4.0	4.2	4.5	4.7	4.9	5.1	31
32										3.5	3.8	4.0	4.3	4.5	4.7	5.0	5.2	5.5	32
33											4.3	4.5	4.8	5.0	5.3	5.6	5.8	6.1	33
34												4.5	4.8	5.1	5.3	5.6	5.9	6.2	34
35												4.8	5.1	5.4	5.6	5.9	6.2	6.5	35
36												5.0	5.4	5.7	6.0	6.3	6.6	6.9	36
37												5.3	5.6	6.0	6.3	6.6	6.9	7.3	37
38														6.3	6.6	7.0	7.3	7.7	38
39														6.6	7.0	7.3	7.7	8.1	39
40														7.0	7.3	7.7	8.1	8.5	40
41														7.3	7.7	8.1	8.5	8.9	41
42														7.7	8.1	8.5	8.9	9.3	42
43																8.9	9.3	9.8	43
44																9.3	9.8	10.2	44
45																9.7	10.2	10.7	45
46																10.1	10.6	11.1	46
47																10.6	11.1	11.6	47
48																		12.1	48
49																		12.6	49
50																		13.1	50
51																		13.7	51
52																		14.2	52
53																			53
54																			54
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pini esotici  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
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19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	4.4	4.6	4.8	5.0															28
29	4.7	4.9	5.1	5.3															29
30	5.0	5.3	5.5	5.7															30
31	5.4	5.6	5.8	6.1															31
32	5.7	6.0	6.2	6.4															32
33	6.1	6.3	6.6	6.8	7.1	7.4	7.6	7.9											33
34	6.4	6.7	7.0	7.3	7.5	7.8	8.1	8.3											34
35	6.8	7.1	7.4	7.7	8.0	8.3	8.5	8.8											35
36	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3											36
37	7.6	7.9	8.2	8.6	8.9	9.2	9.5	9.9											37
38	8.0	8.3	8.7	9.0	9.4	9.7	10.0	10.4											38
39	8.4	8.8	9.1	9.5	9.9	10.2	10.6	10.9											39
40	8.8	9.2	9.6	10.0	10.4	10.7	11.1	11.5											40
41	9.3	9.7	10.1	10.5	10.9	11.3	11.7	12.1											41
42	9.7	10.2	10.6	11.0	11.4	11.8	12.2	12.7											42
43	10.2	10.6	11.1	11.5	11.9	12.4	12.8	13.3											43
44	10.7	11.1	11.6	12.0	12.5	13.0	13.4	13.9											44
45	11.2	11.6	12.1	12.6	13.1	13.5	14.0	14.5											45
46	11.6	12.1	12.6	13.1	13.6	14.1	14.6	15.1											46
47	12.2	12.7	13.2	13.7	14.2	14.8	15.3	15.8											47
48	12.7	13.2	13.8	14.3	14.8	15.4	15.9	16.5											48
49	13.2	13.8	14.3	14.9	15.5	16.0	16.6	17.2											49
50	13.7	14.3	14.9	15.5	16.1	16.7	17.3	17.9											50
51	14.3	14.9	15.5	16.1	16.7	17.4	18.0	18.6											51
52	14.8	15.5	16.1	16.8	17.4	18.0	18.7	19.3											52
53		16.1	16.7	17.4	18.1	18.7	19.4	20.1											53
54		16.7	17.4	18.1	18.7	19.4	20.1	20.8											54
55		17.3	18.0	18.7	19.4	20.2	20.9	21.6											55
56																			56
57																			57
58																			58
59																			59
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Pini esotici  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	7.6	8.0	8.4	8.8															5
6	8.5	9.1	9.6	10.2															6
7	9.5	10.3	11.1	11.9															7
8	10.7	11.7	12.8	13.8	14.8	15.8													8
9	12.1	13.4	14.7	15.9	17.2	18.5													9
10	13.6	15.2	16.8	18.4	20.0	21.6													10
11	15.3	17.2	19.1	21.0	23.0	24.9													11
12	17.1	19.4	21.7	24.0	26.3	28.6													12
13				27.2	29.9	32.6	35.2	37.9	40.6	43.3									13
14				30.6	33.7	36.9	40.0	43.1	46.2	49.4									14
15				34.3	37.9	41.5	45.1	48.7	52.2	55.8									15
16				38.3	42.3	46.4	50.5	54.6	58.7	62.7									16
17				42.5	47.1	51.7	56.3	60.9	65.5	70.1									17
18						57.3	62.4	67.6	72.8	77.9	83.1	88.2	93.4	98.6					18
19						63.2	68.9	74.7	80.4	86.2	91.9	97.7	103.4	109.2					19
20						69.4	75.7	82.1	88.5	94.9	101.2	107.6	114.0	120.4					20
21						75.9	82.9	90.0	97.0	104.0	111.1	118.1	125.1	132.1					21
22						82.8	90.5	98.2	105.9	113.6	121.3	129.0	136.8	144.5					22
23								106.8	115.2	123.7	132.1	140.5	149.0	157.4	165.8	174.3	182.7	191.1	23
24								115.8	125.0	134.1	143.3	152.5	161.7	170.9	180.1	189.2	198.4	207.6	24
25								125.2	135.1	145.1	155.0	165.0	175.0	184.9	194.9	204.9	214.8	224.8	25
26								134.9	145.7	156.5	167.2	178.0	188.8	199.6	210.3	221.1	231.9	242.7	26
27								145.0	156.7	168.3	179.9	191.5	203.1	214.8	226.4	238.0	249.6	261.2	27
28										180.6	193.1	205.6	218.1	230.5	243.0	255.5	268.0	280.5	28
29										193.3	206.7	220.1	233.5	246.9	260.3	273.7	287.1	300.5	29
30										206.4	220.8	235.1	249.5	263.8	278.2	292.5	306.9	321.2	30
31										220.1	235.4	250.7	266.0	281.3	296.6	312.0	327.3	342.6	31
32										234.1	250.4	266.8	283.1	299.4	315.7	332.0	348.4	364.7	32
33										283.3	300.7	318.1	335.4	352.8	370.1	387.5	404.8	422.1	33
34										300.4	318.8	337.3	355.7	374.1	392.6	411.0	429.4	447.8	34
35										318.0	337.5	357.1	376.6	396.1	415.6	435.2	454.7	474.2	35
36										336.1	356.8	377.4	398.1	418.8	439.4	460.1	480.7	501.4	36
37										354.7	376.6	398.4	420.2	442.0	463.8	485.7	507.5	529.4	37
38												419.9	442.9	465.9	488.9	512.0	535.0	558.0	38
39												442.0	466.2	490.5	514.7	539.0	563.2	587.4	39
40												464.7	490.2	515.7	541.2	566.7	592.1	617.6	40
41													487.9	514.7	541.5	568.3	595.1	621.9	41
42													511.7	539.8	567.9	596.1	624.2	652.3	42
43														595.0	624.5	654.0	683.5	713.0	43
44														622.8	653.6	684.5	715.4	746.3	44
45														651.1	683.4	715.7	747.9	780.2	45
46														680.2	713.9	747.6	781.3	815.0	46
47														709.8	745.0	780.2	815.4	850.6	47
48																	813.5	848.7	48
49																	847.5	882.7	49
50																	882.3	917.5	50
51																	917.7	952.9	51
52																	953.8		52
53																			53
54																			54
55																			55
56																			56
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Pini esotici  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	293.0	305.5	318.0	330.5															28
29	313.9	327.3	340.7	354.1															29
30	335.6	349.9	364.2	378.6															30
31	357.9	373.2	388.6	403.9															31
32	381.0	397.3	413.7	430.0															32
33	404.8	422.2	439.6	456.9	474.3	491.6	509.0	526.3											33
34	429.4	447.8	466.3	484.7	503.1	521.5	540.0	558.4											34
35	454.7	474.2	493.7	513.3	532.8	552.3	571.8	591.4											35
36	480.7	501.4	522.0	542.7	563.4	584.0	604.7	625.3											36
37	507.5	529.3	551.1	572.9	594.8	616.6	638.4	660.2											37
38	535.0	558.0	581.0	604.0	627.0	650.1	673.1	696.1											38
39	563.2	587.5	611.7	635.9	660.2	684.4	708.7	732.9											39
40	592.2	617.7	643.2	668.7	694.2	719.7	745.2	770.7											40
41	621.9	648.7	675.5	702.2	729.0	755.8	782.6	809.4											41
42	652.3	680.4	708.5	736.6	764.8	792.9	821.0	849.1											42
43	683.5	712.9	742.4	771.9	801.3	830.8	860.3	889.8											43
44	715.3	746.2	777.1	807.9	838.8	869.6	900.5	931.4											44
45	748.0	780.3	812.5	844.8	877.1	909.4	941.6	973.9											45
46	781.3	815.1	848.8	882.5	916.2	950.0	983.7	1 017.4											46
47	815.4	850.6	885.8	921.1	956.3	991.5	1 026.7	1 061.9											47
48	850.3	887.0	923.7	960.4	997.1	1 033.9	1 070.6	1 107.3											48
49	885.8	924.1	962.4	1 000.6	1 038.9	1 077.2	1 115.4	1 153.7											49
50	922.1	962.0	1 001.8	1 041.7	1 081.5	1 121.3	1 161.2	1 201.0											50
51	959.1	1 000.6	1 042.0	1 083.5	1 125.0	1 166.4	1 207.9	1 249.3											51
52	996.9	1 040.0	1 083.1	1 126.2	1 169.3	1 212.4	1 255.5	1 298.6											52
53		1 080.2	1 124.9	1 169.7	1 214.5	1 259.2	1 304.0	1 348.8											53
54		1 121.1	1 167.6	1 214.0	1 260.5	1 307.0	1 353.5	1 400.0											54
55		1 162.8	1 211.0	1 259.2	1 307.4	1 355.6	1 403.9	1 452.1											55
56																			56
57																			57
58																			58
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65																			65
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Pseudotsuga menziesii* Franco**

**Douglasia**

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## Douglasia

### Volume del fusto e dei rami grossi

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-7.9946 \quad 3.3343 \cdot 10^{-2} \quad 1.2186]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.2135 \cdot 10 & & \\ 6.9406 \cdot 10^{-3} & 1.2592 \cdot 10^{-6} & \\ -6.8517 & -8.2763 \cdot 10^{-4} & 7.7268 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 9.0103 \cdot 10^{-6}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.0529 \quad 1.3823 \cdot 10^{-2} \quad 2.8280 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.6024 \cdot 10 & & \\ 1.7899 \cdot 10^{-3} & 3.2473 \cdot 10^{-7} & \\ -1.7670 & -2.1344 \cdot 10^{-4} & 1.9927 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 2.3237 \cdot 10^{-6}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.5484 \cdot 10 \quad 5.8230 \cdot 10^{-4} \quad 3.5145]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.4150 \cdot 10 & & \\ 3.8146 \cdot 10^{-3} & 6.9206 \cdot 10^{-7} & \\ -3.7658 & -4.5487 \cdot 10^{-4} & 4.2467 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 4.9521 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 35$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 [\text{kg}], d [\text{cm}], h [\text{m}])$$

vettore dei coefficienti

$$\mathbf{b}' = [1.3884 \quad 3.3320 \cdot 10^{-4} \quad -1.2753 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.8698 \cdot 10^{-1} & & \\ 2.0886 \cdot 10^{-5} & 3.7893 \cdot 10^{-9} & \\ -2.0619 \cdot 10^{-2} & -2.4906 \cdot 10^{-6} & 2.3252 \cdot 10^{-3} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.7114 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 35$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 [\text{kg}], d [\text{cm}], h [\text{m}])$$

vettore dei coefficienti

$$\mathbf{b}' = [-2.6149 \cdot 10 \quad 1.4739 \cdot 10^{-2} \quad 3.6698]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.6330 \cdot 10 & & \\ 6.2922 \cdot 10^{-3} & 1.1416 \cdot 10^{-6} & \\ -6.2116 & -7.5031 \cdot 10^{-4} & 7.0049 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 8.1685 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$



Douglasia  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14										100.6	107.1	113.6	120.2	126.7					14
15										115.3	122.8	130.3	137.8	145.3					15
16										131.0	139.5	148.1	156.6	165.1					16
17										147.6	157.3	166.9	176.5	186.2					17
18										165.2	176.0	186.8	197.6	208.4	219.2	230.0	240.8	251.6	18
19										183.7	195.7	207.7	219.8	231.8	243.9	255.9	267.9	280.0	19
20										203.1	216.4	229.8	243.1	256.4	269.8	283.1	296.5	309.8	20
21										223.5	238.2	252.9	267.6	282.3	297.0	311.7	326.4	341.1	21
22										244.7	260.9	277.0	293.2	309.3	325.4	341.6	357.7	373.9	22
23										267.0	284.6	302.2	319.9	337.5	355.2	372.8	390.4	408.1	23
24										290.1	309.3	328.5	347.7	367.0	386.2	405.4	424.6	443.8	24
25										314.2	335.1	355.9	376.7	397.6	418.4	439.3	460.1	480.9	25
26										339.2	361.8	384.3	406.9	429.4	451.9	474.5	497.0	519.6	26
27										365.2	389.5	413.8	438.1	462.4	486.7	511.0	535.4	559.7	27
28										392.1	418.2	444.4	470.5	496.7	522.8	548.9	575.1	601.2	28
29										419.9	448.0	476.0	504.0	532.1	560.1	588.2	616.2	644.3	29
30										448.7	478.7	508.7	538.7	568.7	598.7	628.7	658.7	688.8	30
31										478.4	510.4	542.5	574.5	606.5	638.6	670.6	702.7	734.7	31
32										509.0	543.1	577.3	611.4	645.6	679.7	713.9	748.0	782.2	32
33										613.2	649.5	685.8	722.1	758.4	794.7	831.1	867.4	903.7	33
34										650.1	688.7	727.2	765.8	804.3	842.9	881.4	920.0	958.6	34
35										688.2	729.0	769.9	810.7	851.6	892.4	933.3	974.2	1015.1	35
36										727.3	770.5	813.7	856.9	900.1	943.3	986.6	1030.0	1073.3	36
37										767.4	813.1	858.7	904.4	950.0	995.7	1041.3	1087.0	1132.7	37
38														905.0	953.1	1001.3	1049.4	1097.6	38
39														952.4	1003.1	1053.8	1104.5	1155.3	39
40														1001.0	1054.4	1107.7	1161.1	1214.4	40
41														1050.9	1106.9	1163.0	1219.0	1275.1	41
42														1101.9	1160.7	1219.5	1278.3	1337.2	42
43																1277.4	1339.1	1400.7	43
44																1336.7	1401.2	1465.8	44
45																1397.2	1464.8	1532.3	45
46																1459.1	1529.7	1600.2	46
47																1522.4	1596.0	1669.7	47
48																		1740.6	48
49																		1813.0	49
50																		1886.8	50
51																		1962.1	51
52																		2038.9	52
53																			53
54																			54
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Douglasia  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	425.7	443.4	461.0	478.6															23
24	463.0	482.2	501.4	520.6															24
25	501.8	522.6	543.5	564.3															25
26	542.1	564.6	587.2	609.7															26
27	584.0	608.3	632.6	656.9															27
28	627.4	653.5	679.6	705.8	731.9	758.1													28
29	672.3	700.3	728.4	756.4	784.5	812.5													29
30	718.8	748.8	778.8	808.8	838.8	868.8													30
31	766.8	798.8	830.8	862.9	894.9	927.0													31
32	816.3	850.4	884.6	918.7	952.9	987.0													32
33	867.4	903.7	940.0	976.3	1 012.6	1 048.9	1 085.2	1 121.5											33
34	920.0	958.5	997.1	1 035.6	1 074.1	1 112.7	1 151.2	1 189.8											34
35	974.1	1 014.9	1 055.8	1 096.6	1 137.5	1 178.3	1 219.2	1 260.0											35
36	1 029.8	1 073.0	1 116.2	1 159.4	1 202.6	1 245.8	1 289.0	1 332.3											36
37	1 087.0	1 132.6	1 178.3	1 223.9	1 269.6	1 315.2	1 360.8	1 406.5											37
38	1 145.7	1 193.8	1 242.0	1 290.1	1 338.3	1 386.4	1 434.6	1 482.7	1 530.9	1 579.0	1 627.2	1 675.3							38
39	1 206.0	1 256.7	1 307.4	1 358.1	1 408.8	1 459.5	1 510.3	1 561.0	1 611.7	1 662.4	1 713.1	1 763.8							39
40	1 267.8	1 321.1	1 374.5	1 427.8	1 481.2	1 534.5	1 587.9	1 641.2	1 694.6	1 747.9	1 801.3	1 854.6							40
41	1 331.1	1 387.2	1 443.2	1 499.3	1 555.3	1 611.4	1 667.4	1 723.5	1 779.5	1 835.6	1 891.6	1 947.7							41
42	1 396.0	1 454.8	1 513.6	1 572.4	1 631.2	1 690.1	1 748.9	1 807.7	1 866.5	1 925.3	1 984.1	2 043.0							42
43	1 462.4	1 524.0	1 585.7	1 647.3	1 709.0	1 770.6	1 832.3	1 893.9	1 955.6	2 017.2	2 078.9	2 140.5	2 202.2	2 263.8					43
44	1 530.3	1 594.9	1 659.4	1 724.0	1 788.5	1 853.1	1 917.6	1 982.2	2 046.7	2 111.3	2 175.8	2 240.4	2 304.9	2 369.5					44
45	1 599.8	1 667.3	1 734.8	1 802.4	1 869.9	1 937.4	2 004.9	2 072.4	2 139.9	2 207.5	2 275.0	2 342.5	2 410.0	2 477.5					45
46	1 670.8	1 741.4	1 811.9	1 882.5	1 953.0	2 023.6	2 094.1	2 164.7	2 235.2	2 305.8	2 376.3	2 446.9	2 517.4	2 588.0					46
47	1 743.3	1 817.0	1 890.6	1 964.3	2 038.0	2 111.6	2 185.3	2 258.9	2 332.6	2 406.2	2 479.9	2 553.5	2 627.2	2 700.8					47
48	1 817.4	1 894.2	1 971.1	2 047.9	2 124.7	2 201.5	2 278.3	2 355.2	2 432.0	2 508.8	2 585.6	2 662.5	2 739.3	2 816.1	2 892.9	2 969.7	3 046.6	3 123.4	48
49	1 893.0	1 973.1	2 053.1	2 133.2	2 213.2	2 293.3	2 373.4	2 453.4	2 533.5	2 613.5	2 693.6	2 773.6	2 853.7	2 933.8	3 013.8	3 093.9	3 173.9	3 254.0	49
50	1 970.2	2 053.5	2 136.9	2 220.2	2 303.6	2 386.9	2 470.3	2 553.7	2 637.0	2 720.4	2 803.7	2 887.1	2 970.4	3 053.8	3 137.2	3 220.5	3 303.9	3 387.2	50
51	2 048.8	2 135.6	2 222.3	2 309.0	2 395.7	2 482.5	2 569.2	2 655.9	2 742.6	2 829.4	2 916.1	3 002.8	3 089.5	3 176.3	3 263.0	3 349.7	3 436.4	3 523.2	51
52	2 129.0	2 219.2	2 309.4	2 399.5	2 489.7	2 579.8	2 670.0	2 760.2	2 850.3	2 940.5	3 030.6	3 120.8	3 211.0	3 301.1	3 391.3	3 481.4	3 571.6	3 661.8	52
53	2 304.4	2 398.1	2 491.8	2 585.4	2 679.1	2 772.7	2 866.4	2 960.1	3 053.7	3 147.4	3 241.0	3 334.7	3 428.4	3 522.0	3 615.7	3 709.4	3 803.0		53
54	2 391.3	2 488.5	2 585.7	2 683.0	2 780.2	2 877.4	2 974.7	3 071.9	3 169.1	3 266.3	3 363.6	3 460.8	3 558.0	3 655.3	3 752.5	3 849.7	3 946.9		54
55	2 479.7	2 580.6	2 681.5	2 782.3	2 883.2	2 984.0	3 084.9	3 185.8	3 286.6	3 387.5	3 488.4	3 589.2	3 690.1	3 790.9	3 891.8	3 992.7	4 093.5		55
56	2 569.8	2 674.3	2 778.9	2 883.5	2 988.0	3 092.6	3 197.2	3 301.7	3 406.3	3 510.8	3 615.4	3 720.0	3 824.5	3 929.1	4 033.7	4 138.2	4 242.8		56
57	2 661.4	2 769.8	2 878.1	2 986.4	3 094.7	3 203.1	3 311.4	3 419.7	3 528.1	3 636.4	3 744.7	3 853.1	3 961.4	4 069.7	4 178.1	4 286.4	4 394.7		57
58	2 754.7	2 866.8	2 979.0	3 091.2	3 203.3	3 315.5	3 427.7	3 539.8	3 652.0	3 764.2	3 876.3	3 988.5	4 100.7	4 212.8	4 325.0	4 437.2	4 549.3		58
59	2 849.5	2 965.6	3 081.6	3 197.7	3 313.8	3 429.8	3 545.9	3 662.0	3 778.0	3 894.1	4 010.2	4 126.2	4 242.3	4 358.4	4 474.4	4 590.5	4 706.6		59
60	2 946.0	3 066.0	3 186.0	3 306.1	3 426.1	3 546.1	3 666.2	3 786.2	3 906.2	4 026.3	4 146.3	4 266.3	4 386.4	4 506.4	4 626.4	4 746.5	4 866.5		60
61	3 044.0	3 168.1	3 292.1	3 416.2	3 540.3	3 664.3	3 788.4	3 912.5	4 036.6	4 160.6	4 284.7	4 408.8	4 532.8	4 656.9	4 781.0	4 905.0	5 029.1		61
62	3 143.7	3 271.8	3 400.0	3 528.2	3 656.3	3 784.5	3 912.7	4 040.8	4 169.0	4 297.2	4 425.4	4 553.5	4 681.7	4 809.9	4 938.0	5 066.2	5 194.4		62
63			3 509.6	3 641.9	3 774.3	3 906.6	4 038.9	4 171.3	4 303.6	4 435.9	4 568.3	4 700.6	4 833.0	4 965.3	5 097.6	5 230.0	5 362.3		63
64			3 620.9	3 757.5	3 894.0	4 030.6	4 167.2	4 303.8	4 440.3	4 576.9	4 713.5	4 850.0	4 986.6	5 123.2	5 259.8	5 396.3	5 532.9		64
65			3 733.9	3 874.8	4 015.7	4 156.6	4 297.4	4 438.3	4 579.2	4 720.1	4 860.9	5 001.8	5 142.7	5 283.6	5 424.4	5 565.3	5 706.2		65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Douglasia  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14										39.8	42.5	45.3	48.0	50.7					14
15										45.7	48.8	52.0	55.1	58.2					15
16										52.0	55.6	59.1	62.6	66.2					16
17										58.7	62.7	66.7	70.7	74.7					17
18										65.7	70.2	74.7	79.2	83.7	88.1	92.6	97.1	101.6	18
19										73.2	78.2	83.2	88.2	93.1	98.1	103.1	108.1	113.1	19
20										81.0	86.5	92.1	97.6	103.1	108.7	114.2	119.7	125.2	20
21										89.2	95.3	101.4	107.5	113.6	119.7	125.8	131.9	138.0	21
22										97.8	104.5	111.2	117.9	124.6	131.3	138.0	144.7	151.4	22
23										106.8	114.1	121.4	128.8	136.1	143.4	150.7	158.0	165.3	23
24										116.2	124.2	132.1	140.1	148.1	156.0	164.0	171.9	179.9	24
25										126.0	134.6	143.2	151.9	160.5	169.2	177.8	186.4	195.1	25
26										136.1	145.5	154.8	164.2	173.5	182.8	192.2	201.5	210.9	26
27										146.7	156.7	166.8	176.9	187.0	197.0	207.1	217.2	227.3	27
28										157.6	168.4	179.3	190.1	200.9	211.8	222.6	233.4	244.3	28
29										168.9	180.5	192.2	203.8	215.4	227.0	238.7	250.3	261.9	29
30										180.6	193.0	205.5	217.9	230.4	242.8	255.2	267.7	280.1	30
31										192.7	206.0	219.3	232.5	245.8	259.1	272.4	285.7	299.0	31
32										205.2	219.3	233.5	247.6	261.8	275.9	290.1	304.2	318.4	32
33										248.1	263.2	278.2	293.3	308.3	323.4	338.5	353.6	368.7	33
34										263.2	279.2	295.2	311.2	327.2	343.1	359.1	375.1	391.1	34
35										278.8	295.7	312.6	329.6	346.5	363.4	380.4	397.3	414.3	35
36										294.8	312.7	330.6	348.5	366.4	384.3	402.2	420.1	438.0	36
37										311.2	330.1	349.0	368.0	386.9	405.8	424.7	443.6	462.5	37
38														368.0	387.9	407.9	427.9	447.8	38
39														387.4	408.4	429.5	450.5	471.5	39
40														407.4	429.5	451.6	473.7	495.8	40
41														427.8	451.0	474.3	497.5	520.7	41
42														448.7	473.1	497.5	521.9	546.3	42
43																521.3	546.8	572.4	43
44																545.6	572.4	599.1	44
45																570.5	598.5	626.5	45
46																595.9	625.2	654.4	46
47																621.9	652.5	683.0	47
48																		712.2	48
49																		742.0	49
50																		772.4	50
51																		803.3	51
52																		835.0	52
53																			53
54																			54
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Douglasia  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	172.6	179.9	187.3	194.6															23
24	187.9	195.8	203.8	211.7															24
25	203.7	212.4	221.0	229.6															25
26	220.2	229.6	238.9	248.3															26
27	237.4	247.4	257.5	267.6															27
28	255.1	266.0	276.8	287.6	298.5	309.3													28
29	273.5	285.2	296.8	308.4	320.0	331.7													29
30	292.6	305.0	317.4	329.9	342.3	354.8													30
31	312.2	325.5	338.8	352.1	365.4	378.7													31
32	332.6	346.7	360.9	375.0	389.2	403.3													32
33	353.5	368.6	383.6	398.7	413.7	428.8	443.8	458.9											33
34	375.1	391.1	407.0	423.0	439.0	455.0	471.0	486.9											34
35	397.3	414.2	431.2	448.1	465.0	482.0	498.9	515.8											35
36	420.2	438.1	456.0	473.9	491.8	509.7	527.7	545.6											36
37	443.7	462.6	481.5	500.4	519.4	538.3	557.2	576.1											37
38	467.8	487.7	507.7	527.7	547.6	567.6	587.5	607.5	627.5	647.4	667.4	687.3							38
39	492.5	513.6	534.6	555.6	576.6	597.7	618.7	639.7	660.7	681.8	702.8	723.8							39
40	517.9	540.1	562.2	584.3	606.4	628.5	650.6	672.8	694.9	717.0	739.1	761.2							40
41	544.0	567.2	590.5	613.7	636.9	660.2	683.4	706.6	729.9	753.1	776.3	799.6							41
42	570.7	595.0	619.4	643.8	668.2	692.6	717.0	741.3	765.7	790.1	814.5	838.9							42
43	598.0	623.5	649.1	674.6	700.2	725.8	751.3	776.9	802.4	828.0	853.5	879.1	904.7	930.2					43
44	625.9	652.7	679.4	706.2	732.9	759.7	786.5	813.2	840.0	866.8	893.5	920.3	947.0	973.8					44
45	654.5	682.5	710.5	738.5	766.4	794.4	822.4	850.4	878.4	906.4	934.4	962.4	990.4	1 018.4					45
46	683.7	712.9	742.2	771.4	800.7	829.9	859.2	888.4	917.7	946.9	976.2	1 005.4	1 034.7	1 063.9					46
47	713.5	744.1	774.6	805.1	835.7	866.2	896.8	927.3	957.8	988.4	1 018.9	1 049.4	1 080.0	1 110.5					47
48	744.0	775.9	807.7	839.6	871.4	903.3	935.1	967.0	998.8	1 030.7	1 062.5	1 094.4	1 126.2	1 158.1	1 189.9	1 221.8	1 253.6	1 285.4	48
49	775.2	808.3	841.5	874.7	907.9	941.1	974.3	1 007.5	1 040.7	1 073.9	1 107.0	1 140.2	1 173.4	1 206.6	1 239.8	1 273.0	1 306.2	1 339.4	49
50	806.9	841.5	876.0	910.6	945.1	979.7	1 014.3	1 048.8	1 083.4	1 117.9	1 152.5	1 187.0	1 221.6	1 256.2	1 290.7	1 325.3	1 359.8	1 394.4	50
51	839.3	875.3	911.2	947.2	983.1	1 019.1	1 055.0	1 091.0	1 126.9	1 162.9	1 198.8	1 234.8	1 270.7	1 306.7	1 342.7	1 378.6	1 414.6	1 450.5	51
52	872.3	909.7	947.1	984.5	1 021.8	1 059.2	1 096.6	1 134.0	1 171.4	1 208.7	1 246.1	1 283.5	1 320.9	1 358.2	1 395.6	1 433.0	1 470.4	1 507.7	52
53	944.8	983.7	1 022.5	1 061.3	1 100.1	1 139.0	1 177.8	1 216.6	1 255.5	1 294.3	1 333.1	1 371.9	1 410.8	1 449.6	1 488.4	1 527.3	1 566.1		53
54	980.6	1 020.9	1 061.2	1 101.5	1 141.8	1 182.1	1 222.5	1 262.8	1 303.1	1 343.4	1 383.7	1 424.0	1 464.3	1 504.6	1 544.9	1 585.2	1 625.5		54
55	1 017.1	1 058.9	1 100.7	1 142.5	1 184.3	1 226.1	1 267.9	1 309.8	1 351.6	1 393.4	1 435.2	1 477.0	1 518.8	1 560.6	1 602.5	1 644.3	1 686.1		55
56	1 054.2	1 097.5	1 140.9	1 184.2	1 227.6	1 270.9	1 314.3	1 357.6	1 400.9	1 444.3	1 487.6	1 531.0	1 574.3	1 617.7	1 661.0	1 704.4	1 747.7		56
57	1 091.9	1 136.8	1 181.8	1 226.7	1 271.6	1 316.5	1 361.4	1 406.3	1 451.2	1 496.1	1 541.0	1 585.9	1 630.9	1 675.8	1 720.7	1 765.6	1 810.5		57
58	1 130.4	1 176.9	1 223.4	1 269.9	1 316.4	1 362.9	1 409.4	1 455.9	1 502.4	1 548.9	1 595.4	1 641.9	1 688.4	1 734.9	1 781.4	1 827.9	1 874.4		58
59	1 169.5	1 217.6	1 265.7	1 313.8	1 361.9	1 410.1	1 458.2	1 506.3	1 554.4	1 602.5	1 650.6	1 698.8	1 746.9	1 795.0	1 843.1	1 891.2	1 939.3		59
60	1 209.2	1 259.0	1 308.7	1 358.5	1 408.3	1 458.0	1 507.8	1 557.6	1 607.3	1 657.1	1 706.9	1 756.6	1 806.4	1 856.1	1 905.9	1 955.7	2 005.4		60
61	1 249.6	1 301.1	1 352.5	1 404.0	1 455.4	1 506.8	1 558.3	1 609.7	1 661.1	1 712.6	1 764.0	1 815.4	1 866.9	1 918.3	1 969.7	2 021.2	2 072.6		61
62	1 290.7	1 343.9	1 397.0	1 450.1	1 503.3	1 556.4	1 609.5	1 662.7	1 715.8	1 769.0	1 822.1	1 875.2	1 928.4	1 981.5	2 034.6	2 087.8	2 140.9		62
63			1 442.2	1 497.1	1 551.9	1 606.8	1 661.7	1 716.5	1 771.4	1 826.3	1 881.1	1 936.0	1 990.8	2 045.7	2 100.6	2 155.4	2 210.3		63
64			1 488.1	1 544.8	1 601.4	1 658.0	1 714.6	1 771.2	1 827.9	1 884.5	1 941.1	1 997.7	2 054.3	2 110.9	2 167.6	2 224.2	2 280.8		64
65			1 534.8	1 593.2	1 651.6	1 710.0	1 768.4	1 826.8	1 885.2	1 943.6	2 002.0	2 060.4	2 118.8	2 177.2	2 235.6	2 294.0	2 352.4		65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Douglasia  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14										25.3	25.4	25.5	25.7	25.8					14
15										29.1	29.2	29.3	29.5	29.6					15
16										32.8	33.0	33.1	33.3	33.4					16
17										36.6	36.8	37.0	37.1	37.3					17
18										40.4	40.6	40.8	41.0	41.2	41.4	41.6	41.7	41.9	18
19										44.2	44.4	44.7	44.9	45.1	45.3	45.5	45.7	45.9	19
20										48.1	48.3	48.5	48.8	49.0	49.2	49.5	49.7	49.9	20
21										51.9	52.2	52.4	52.7	52.9	53.2	53.5	53.7	54.0	21
22										55.8	56.1	56.3	56.6	56.9	57.2	57.5	57.8	58.0	22
23										59.7	60.0	60.3	60.6	60.9	61.2	61.5	61.8	62.1	23
24										63.6	63.9	64.2	64.6	64.9	65.2	65.6	65.9	66.2	24
25										67.5	67.8	68.2	68.6	68.9	69.3	69.7	70.0	70.4	25
26										71.4	71.8	72.2	72.6	73.0	73.4	73.8	74.2	74.6	26
27										75.4	75.8	76.2	76.6	77.0	77.5	77.9	78.3	78.7	27
28										79.3	79.8	80.2	80.7	81.1	81.6	82.1	82.5	83.0	28
29										83.3	83.8	84.3	84.8	85.3	85.7	86.2	86.7	87.2	29
30										87.3	87.8	88.3	88.9	89.4	89.9	90.4	91.0	91.5	30
31										91.3	91.9	92.4	93.0	93.5	94.1	94.7	95.2	95.8	31
32										95.3	95.9	96.5	97.1	97.7	98.3	98.9	99.5	100.1	32
33										100.6	101.3	101.9	102.5	103.2	103.8	104.4	104.4	104.4	33
34										104.8	105.5	106.1	106.8	107.5	108.1	108.8	108.8	108.8	34
35										108.9	109.6	110.4	111.1	111.8	112.5	113.2	113.2	113.2	35
36										113.1	113.9	114.6	115.4	116.1	116.9	117.6	117.6	117.6	36
37										117.3	118.1	118.9	119.7	120.5	121.3	122.1	122.1	122.1	37
38														123.2	124.0	124.9	125.7	126.6	38
39														127.5	128.4	129.3	130.2	131.1	39
40														131.9	132.8	133.7	134.7	135.6	40
41														136.2	137.2	138.2	139.2	140.1	41
42														140.6	141.6	142.7	143.7	144.7	42
43																147.2	148.2	149.3	43
44																151.7	152.8	154.0	44
45																156.3	157.4	158.6	45
46																160.8	162.1	163.3	46
47																165.4	166.7	168.0	47
48																		172.7	48
49																		177.5	49
50																		182.3	50
51																		187.1	51
52																		191.9	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Douglasia  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	62.4	62.7	63.1	63.4															23
24	66.6	66.9	67.2	67.6															24
25	70.7	71.1	71.5	71.8															25
26	74.9	75.3	75.7	76.1															26
27	79.2	79.6	80.0	80.4															27
28	83.4	83.9	84.3	84.8	85.2	85.7													28
29	87.7	88.2	88.7	89.2	89.7	90.1													29
30	92.0	92.5	93.1	93.6	94.1	94.6													30
31	96.3	96.9	97.5	98.0	98.6	99.1													31
32	100.7	101.3	101.9	102.5	103.1	103.7													32
33	105.1	105.7	106.3	107.0	107.6	108.2	108.9	109.5											33
34	109.5	110.2	110.8	111.5	112.2	112.9	113.5	114.2											34
35	113.9	114.6	115.4	116.1	116.8	117.5	118.2	118.9											35
36	118.4	119.1	119.9	120.7	121.4	122.2	122.9	123.7											36
37	122.9	123.7	124.5	125.3	126.1	126.9	127.7	128.5											37
38	127.4	128.2	129.1	129.9	130.8	131.6	132.5	133.3	134.1	135.0	135.8	136.7							38
39	132.0	132.8	133.7	134.6	135.5	136.4	137.3	138.2	139.0	139.9	140.8	141.7							39
40	136.5	137.5	138.4	139.3	140.3	141.2	142.1	143.0	144.0	144.9	145.8	146.8							40
41	141.1	142.1	143.1	144.1	145.0	146.0	147.0	148.0	149.0	149.9	150.9	151.9							41
42	145.8	146.8	147.8	148.8	149.9	150.9	151.9	152.9	154.0	155.0	156.0	157.0							42
43	150.4	151.5	152.6	153.6	154.7	155.8	156.9	157.9	159.0	160.1	161.2	162.2	163.3	164.4					43
44	155.1	156.2	157.3	158.5	159.6	160.7	161.8	163.0	164.1	165.2	166.4	167.5	168.6	169.7					44
45	159.8	161.0	162.1	163.3	164.5	165.7	166.9	168.0	169.2	170.4	171.6	172.8	173.9	175.1					45
46	164.5	165.8	167.0	168.2	169.5	170.7	171.9	173.1	174.4	175.6	176.8	178.1	179.3	180.5					46
47	169.3	170.6	171.9	173.1	174.4	175.7	177.0	178.3	179.6	180.9	182.1	183.4	184.7	186.0					47
48	174.1	175.4	176.8	178.1	179.4	180.8	182.1	183.5	184.8	186.1	187.5	188.8	190.2	191.5	192.9	194.2	195.5	196.9	48
49	178.9	180.3	181.7	183.1	184.5	185.9	187.3	188.7	190.1	191.5	192.9	194.3	195.7	197.1	198.5	199.9	201.3	202.7	49
50	183.7	185.2	186.6	188.1	189.5	191.0	192.5	193.9	195.4	196.8	198.3	199.7	201.2	202.6	204.1	205.6	207.0	208.5	50
51	188.6	190.1	191.6	193.1	194.6	196.2	197.7	199.2	200.7	202.2	203.7	205.3	206.8	208.3	209.8	211.3	212.8	214.3	51
52	193.5	195.1	196.6	198.2	199.8	201.4	202.9	204.5	206.1	207.7	209.2	210.8	212.4	214.0	215.5	217.1	218.7	220.3	52
53		200.0	201.7	203.3	204.9	206.6	208.2	209.9	211.5	213.1	214.8	216.4	218.0	219.7	221.3	222.9	224.6	226.2	53
54		205.1	206.7	208.4	210.1	211.8	213.5	215.2	216.9	218.6	220.3	222.0	223.7	225.4	227.1	228.8	230.5	232.2	54
55		210.1	211.8	213.6	215.4	217.1	218.9	220.7	222.4	224.2	225.9	227.7	229.5	231.2	233.0	234.7	236.5	238.3	55
56		215.2	217.0	218.8	220.6	222.5	224.3	226.1	227.9	229.8	231.6	233.4	235.2	237.1	238.9	240.7	242.5	244.4	56
57		220.2	222.1	224.0	225.9	227.8	229.7	231.6	233.5	235.4	237.3	239.2	241.1	243.0	244.8	246.7	248.6	250.5	57
58		225.4	227.3	229.3	231.2	233.2	235.2	237.1	239.1	241.0	243.0	245.0	246.9	248.9	250.8	252.8	254.8	256.7	58
59		230.5	232.5	234.6	236.6	238.6	240.7	242.7	244.7	246.7	248.8	250.8	252.8	254.8	256.9	258.9	260.9	263.0	59
60		235.7	237.8	239.9	242.0	244.1	246.2	248.3	250.4	252.5	254.6	256.7	258.8	260.9	262.9	265.0	267.1	269.2	60
61		240.9	243.1	245.2	247.4	249.6	251.7	253.9	256.1	258.2	260.4	262.6	264.7	266.9	269.1	271.2	273.4	275.6	61
62		246.1	248.4	250.6	252.9	255.1	257.3	259.6	261.8	264.0	266.3	268.5	270.8	273.0	275.2	277.5	279.7	281.9	62
63				256.0	258.3	260.6	263.0	265.3	267.6	269.9	272.2	274.5	276.8	279.1	281.4	283.8	286.1	288.4	63
64				261.5	263.8	266.2	268.6	271.0	273.4	275.8	278.2	280.5	282.9	285.3	287.7	290.1	292.5	294.8	64
65				266.9	269.4	271.8	274.3	276.8	279.2	281.7	284.1	286.6	289.1	291.5	294.0	296.4	298.9	301.4	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Douglasia  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14										0.5	0.6	0.6	0.7	0.8					14
15										0.5	0.6	0.7	0.7	0.8					15
16										0.5	0.6	0.7	0.8	0.9					16
17										0.6	0.7	0.8	0.9	1.0					17
18										0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4	1.5	18
19										0.6	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.6	19
20										0.7	0.8	1.0	1.1	1.2	1.4	1.5	1.6	1.8	20
21										0.8	0.9	1.1	1.2	1.4	1.5	1.6	1.8	1.9	21
22										0.8	1.0	1.2	1.3	1.5	1.6	1.8	2.0	2.1	22
23										0.9	1.1	1.3	1.5	1.6	1.8	2.0	2.2	2.3	23
24										1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.5	24
25										1.1	1.3	1.5	1.7	1.9	2.2	2.4	2.6	2.8	25
26										1.2	1.5	1.7	1.9	2.1	2.4	2.6	2.8	3.0	26
27										1.3	1.6	1.8	2.1	2.3	2.6	2.8	3.0	3.3	27
28										1.5	1.7	2.0	2.3	2.5	2.8	3.0	3.3	3.6	28
29										1.6	1.9	2.2	2.5	2.7	3.0	3.3	3.6	3.9	29
30										1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	30
31										1.9	2.2	2.6	2.9	3.2	3.5	3.8	4.2	4.5	31
32										2.1	2.4	2.8	3.1	3.4	3.8	4.1	4.5	4.8	32
33												3.0	3.3	3.7	4.1	4.4	4.8	5.2	33
34												3.2	3.6	4.0	4.4	4.8	5.1	5.5	34
35												3.5	3.9	4.3	4.7	5.1	5.5	5.9	35
36												3.7	4.1	4.6	5.0	5.4	5.9	6.3	36
37												4.0	4.4	4.9	5.3	5.8	6.2	6.7	37
38														5.2	5.7	6.2	6.6	7.1	38
39														5.5	6.0	6.6	7.1	7.6	39
40														5.9	6.4	6.9	7.5	8.0	40
41														6.2	6.8	7.4	7.9	8.5	41
42														6.6	7.2	7.8	8.4	9.0	42
43																8.2	8.8	9.5	43
44																8.7	9.3	10.0	44
45																9.1	9.8	10.5	45
46																9.6	10.3	11.0	46
47																10.1	10.9	11.6	47
48																		12.2	48
49																		12.7	49
50																		13.3	50
51																		14.0	51
52																		14.6	52
53																			53
54																			54
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Douglasia  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	2.5	2.7	2.9	3.0															23
24	2.7	2.9	3.1	3.3															24
25	3.0	3.2	3.4	3.6															25
26	3.3	3.5	3.7	3.9															26
27	3.5	3.8	4.0	4.3															27
28	3.8	4.1	4.3	4.6	4.9	5.1													28
29	4.1	4.4	4.7	5.0	5.3	5.5													29
30	4.5	4.8	5.1	5.4	5.7	6.0													30
31	4.8	5.1	5.4	5.8	6.1	6.4													31
32	5.2	5.5	5.8	6.2	6.5	6.9													32
33	5.5	5.9	6.3	6.6	7.0	7.3	7.7	8.1											33
34	5.9	6.3	6.7	7.1	7.5	7.8	8.2	8.6											34
35	6.3	6.7	7.1	7.5	7.9	8.4	8.8	9.2											35
36	6.7	7.2	7.6	8.0	8.5	8.9	9.3	9.8											36
37	7.2	7.6	8.1	8.5	9.0	9.4	9.9	10.4											37
38	7.6	8.1	8.6	9.1	9.5	10.0	10.5	11.0	11.5	11.9	12.4	12.9							38
39	8.1	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.6	13.1	13.6							39
40	8.5	9.1	9.6	10.1	10.7	11.2	11.7	12.3	12.8	13.3	13.9	14.4							40
41	9.0	9.6	10.2	10.7	11.3	11.8	12.4	13.0	13.5	14.1	14.6	15.2							41
42	9.6	10.1	10.7	11.3	11.9	12.5	13.1	13.7	14.3	14.8	15.4	16.0							42
43	10.1	10.7	11.3	11.9	12.5	13.2	13.8	14.4	15.0	15.6	16.2	16.9	17.5	18.1					43
44	10.6	11.3	11.9	12.5	13.2	13.8	14.5	15.1	15.8	16.4	17.1	17.7	18.4	19.0					44
45	11.2	11.8	12.5	13.2	13.9	14.5	15.2	15.9	16.6	17.2	17.9	18.6	19.3	19.9					45
46	11.7	12.4	13.1	13.9	14.6	15.3	16.0	16.7	17.4	18.1	18.8	19.5	20.2	20.9					46
47	12.3	13.1	13.8	14.5	15.3	16.0	16.7	17.5	18.2	18.9	19.7	20.4	21.2	21.9					47
48	12.9	13.7	14.5	15.2	16.0	16.8	17.5	18.3	19.1	19.8	20.6	21.4	22.1	22.9	23.7	24.4	25.2	26.0	48
49	13.5	14.3	15.1	15.9	16.7	17.5	18.3	19.1	19.9	20.7	21.5	22.3	23.1	23.9	24.7	25.5	26.3	27.1	49
50	14.2	15.0	15.8	16.7	17.5	18.3	19.2	20.0	20.8	21.7	22.5	23.3	24.2	25.0	25.8	26.7	27.5	28.3	50
51	14.8	15.7	16.6	17.4	18.3	19.2	20.0	20.9	21.8	22.6	23.5	24.4	25.2	26.1	27.0	27.8	28.7	29.6	51
52	15.5	16.4	17.3	18.2	19.1	20.0	20.9	21.8	22.7	23.6	24.5	25.4	26.3	27.2	28.1	29.0	29.9	30.8	52
53	17.1	18.0	19.0	19.9	20.8	21.8	22.7	23.6	24.6	25.5	26.5	27.4	28.3	29.3	30.2	31.1	32.1	32.1	53
54	17.8	18.8	19.8	20.7	21.7	22.7	23.7	24.6	25.6	26.6	27.5	28.5	29.5	30.5	31.4	32.4	33.4	33.4	54
55	18.6	19.6	20.6	21.6	22.6	23.6	24.6	25.6	26.6	27.6	28.6	29.7	30.7	31.7	32.7	33.7	34.7	34.7	55
56	19.3	20.4	21.4	22.5	23.5	24.5	25.6	26.6	27.7	28.7	29.8	30.8	31.9	32.9	34.0	35.0	36.0	36.0	56
57	20.1	21.2	22.3	23.3	24.4	25.5	26.6	27.7	28.8	29.8	30.9	32.0	33.1	34.2	35.3	36.3	37.4	37.4	57
58	20.9	22.0	23.1	24.3	25.4	26.5	27.6	28.7	29.9	31.0	32.1	33.2	34.3	35.5	36.6	37.7	38.8	38.8	58
59	21.7	22.9	24.0	25.2	26.3	27.5	28.7	29.8	31.0	32.1	33.3	34.5	35.6	36.8	37.9	39.1	40.3	40.3	59
60	22.5	23.7	24.9	26.1	27.3	28.5	29.7	30.9	32.1	33.3	34.5	35.7	36.9	38.1	39.3	40.5	41.7	41.7	60
61	23.4	24.6	25.8	27.1	28.3	29.6	30.8	32.0	33.3	34.5	35.8	37.0	38.2	39.5	40.7	42.0	43.2	43.2	61
62	24.2	25.5	26.8	28.1	29.3	30.6	31.9	33.2	34.5	35.7	37.0	38.3	39.6	40.9	42.2	43.4	44.7	44.7	62
63			27.7	29.1	30.4	31.7	33.0	34.4	35.7	37.0	38.3	39.6	41.0	42.3	43.6	44.9	46.3	46.3	63
64			28.7	30.1	31.4	32.8	34.2	35.5	36.9	38.3	39.6	41.0	42.4	43.7	45.1	46.5	47.8	47.8	64
65			29.7	31.1	32.5	33.9	35.3	36.7	38.1	39.6	41.0	42.4	43.8	45.2	46.6	48.0	49.4	49.4	65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Douglasia  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14										65.7	68.6	71.4	74.3	77.2					14
15										75.3	78.6	82.0	85.3	88.6					15
16										85.4	89.2	92.9	96.7	100.5					16
17										95.9	100.1	104.4	108.7	112.9					17
18										106.8	111.5	116.3	121.1	125.9	130.6	135.4	140.2	145.0	18
19										118.1	123.4	128.7	134.0	139.4	144.7	150.0	155.3	160.6	19
20										129.8	135.7	141.6	147.5	153.4	159.3	165.2	171.1	177.0	20
21										141.9	148.4	154.9	161.4	167.9	174.4	180.9	187.4	193.9	21
22										154.5	161.6	168.7	175.9	183.0	190.1	197.3	204.4	211.5	22
23										167.4	175.2	183.0	190.8	198.6	206.4	214.2	222.0	229.8	23
24										180.8	189.3	197.8	206.3	214.7	223.2	231.7	240.2	248.7	24
25										194.6	203.8	213.0	222.2	231.4	240.6	249.8	259.0	268.3	25
26										208.8	218.7	228.7	238.6	248.6	258.6	268.5	278.5	288.5	26
27										223.4	234.1	244.9	255.6	266.3	277.1	287.8	298.6	309.3	27
28										238.4	249.9	261.5	273.0	284.6	296.2	307.7	319.3	330.8	28
29										253.8	266.2	278.6	291.0	303.4	315.8	328.2	340.6	353.0	29
30										269.7	282.9	296.2	309.5	322.7	336.0	349.2	362.5	375.8	30
31										285.9	300.1	314.2	328.4	342.6	356.7	370.9	385.1	399.2	31
32										302.6	317.7	332.8	347.9	363.0	378.0	393.1	408.2	423.3	32
33											351.8	367.8	383.9	399.9	416.0	432.0	448.1		33
34											371.2	388.3	405.3	422.4	439.4	456.4	473.5		34
35											391.2	409.2	427.3	445.3	463.4	481.5	499.5		35
36											411.6	430.7	449.8	468.9	488.0	507.1	526.2		36
37											432.5	452.7	472.8	493.0	513.2	533.4	553.5		37
38													496.4	517.7	539.0	560.2	581.5		38
39													520.5	542.9	565.3	587.8	610.2		39
40													545.1	568.7	592.3	615.9	639.5		40
41														570.3	595.1	619.8	644.6	669.4	41
42														596.0	622.0	648.0	674.0	700.0	42
43																676.7	704.0	731.2	43
44																706.0	734.6	763.1	44
45																735.9	765.8	795.6	45
46																766.4	797.6	828.8	46
47																797.5	830.1	862.6	47
48																		897.1	48
49																		932.2	49
50																		968.0	50
51																		1 004.4	51
52																		1 041.5	52
53																			53
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Douglasia  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	237.6	245.4	253.2	261.0															23
24	257.2	265.7	274.2	282.7															24
25	277.5	286.7	295.9	305.1															25
26	298.4	308.4	318.4	328.3															26
27	320.1	330.8	341.6	352.3															27
28	342.4	353.9	365.5	377.0	388.6	400.2													28
29	365.4	377.8	390.2	402.6	415.0	427.3													29
30	389.0	402.3	415.6	428.8	442.1	455.4													30
31	413.4	427.6	441.7	455.9	470.0	484.2													31
32	438.4	453.5	468.6	483.7	498.8	513.9													32
33	464.1	480.2	496.2	512.3	528.3	544.4	560.4	576.5											33
34	490.5	507.5	524.6	541.6	558.7	575.7	592.7	609.8											34
35	517.6	535.6	553.7	571.7	589.8	607.8	625.9	644.0											35
36	545.3	564.4	583.5	602.6	621.7	640.8	659.9	679.0											36
37	573.7	593.9	614.1	634.3	654.4	674.6	694.8	715.0											37
38	602.8	624.1	645.4	666.7	687.9	709.2	730.5	751.8	773.1	794.4	815.6	836.9							38
39	632.6	655.0	677.4	699.8	722.3	744.7	767.1	789.5	811.9	834.3	856.8	879.2							39
40	663.0	686.6	710.2	733.8	757.4	781.0	804.5	828.1	851.7	875.3	898.9	922.4							40
41	694.2	718.9	743.7	768.5	793.3	818.0	842.8	867.6	892.4	917.2	941.9	966.7							41
42	726.0	752.0	778.0	804.0	830.0	856.0	882.0	908.0	934.0	960.0	986.0	1012.0							42
43	758.5	785.7	813.0	840.2	867.5	894.7	922.0	949.2	976.5	1003.7	1031.0	1058.2	1085.5	1112.7					43
44	791.6	820.2	848.7	877.2	905.8	934.3	962.8	991.4	1019.9	1048.4	1077.0	1105.5	1134.0	1162.6					44
45	825.5	855.3	885.2	915.0	944.8	974.7	1004.5	1034.4	1064.2	1094.1	1123.9	1153.8	1183.6	1213.5					45
46	860.0	891.2	922.4	953.5	984.7	1015.9	1047.1	1078.3	1109.5	1140.7	1171.9	1203.0	1234.2	1265.4					46
47	895.2	927.7	960.3	992.9	1025.4	1058.0	1090.5	1123.1	1155.6	1188.2	1220.8	1253.3	1285.9	1318.4					47
48	931.1	965.0	999.0	1032.9	1066.9	1100.8	1134.8	1168.8	1202.7	1236.7	1270.6	1304.6	1338.6	1372.5	1406.5	1440.4	1474.4	1508.3	48
49	967.6	1003.0	1038.4	1073.8	1109.2	1144.5	1179.9	1215.3	1250.7	1286.1	1321.5	1356.9	1392.3	1427.7	1463.0	1498.4	1533.8	1569.2	49
50	1004.8	1041.7	1078.5	1115.4	1152.2	1189.1	1225.9	1262.8	1299.6	1336.5	1373.3	1410.2	1447.0	1483.9	1520.7	1557.5	1594.4	1631.2	50
51	1042.7	1081.1	1119.4	1157.8	1196.1	1234.4	1272.8	1311.1	1349.4	1387.8	1426.1	1464.4	1502.8	1541.1	1579.4	1617.8	1656.1	1694.5	51
52	1081.3	1121.2	1161.0	1200.9	1240.7	1280.6	1320.5	1360.3	1400.2	1440.0	1479.9	1519.7	1559.6	1599.4	1639.3	1679.1	1719.0	1758.9	52
53	1162.0	1203.4	1244.8	1286.2	1327.6	1369.0	1410.4	1451.8	1493.2	1534.6	1576.0	1617.4	1658.8	1700.2	1741.6	1783.0	1824.4		53
54	1203.5	1246.5	1289.5	1332.5	1375.4	1418.4	1461.4	1504.4	1547.3	1590.3	1633.3	1676.3	1719.3	1762.2	1805.2	1848.2	1891.2		54
55	1245.7	1290.3	1334.9	1379.5	1424.1	1468.7	1513.3	1557.8	1602.4	1647.0	1691.6	1736.2	1780.8	1825.4	1869.9	1914.5	1959.1		55
56	1288.7	1334.9	1381.1	1427.3	1473.6	1519.8	1566.0	1612.2	1658.4	1704.7	1750.9	1797.1	1843.3	1889.6	1935.8	1982.0	2028.2		56
57	1332.3	1380.2	1428.1	1476.0	1523.9	1571.8	1619.6	1667.5	1715.4	1763.3	1811.2	1859.1	1907.0	1954.8	2002.7	2050.6	2098.5		57
58	1376.7	1426.2	1475.8	1525.4	1575.0	1624.6	1674.2	1723.7	1773.3	1822.9	1872.5	1922.1	1971.7	2021.2	2070.8	2120.4	2170.0		58
59	1421.7	1473.0	1524.3	1575.6	1627.0	1678.3	1729.6	1780.9	1832.2	1883.5	1934.8	1986.1	2037.4	2088.7	2140.0	2191.3	2242.6		59
60	1467.5	1520.5	1573.6	1626.7	1679.7	1732.8	1785.9	1838.9	1892.0	1945.0	1998.1	2051.2	2104.2	2157.3	2210.3	2263.4	2316.5		60
61	1514.0	1568.8	1623.6	1678.5	1733.3	1788.2	1843.0	1897.9	1952.7	2007.6	2062.4	2117.2	2172.1	2226.9	2281.8	2336.6	2391.5		61
62	1561.1	1617.8	1674.5	1731.1	1787.8	1844.4	1901.1	1957.7	2014.4	2071.1	2127.7	2184.4	2241.0	2297.7	2354.3	2411.0	2467.6		62
63			1726.0	1784.5	1843.0	1901.5	1960.0	2018.5	2077.0	2135.5	2194.0	2252.5	2311.0	2369.5	2428.0	2486.5	2545.0		63
64			1778.4	1838.7	1899.1	1959.5	2019.8	2080.2	2140.6	2201.0	2261.3	2321.7	2382.1	2442.4	2502.8	2563.2	2623.6		64
65			1831.5	1893.7	1956.0	2018.3	2080.6	2142.8	2205.1	2267.4	2329.6	2391.9	2454.2	2516.5	2578.7	2641.0	2703.3		65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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## **Piccoli alberi di conifere**

Abete bianco

Abete rosso

Cipresso comune

Douglasia

Larice

Pino cembro

Pino d'Aleppo

Pino domestico

Pino insigne

Pino marittimo

Pino nero

Pino silvestre

Pino strobo

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## Piccoli alberi di conifere

### Volume del fusto e dei rami grossi

$n = 196$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.1414 \quad 3.4914 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 1.4937 \cdot 10^{-3} & \\ -2.6241 \cdot 10^{-5} & 5.0470 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 8.9885 \cdot 10^{-4}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 196$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.7564 \quad 1.5022 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 8.8481 \cdot 10^{-4} & \\ -1.5544 \cdot 10^{-5} & 2.9896 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 5.3244 \cdot 10^{-4}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 196$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.5672 \cdot 10^{-1} \quad 1.0719 \cdot 10^{-2}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.1858 \cdot 10^{-4} & \\ -3.8398 \cdot 10^{-6} & 7.3853 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.3153 \cdot 10^{-4}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 196$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [9.8819 \cdot 10^{-2} \quad 2.4185 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.1449 \cdot 10^{-7} & \\ -3.7680 \cdot 10^{-9} & 7.2472 \cdot 10^{-10} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.2907 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 196$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [2.1119 \quad 2.5983 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.4609 \cdot 10^{-3} & \\ -2.5664 \cdot 10^{-5} & 4.9361 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 8.7910 \cdot 10^{-4}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Piccoli alberi di conifere  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)
1		2.2																	1
2		2.4	2.6	2.7															2
3		2.8	3.1	3.4	3.7	4.0	4.3												3
4		3.3	3.8	4.4	4.9	5.5	6.1	6.6	7.2										4
5		3.9	4.8	5.6	6.5	7.4	8.3	9.1	10.0										5
6			5.9	7.2	8.4	9.7	10.9	12.2	13.5	14.7									6
7			7.3	9.0	10.7	12.4	14.1	15.8	17.5	19.2	21.0	22.7	24.4						7
8				11.1	13.3	15.5	17.8	20.0	22.3	24.5	26.7	29.0	31.2						8
9				13.5	16.3	19.1	21.9	24.8	27.6	30.4	33.2	36.1	38.9	41.7	44.6				9
10					19.6	23.1	26.6	30.1	33.6	37.1	40.5	44.0	47.5	51.0	54.5				10
11						27.5	31.7	35.9	40.2	44.4	48.6	52.8	57.1	61.3	65.5				11
12							32.3	37.3	42.4	47.4	52.4	57.4	62.5	67.5	72.5	77.6			12
13								37.5	43.4	49.3	55.2	61.1	67.0	72.9	78.8	84.7	90.6		13
14									50.0	56.9	63.7	70.6	77.4	84.3	91.1	97.9	104.8		14
15										57.1	65.0	72.8	80.7	88.6	96.4	104.3	112.1	120.0	15
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66																			66
h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)

Piccoli alberi di conifere  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)
1																			1
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h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)



Piccoli alberi di conifere  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)
1		1.8																	1
2		1.9	1.9	2.0															2
3		2.0	2.2	2.3	2.4	2.6	2.7												3
4		2.2	2.5	2.7	3.0	3.2	3.4	3.7	3.9										4
5		2.5	2.9	3.3	3.6	4.0	4.4	4.8	5.1										5
6			3.4	3.9	4.5	5.0	5.5	6.1	6.6	7.2									6
7			4.0	4.7	5.4	6.2	6.9	7.6	8.4	9.1	9.9	10.6	11.3						7
8				5.6	6.6	7.5	8.5	9.4	10.4	11.4	12.3	13.3	14.3						8
9				6.6	7.8	9.1	10.3	11.5	12.7	13.9	15.1	16.4	17.6	18.8					9
10					9.3	10.8	12.3	13.8	15.3	16.8	18.3	19.8	21.3	22.8	24.3				10
11						12.7	14.5	16.3	18.1	19.9	21.8	23.6	25.4	27.2	29.0				11
12							14.7	16.9	19.1	21.2	23.4	25.6	27.7	29.9	32.0	34.2			12
13								17.0	19.5	22.1	24.6	27.1	29.7	32.2	34.8	37.3	39.8		13
14									22.4	25.3	28.3	31.2	34.1	37.1	40.0	43.0	45.9		14
15										25.4	28.8	32.2	35.6	38.9	42.3	45.7	49.1	52.5	15
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h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)
1																			1
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h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa ramaglia (kg)

h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)
1		0.3																	1
2		0.3	0.4	0.4															2
3		0.4	0.5	0.6	0.7	0.8	0.9												3
4		0.6	0.8	0.9	1.1	1.3	1.5	1.6	1.8										4
5		0.8	1.1	1.3	1.6	1.9	2.1	2.4	2.7										5
6			1.4	1.8	2.2	2.6	3.0	3.3	3.7	4.1									6
7			1.8	2.4	2.9	3.4	3.9	4.5	5.0	5.5	6.0	6.6	7.1						7
8				3.0	3.7	4.4	5.1	5.7	6.4	7.1	7.8	8.5	9.2						8
9				3.7	4.6	5.5	6.3	7.2	8.1	8.9	9.8	10.7	11.5	12.4					9
10					5.6	6.7	7.8	8.8	9.9	11.0	12.0	13.1	14.2	15.3	16.3				10
11						8.0	9.3	10.6	11.9	13.2	14.5	15.8	17.1	18.4	19.7				11
12						9.5	11.1	12.6	14.1	15.7	17.2	18.8	20.3	21.9	23.4				12
13						11.1	12.9	14.7	16.6	18.4	20.2	22.0	23.8	25.6	27.4				13
14							15.0	17.1	19.2	21.3	23.4	25.5	27.6	29.7	31.8				14
15							17.1	19.6	22.0	24.4	26.8	29.2	31.6	34.0	36.4				15
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h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa ramaglia (kg)

h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)
1																			1
2																			2
3																			3
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h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa ceppaie (kg)

h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)
1		0.1																	1
2		0.1	0.1	0.1															2
3		0.1	0.1	0.1	0.1	0.1	0.1												3
4		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1										4
5		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2										5
6			0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2									6
7			0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3						7
8				0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3						8
9				0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4					9
10					0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5				10
11						0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5				11
12						0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6				12
13						0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7				13
14							0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8				14
15							0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.9	0.9				15
16																			16
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h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa ceppaie (kg)

h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)
1																			1
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66																			66
h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa epigea totale (kg)

h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)
1		2.2																	1
2		2.3	2.4	2.5															2
3		2.6	2.8	3.0	3.3	3.5	3.7												3
4		2.9	3.4	3.8	4.2	4.6	5.0	5.4	5.9										4
5		3.4	4.1	4.7	5.4	6.0	6.7	7.3	8.0										5
6			4.9	5.9	6.8	7.7	8.7	9.6	10.5	11.5									6
7			5.9	7.2	8.5	9.8	11.0	12.3	13.6	14.8	16.1	17.4	18.7						7
8				8.8	10.4	12.1	13.8	15.4	17.1	18.7	20.4	22.1	23.7						8
9				10.5	12.6	14.7	16.8	18.9	21.1	23.2	25.3	27.4	29.5	31.6					9
10					15.1	17.7	20.3	22.9	25.5	28.1	30.7	33.3	35.9	38.5	41.1				10
11						21.0	24.1	27.3	30.4	33.6	36.7	39.8	43.0	46.1	49.3				11
12							24.6	28.3	32.0	35.8	39.5	43.3	47.0	50.8	54.5	58.2			12
13								28.5	32.8	37.2	41.6	46.0	50.4	54.8	59.2	63.6	68.0		13
14									37.8	42.9	47.9	53.0	58.1	63.2	68.3	73.4	78.5		14
15										43.0	48.9	54.7	60.6	66.4	72.3	78.1	84.0	89.8	15
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66																			66
h (m) d (cm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	h (m) d (cm)

Piccoli alberi di conifere  
Fitomassa epigea totale (kg)

h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)
1																			1
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66																			66
h (m) d (cm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	h (m) d (cm)





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# **SEZIONE B**

# **LATIFOGLIE**



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## ***Acer* spp.**

### **Aceri**

*Acer campestre* L.

Acero campestre

*Acer monspessulanum* L.

Acero minore

*Acer opalus* Mill.

Acero opalo

*Acer pseudoplatanus* L.

Acero di monte

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## Aceri

### Volume del fusto e dei rami grossi

$n = 37$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.6905 \quad 3.7082 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 9.8852 \cdot 10^{-1} & \\ -4.7366 \cdot 10^{-4} & 8.4075 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 2.2710 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 37$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [8.6876 \cdot 10^{-1} \quad 2.0421 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 4.6944 \cdot 10^{-1} & \\ -2.2494 \cdot 10^{-4} & 3.9927 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.0785 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 37$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [5.3322 \quad 5.5554 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.3169 \cdot 10^{-1} & \\ -1.5893 \cdot 10^{-4} & 2.8210 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 7.6201 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 37$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [2.5852 \cdot 10^{-1} \quad 3.9206 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.9886 \cdot 10^{-3} & \\ -1.4320 \cdot 10^{-6} & 2.5418 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 6.8660 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 37$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [6.4595 \quad 2.6368 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.3676 & \\ -6.5528 \cdot 10^{-4} & 1.1631 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.1419 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

Aceri  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	6.3	7.3	8.2	9.1															5
6	8.4	9.7	11.0	12.4															6
7	10.8	12.6	14.4	16.2															7
8	13.6	15.9	18.3	20.7	23.0	25.4	27.8	30.2											8
9	16.7	19.7	22.7	25.7	28.7	31.7	34.7	37.7											9
10	20.2	23.9	27.6	31.4	35.1	38.8	42.5	46.2											10
11	24.1	28.6	33.1	37.6	42.1	46.6	51.0	55.5											11
12		33.7	39.1	44.4	49.7	55.1	60.4	65.8											12
13				51.8	58.1	64.4	70.6	76.9	83.2	89.4	95.7	102.0							13
14				59.8	67.1	74.4	81.6	88.9	96.2	103.4	110.7	118.0							14
15				68.4	76.8	85.1	93.5	101.8	110.2	118.5	126.8	135.2							15
16				77.6	87.1	96.6	106.1	115.6	125.1	134.6	144.1	153.6							16
17				87.4	98.1	108.9	119.6	130.3	141.0	151.7	162.4	173.2							17
18						121.8	133.9	145.9	157.9	169.9	181.9	193.9	205.9	218.0	230.0	242.0			18
19						135.6	148.9	162.3	175.7	189.1	202.5	215.9	229.3	242.6	256.0	269.4			19
20						150.0	164.9	179.7	194.5	209.3	224.2	239.0	253.8	268.7	283.5	298.3			20
21						165.2	181.6	197.9	214.3	230.6	247.0	263.3	279.7	296.0	312.4	328.8			21
22						181.2	199.1	217.1	235.0	253.0	270.9	288.9	306.8	324.7	342.7	360.6			22
23								237.1	256.7	276.3	295.9	315.6	335.2	354.8	374.4	394.0	413.6	433.3	23
24								258.0	279.4	300.7	322.1	343.4	364.8	386.2	407.5	428.9	450.2	471.6	24
25								279.8	303.0	326.2	349.3	372.5	395.7	418.9	442.0	465.2	488.4	511.6	25
26								302.5	327.6	352.6	377.7	402.8	427.8	452.9	478.0	503.0	528.1	553.2	26
27								326.1	353.1	380.1	407.2	434.2	461.2	488.3	515.3	542.3	569.4	596.4	27
28										408.7	437.8	466.8	495.9	525.0	554.1	583.1	612.2	641.3	28
29										438.3	469.5	500.7	531.9	563.0	594.2	625.4	656.6	687.8	29
30										468.9	502.3	535.7	569.0	602.4	635.8	669.2	702.5	735.9	30
31										500.6	536.2	571.9	607.5	643.1	678.8	714.4	750.0	785.7	31
32										533.3	571.3	609.2	647.2	685.2	723.2	761.1	799.1	837.1	32
33											647.8	688.2	728.6	769.0	809.3	849.7	890.1		33
34											687.6	730.4	773.3	816.2	859.0	901.9	944.8		34
35											728.5	773.9	819.3	864.8	910.2	955.6	1 001.1		35
36											770.6	818.7	866.7	914.8	962.9	1 010.9	1 059.0		36
37											813.9	864.7	915.5	966.2	1 017.0	1 067.8	1 118.5		37
38													965.5	1 019.1	1 072.6	1 126.2	1 179.7		38
39													1 016.9	1 073.3	1 129.7	1 186.1	1 242.5		39
40													1 069.7	1 129.0	1 188.3	1 247.6	1 307.0		40
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Aceri  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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24																			24
25																			25
26																			26
27																			27
28	670.4	699.4																	28
29	719.0	750.2																	29
30	769.3	802.7																	30
31	821.3	856.9																	31
32	875.0	913.0																	32
33	930.5	970.9																	33
34	987.6	1 030.5																	34
35	1 046.5	1 091.9																	35
36	1 107.0	1 155.1																	36
37	1 169.3	1 220.1																	37
38	1 233.3	1 286.8																	38
39	1 298.9	1 355.3																	39
40	1 366.3	1 425.6																	40
41																			41
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Aceri  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.4	3.9	4.4	5.0															5
6	4.5	5.3	6.0	6.8															6
7	5.9	6.9	7.9	8.9															7
8	7.4	8.7	10.0	11.3	12.6	13.9	15.2	16.6											8
9	9.1	10.8	12.4	14.1	15.8	17.4	19.1	20.7											9
10	11.1	13.1	15.2	17.2	19.2	21.3	23.3	25.4											10
11	13.2	15.7	18.2	20.6	23.1	25.6	28.0	30.5											11
12		18.5	21.5	24.4	27.3	30.3	33.2	36.2											12
13				28.5	31.9	35.4	38.8	42.3	45.7	49.2	52.6	56.1							13
14				32.9	36.9	40.9	44.9	48.9	52.9	56.9	60.9	64.9							14
15				37.6	42.2	46.8	51.4	56.0	60.6	65.2	69.8	74.4							15
16				42.7	47.9	53.1	58.4	63.6	68.8	74.1	79.3	84.5							16
17				48.1	54.0	59.9	65.8	71.7	77.6	83.5	89.4	95.3							17
18						67.0	73.6	80.3	86.9	93.5	100.1	106.7	113.3	120.0	126.6	133.2			18
19						74.6	82.0	89.3	96.7	104.1	111.4	118.8	126.2	133.6	140.9	148.3			19
20						82.6	90.7	98.9	107.1	115.2	123.4	131.6	139.7	147.9	156.1	164.2			20
21						90.9	99.9	108.9	117.9	126.9	136.0	145.0	154.0	163.0	172.0	181.0			21
22						99.7	109.6	119.5	129.4	139.2	149.1	159.0	168.9	178.8	188.7	198.5			22
23								130.5	141.3	152.1	162.9	173.7	184.5	195.3	206.1	216.9	227.7	238.5	23
24								142.0	153.8	165.5	177.3	189.1	200.8	212.6	224.4	236.1	247.9	259.6	24
25								154.0	166.8	179.6	192.3	205.1	217.8	230.6	243.4	256.1	268.9	281.7	25
26								166.5	180.3	194.1	207.9	221.7	235.5	249.4	263.2	277.0	290.8	304.6	26
27								179.5	194.4	209.3	224.2	239.1	253.9	268.8	283.7	298.6	313.5	328.4	27
28										225.0	241.0	257.0	273.0	289.0	305.1	321.1	337.1	353.1	28
29										241.3	258.5	275.7	292.8	310.0	327.2	344.3	361.5	378.7	29
30										258.2	276.6	294.9	313.3	331.7	350.1	368.4	386.8	405.2	30
31										275.6	295.2	314.9	334.5	354.1	373.7	393.4	413.0	432.6	31
32										293.6	314.5	335.4	356.4	377.3	398.2	419.1	440.0	460.9	32
33											356.7	378.9	401.2	423.4	445.6	467.9	490.1	512.3	33
34											378.6	402.2	425.8	449.4	473.0	496.6	520.2	543.8	34
35											401.1	426.1	451.2	476.2	501.2	526.2	551.2	576.2	35
36											424.3	450.8	477.2	503.7	530.2	556.6	583.1	609.5	36
37											448.2	476.1	504.1	532.0	560.0	588.0	615.9	643.8	37
38													531.7	561.1	590.6	620.1	649.6	679.1	38
39													560.0	591.0	622.1	653.1	684.2	715.2	39
40													589.0	621.7	654.3	687.0	719.7	752.4	40
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68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Aceri  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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7																			7
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	369.1	385.1																	28
29	395.9	413.0																	29
30	423.6	442.0																	30
31	452.2	471.9																	31
32	481.8	502.7																	32
33	512.4	534.6																	33
34	543.8	567.4																	34
35	576.2	601.2																	35
36	609.6	636.0																	36
37	643.9	671.8																	37
38	679.1	708.6																	38
39	715.3	746.3																	39
40	752.4	785.0																	40
41																			41
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Aceri  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	6.0	6.2	6.3	6.4															5
6	6.3	6.5	6.7	6.9															6
7	6.7	7.0	7.2	7.5															7
8	7.1	7.5	7.8	8.2	8.5	8.9	9.2	9.6											8
9	7.6	8.0	8.5	8.9	9.4	9.8	10.3	10.7											9
10	8.1	8.7	9.2	9.8	10.3	10.9	11.4	12.0											10
11	8.7	9.4	10.0	10.7	11.4	12.1	12.7	13.4											11
12		10.1	10.9	11.7	12.5	13.3	14.1	14.9											12
13				12.8	13.8	14.7	15.7	16.6	17.5	18.5	19.4	20.4							13
14				14.0	15.1	16.2	17.3	18.4	19.5	20.6	21.7	22.8							14
15				15.3	16.6	17.8	19.1	20.3	21.6	22.8	24.1	25.3							15
16				16.7	18.1	19.6	21.0	22.4	23.8	25.2	26.7	28.1							16
17				18.2	19.8	21.4	23.0	24.6	26.2	27.8	29.4	31.0							17
18						23.3	25.1	26.9	28.7	30.5	32.3	34.1	35.9	37.7	39.5	41.3			18
19						25.4	27.4	29.4	31.4	33.4	35.4	37.4	39.4	41.4	43.4	45.4			19
20						27.6	29.8	32.0	34.2	36.4	38.7	40.9	43.1	45.3	47.6	49.8			20
21						29.8	32.3	34.7	37.2	39.6	42.1	44.5	47.0	49.4	51.9	54.3			21
22						32.2	34.9	37.6	40.3	43.0	45.7	48.4	51.0	53.7	56.4	59.1			22
23								40.6	43.5	46.5	49.4	52.4	55.3	58.2	61.2	64.1	67.0	70.0	23
24								43.7	46.9	50.1	53.3	56.5	59.7	62.9	66.1	69.3	72.5	75.7	24
25								47.0	50.5	53.9	57.4	60.9	64.4	67.8	71.3	74.8	78.2	81.7	25
26								50.4	54.2	57.9	61.7	65.4	69.2	72.9	76.7	80.4	84.2	88.0	26
27								53.9	58.0	62.0	66.1	70.1	74.2	78.2	82.3	86.3	90.4	94.4	27
28										66.3	70.7	75.0	79.4	83.7	88.1	92.4	96.8	101.2	28
29										70.7	75.4	80.1	84.8	89.4	94.1	98.8	103.4	108.1	29
30										75.3	80.3	85.3	90.3	95.3	100.3	105.3	110.3	115.3	30
31										80.1	85.4	90.8	96.1	101.4	106.8	112.1	117.4	122.8	31
32										85.0	90.7	96.4	102.0	107.7	113.4	119.1	124.8	130.5	32
33												102.1	108.2	114.2	120.3	126.3	132.4	138.4	33
34												108.1	114.5	120.9	127.4	133.8	140.2	146.6	34
35												114.2	121.0	127.8	134.6	141.4	148.2	155.1	35
36												120.5	127.7	134.9	142.1	149.3	156.5	163.7	36
37												127.0	134.6	142.2	149.8	157.4	165.0	172.6	37
38														149.7	157.8	165.8	173.8	181.8	38
39														157.4	165.9	174.3	182.8	191.2	39
40														165.3	174.2	183.1	192.0	200.9	40
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Aceri  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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24																			24
25																			25
26																			26
27																			27
28	105.5	109.9																	28
29	112.8	117.5																	29
30	120.3	125.3																	30
31	128.1	133.5																	31
32	136.2	141.9																	32
33	144.5	150.5																	33
34	153.0	159.5																	34
35	161.9	168.7																	35
36	170.9	178.1																	36
37	180.3	187.9																	37
38	189.8	197.9																	38
39	199.7	208.1																	39
40	209.8	218.7																	40
41																			41
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Aceri  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.3	0.3	0.3	0.3															5
6	0.3	0.3	0.4	0.4															6
7	0.4	0.4	0.4	0.4															7
8	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6											8
9	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6											9
10	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.7											10
11	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8											11
12		0.6	0.7	0.7	0.8	0.8	0.9	0.9											12
13				0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3							13
14				0.9	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.5							14
15				1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7							15
16				1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9							16
17				1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.1							17
18						1.5	1.7	1.8	1.9	2.0	2.2	2.3	2.4	2.5	2.7	2.8			18
19						1.7	1.8	2.0	2.1	2.2	2.4	2.5	2.7	2.8	2.9	3.1			19
20						1.8	2.0	2.1	2.3	2.5	2.6	2.8	2.9	3.1	3.2	3.4			20
21						2.0	2.2	2.3	2.5	2.7	2.9	3.0	3.2	3.4	3.5	3.7			21
22						2.2	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1			22
23								2.7	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	23
24								3.0	3.2	3.4	3.6	3.9	4.1	4.3	4.5	4.8	5.0	5.2	24
25								3.2	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2	5.4	5.6	25
26								3.4	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.6	5.8	6.1	26
27								3.7	4.0	4.3	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.5	27
28										4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	28
29										4.9	5.2	5.5	5.9	6.2	6.5	6.9	7.2	7.5	29
30										5.2	5.6	5.9	6.3	6.6	7.0	7.3	7.7	8.0	30
31										5.5	5.9	6.3	6.7	7.0	7.4	7.8	8.2	8.5	31
32										5.9	6.3	6.7	7.1	7.5	7.9	8.3	8.7	9.1	32
33												7.1	7.5	7.9	8.4	8.8	9.2	9.7	33
34												7.5	8.0	8.4	8.9	9.3	9.8	10.2	34
35												7.9	8.4	8.9	9.4	9.9	10.3	10.8	35
36												8.4	8.9	9.4	9.9	10.4	10.9	11.4	36
37												8.8	9.4	9.9	10.5	11.0	11.5	12.1	37
38														10.4	11.0	11.6	12.1	12.7	38
39														11.0	11.6	12.2	12.8	13.4	39
40														11.5	12.2	12.8	13.4	14.1	40
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Aceri  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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25																			25
26																			26
27																			27
28	7.3	7.6																	28
29	7.8	8.2																	29
30	8.4	8.7																	30
31	8.9	9.3																	31
32	9.5	9.9																	32
33	10.1	10.5																	33
34	10.7	11.1																	34
35	11.3	11.8																	35
36	11.9	12.5																	36
37	12.6	13.1																	37
38	13.3	13.8																	38
39	14.0	14.6																	39
40	14.7	15.3																	40
41																			41
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Aceri  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	9.8	10.4	11.1	11.7															5
6	11.2	12.2	13.1	14.1															6
7	12.9	14.2	15.5	16.8															7
8	14.9	16.6	18.3	20.0	21.6	23.3	25.0	26.7											8
9	17.1	19.3	21.4	23.5	25.7	27.8	30.0	32.1											9
10	19.6	22.3	24.9	27.6	30.2	32.8	35.5	38.1											10
11	22.4	25.6	28.8	32.0	35.2	38.4	41.6	44.7											11
12		29.2	33.0	36.8	40.6	44.4	48.2	52.0											12
13				42.1	46.6	51.0	55.5	59.9	64.4	68.8	73.3	77.8							13
14				47.8	53.0	58.1	63.3	68.5	73.6	78.8	84.0	89.1							14
15				53.9	59.9	65.8	71.7	77.7	83.6	89.5	95.5	101.4							15
16				60.5	67.2	74.0	80.7	87.5	94.2	101.0	107.7	114.5							16
17				67.4	75.0	82.7	90.3	97.9	105.5	113.1	120.8	128.4							17
18						91.9	100.4	109.0	117.5	126.1	134.6	143.2	151.7	160.2	168.8	177.3			18
19						101.6	111.2	120.7	130.2	139.7	149.2	158.8	168.3	177.8	187.3	196.8			19
20						111.9	122.5	133.0	143.6	154.1	164.7	175.2	185.8	196.3	206.9	217.4			20
21						122.7	134.4	146.0	157.6	169.3	180.9	192.5	204.1	215.8	227.4	239.0			21
22						134.1	146.8	159.6	172.4	185.1	197.9	210.7	223.4	236.2	248.9	261.7			22
23								173.8	187.8	201.7	215.7	229.6	243.6	257.5	271.5	285.4	299.4	313.3	23
24								188.7	203.9	219.1	234.3	249.5	264.7	279.8	295.0	310.2	325.4	340.6	24
25								204.2	220.7	237.2	253.7	270.1	286.6	303.1	319.6	336.1	352.5	369.0	25
26								220.4	238.2	256.0	273.8	291.7	309.5	327.3	345.1	363.0	380.8	398.6	26
27								237.1	256.3	275.6	294.8	314.0	333.2	352.5	371.7	390.9	410.1	429.3	27
28										295.9	316.5	337.2	357.9	378.6	399.2	419.9	440.6	461.3	28
29										316.9	339.1	361.3	383.4	405.6	427.8	450.0	472.1	494.3	29
30										338.7	362.4	386.2	409.9	433.6	457.4	481.1	504.8	528.5	30
31										361.2	386.6	411.9	437.2	462.6	487.9	513.3	538.6	563.9	31
32										384.5	411.5	438.5	465.5	492.5	519.5	546.5	573.5	600.5	32
33										465.9	494.6	523.3	552.0	580.8	609.5	638.2			33
34										494.2	524.6	555.1	585.6	616.1	646.6	677.1			34
35										523.3	555.6	587.9	620.2	652.5	684.8	717.1			35
36										553.2	587.4	621.6	655.7	689.9	724.1	758.3			36
37										584.0	620.1	656.2	692.3	728.4	764.5	800.6			37
38														691.8	729.9	768.0	806.0	844.1	38
39														728.4	768.5	808.6	848.7	888.8	39
40														765.9	808.0	850.2	892.4	934.6	40
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Aceri  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	481.9	502.6																	28
29	516.5	538.7																	29
30	552.3	576.0																	30
31	589.3	614.6																	31
32	627.5	654.5																	32
33	666.9	695.6																	33
34	707.5	738.0																	34
35	749.4	781.7																	35
36	792.4	826.6																	36
37	836.7	872.8																	37
38	882.2	920.3																	38
39	928.9	969.0																	39
40	976.8	1 019.0																	40
41																			41
42																			42
43																			43
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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## ***Alnus* spp.**

### **Ontani**

*Alnus cordata* (Loisel) Desf.  
Ontano napoletano

*Alnus glutinosa* (L.) Gaertn  
Ontano nero

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## Ontani

### Volume del fusto e dei rami grossi

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.2932 \cdot 10 \quad 3.2641 \cdot 10^{-2} \quad 2.9991]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 4.9867 \cdot 10 & & & & \\ 1.3116 \cdot 10^{-2} & 5.3498 \cdot 10^{-6} & & & \\ -7.1964 & -2.0513 \cdot 10^{-3} & 1.0716 & & \\ & & & & \\ & & & & \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 3.9958 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-8.8718 \quad 1.6235 \cdot 10^{-2} \quad 1.0538]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.7981 \cdot 10 & & & & \\ 2.7296 \cdot 10^{-3} & 1.9291 \cdot 10^{-6} & & & \\ -2.5949 & -7.3965 \cdot 10^{-4} & 3.8641 \cdot 10^{-1} & & \\ & & & & \\ & & & & \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.4408 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 35$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-7.2566 \quad 1.3977 \cdot 10^{-3} \quad 1.5009]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 2.9725 & & \\ 7.8186 \cdot 10^{-4} & 3.1890 \cdot 10^{-7} & \\ -4.2897 \cdot 10^{-1} & -1.2227 \cdot 10^{-4} & 6.3879 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 2.3819 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 35$

$p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-6.1812 \cdot 10^{-1} \quad 2.9779 \cdot 10^{-4} \quad 1.1172 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 1.7704 \cdot 10^{-1} & & \\ 4.6566 \cdot 10^{-5} & 1.8993 \cdot 10^{-8} & \\ -2.5549 \cdot 10^{-2} & -7.2824 \cdot 10^{-6} & 3.8045 \cdot 10^{-3} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 1.4186 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 35$

$p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.6747 \cdot 10 \quad 1.7930 \cdot 10^{-2} \quad 2.6664]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 2.6258 \cdot 10 & & \\ 6.9065 \cdot 10^{-3} & 2.8170 \cdot 10^{-6} & \\ -3.7893 & -1.0801 \cdot 10^{-3} & 5.6427 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 2.1040 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

Ontani  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.9	2.1	3.3	4.5	5.6	6.8													6
7	6.1	7.7	9.3	10.9	12.5	14.1													7
8	11.5	13.6	15.7	17.8	19.9	22.0	24.0	26.1											8
9	17.3	19.9	22.6	25.2	27.9	30.5	33.1	35.8											9
10	23.4	26.6	29.9	33.2	36.4	39.7	43.0	46.2											10
11	29.8	33.8	37.7	41.7	45.6	49.6	53.5	57.5											11
12	36.6	41.3	46.0	50.7	55.4	60.1	64.8	69.5											12
13				60.2	65.7	71.2	76.7	82.3	87.8	93.3	98.8	104.3							13
14				70.2	76.6	83.0	89.4	95.8	102.2	108.6	115.0	121.4							14
15				80.8	88.2	95.5	102.8	110.2	117.5	124.9	132.2	139.6							15
16				91.9	100.3	108.6	117.0	125.3	133.7	142.0	150.4	158.8							16
17				103.5	113.0	122.4	131.8	141.3	150.7	160.1	169.6	179.0							17
18						136.8	147.4	158.0	168.5	179.1	189.7	200.3	210.8	221.4	232.0	242.6			18
19						151.9	163.7	175.5	187.2	199.0	210.8	222.6	234.4	246.2	257.9	269.7			19
20						167.6	180.7	193.7	206.8	219.8	232.9	246.0	259.0	272.1	285.1	298.2			20
21						184.0	198.4	212.8	227.2	241.6	256.0	270.4	284.8	299.2	313.5	327.9			21
22						201.0	216.8	232.6	248.4	264.2	280.0	295.8	311.6	327.4	343.2	359.0			22
23								253.3	270.5	287.8	305.1	322.3	339.6	356.9	374.1	391.4	408.7	425.9	23
24								274.7	293.5	312.3	331.1	349.9	368.7	387.5	406.3	425.1	443.9	462.7	24
25								296.9	317.3	337.7	358.1	378.5	398.9	419.3	439.7	460.1	480.5	500.9	25
26								319.8	341.9	364.0	386.0	408.1	430.2	452.2	474.3	496.4	518.4	540.5	26
27								343.6	367.4	391.2	415.0	438.8	462.6	486.4	510.2	533.9	557.7	581.5	27
28										419.3	444.9	470.5	496.1	521.7	547.3	572.9	598.4	624.0	28
29										448.4	475.8	503.3	530.7	558.2	585.6	613.1	640.5	668.0	29
30										478.3	507.7	537.1	566.4	595.8	625.2	654.6	684.0	713.3	30
31										509.2	540.6	571.9	603.3	634.7	666.0	697.4	728.8	760.1	31
32										541.0	574.4	607.8	641.3	674.7	708.1	741.5	775.0	808.4	32
33												644.8	680.3	715.9	751.4	787.0	822.5	858.1	33
34												682.8	720.5	758.2	796.0	833.7	871.4	909.2	34
35												721.8	761.8	801.8	841.8	881.7	921.7	961.7	35
36												761.9	804.2	846.5	888.8	931.1	973.4	1 015.7	36
37												803.0	847.7	892.4	937.1	981.7	1 026.4	1 071.1	37
38														939.4	986.6	1 033.7	1 080.8	1 128.0	38
39														987.7	1 037.3	1 087.0	1 136.6	1 186.3	39
40														1 037.1	1 089.3	1 141.5	1 193.8	1 246.0	40
41														1 087.7	1 142.6	1 197.4	1 252.3	1 307.2	41
42														1 139.4	1 197.0	1 254.6	1 312.2	1 369.8	42
43																1 313.1	1 373.4	1 433.8	43
44																1 372.9	1 436.1	1 499.3	44
45																1 434.0	1 500.1	1 566.2	45
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Ontani  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	443.2	460.5																	23
24	481.5	500.3																	24
25	521.3	541.7																	25
26	562.5	584.6																	26
27	605.3	629.1																	27
28	649.6	675.2	700.8	726.4	752.0	777.6													28
29	695.4	722.9	750.3	777.8	805.2	832.7													29
30	742.7	772.1	801.5	830.8	860.2	889.6													30
31	791.5	822.9	854.2	885.6	917.0	948.3													31
32	841.8	875.2	908.6	942.1	975.5	1 008.9													32
33	893.6	929.1	964.7	1 000.2	1 035.8	1 071.3													33
34	946.9	984.6	1 022.4	1 060.1	1 097.8	1 135.6													34
35	1 001.7	1 041.7	1 081.7	1 121.7	1 161.6	1 201.6													35
36	1 058.0	1 100.3	1 142.6	1 184.9	1 227.2	1 269.5													36
37	1 115.8	1 160.5	1 205.2	1 249.9	1 294.5	1 339.2													37
38	1 175.1	1 222.2	1 269.4	1 316.5	1 363.6	1 410.8													38
39	1 235.9	1 285.6	1 335.2	1 384.9	1 434.5	1 484.1													39
40	1 298.2	1 350.4	1 402.7	1 454.9	1 507.1	1 559.3													40
41	1 362.0	1 416.9	1 471.8	1 526.6	1 581.5	1 636.4													41
42	1 427.3	1 484.9	1 542.5	1 600.1	1 657.7	1 715.2													42
43	1 494.2	1 554.5	1 614.9	1 675.2	1 735.6	1 795.9													43
44	1 562.5	1 625.7	1 688.9	1 752.0	1 815.2	1 878.4													44
45	1 632.3	1 698.4	1 764.5	1 830.6	1 896.7	1 962.8													45
46																			46
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Ontani  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.4	1.0	1.5	2.1	2.7	3.3													6
7	2.5	3.3	4.1	4.9	5.7	6.5													7
8	4.8	5.8	6.8	7.9	8.9	9.9	11.0	12.0											8
9	7.2	8.5	9.8	11.1	12.4	13.8	15.1	16.4											9
10	9.8	11.4	13.0	14.7	16.3	17.9	19.5	21.1											10
11	12.5	14.5	16.5	18.4	20.4	22.4	24.3	26.3											11
12	15.5	17.8	20.1	22.5	24.8	27.2	29.5	31.8											12
13				26.8	29.5	32.3	35.0	37.8	40.5	43.2	46.0	48.7							13
14				31.3	34.5	37.7	40.9	44.1	47.2	50.4	53.6	56.8							14
15				36.2	39.8	43.5	47.1	50.8	54.4	58.1	61.7	65.4							15
16				41.2	45.4	49.6	53.7	57.9	62.0	66.2	70.3	74.5							16
17				46.6	51.3	56.0	60.7	65.3	70.0	74.7	79.4	84.1							17
18						62.7	68.0	73.2	78.5	83.7	89.0	94.3	99.5	104.8	110.0	115.3			18
19						69.8	75.6	81.5	87.3	93.2	99.1	104.9	110.8	116.6	122.5	128.4			19
20						77.1	83.6	90.1	96.6	103.1	109.6	116.1	122.6	129.1	135.6	142.1			20
21						84.9	92.0	99.2	106.3	113.5	120.7	127.8	135.0	142.1	149.3	156.5			21
22						92.9	100.7	108.6	116.5	124.3	132.2	140.0	147.9	155.8	163.6	171.5			22
23								118.4	127.0	135.6	144.2	152.8	161.4	170.0	178.5	187.1	195.7	204.3	23
24								128.6	138.0	147.3	156.7	166.0	175.4	184.7	194.1	203.4	212.8	222.1	24
25								139.2	149.4	159.5	169.7	179.8	190.0	200.1	210.3	220.4	230.6	240.7	25
26								150.2	161.2	172.2	183.1	194.1	205.1	216.1	227.0	238.0	249.0	260.0	26
27								161.6	173.4	185.3	197.1	208.9	220.8	232.6	244.5	256.3	268.1	280.0	27
28										198.8	211.6	224.3	237.0	249.7	262.5	275.2	287.9	300.7	28
29										212.8	226.5	240.1	253.8	267.5	281.1	294.8	308.4	322.1	29
30										227.3	241.9	256.5	271.1	285.7	300.4	315.0	329.6	344.2	30
31										242.2	257.8	273.4	289.0	304.6	320.2	335.8	351.4	367.0	31
32										257.6	274.2	290.8	307.5	324.1	340.7	357.3	374.0	390.6	32
33											308.8	326.5	344.1	361.8	379.5	397.2	414.9	432.6	33
34											327.2	346.0	364.8	383.5	402.3	421.1	439.8	458.6	34
35											346.2	366.1	386.0	405.9	425.8	445.7	465.5	485.4	35
36											365.7	386.8	407.8	428.8	449.9	470.9	492.0	513.0	36
37											385.7	408.0	430.2	452.4	474.6	496.9	519.1	541.4	37
38													453.2	476.6	500.0	523.5	546.9	570.3	38
39													476.7	501.4	526.1	550.8	575.5	600.2	39
40													500.8	526.8	552.8	578.8	604.8	630.8	40
41														525.6	552.9	580.2	607.4	634.7	41
42														550.9	579.5	608.2	636.8	665.4	42
43															636.8	666.8	696.8	726.8	43
44															666.1	697.5	729.0	760.4	44
45															696.1	728.9	761.8	794.6	45
46																			46
47																			47
48																			48
49																			49
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Ontani  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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18																			18
19																			19
20																			20
21																			21
22																			22
23	212.9	221.5																	23
24	231.5	240.9																	24
25	250.9	261.0																	25
26	270.9	281.9																	26
27	291.8	303.6																	27
28	313.4	326.1	338.8	351.6	364.3	377.0													28
29	335.7	349.4	363.0	376.7	390.3	404.0													29
30	358.8	373.4	388.0	402.6	417.3	431.9													30
31	382.6	398.2	413.8	429.4	445.0	460.6													31
32	407.2	423.8	440.5	457.1	473.7	490.3													32
33	432.5	450.2	467.9	485.6	503.3	520.9													33
34	458.6	477.4	496.1	514.9	533.7	552.5													34
35	485.4	505.3	525.2	545.1	565.0	584.9													35
36	513.0	534.0	555.1	576.1	597.2	618.2													36
37	541.3	563.5	585.8	608.0	630.2	652.4													37
38	570.4	593.8	617.3	640.7	664.1	687.6													38
39	600.2	624.9	649.6	674.3	698.9	723.6													39
40	630.7	656.7	682.7	708.7	734.6	760.6													40
41	662.0	689.3	716.6	743.9	771.2	798.5													41
42	694.1	722.7	751.4	780.0	808.6	837.3													42
43	726.9	756.9	786.9	816.9	846.9	877.0													43
44	760.4	791.8	823.3	854.7	886.1	917.6													44
45	794.7	827.6	860.4	893.3	926.2	959.1													45
46																			46
47																			47
48																			48
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Ontani  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	2.0	2.1	2.1	2.2	2.2	2.3													6
7	3.6	3.7	3.7	3.8	3.9	3.9													7
8	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.8											8
9	6.8	6.9	7.0	7.2	7.3	7.4	7.5	7.6											9
10	8.5	8.6	8.7	8.9	9.0	9.2	9.3	9.4											10
11	10.1	10.3	10.4	10.6	10.8	10.9	11.1	11.3											11
12	11.8	12.0	12.2	12.4	12.6	12.8	13.0	13.2											12
13				14.1	14.4	14.6	14.9	15.1	15.3	15.6	15.8	16.0							13
14				15.9	16.2	16.5	16.8	17.0	17.3	17.6	17.9	18.1							14
15				17.8	18.1	18.4	18.7	19.0	19.3	19.7	20.0	20.3							15
16				19.6	20.0	20.3	20.7	21.1	21.4	21.8	22.1	22.5							16
17				21.5	21.9	22.3	22.7	23.1	23.5	23.9	24.3	24.7							17
18						24.3	24.7	25.2	25.6	26.1	26.6	27.0	27.5	27.9	28.4	28.8			18
19						26.3	26.8	27.3	27.8	28.3	28.8	29.3	29.8	30.3	30.8	31.4			19
20						28.4	28.9	29.5	30.0	30.6	31.1	31.7	32.3	32.8	33.4	33.9			20
21						30.4	31.0	31.7	32.3	32.9	33.5	34.1	34.7	35.4	36.0	36.6			21
22						32.5	33.2	33.9	34.6	35.2	35.9	36.6	37.3	37.9	38.6	39.3			22
23								36.1	36.9	37.6	38.4	39.1	39.8	40.6	41.3	42.1	42.8	43.5	23
24								38.4	39.2	40.0	40.8	41.6	42.5	43.3	44.1	44.9	45.7	46.5	24
25								40.7	41.6	42.5	43.4	44.2	45.1	46.0	46.9	47.7	48.6	49.5	25
26								43.1	44.0	45.0	45.9	46.9	47.8	48.8	49.7	50.7	51.6	52.6	26
27								45.5	46.5	47.5	48.6	49.6	50.6	51.6	52.6	53.6	54.7	55.7	27
28										50.1	51.2	52.3	53.4	54.5	55.6	56.7	57.8	58.9	28
29										52.7	53.9	55.1	56.3	57.4	58.6	59.8	61.0	62.1	29
30										55.4	56.6	57.9	59.2	60.4	61.7	62.9	64.2	65.4	30
31										58.1	59.4	60.8	62.1	63.4	64.8	66.1	67.5	68.8	31
32										60.8	62.2	63.7	65.1	66.5	68.0	69.4	70.8	72.3	32
33												66.6	68.1	69.7	71.2	72.7	74.2	75.8	33
34												69.6	71.2	72.9	74.5	76.1	77.7	79.3	34
35												72.7	74.4	76.1	77.8	79.5	81.2	82.9	35
36												75.8	77.6	79.4	81.2	83.0	84.8	86.6	36
37												78.9	80.8	82.7	84.6	86.5	88.5	90.4	37
38														86.1	88.1	90.1	92.2	94.2	38
39														89.5	91.7	93.8	95.9	98.0	39
40														93.0	95.3	97.5	99.7	102.0	40
41														96.6	98.9	101.3	103.6	106.0	41
42														100.2	102.6	105.1	107.6	110.0	42
43																109.0	111.6	114.1	43
44																112.9	115.6	118.3	44
45																116.9	119.7	122.6	45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Ontani  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	44.3	45.0																	23
24	47.3	48.1																	24
25	50.4	51.2																	25
26	53.5	54.4																	26
27	56.7	57.7																	27
28	60.0	61.1	62.2	63.3	64.4	65.5													28
29	63.3	64.5	65.7	66.8	68.0	69.2													29
30	66.7	68.0	69.2	70.5	71.7	73.0													30
31	70.2	71.5	72.9	74.2	75.5	76.9													31
32	73.7	75.1	76.6	78.0	79.4	80.8													32
33	77.3	78.8	80.3	81.8	83.4	84.9													33
34	80.9	82.6	84.2	85.8	87.4	89.0													34
35	84.7	86.4	88.1	89.8	91.5	93.2													35
36	88.4	90.2	92.1	93.9	95.7	97.5													36
37	92.3	94.2	96.1	98.0	99.9	101.9													37
38	96.2	98.2	100.2	102.3	104.3	106.3													38
39	100.2	102.3	104.4	106.6	108.7	110.8													39
40	104.2	106.5	108.7	110.9	113.2	115.4													40
41	108.3	110.7	113.0	115.4	117.7	120.1													41
42	112.5	115.0	117.4	119.9	122.4	124.8													42
43	116.7	119.3	121.9	124.5	127.1	129.6													43
44	121.0	123.7	126.4	129.1	131.8	134.5													44
45	125.4	128.2	131.0	133.9	136.7	139.5													45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Ontani  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.1	0.1	0.1	0.1	0.1	0.2													6
7	0.2	0.3	0.3	0.3	0.3	0.3													7
8	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5											8
9	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7											9
10	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9											10
11	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0											11
12	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.2											12
13				1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6							13
14				1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.9							14
15				1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.1	2.1							15
16				1.8	1.9	1.9	2.0	2.1	2.2	2.2	2.3	2.4							16
17				2.0	2.1	2.1	2.2	2.3	2.4	2.5	2.6	2.7							17
18						2.4	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3			18
19						2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.7			19
20						2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.8	3.9	4.0			20
21						3.0	3.2	3.3	3.4	3.6	3.7	3.8	4.0	4.1	4.2	4.4			21
22						3.3	3.4	3.6	3.7	3.9	4.0	4.1	4.3	4.4	4.6	4.7			22
23								3.8	4.0	4.2	4.3	4.5	4.6	4.8	4.9	5.1	5.3	5.4	23
24								4.1	4.3	4.5	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.8	24
25								4.4	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.9	6.1	6.3	25
26								4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.7	26
27								5.0	5.2	5.4	5.7	5.9	6.1	6.3	6.5	6.7	7.0	7.2	27
28										5.8	6.0	6.2	6.5	6.7	6.9	7.2	7.4	7.6	28
29										6.1	6.4	6.6	6.9	7.1	7.4	7.6	7.9	8.1	29
30										6.5	6.8	7.0	7.3	7.6	7.8	8.1	8.4	8.6	30
31										6.9	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.1	31
32										7.2	7.5	7.8	8.1	8.4	8.8	9.1	9.4	9.7	32
33												8.3	8.6	8.9	9.2	9.6	9.9	10.2	33
34												8.7	9.0	9.4	9.7	10.1	10.4	10.8	34
35												9.1	9.5	9.9	10.2	10.6	11.0	11.3	35
36												9.6	10.0	10.4	10.7	11.1	11.5	11.9	36
37												10.0	10.4	10.9	11.3	11.7	12.1	12.5	37
38														11.4	11.8	12.2	12.7	13.1	38
39														11.9	12.3	12.8	13.3	13.7	39
40														12.4	12.9	13.4	13.9	14.3	40
41														13.0	13.5	14.0	14.5	15.0	41
42														13.5	14.1	14.6	15.1	15.6	42
43																15.2	15.7	16.3	43
44																15.8	16.4	17.0	44
45																16.5	17.1	17.7	45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Ontani  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
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13																			13
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	5.6	5.7																	23
24	6.0	6.2																	24
25	6.5	6.6																	25
26	6.9	7.1																	26
27	7.4	7.6																	27
28	7.9	8.1	8.3	8.6	8.8	9.0													28
29	8.4	8.6	8.9	9.1	9.4	9.6													29
30	8.9	9.2	9.4	9.7	10.0	10.2													30
31	9.4	9.7	10.0	10.3	10.6	10.9													31
32	10.0	10.3	10.6	10.9	11.2	11.5													32
33	10.5	10.9	11.2	11.5	11.8	12.1													33
34	11.1	11.4	11.8	12.1	12.5	12.8													34
35	11.7	12.0	12.4	12.8	13.1	13.5													35
36	12.3	12.7	13.1	13.4	13.8	14.2													36
37	12.9	13.3	13.7	14.1	14.5	14.9													37
38	13.5	13.9	14.4	14.8	15.2	15.7													38
39	14.2	14.6	15.1	15.5	16.0	16.4													39
40	14.8	15.3	15.8	16.2	16.7	17.2													40
41	15.5	16.0	16.5	17.0	17.5	18.0													41
42	16.2	16.7	17.2	17.7	18.3	18.8													42
43	16.8	17.4	18.0	18.5	19.1	19.6													43
44	17.6	18.1	18.7	19.3	19.9	20.4													44
45	18.3	18.9	19.5	20.1	20.7	21.3													45
46																			46
47																			47
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Ontani  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	2.5	3.1	3.8	4.4	5.1	5.7													6
7	6.3	7.2	8.1	8.9	9.8	10.7													7
8	10.3	11.5	12.6	13.8	14.9	16.1	17.2	18.4											8
9	14.5	16.0	17.4	18.9	20.3	21.8	23.2	24.7											9
10	18.9	20.7	22.5	24.3	26.1	27.8	29.6	31.4											10
11	23.4	25.6	27.8	29.9	32.1	34.3	36.4	38.6											11
12	28.2	30.7	33.3	35.9	38.5	41.1	43.7	46.2											12
13				42.2	45.2	48.2	51.2	54.3	57.3	60.3	63.4	66.4							13
14				48.7	52.2	55.7	59.2	62.8	66.3	69.8	73.3	76.8							14
15				55.5	59.6	63.6	67.6	71.7	75.7	79.7	83.8	87.8							15
16				62.6	67.2	71.8	76.4	81.0	85.6	90.2	94.8	99.4							16
17				70.0	75.2	80.4	85.6	90.8	95.9	101.1	106.3	111.5							17
18						89.3	95.2	101.0	106.8	112.6	118.4	124.2	130.0	135.8	141.6	147.4			18
19						98.6	105.1	111.6	118.1	124.5	131.0	137.5	144.0	150.4	156.9	163.4			19
20						108.3	115.5	122.6	129.8	137.0	144.2	151.3	158.5	165.7	172.8	180.0			20
21						118.3	126.2	134.1	142.0	149.9	157.9	165.8	173.7	181.6	189.5	197.4			21
22						128.7	137.4	146.1	154.7	163.4	172.1	180.8	189.4	198.1	206.8	215.5			22
23								158.4	167.9	177.4	186.9	196.3	205.8	215.3	224.8	234.3	243.8	253.2	23
24								171.2	181.5	191.8	202.2	212.5	222.8	233.1	243.5	253.8	264.1	274.5	24
25								184.4	195.6	206.8	218.0	229.2	240.4	251.6	262.8	274.0	285.2	296.5	25
26								198.0	210.1	222.3	234.4	246.5	258.6	270.8	282.9	295.0	307.1	319.2	26
27								212.1	225.2	238.2	251.3	264.4	277.5	290.5	303.6	316.7	329.7	342.8	27
28										254.7	268.8	282.8	296.9	310.9	325.0	339.1	353.1	367.2	28
29										271.7	286.8	301.8	316.9	332.0	347.1	362.2	377.2	392.3	29
30										289.2	305.3	321.4	337.6	353.7	369.8	386.0	402.1	418.3	30
31										307.1	324.4	341.6	358.8	376.1	393.3	410.5	427.8	445.0	31
32										325.6	344.0	362.3	380.7	399.1	417.4	435.8	454.1	472.5	32
33												383.7	403.2	422.7	442.2	461.8	481.3	500.8	33
34												405.5	426.3	447.0	467.7	488.5	509.2	529.9	34
35												428.0	450.0	471.9	493.9	515.9	537.8	559.8	35
36												451.0	474.3	497.5	520.8	544.0	567.2	590.5	36
37												474.6	499.2	523.7	548.3	572.8	597.4	621.9	37
38														550.6	576.5	602.4	628.3	654.2	38
39														578.1	605.4	632.7	659.9	687.2	39
40														606.3	635.0	663.7	692.4	721.0	40
41														635.1	665.2	695.4	725.5	755.7	41
42														664.6	696.2	727.8	759.4	791.1	42
43																761.0	794.1	827.3	43
44																794.8	829.5	864.2	44
45																829.4	865.7	902.0	45
46																			46
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Ontani  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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18																			18
19																			19
20																			20
21																			21
22																			22
23	262.7	272.2																	23
24	284.8	295.1																	24
25	307.7	318.9																	25
26	331.4	343.5																	26
27	355.9	368.9																	27
28	381.2	395.3	409.3	423.4	437.5	451.5													28
29	407.4	422.5	437.6	452.6	467.7	482.8													29
30	434.4	450.5	466.7	482.8	498.9	515.1													30
31	462.2	479.4	496.7	513.9	531.1	548.4													31
32	490.9	509.2	527.6	545.9	564.3	582.7													32
33	520.3	539.9	559.4	578.9	598.4	618.0													33
34	550.6	571.4	592.1	612.8	633.5	654.3													34
35	581.8	603.7	625.7	647.6	669.6	691.6													35
36	613.7	636.9	660.2	683.4	706.6	729.9													36
37	646.5	671.0	695.6	720.1	744.7	769.2													37
38	680.1	706.0	731.8	757.7	783.6	809.5													38
39	714.5	741.8	769.0	796.3	823.6	850.8													39
40	749.7	778.4	807.1	835.8	864.5	893.2													40
41	785.8	815.9	846.1	876.2	906.4	936.5													41
42	822.7	854.3	886.0	917.6	949.2	980.8													42
43	860.4	893.6	926.7	959.9	993.0	1 026.2													43
44	899.0	933.7	968.4	1 003.1	1 037.8	1 072.5													44
45	938.3	974.6	1 010.9	1 047.3	1 083.6	1 119.9													45
46																			46
47																			47
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49																			49
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Carpinus—Ostrya* spp.**

**Carpini**

*Carpinus betulus* L.

Carpino bianco

*Ostrya carpinifolia* Scop.

Carpinio nero



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## Carpini

### Volume del fusto e dei rami grossi

$n = 65$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.4983 \quad 3.8828 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 4.8310 \cdot 10^{-1} & \\ -2.3935 \cdot 10^{-4} & 4.6352 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 2.2421 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 65$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.0514 \quad 2.3952 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 2.8755 \cdot 10^{-1} & \\ -1.4247 \cdot 10^{-4} & 2.7590 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.3345 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 65$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [3.8823 \quad 5.6122 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.3762 \cdot 10^{-1} & \\ -1.1773 \cdot 10^{-4} & 2.2799 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.1028 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 65$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [4.1760 \cdot 10^{-1} \quad 6.0317 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.1007 \cdot 10^{-2} & \\ -5.4534 \cdot 10^{-6} & 1.0561 \cdot 10^{-8} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 5.1084 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 65$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [3.2485 \quad 3.0167 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.7332 \cdot 10^{-1} & \\ -3.3360 \cdot 10^{-4} & 6.4604 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.1249 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Carpini  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.4	4.3	5.3	6.3	7.2	8.2													5
6	5.5	6.9	8.3	9.7	11.1	12.5													6
7	8.0	9.9	11.8	13.7	15.6	17.5													7
8			15.9	18.4	20.9	23.4	25.8	28.3	30.8	33.3									8
9				23.7	26.8	30.0	33.1	36.2	39.4	42.5									9
10				29.6	33.4	37.3	41.2	45.1	49.0	52.9									10
11				36.1	40.8	45.5	50.2	54.9	59.6	64.3	69.0	73.7							11
12				43.2	48.8	54.4	60.0	65.6	71.2	76.8	82.4	88.0							12
13					64.1	70.7	77.2	83.8	90.4	96.9	103.5	110.1	116.6						13
14					74.6	82.2	89.8	97.4	105.0	112.7	120.3	127.9	135.5						14
15					85.9	94.6	103.3	112.1	120.8	129.5	138.3	147.0	155.8						15
16					97.9	107.8	117.8	127.7	137.7	147.6	157.5	167.5	177.4	187.4	197.3	207.2	217.2		16
17					110.7	121.9	133.2	144.4	155.6	166.8	178.0	189.3	200.5	211.7	222.9	234.1	245.4		17
18							149.5	162.0	174.6	187.2	199.8	212.4	224.9	237.5	250.1	262.7	275.3		18
19							166.7	180.7	194.7	208.8	222.8	236.8	250.8	264.8	278.8	292.9	306.9		19
20							184.9	200.4	215.9	231.5	247.0	262.5	278.1	293.6	309.1	324.7	340.2		20
21							204.0	221.1	238.2	255.3	272.5	289.6	306.7	323.8	341.0	358.1	375.2		21
22							224.0	242.8	261.6	280.4	299.2	318.0	336.8	355.6	374.4	393.1	411.9		22
23									286.1	306.6	327.1	347.7	368.2	388.8	409.3	429.8	450.4		23
24									311.6	334.0	356.3	378.7	401.1	423.4	445.8	468.2	490.5		24
25									338.2	362.5	386.8	411.0	435.3	459.6	483.9	508.1	532.4		25
26									366.0	392.2	418.5	444.7	471.0	497.2	523.5	549.7	576.0		26
27									394.8	423.1	451.4	479.7	508.0	536.3	564.6	592.9	621.2		27
28											485.6	516.0	546.4	576.9	607.3	637.8	668.2		28
29											521.0	553.6	586.3	618.9	651.6	684.2	716.9		29
30											557.6	592.6	627.5	662.5	697.4	732.4	767.3		30
31											595.5	632.8	670.1	707.5	744.8	782.1	819.4		31
32											634.7	674.4	714.2	753.9	793.7	833.5	873.2		32
33											675.0	717.3	759.6	801.9	844.2	886.5	928.7		33
34											716.7	761.5	806.4	851.3	896.2	941.1	986.0		34
35											759.5	807.1	854.7	902.2	949.8	997.4	1 044.9		35
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Carpini  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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17																			17
18																			18
19																			19
20																			20
21	392.3	409.5	426.6	443.7															21
22	430.7	449.5	468.3	487.1															22
23	470.9	491.5	512.0	532.5															23
24	512.9	535.3	557.6	580.0															24
25	556.7	580.9	605.2	629.5															25
26	602.2	628.4	654.7	680.9	707.2	733.4	759.7	785.9											26
27	649.5	677.8	706.1	734.4	762.8	791.1	819.4	847.7											27
28	698.6	729.1	759.5	790.0	820.4	850.9	881.3	911.7											28
29	749.6	782.2	814.9	847.5	880.2	912.8	945.5	978.1											29
30	802.2	837.2	872.1	907.1	942.0	977.0	1 011.9	1 046.9											30
31	856.7	894.0	931.3	968.7	1 006.0	1 043.3	1 080.6	1 117.9											31
32	913.0	952.7	992.5	1 032.3	1 072.0	1 111.8	1 151.5	1 191.3											32
33	971.0	1 013.3	1 055.6	1 097.9	1 140.2	1 182.4	1 224.7	1 267.0											33
34	1 030.9	1 075.7	1 120.6	1 165.5	1 210.4	1 255.3	1 300.2	1 345.1											34
35	1 092.5	1 140.0	1 187.6	1 235.2	1 282.7	1 330.3	1 377.9	1 425.4											35
36																			36
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Carpini  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	1.9	2.5	3.1	3.7	4.3	4.9													5
6	3.3	4.1	5.0	5.8	6.7	7.6													6
7	4.8	6.0	7.2	8.3	9.5	10.7													7
8			9.7	11.2	12.7	14.3	15.8	17.3	18.9	20.4									8
9				14.5	16.4	18.3	20.3	22.2	24.2	26.1									9
10				18.1	20.5	22.9	25.3	27.7	30.1	32.5									10
11				22.1	25.0	27.9	30.8	33.7	36.6	39.5	42.4	45.3							11
12				26.5	30.0	33.4	36.9	40.3	43.8	47.2	50.7	54.1							12
13					39.4	43.5	47.5	51.6	55.6	59.7	63.7	67.8	71.8						13
14					45.9	50.6	55.3	60.0	64.7	69.4	74.1	78.8	83.5						14
15					52.8	58.2	63.6	69.0	74.4	79.8	85.2	90.6	96.0						15
16					60.3	66.4	72.5	78.7	84.8	90.9	97.1	103.2	109.3	115.5	121.6	127.7	133.8		16
17					68.2	75.1	82.0	88.9	95.9	102.8	109.7	116.6	123.5	130.5	137.4	144.3	151.2		17
18							92.1	99.8	107.6	115.4	123.1	130.9	138.6	146.4	154.2	161.9	169.7		18
19							102.7	111.4	120.0	128.6	137.3	145.9	154.6	163.2	171.9	180.5	189.2		19
20							113.9	123.5	133.1	142.7	152.2	161.8	171.4	181.0	190.6	200.1	209.7		20
21							125.7	136.3	146.8	157.4	168.0	178.5	189.1	199.6	210.2	220.8	231.3		21
22							138.1	149.7	161.2	172.8	184.4	196.0	207.6	219.2	230.8	242.4	254.0		22
23									176.3	189.0	201.7	214.3	227.0	239.7	252.4	265.0	277.7		23
24									192.1	205.9	219.7	233.5	247.3	261.1	274.9	288.7	302.5		24
25									208.5	223.5	238.5	253.4	268.4	283.4	298.3	313.3	328.3		25
26									225.6	241.8	258.0	274.2	290.4	306.6	322.8	339.0	355.2		26
27									243.4	260.9	278.3	295.8	313.2	330.7	348.2	365.6	383.1		27
28											299.4	318.2	337.0	355.7	374.5	393.3	412.1		28
29											321.2	341.4	361.5	381.7	401.8	422.0	442.1		29
30											343.9	365.4	387.0	408.5	430.1	451.6	473.2		30
31											367.2	390.3	413.3	436.3	459.3	482.3	505.3		31
32											391.4	415.9	440.4	465.0	489.5	514.0	538.5		32
33											416.3	442.4	468.5	494.5	520.6	546.7	572.8		33
34											442.0	469.7	497.3	525.0	552.7	580.4	608.1		34
35											468.4	497.7	527.1	556.4	585.8	615.1	644.5		35
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Carpini  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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18																			18
19																			19
20																			20
21	241.9	252.5	263.0	273.6															21
22	265.6	277.2	288.8	300.4															22
23	290.4	303.0	315.7	328.4															23
24	316.3	330.1	343.9	357.7															24
25	343.3	358.2	373.2	388.2															25
26	371.4	387.5	403.7	419.9	436.1	452.3	468.5	484.7											26
27	400.6	418.0	435.5	452.9	470.4	487.9	505.3	522.8											27
28	430.9	449.6	468.4	487.2	506.0	524.7	543.5	562.3											28
29	462.3	482.4	502.5	522.7	542.8	563.0	583.1	603.3											29
30	494.8	516.3	537.9	559.4	581.0	602.5	624.1	645.7											30
31	528.4	551.4	574.4	597.4	620.4	643.4	666.5	689.5											31
32	563.1	587.6	612.1	636.6	661.2	685.7	710.2	734.8											32
33	598.9	625.0	651.0	677.1	703.2	729.3	755.4	781.5											33
34	635.8	663.5	691.2	718.8	746.5	774.2	801.9	829.6											34
35	673.8	703.1	732.5	761.8	791.2	820.5	849.8	879.2											35
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Carpini  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.6	4.7	4.9	5.0	5.1	5.3													5
6	4.9	5.1	5.3	5.5	5.7	5.9													6
7	5.3	5.5	5.8	6.1	6.4	6.6													7
8			6.4	6.8	7.1	7.5	7.8	8.2	8.6	8.9									8
9				7.5	8.0	8.4	8.9	9.3	9.8	10.2									9
10				8.4	8.9	9.5	10.1	10.6	11.2	11.7									10
11				9.3	10.0	10.7	11.4	12.0	12.7	13.4	14.1	14.7							11
12				10.3	11.2	12.0	12.8	13.6	14.4	15.2	16.0	16.8							12
13						13.4	14.3	15.3	16.2	17.2	18.1	19.1	20.0	21.0					13
14						14.9	16.0	17.1	18.2	19.3	20.4	21.5	22.6	23.7					14
15						16.5	17.8	19.0	20.3	21.6	22.8	24.1	25.3	26.6					15
16						18.2	19.7	21.1	22.6	24.0	25.4	26.9	28.3	29.7	31.2	32.6	34.1	35.5	16
17						20.1	21.7	23.3	25.0	26.6	28.2	29.8	31.5	33.1	34.7	36.3	37.9	39.6	17
18								25.7	27.5	29.3	31.2	33.0	34.8	36.6	38.4	40.2	42.1	43.9	18
19								28.2	30.2	32.2	34.3	36.3	38.3	40.4	42.4	44.4	46.4	48.5	19
20								30.8	33.1	35.3	37.6	39.8	42.0	44.3	46.5	48.8	51.0	53.3	20
21								33.6	36.1	38.5	41.0	43.5	46.0	48.4	50.9	53.4	55.9	58.3	21
22								36.5	39.2	41.9	44.6	47.3	50.1	52.8	55.5	58.2	60.9	63.6	22
23										45.4	48.4	51.4	54.4	57.3	60.3	63.3	66.2	69.2	23
24										49.1	52.4	55.6	58.8	62.1	65.3	68.5	71.8	75.0	24
25										53.0	56.5	60.0	63.5	67.0	70.5	74.0	77.5	81.1	25
26										57.0	60.8	64.6	68.4	72.2	76.0	79.8	83.6	87.3	26
27										61.2	65.3	69.3	73.4	77.5	81.6	85.7	89.8	93.9	27
28												74.3	78.7	83.1	87.5	91.9	96.3	100.7	28
29												79.4	84.1	88.8	93.6	98.3	103.0	107.7	29
30												84.7	89.7	94.8	99.9	104.9	110.0	115.0	30
31												90.2	95.6	101.0	106.4	111.7	117.1	122.5	31
32												95.8	101.6	107.3	113.1	118.8	124.6	130.3	32
33												101.7	107.8	113.9	120.0	126.1	132.2	138.3	33
34												107.7	114.2	120.7	127.1	133.6	140.1	146.6	34
35												113.9	120.8	127.6	134.5	141.4	148.3	155.1	35
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Carpini  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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19																			19
20																			20
21	60.8	63.3	65.8	68.2															21
22	66.4	69.1	71.8	74.5															22
23	72.2	75.1	78.1	81.1															23
24	78.2	81.5	84.7	87.9															24
25	84.6	88.1	91.6	95.1															25
26	91.1	94.9	98.7	102.5	106.3	110.1	113.9	117.7											26
27	98.0	102.1	106.2	110.3	114.3	118.4	122.5	126.6											27
28	105.1	109.5	113.9	118.3	122.7	127.1	131.5	135.9											28
29	112.4	117.2	121.9	126.6	131.3	136.0	140.8	145.5											29
30	120.1	125.1	130.2	135.2	140.3	145.3	150.4	155.4											30
31	127.9	133.3	138.7	144.1	149.5	154.9	160.3	165.7											31
32	136.1	141.8	147.6	153.3	159.0	164.8	170.5	176.3											32
33	144.5	150.6	156.7	162.8	168.9	175.0	181.1	187.2											33
34	153.1	159.6	166.1	172.6	179.1	185.5	192.0	198.5											34
35	162.0	168.9	175.8	182.6	189.5	196.4	203.3	210.1											35
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Carpini  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.5	0.5	0.5	0.5	0.6	0.6													5
6	0.5	0.5	0.6	0.6	0.6	0.6													6
7	0.6	0.6	0.6	0.7	0.7	0.7													7
8			0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0									8
9				0.8	0.9	0.9	1.0	1.0	1.1	1.1									9
10				0.9	1.0	1.0	1.1	1.1	1.2	1.3									10
11				1.0	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6							11
12				1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.8							12
13						1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3					13
14						1.6	1.7	1.8	2.0	2.1	2.2	2.3	2.4	2.5					14
15						1.8	1.9	2.0	2.2	2.3	2.5	2.6	2.7	2.9					15
16						2.0	2.1	2.3	2.4	2.6	2.7	2.9	3.0	3.2	3.4	3.5	3.7	3.8	16
17						2.2	2.3	2.5	2.7	2.9	3.0	3.2	3.4	3.6	3.7	3.9	4.1	4.3	17
18								2.8	3.0	3.2	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	18
19								3.0	3.2	3.5	3.7	3.9	4.1	4.3	4.6	4.8	5.0	5.2	19
20								3.3	3.6	3.8	4.0	4.3	4.5	4.8	5.0	5.2	5.5	5.7	20
21								3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.5	5.7	6.0	6.3	21
22								3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.5	6.8	22
23										4.9	5.2	5.5	5.8	6.2	6.5	6.8	7.1	7.4	23
24										5.3	5.6	6.0	6.3	6.7	7.0	7.4	7.7	8.1	24
25										5.7	6.1	6.4	6.8	7.2	7.6	8.0	8.3	8.7	25
26										6.1	6.5	6.9	7.3	7.8	8.2	8.6	9.0	9.4	26
27										6.6	7.0	7.5	7.9	8.3	8.8	9.2	9.7	10.1	27
28												8.0	8.5	8.9	9.4	9.9	10.3	10.8	28
29												8.5	9.0	9.5	10.1	10.6	11.1	11.6	29
30												9.1	9.6	10.2	10.7	11.3	11.8	12.4	30
31												9.7	10.3	10.9	11.4	12.0	12.6	13.2	31
32												10.3	10.9	11.5	12.2	12.8	13.4	14.0	32
33												10.9	11.6	12.2	12.9	13.6	14.2	14.9	33
34												11.6	12.3	13.0	13.7	14.4	15.1	15.8	34
35												12.2	13.0	13.7	14.5	15.2	15.9	16.7	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Carpini  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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19																			19
20																			20
21	6.5	6.8	7.1	7.3															21
22	7.1	7.4	7.7	8.0															22
23	7.8	8.1	8.4	8.7															23
24	8.4	8.8	9.1	9.5															24
25	9.1	9.5	9.8	10.2															25
26	9.8	10.2	10.6	11.0	11.4	11.8	12.2	12.6											26
27	10.5	11.0	11.4	11.9	12.3	12.7	13.2	13.6											27
28	11.3	11.8	12.2	12.7	13.2	13.7	14.1	14.6											28
29	12.1	12.6	13.1	13.6	14.1	14.6	15.1	15.6											29
30	12.9	13.4	14.0	14.5	15.1	15.6	16.2	16.7											30
31	13.7	14.3	14.9	15.5	16.1	16.6	17.2	17.8											31
32	14.6	15.2	15.9	16.5	17.1	17.7	18.3	18.9											32
33	15.5	16.2	16.8	17.5	18.2	18.8	19.5	20.1											33
34	16.5	17.2	17.8	18.5	19.2	19.9	20.6	21.3											34
35	17.4	18.2	18.9	19.6	20.4	21.1	21.8	22.6											35
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Carpini  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5	7.0	7.8	8.5	9.3	10.0	10.8													5	
6	8.7	9.8	10.9	11.9	13.0	14.1													6	
7	10.6	12.1	13.6	15.1	16.6	18.0													7	
8			16.8	18.7	20.6	22.6	24.5	26.4	28.3	30.3									8	
9				22.8	25.2	27.7	30.1	32.6	35.0	37.5									9	
10				27.4	30.4	33.4	36.4	39.4	42.5	45.5									10	
11				32.5	36.1	39.8	43.4	47.1	50.7	54.4	58.0	61.7							11	
12				38.0	42.3	46.7	51.0	55.4	59.7	64.1	68.4	72.8							12	
13					54.2	59.3	64.4	69.5	74.6	79.7	84.8	89.9	95.0						13	
14						62.4	68.3	74.2	80.1	86.0	91.9	97.9	103.8	109.7					14	
15							71.1	77.9	84.7	91.5	98.3	105.1	111.8	118.6	125.4				15	
16							80.5	88.2	95.9	103.6	111.4	119.1	126.8	134.5	142.3	150.0	157.7	165.4	173.1	16
17							90.4	99.1	107.9	116.6	125.3	134.0	142.7	151.5	160.2	168.9	177.6	186.3	195.1	17
18									120.5	130.3	140.1	149.9	159.6	169.4	179.2	189.0	198.7	208.5	218.3	18
19									133.9	144.8	155.7	166.6	177.5	188.4	199.3	210.2	221.1	231.9	242.8	19
20									148.1	160.1	172.2	184.3	196.3	208.4	220.5	232.5	244.6	256.7	268.7	20
21									162.9	176.2	189.5	202.8	216.1	229.4	242.7	256.0	269.3	282.6	295.9	21
22									178.5	193.1	207.7	222.3	236.9	251.5	266.1	280.7	295.3	309.9	324.5	22
23											226.7	242.6	258.6	274.5	290.5	306.5	322.4	338.4	354.3	23
24											246.5	263.9	281.3	298.6	316.0	333.4	350.8	368.1	385.5	24
25											267.2	286.1	304.9	323.8	342.6	361.5	380.3	399.2	418.0	25
26											288.7	309.1	329.5	349.9	370.3	390.7	411.1	431.5	451.9	26
27											311.1	333.1	355.1	377.1	399.1	421.1	443.1	465.1	487.1	27
28													381.7	405.3	429.0	452.6	476.3	499.9	523.6	28
29													409.2	434.5	459.9	485.3	510.7	536.0	561.4	29
30													437.7	464.8	492.0	519.1	546.3	573.4	600.6	30
31													467.1	496.1	525.1	554.1	583.1	612.0	641.0	31
32													497.5	528.4	559.3	590.2	621.1	652.0	682.9	32
33													528.9	561.7	594.6	627.4	660.3	693.1	726.0	33
34													561.2	596.1	631.0	665.8	700.7	735.6	770.5	34
35													594.5	631.5	668.4	705.4	742.3	779.3	816.2	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Carpini  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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18																			18
19																			19
20																			20
21	309.2	322.5	335.8	349.1															21
22	339.1	353.7	368.3	382.9															22
23	370.3	386.2	402.2	418.2															23
24	402.9	420.3	437.7	455.0															24
25	436.9	455.8	474.6	493.5															25
26	472.3	492.7	513.1	533.5	553.9	574.2	594.6	615.0											26
27	509.1	531.1	553.0	575.0	597.0	619.0	641.0	663.0											27
28	547.2	570.9	594.5	618.2	641.8	665.5	689.1	712.8											28
29	586.8	612.1	637.5	662.9	688.3	713.6	739.0	764.4											29
30	627.7	654.9	682.0	709.2	736.3	763.5	790.6	817.8											30
31	670.0	699.0	728.0	757.0	786.0	815.0	844.0	873.0											31
32	713.7	744.6	775.5	806.4	837.3	868.2	899.1	930.0											32
33	758.8	791.7	824.5	857.4	890.2	923.1	956.0	988.8											33
34	805.3	840.2	875.1	909.9	944.8	979.7	1 014.6	1 049.4											34
35	853.2	890.2	927.1	964.1	1 001.0	1 038.0	1 074.9	1 111.9											35
36																			36
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Castanea sativa* Mill.**

**Castagno**

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## Castagno

### Volume del fusto e dei rami grossi

$n = 85$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.0010 \quad 3.6524 \cdot 10^{-2} \quad 7.4466 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 6.5052 & & \\ 2.0090 \cdot 10^{-3} & 1.2430 \cdot 10^{-6} & \\ -1.0771 & -3.9067 \cdot 10^{-4} & 1.9110 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 3.0491 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 85$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-9.5407 \cdot 10^{-1} \quad 1.8335 \cdot 10^{-2} \quad 1.9237 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 1.2336 & & \\ 3.8097 \cdot 10^{-4} & 2.3572 \cdot 10^{-7} & \\ -2.0425 \cdot 10^{-1} & -7.4083 \cdot 10^{-5} & 3.6239 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 5.7820 \cdot 10^{-6}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 85$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-7.9938 \cdot 10^{-1} \quad 2.6769 \cdot 10^{-3} \quad 6.9544 \cdot 10^{-1}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.5218 \cdot 10^{-1} & & \\ 2.0141 \cdot 10^{-4} & 1.2462 \cdot 10^{-7} & \\ -1.0798 \cdot 10^{-1} & -3.9167 \cdot 10^{-5} & 1.9159 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.0569 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 85$

$p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-4.2047 \cdot 10^{-1} \quad 4.2980 \cdot 10^{-4} \quad 8.2936 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.9566 \cdot 10^{-2} & & \\ 6.0425 \cdot 10^{-6} & 3.7387 \cdot 10^{-9} & \\ -3.2396 \cdot 10^{-3} & -1.1750 \cdot 10^{-6} & 5.7478 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 9.1708 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 85$

$p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-2.1739 \quad 2.1442 \cdot 10^{-2} \quad 9.7075 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.2504 & & \\ 6.9498 \cdot 10^{-4} & 4.3000 \cdot 10^{-7} & \\ -3.7260 \cdot 10^{-1} & -1.3515 \cdot 10^{-4} & 6.6108 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.0548 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$



**Castagno**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	9.0	10.4	11.7	13.0	14.3	15.6													6
7	12.2	13.9	15.7	17.5	19.3	21.1													7
8	15.6	18.0	20.3	22.7	25.0	27.3	29.7	32.0	34.3	36.7									8
9	19.5	22.5	25.4	28.4	31.3	34.3	37.2	40.2	43.2	46.1									9
10	23.7	27.4	31.0	34.7	38.3	42.0	45.6	49.3	52.9	56.6									10
11	28.3	32.7	37.1	41.5	46.0	50.4	54.8	59.2	63.6	68.1									11
12	33.2	38.5	43.8	49.0	54.3	59.5	64.8	70.0	75.3	80.6									12
13				57.1	63.2	69.4	75.6	81.8	87.9	94.1	100.3	106.4	112.6	118.8					13
14				65.7	72.9	80.0	87.2	94.3	101.5	108.6	115.8	123.0	130.1	137.3					14
15				74.9	83.1	91.3	99.6	107.8	116.0	124.2	132.4	140.7	148.9	157.1					15
16				84.7	94.1	103.4	112.8	122.1	131.5	140.8	150.2	159.5	168.9	178.2					16
17				95.1	105.7	116.2	126.8	137.3	147.9	158.4	169.0	179.5	190.1	200.7					17
18						129.7	141.6	153.4	165.2	177.1	188.9	200.7	212.6	224.4	236.2	248.1	259.9	271.7	18
19						144.0	157.2	170.4	183.6	196.7	209.9	223.1	236.3	249.5	262.7	275.9	289.0	302.2	19
20						159.0	173.6	188.2	202.8	217.4	232.0	246.6	261.3	275.9	290.5	305.1	319.7	334.3	20
21						174.7	190.8	206.9	223.0	239.1	255.2	271.4	287.5	303.6	319.7	335.8	351.9	368.0	21
22						191.2	208.8	226.5	244.2	261.9	279.5	297.2	314.9	332.6	350.3	367.9	385.6	403.3	22
23								247.0	266.3	285.6	304.9	324.3	343.6	362.9	382.2	401.6	420.9	440.2	23
24								268.3	289.4	310.4	331.4	352.5	373.5	394.6	415.6	436.6	457.7	478.7	24
25								290.5	313.4	336.2	359.0	381.9	404.7	427.5	450.3	473.2	496.0	518.8	25
26								313.6	338.3	363.0	387.7	412.4	437.1	461.8	486.5	511.2	535.9	560.5	26
27								337.6	364.2	390.9	417.5	444.1	470.7	497.4	524.0	550.6	577.3	603.9	27
28										419.7	448.4	477.0	505.6	534.3	562.9	591.5	620.2	648.8	28
29										449.6	480.3	511.1	541.8	572.5	603.2	633.9	664.6	695.4	29
30										480.5	513.4	546.3	579.2	612.0	644.9	677.8	710.6	743.5	30
31										512.5	547.6	582.7	617.8	652.9	688.0	723.1	758.2	793.3	31
32										545.4	582.8	620.2	657.6	695.0	732.4	769.8	807.2	844.6	32
33										659.0	698.7	738.5	778.3	818.1	857.8	897.6			33
34										698.9	741.1	783.3	825.5	867.8	910.0	952.2			34
35										739.9	784.7	829.4	874.2	918.9	963.6	1 008.4			35
36										782.2	829.5	876.8	924.2	971.5	1 018.8	1 066.2			36
37										825.6	875.6	925.6	975.6	1 025.6	1 075.6	1 125.6			37
38														975.6	1 028.4	1 081.1	1 133.8	1 186.6	38
39														1 027.0	1 082.5	1 138.1	1 193.7	1 249.2	39
40														1 079.7	1 138.1	1 196.6	1 255.0	1 313.4	40
41														1 133.7	1 195.1	1 256.5	1 317.9	1 379.3	41
42														1 189.0	1 253.4	1 317.8	1 382.3	1 446.7	42
43																1 380.7	1 448.2	1 515.7	43
44																1 445.0	1 515.7	1 586.4	44
45																1 510.7	1 584.7	1 658.7	45
46																1 577.9	1 655.2	1 732.5	46
47																1 646.6	1 727.3	1 808.0	47
48																		1 885.1	48
49																		1 963.8	49
50																		2 044.1	50
51																		2 126.0	51
52																		2 209.5	52
53																			53
54																			54
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Castagno  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	459.5	478.8																	23
24	499.7	520.8																	24
25	541.6	564.5																	25
26	585.2	609.9																	26
27	630.5	657.1																	27
28	677.5	706.1	734.7	763.4															28
29	726.1	756.8	787.5	818.2															29
30	776.4	809.3	842.1	875.0															30
31	828.4	863.5	898.6	933.7															31
32	882.0	919.4	956.8	994.2															32
33	937.4	977.2	1 016.9	1 056.7	1 096.5	1 136.3													33
34	994.4	1 036.6	1 078.9	1 121.1	1 163.3	1 205.5													34
35	1 053.1	1 097.9	1 142.6	1 187.4	1 232.1	1 276.8													35
36	1 113.5	1 160.8	1 208.2	1 255.5	1 302.9	1 350.2													36
37	1 175.6	1 225.6	1 275.6	1 325.6	1 375.6	1 425.6													37
38	1 239.3	1 292.1	1 344.8	1 397.6	1 450.3	1 503.0	1 555.8	1 608.5											38
39	1 304.8	1 360.3	1 415.9	1 471.4	1 527.0	1 582.5	1 638.1	1 693.6											39
40	1 371.9	1 430.3	1 488.7	1 547.2	1 605.6	1 664.1	1 722.5	1 780.9											40
41	1 440.7	1 502.1	1 563.5	1 624.8	1 686.2	1 747.6	1 809.0	1 870.4											41
42	1 511.1	1 575.6	1 640.0	1 704.4	1 768.8	1 833.3	1 897.7	1 962.1											42
43	1 583.3	1 650.8	1 718.3	1 785.9	1 853.4	1 920.9	1 988.5	2 056.0											43
44	1 657.1	1 727.8	1 798.5	1 869.2	1 939.9	2 010.7	2 081.4	2 152.1											44
45	1 732.6	1 806.6	1 880.5	1 954.5	2 028.5	2 102.4	2 176.4	2 250.3											45
46	1 809.8	1 887.1	1 964.4	2 041.7	2 118.9	2 196.2	2 273.5	2 350.8											46
47	1 888.7	1 969.4	2 050.0	2 130.7	2 211.4	2 292.1	2 372.8	2 453.4											47
48	1 969.2	2 053.4	2 137.5	2 221.7	2 305.8	2 390.0	2 474.1	2 558.3											48
49	2 051.5	2 139.1	2 226.8	2 314.5	2 402.2	2 489.9	2 577.6	2 665.3											49
50	2 135.4	2 226.7	2 318.0	2 409.3	2 500.6	2 591.9	2 683.2	2 774.5											50
51	2 221.0	2 316.0	2 410.9	2 505.9	2 600.9	2 695.9	2 790.9	2 885.9											51
52	2 308.2	2 407.0	2 505.7	2 604.5	2 703.3	2 802.0	2 900.8	2 999.5											52
53		2 499.8	2 602.4	2 705.0	2 807.6	2 910.2	3 012.7	3 115.3											53
54		2 594.3	2 700.8	2 807.3	2 913.8	3 020.3	3 126.8	3 233.3											54
55		2 690.6	2 801.1	2 911.6	3 022.1	3 132.5	3 243.0	3 353.5											55
56		2 788.6	2 903.2	3 017.7	3 132.3	3 246.8	3 361.3	3 475.9											56
57		2 888.4	3 007.1	3 125.8	3 244.4	3 363.1	3 481.8	3 600.4											57
58		2 990.0	3 112.9	3 235.7	3 358.6	3 481.5	3 604.3	3 727.2											58
59		3 093.3	3 220.4	3 347.6	3 474.7	3 601.9	3 729.0	3 856.1											59
60		3 198.4	3 329.8	3 461.3	3 592.8	3 724.3	3 855.8	3 987.3											60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Castagno**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	3.5	4.2	4.8	5.5	6.1	6.8													6
7	4.9	5.8	6.7	7.6	8.5	9.4													7
8	6.5	7.6	8.8	10.0	11.1	12.3	13.5	14.7	15.8	17.0									8
9	8.2	9.7	11.2	12.7	14.1	15.6	17.1	18.6	20.1	21.6									9
10	10.1	12.0	13.8	15.6	17.5	19.3	21.1	23.0	24.8	26.6									10
11	12.3	14.5	16.7	18.9	21.1	23.3	25.6	27.8	30.0	32.2									11
12	14.6	17.2	19.8	22.5	25.1	27.8	30.4	33.0	35.7	38.3									12
13				26.3	29.4	32.5	35.6	38.7	41.8	44.9	48.0	51.1	54.2	57.3					13
14				30.5	34.1	37.7	41.3	44.9	48.5	52.1	55.6	59.2	62.8	66.4					14
15				34.9	39.1	43.2	47.3	51.4	55.6	59.7	63.8	67.9	72.1	76.2					15
16				39.7	44.4	49.1	53.8	58.4	63.1	67.8	72.5	77.2	81.9	86.6					16
17				44.7	50.0	55.3	60.6	65.9	71.2	76.5	81.8	87.1	92.4	97.7					17
18						61.9	67.9	73.8	79.7	85.7	91.6	97.6	103.5	109.4	115.4	121.3	127.3	133.2	18
19						68.9	75.5	82.1	88.7	95.4	102.0	108.6	115.2	121.8	128.5	135.1	141.7	148.3	19
20						76.2	83.6	90.9	98.2	105.6	112.9	120.2	127.6	134.9	142.2	149.6	156.9	164.2	20
21						83.9	92.0	100.1	108.2	116.3	124.4	132.5	140.5	148.6	156.7	164.8	172.9	181.0	21
22						92.0	100.9	109.8	118.6	127.5	136.4	145.3	154.1	163.0	171.9	180.8	189.6	198.5	22
23								119.9	129.6	139.3	149.0	158.7	168.4	178.1	187.8	197.5	207.2	216.9	23
24								130.4	141.0	151.5	162.1	172.6	183.2	193.8	204.3	214.9	225.4	236.0	24
25								141.4	152.8	164.3	175.7	187.2	198.7	210.1	221.6	233.0	244.5	256.0	25
26								152.8	165.2	177.6	190.0	202.4	214.8	227.1	239.5	251.9	264.3	276.7	26
27								164.6	178.0	191.4	204.7	218.1	231.5	244.8	258.2	271.6	284.9	298.3	27
28										205.7	220.1	234.4	248.8	263.2	277.6	291.9	306.3	320.7	28
29										220.5	235.9	251.3	266.8	282.2	297.6	313.0	328.4	343.9	29
30										235.8	252.3	268.8	285.3	301.8	318.3	334.8	351.3	367.9	30
31										251.7	269.3	286.9	304.5	322.2	339.8	357.4	375.0	392.6	31
32										268.1	286.8	305.6	324.4	343.2	361.9	380.7	399.5	418.3	32
33										324.9	344.8	364.8	384.8	404.7	424.7	444.7			33
34										344.7	365.9	387.1	408.3	429.5	450.7	471.9			34
35										365.1	387.6	410.1	432.5	455.0	477.4	499.9			35
36										386.2	409.9	433.7	457.5	481.2	505.0	528.7			36
37										407.8	432.9	458.0	483.1	508.2	533.3	558.4			37
38												482.9	509.4	535.9	562.3	588.8			38
39												508.5	536.4	564.3	592.2	620.1			39
40												534.8	564.1	593.5	622.8	652.1			40
41													561.7	592.5	623.4	654.2	685.0		41
42													589.3	621.6	654.0	686.3	718.7		42
43															685.3	719.2	753.1		43
44															717.4	752.9	788.4		44
45															750.3	787.4	824.5		45
46															783.8	822.6	861.4		46
47															818.1	858.6	899.1		47
48																	937.6		48
49																	977.0		49
50																	1 017.1		50
51																	1 058.0		51
52																	1 099.8		52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Castagno  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	226.6	236.3																	23
24	246.6	257.1																	24
25	267.4	278.9																	25
26	289.1	301.5																	26
27	311.7	325.0																	27
28	335.0	349.4	363.8	378.2															28
29	359.3	374.7	390.1	405.5															29
30	384.4	400.9	417.4	433.9															30
31	410.3	427.9	445.5	463.1															31
32	437.0	455.8	474.6	493.4															32
33	464.6	484.6	504.6	524.5	544.5	564.5													33
34	493.1	514.3	535.5	556.7	577.9	599.1													34
35	522.4	544.8	567.3	589.7	612.2	634.7													35
36	552.5	576.3	600.0	623.8	647.5	671.3													36
37	583.5	608.6	633.7	658.8	683.9	709.0													37
38	615.3	641.8	668.2	694.7	721.2	747.7	774.2	800.6											38
39	648.0	675.8	703.7	731.6	759.5	787.4	815.3	843.2											39
40	681.5	710.8	740.1	769.5	798.8	828.1	857.5	886.8											40
41	715.8	746.6	777.5	808.3	839.1	869.9	900.7	931.6											41
42	751.0	783.4	815.7	848.0	880.4	912.7	945.1	977.4											42
43	787.1	821.0	854.9	888.8	922.7	956.6	990.5	1 024.4											43
44	823.9	859.4	894.9	930.4	965.9	1 001.4	1 036.9	1 072.4											44
45	861.7	898.8	935.9	973.0	1 010.2	1 047.3	1 084.4	1 121.6											45
46	900.2	939.0	977.8	1 016.6	1 055.4	1 094.2	1 133.0	1 171.8											46
47	939.6	980.1	1 020.6	1 061.1	1 101.6	1 142.1	1 182.6	1 223.1											47
48	979.9	1 022.1	1 064.4	1 106.6	1 148.9	1 191.1	1 233.4	1 275.6											48
49	1 021.0	1 065.0	1 109.0	1 153.1	1 197.1	1 241.1	1 285.1	1 329.1											49
50	1 062.9	1 108.8	1 154.6	1 200.4	1 246.3	1 292.1	1 338.0	1 383.8											50
51	1 105.7	1 153.4	1 201.1	1 248.8	1 296.5	1 344.2	1 391.8	1 439.5											51
52	1 149.3	1 198.9	1 248.5	1 298.1	1 347.7	1 397.2	1 446.8	1 496.4											52
53	1 245.3	1 296.8	1 348.3	1 399.8	1 451.3	1 502.8	1 554.3												53
54	1 292.6	1 346.1	1 399.5	1 453.0	1 506.4	1 559.9	1 613.4												54
55	1 340.7	1 396.2	1 451.7	1 507.1	1 562.6	1 618.1	1 673.5												55
56	1 389.8	1 447.3	1 504.8	1 562.3	1 619.8	1 677.3	1 734.8												56
57	1 439.7	1 499.3	1 558.8	1 618.4	1 678.0	1 737.6	1 797.1												57
58	1 490.5	1 552.2	1 613.9	1 675.5	1 737.2	1 798.9	1 860.6												58
59	1 542.2	1 606.0	1 669.8	1 733.6	1 797.5	1 861.3	1 925.1												59
60	1 594.7	1 660.7	1 726.7	1 792.8	1 858.8	1 924.8	1 990.8												60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Castagno  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	3.9	4.0	4.0	4.1	4.2	4.3													6
7	4.7	4.9	5.0	5.1	5.2	5.4													7
8	5.6	5.8	6.0	6.1	6.3	6.5	6.6	6.8	7.0	7.2									8
9	6.5	6.8	7.0	7.2	7.4	7.6	7.8	8.1	8.3	8.5									9
10	7.5	7.8	8.0	8.3	8.6	8.8	9.1	9.4	9.6	9.9									10
11	8.5	8.8	9.1	9.4	9.8	10.1	10.4	10.7	11.1	11.4									11
12	9.5	9.9	10.2	10.6	11.0	11.4	11.8	12.2	12.6	12.9									12
13				11.9	12.3	12.8	13.2	13.7	14.1	14.6	15.0	15.5	15.9	16.4					13
14				13.1	13.7	14.2	14.7	15.2	15.8	16.3	16.8	17.3	17.9	18.4					14
15				14.5	15.1	15.7	16.3	16.9	17.5	18.1	18.7	19.3	19.9	20.5					15
16				15.8	16.5	17.2	17.9	18.6	19.2	19.9	20.6	21.3	22.0	22.7					16
17				17.2	18.0	18.8	19.5	20.3	21.1	21.9	22.6	23.4	24.2	24.9					17
18						20.4	21.3	22.1	23.0	23.9	24.7	25.6	26.5	27.3	28.2	29.1	29.9	30.8	18
19						22.1	23.0	24.0	25.0	25.9	26.9	27.9	28.8	29.8	30.8	31.7	32.7	33.7	19
20						23.8	24.9	26.0	27.0	28.1	29.2	30.2	31.3	32.4	33.5	34.5	35.6	36.7	20
21						25.6	26.8	28.0	29.2	30.3	31.5	32.7	33.9	35.1	36.2	37.4	38.6	39.8	21
22						27.5	28.8	30.0	31.3	32.6	33.9	35.2	36.5	37.8	39.1	40.4	41.7	43.0	22
23								32.2	33.6	35.0	36.4	37.9	39.3	40.7	42.1	43.5	44.9	46.3	23
24								34.4	35.9	37.5	39.0	40.6	42.1	43.6	45.2	46.7	48.3	49.8	24
25								36.7	38.3	40.0	41.7	43.4	45.0	46.7	48.4	50.0	51.7	53.4	25
26								39.0	40.8	42.6	44.4	46.2	48.0	49.9	51.7	53.5	55.3	57.1	26
27								41.4	43.3	45.3	47.2	49.2	51.2	53.1	55.1	57.0	59.0	60.9	27
28										48.1	50.2	52.3	54.4	56.4	58.5	60.6	62.7	64.8	28
29										50.9	53.1	55.4	57.6	59.9	62.1	64.4	66.6	68.9	29
30										53.8	56.2	58.6	61.0	63.4	65.8	68.2	70.7	73.1	30
31										56.8	59.3	61.9	64.5	67.1	69.6	72.2	74.8	77.4	31
32										59.8	62.6	65.3	68.1	70.8	73.5	76.3	79.0	81.8	32
33												68.8	71.7	74.6	77.5	80.5	83.4	86.3	33
34													72.4	75.5	78.5	81.6	84.7	87.8	34
35													76.0	79.3	82.6	85.8	89.1	92.4	35
36													79.7	83.2	86.7	90.2	93.6	97.1	36
37													83.6	87.2	90.9	94.6	98.2	101.9	37
38														95.2	99.1	102.9	106.8	110.7	38
39														99.6	103.7	107.8	111.8	115.9	39
40														104.1	108.4	112.7	117.0	121.2	40
41														108.7	113.2	117.7	122.2	126.7	41
42														113.4	118.1	122.9	127.6	132.3	42
43																128.1	133.0	138.0	43
44																133.4	138.6	143.8	44
45																138.9	144.3	149.8	45
46																144.5	150.1	155.8	46
47																150.2	156.1	162.0	47
48																		168.3	48
49																		174.7	49
50																		181.2	50
51																		187.8	51
52																		194.6	52
53																			53
54																			54
55																			55
56																			56
57																			57
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Castagno  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	47.8	49.2																	23
24	51.4	52.9																	24
25	55.1	56.7																	25
26	58.9	60.7																	26
27	62.9	64.8																	27
28	66.9	69.0	71.1	73.2															28
29	71.1	73.4	75.7	77.9															29
30	75.5	77.9	80.3	82.7															30
31	79.9	82.5	85.1	87.6															31
32	84.5	87.2	90.0	92.7															32
33	89.2	92.1	95.0	97.9	100.9	103.8													33
34	94.0	97.1	100.2	103.3	106.4	109.5													34
35	99.0	102.2	105.5	108.8	112.1	115.4													35
36	104.0	107.5	111.0	114.4	117.9	121.4													36
37	109.2	112.9	116.5	120.2	123.9	127.5													37
38	114.5	118.4	122.3	126.1	130.0	133.9	137.7	141.6											38
39	120.0	124.0	128.1	132.2	136.3	140.3	144.4	148.5											39
40	125.5	129.8	134.1	138.4	142.7	146.9	151.2	155.5											40
41	131.2	135.7	140.2	144.7	149.2	153.7	158.2	162.7											41
42	137.0	141.7	146.5	151.2	155.9	160.6	165.3	170.1											42
43	142.9	147.9	152.8	157.8	162.7	167.7	172.6	177.6											43
44	149.0	154.2	159.4	164.5	169.7	174.9	180.1	185.3											44
45	155.2	160.6	166.0	171.4	176.9	182.3	187.7	193.1											45
46	161.5	167.1	172.8	178.5	184.1	189.8	195.5	201.1											46
47	167.9	173.8	179.7	185.6	191.5	197.5	203.4	209.3											47
48	174.4	180.6	186.8	192.9	199.1	205.3	211.4	217.6											48
49	181.1	187.5	194.0	200.4	206.8	213.2	219.7	226.1											49
50	187.9	194.6	201.3	208.0	214.7	221.4	228.0	234.7											50
51	194.8	201.8	208.7	215.7	222.7	229.6	236.6	243.5											51
52	201.8	209.1	216.3	223.6	230.8	238.0	245.3	252.5											52
53	216.5	224.0	231.6	239.1	246.6	254.1	261.6												53
54	224.1	231.9	239.7	247.5	255.3	263.1	270.9												54
55	231.8	239.9	248.0	256.1	264.2	272.3	280.4												55
56	239.6	248.0	256.4	264.8	273.2	281.6	290.0												56
57	247.6	256.3	265.0	273.7	282.4	291.1	299.8												57
58	255.7	264.7	273.7	282.7	291.7	300.7	309.7												58
59	263.9	273.2	282.5	291.8	301.1	310.5	319.8												59
60	272.2	281.8	291.5	301.1	310.8	320.4	330.0												60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Castagno  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	0.2	0.2	0.2	0.2	0.2	0.2													6
7	0.3	0.3	0.3	0.3	0.3	0.4													7
8	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6									8
9	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8									9
10	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0									10
11	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2									11
12	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.4									12
13				1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	2.0					13
14				1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3					14
15				1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6					15
16				1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9					16
17				2.0	2.1	2.2	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.2					17
18						2.5	2.6	2.7	2.9	3.0	3.2	3.3	3.4	3.6	3.7	3.9	4.0	4.1	18
19						2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.3	4.4	4.6	19
20						3.0	3.1	3.3	3.5	3.6	3.8	4.0	4.2	4.3	4.5	4.7	4.8	5.0	20
21						3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.7	4.9	5.1	5.3	5.5	21
22						3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.4	5.6	5.8	6.0	22
23								4.2	4.4	4.7	4.9	5.1	5.4	5.6	5.8	6.0	6.3	6.5	23
24								4.5	4.8	5.0	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.0	24
25								4.9	5.1	5.4	5.7	6.0	6.2	6.5	6.8	7.0	7.3	7.6	25
26								5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.5	7.8	8.1	26
27								5.6	5.9	6.2	6.5	6.8	7.1	7.5	7.8	8.1	8.4	8.7	27
28										6.6	7.0	7.3	7.6	8.0	8.3	8.6	9.0	9.3	28
29										7.0	7.4	7.8	8.1	8.5	8.9	9.2	9.6	9.9	29
30										7.5	7.9	8.3	8.6	9.0	9.4	9.8	10.2	10.6	30
31										7.9	8.3	8.8	9.2	9.6	10.0	10.4	10.8	11.2	31
32										8.4	8.8	9.3	9.7	10.2	10.6	11.0	11.5	11.9	32
33												9.8	10.3	10.7	11.2	11.7	12.1	12.6	33
34												10.3	10.8	11.3	11.8	12.3	12.8	13.3	34
35												10.9	11.4	12.0	12.5	13.0	13.5	14.1	35
36												11.5	12.0	12.6	13.1	13.7	14.3	14.8	36
37												12.1	12.7	13.2	13.8	14.4	15.0	15.6	37
38														13.9	14.5	15.1	15.8	16.4	38
39														14.6	15.2	15.9	16.5	17.2	39
40														15.3	16.0	16.7	17.3	18.0	40
41														16.0	16.7	17.4	18.2	18.9	41
42														16.7	17.5	18.2	19.0	19.7	42
43																19.0	19.8	20.6	43
44																19.9	20.7	21.5	44
45																20.7	21.6	22.5	45
46																21.6	22.5	23.4	46
47																22.5	23.4	24.4	47
48																		25.3	48
49																		26.3	49
50																		27.4	50
51																		28.4	51
52																		29.5	52
53																			53
54																			54
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Castagno  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	6.7	6.9																	23
24	7.3	7.5																	24
25	7.8	8.1																	25
26	8.4	8.7																	26
27	9.0	9.3																	27
28	9.7	10.0	10.3	10.7															28
29	10.3	10.7	11.0	11.4															29
30	11.0	11.4	11.7	12.1															30
31	11.7	12.1	12.5	12.9															31
32	12.4	12.8	13.2	13.7															32
33	13.1	13.5	14.0	14.5	15.0	15.4													33
34	13.8	14.3	14.8	15.3	15.8	16.3													34
35	14.6	15.1	15.6	16.2	16.7	17.2													35
36	15.4	15.9	16.5	17.0	17.6	18.2													36
37	16.2	16.8	17.4	17.9	18.5	19.1													37
38	17.0	17.6	18.2	18.9	19.5	20.1	20.7	21.4											38
39	17.8	18.5	19.2	19.8	20.5	21.1	21.8	22.4											39
40	18.7	19.4	20.1	20.8	21.5	22.2	22.8	23.5											40
41	19.6	20.3	21.0	21.8	22.5	23.2	23.9	24.7											41
42	20.5	21.3	22.0	22.8	23.5	24.3	25.0	25.8											42
43	21.4	22.2	23.0	23.8	24.6	25.4	26.2	27.0											43
44	22.4	23.2	24.0	24.9	25.7	26.5	27.4	28.2											44
45	23.3	24.2	25.1	25.9	26.8	27.7	28.6	29.4											45
46	24.3	25.2	26.1	27.0	27.9	28.9	29.8	30.7											46
47	25.3	26.3	27.2	28.2	29.1	30.1	31.0	32.0											47
48	26.3	27.3	28.3	29.3	30.3	31.3	32.3	33.3											48
49	27.4	28.4	29.4	30.5	31.5	32.5	33.6	34.6											49
50	28.4	29.5	30.6	31.7	32.7	33.8	34.9	36.0											50
51	29.5	30.6	31.8	32.9	34.0	35.1	36.2	37.3											51
52	30.6	31.8	32.9	34.1	35.3	36.4	37.6	38.8											52
53		33.0	34.2	35.4	36.6	37.8	39.0	40.2											53
54		34.1	35.4	36.6	37.9	39.2	40.4	41.7											54
55		35.3	36.6	37.9	39.2	40.5	41.8	43.1											55
56		36.6	37.9	39.3	40.6	42.0	43.3	44.7											56
57		37.8	39.2	40.6	42.0	43.4	44.8	46.2											57
58		39.1	40.5	42.0	43.4	44.9	46.3	47.8											58
59		40.4	41.9	43.4	44.9	46.4	47.9	49.4											59
60		41.7	43.2	44.8	46.3	47.9	49.4	51.0											60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



**Castagno**  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6	7.5	8.3	9.1	9.8	10.6	11.4													6
7	9.9	10.9	12.0	13.0	14.1	15.1													7
8	12.5	13.8	15.2	16.6	17.9	19.3	20.7	22.1	23.4	24.8									8
9	15.2	17.0	18.7	20.5	22.2	23.9	25.7	27.4	29.1	30.9									9
10	18.3	20.4	22.5	24.7	26.8	29.0	31.1	33.3	35.4	37.6									10
11	21.5	24.1	26.7	29.3	31.9	34.4	37.0	39.6	42.2	44.8									11
12	24.9	28.0	31.1	34.2	37.3	40.4	43.4	46.5	49.6	52.7									12
13				39.4	43.1	46.7	50.3	53.9	57.6	61.2	64.8	68.4	72.0	75.7					13
14				45.0	49.2	53.4	57.6	61.8	66.1	70.3	74.5	78.7	82.9	87.1					14
15				51.0	55.8	60.6	65.5	70.3	75.1	79.9	84.8	89.6	94.4	99.2					15
16				57.3	62.8	68.2	73.7	79.2	84.7	90.2	95.7	101.2	106.7	112.2					16
17				63.9	70.1	76.3	82.5	88.7	94.9	101.1	107.3	113.5	119.7	125.9					17
18						84.8	91.7	98.7	105.6	112.6	119.5	126.5	133.4	140.3	147.3	154.2	161.2	168.1	18
19						93.7	101.4	109.2	116.9	124.6	132.4	140.1	147.9	155.6	163.3	171.1	178.8	186.6	19
20						103.0	111.6	120.2	128.7	137.3	145.9	154.5	163.0	171.6	180.2	188.8	197.4	205.9	20
21						112.8	122.2	131.7	141.1	150.6	160.1	169.5	179.0	188.4	197.9	207.3	216.8	226.2	21
22						123.0	133.3	143.7	154.1	164.5	174.9	185.2	195.6	206.0	216.4	226.7	237.1	247.5	22
23								156.3	167.6	179.0	190.3	201.6	213.0	224.3	235.7	247.0	258.4	269.7	23
24								169.3	181.7	194.0	206.4	218.7	231.1	243.4	255.8	268.1	280.5	292.8	24
25								182.9	196.3	209.7	223.1	236.5	249.9	263.3	276.7	290.1	303.5	316.9	25
26								197.0	211.5	226.0	240.5	255.0	269.5	284.0	298.5	313.0	327.5	342.0	26
27								211.6	227.2	242.9	258.5	274.1	289.8	305.4	321.0	336.7	352.3	367.9	27
28										260.4	277.2	294.0	310.8	327.6	344.4	361.2	378.0	394.8	28
29										278.4	296.5	314.5	332.5	350.6	368.6	386.6	404.7	422.7	29
30										297.1	316.4	335.7	355.0	374.3	393.6	412.9	432.2	451.5	30
31										316.4	337.0	357.6	378.2	398.8	419.4	440.0	460.6	481.2	31
32										336.3	358.2	380.2	402.2	424.1	446.1	468.0	490.0	511.9	32
33										403.5	426.8	450.2	473.5	496.9	520.2	543.6			33
34										427.4	452.2	477.0	501.8	526.6	551.4	576.1			34
35										452.1	478.3	504.6	530.9	557.1	583.4	609.7			35
36										477.4	505.2	533.0	560.8	588.5	616.3	644.1			36
37										503.4	532.8	562.1	591.5	620.8	650.2	679.5			37
38												592.0	623.0	654.0	684.9	715.9			38
39												622.7	655.3	688.0	720.6	753.2			39
40												654.2	688.5	722.8	757.1	791.4			40
41												686.4	722.5	758.5	794.6	830.6			41
42												719.4	757.2	795.1	832.9	870.7			42
43														832.5	872.1	911.8			43
44														870.8	912.3	953.8			44
45														909.9	953.3	996.8			45
46														949.9	995.3	1 040.6			46
47														990.8	1 038.1	1 085.5			47
48																1 131.3			48
49																1 178.0			49
50																1 225.7			50
51																1 274.3			51
52																1 323.8			52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Castagno  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	281.0	292.4																	23
24	305.2	317.5																	24
25	330.3	343.7																	25
26	356.4	370.9																	26
27	383.6	399.2																	27
28	411.6	428.5	445.3	462.1															28
29	440.7	458.8	476.8	494.8															29
30	470.8	490.1	509.4	528.7															30
31	501.9	522.5	543.1	563.7															31
32	533.9	555.8	577.8	599.8															32
33	566.9	590.3	613.6	637.0	660.3	683.7													33
34	600.9	625.7	650.5	675.3	700.1	724.9													34
35	635.9	662.2	688.5	714.7	741.0	767.3													35
36	671.9	699.7	727.5	755.3	783.1	810.9													36
37	708.9	738.2	767.6	797.0	826.3	855.7													37
38	746.8	777.8	808.8	839.7	870.7	901.7	932.6	963.6											38
39	785.8	818.4	851.0	883.6	916.2	948.9	981.5	1 014.1											39
40	825.7	860.0	894.3	928.6	963.0	997.3	1 031.6	1 065.9											40
41	866.6	902.7	938.7	974.8	1 010.8	1 046.9	1 082.9	1 118.9											41
42	908.5	946.4	984.2	1 022.0	1 059.8	1 097.7	1 135.5	1 173.3											42
43	951.4	991.1	1 030.7	1 070.4	1 110.0	1 149.7	1 189.3	1 229.0											43
44	995.3	1 036.8	1 078.3	1 119.8	1 161.4	1 202.9	1 244.4	1 285.9											44
45	1 040.2	1 083.6	1 127.0	1 170.4	1 213.9	1 257.3	1 300.7	1 344.1											45
46	1 086.0	1 131.4	1 176.8	1 222.1	1 267.5	1 312.9	1 358.2	1 403.6											46
47	1 132.9	1 180.2	1 227.6	1 275.0	1 322.3	1 369.7	1 417.0	1 464.4											47
48	1 180.7	1 230.1	1 279.5	1 328.9	1 378.3	1 427.7	1 477.1	1 526.5											48
49	1 229.5	1 281.0	1 332.4	1 383.9	1 435.4	1 486.9	1 538.4	1 589.9											49
50	1 279.3	1 332.9	1 386.5	1 440.1	1 493.7	1 547.3	1 600.9	1 654.5											50
51	1 330.1	1 385.8	1 441.6	1 497.4	1 553.1	1 608.9	1 664.7	1 720.5											51
52	1 381.8	1 439.8	1 497.8	1 555.8	1 613.7	1 671.7	1 729.7	1 787.7											52
53	1 494.8	1 555.0	1 615.3	1 675.5	1 735.7	1 796.0	1 856.2												53
54	1 550.8	1 613.4	1 675.9	1 738.4	1 800.9	1 863.5	1 926.0												54
55	1 607.9	1 672.8	1 737.6	1 802.5	1 867.4	1 932.2	1 997.1												55
56	1 666.0	1 733.2	1 800.5	1 867.7	1 935.0	2 002.2	2 069.5												56
57	1 725.1	1 794.8	1 864.5	1 934.1	2 003.8	2 073.4	2 143.1												57
58	1 785.3	1 857.4	1 929.5	2 001.7	2 073.8	2 145.9	2 218.1												58
59	1 846.5	1 921.1	1 995.7	2 070.4	2 145.0	2 219.6	2 294.3												59
60	1 908.7	1 985.9	2 063.0	2 140.2	2 217.4	2 294.6	2 371.8												60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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*Eucalyptus* spp.

Eucalitti

*Eucalyptus occidentalis* Endl.

Eucalipto occidentale

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## Eucalitti spp.

### Volume del fusto e dei rami grossi

$$n = 24 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.3789 \quad 4.5811 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.7898 & \\ -2.1378 \cdot 10^{-3} & 5.6261 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 7.3740 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$$n = 24 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.6507 \quad 2.8060 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.6418 \cdot 10^{-1} & \\ -7.9334 \cdot 10^{-4} & 2.0878 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 2.7365 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$$n = 24 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.9006 \quad 4.7954 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.5716 \cdot 10^{-1} & \\ -3.0717 \cdot 10^{-4} & 8.0836 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.0595 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 24$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [2.3448 \cdot 10^{-1} \quad 7.2878 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.2307 \cdot 10^{-3} & \\ -2.6645 \cdot 10^{-6} & 7.0121 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 9.1906 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 24$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [4.8447 \cdot 10^{-1} \quad 3.3584 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 7.0517 \cdot 10^{-1} & \\ -8.4231 \cdot 10^{-4} & 2.2167 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.9054 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Eucalitti**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)													
5	4.3	5.5	6.6	7.8	8.9	10.1													5													
6	6.9	8.5	10.2	11.8	13.5	15.1													6													
7	9.8	12.1	14.3	16.6	18.8	21.1													7													
8			19.1	22.1	25.0	27.9	30.9	33.8											8													
9			24.6	28.3	32.0	35.7	39.4	43.1											9													
10				35.3	39.9	44.4	49.0	53.6											10													
11				43.0	48.5	54.1	59.6	65.1	70.7	76.2	81.8	87.3							11													
12				51.4	58.0	64.6	71.2	77.8	84.4	91.0	97.6	104.2							12													
13					76.0	83.8	91.5	99.3	107.0	114.8	122.5								13													
14						88.4	97.4	106.4	115.3	124.3	133.3	142.3							14													
15							101.7	112.0	122.3	132.6	142.9	153.2	163.5						15													
16								115.9	127.6	139.4	151.1	162.8	174.5	186.3	198.0	209.7	221.4	233.2	16													
17									131.0	144.3	157.5	170.7	184.0	197.2	210.5	223.7	236.9	250.2	263.4	17												
18										176.7	191.6	206.4	221.3	236.1	250.9	265.8	280.6	295.5	310.3	18												
19											197.1	213.6	230.1	246.7	263.2	279.8	296.3	312.8	329.4	345.9	19											
20												218.5	236.8	255.2	273.5	291.8	310.1	328.5	346.8	365.1	383.4	401.8	20									
21													241.1	261.3	281.5	301.7	321.9	342.1	362.3	382.5	402.7	422.9	443.1	21								
22														264.7	286.9	309.0	331.2	353.4	375.6	397.7	419.9	442.1	464.2	486.4	22							
23																337.9	362.1	386.4	410.6	434.8	459.1	483.3	507.5	531.8	23							
24																	368.0	394.4	420.8	447.2	473.6	500.0	526.4	552.8	579.1	24						
25																		399.5	428.1	456.7	485.4	514.0	542.6	571.3	599.9	628.5	25					
26																			432.2	463.1	494.1	525.1	556.0	587.0	618.0	649.0	679.9	26				
27																				466.2	499.6	533.0	566.4	599.8	633.1	666.5	699.9	733.3	27			
28																					501.4	537.4	573.3	609.2	645.1	681.0	716.9	752.9	788.8	28		
29																						538.0	576.5	615.1	653.6	692.1	730.6	769.2	807.7	846.2	29	
30																							575.8	617.1	658.3	699.5	740.8	782.0	823.2	864.4	905.7	30
31																														31		
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)													

**Eucalitti**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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7																			7
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	556.0	580.2																	23
24	605.5	631.9																	24
25	657.2	685.8																	25
26	710.9	741.9																	26
27	766.7	800.1																	27
28	824.7	860.6																	28
29	884.7	923.3																	29
30	946.9	988.1																	30
31																			31
32																			32
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



**Eucalitti**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	1.9	2.6	3.3	4.0	4.7	5.4													5
6	3.4	4.4	5.4	6.4	7.4	8.5													6
7	5.2	6.6	8.0	9.3	10.7	12.1													7
8			10.9	12.7	14.5	16.3	18.1	19.9											8
9			14.3	16.5	18.8	21.1	23.4	25.6											9
10				20.8	23.6	26.4	29.2	32.0											10
11				25.5	28.9	32.3	35.7	39.1	42.5	45.9	49.3	52.7							11
12				30.7	34.7	38.8	42.8	46.8	50.9	54.9	59.0	63.0							12
13					45.8	50.5	55.3	60.0	64.7	69.5	74.2								13
14						53.3	58.8	64.3	69.8	75.3	80.8	86.3							14
15						61.5	67.8	74.1	80.4	86.7	93.1	99.4							15
16						70.2	77.4	84.5	91.7	98.9	106.1	113.3	120.5	127.6	134.8	142.0			16
17						79.4	87.6	95.7	103.8	111.9	120.0	128.1	136.2	144.3	152.4	160.5			17
18								107.4	116.5	125.6	134.7	143.8	152.9	162.0	171.1	180.2	189.3		18
19								119.9	130.0	140.2	150.3	160.4	170.6	180.7	190.8	200.9	211.1		19
20								133.0	144.3	155.5	166.7	177.9	189.2	200.4	211.6	222.8	234.1	245.3	20
21								146.8	159.2	171.6	184.0	196.3	208.7	221.1	233.5	245.8	258.2	270.6	21
22								161.3	174.9	188.5	202.1	215.6	229.2	242.8	256.4	270.0	283.6	297.1	22
23										206.2	221.0	235.8	250.7	265.5	280.4	295.2	310.1	324.9	23
24										224.6	240.8	257.0	273.1	289.3	305.4	321.6	337.8	353.9	24
25										243.9	261.4	278.9	296.5	314.0	331.6	349.1	366.6	384.2	25
26										263.9	282.9	301.8	320.8	339.8	358.8	377.7	396.7	415.7	26
27										284.7	305.2	325.6	346.1	366.6	387.0	407.5	427.9	448.4	27
28										306.3	328.3	350.3	372.3	394.3	416.3	438.3	460.3	482.3	28
29										328.7	352.3	375.9	399.5	423.1	446.7	470.3	493.9	517.5	29
30										351.9	377.2	402.4	427.7	452.9	478.2	503.4	528.7	553.9	30
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68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Eucalitti**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	339.8	354.6																	23
24	370.1	386.3																	24
25	401.7	419.2																	25
26	434.6	453.6																	26
27	468.8	489.3																	27
28	504.3	526.3																	28
29	541.1	564.7																	29
30	579.2	604.4																	30
31																			31
32																			32
33																			33
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Eucalitti**  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.5	2.6	2.7	2.9	3.0	3.1													5
6	2.8	2.9	3.1	3.3	3.5	3.6													6
7	3.1	3.3	3.5	3.8	4.0	4.3													7
8			4.0	4.4	4.7	5.0	5.3	5.6											8
9			4.6	5.0	5.4	5.8	6.2	6.6											9
10				5.7	6.2	6.7	7.2	7.7											10
11				6.5	7.1	7.7	8.3	8.9	9.4	10.0	10.6	11.2							11
12				7.4	8.1	8.8	9.5	10.2	10.9	11.6	12.3	12.9							12
13						10.0	10.8	11.6	12.4	13.2	14.1	14.9							13
14						11.3	12.2	13.2	14.1	15.1	16.0	16.9							14
15						12.7	13.8	14.8	15.9	17.0	18.1	19.2							15
16						14.2	15.4	16.6	17.9	19.1	20.3	21.5	22.8	24.0	25.2	26.5			16
17						15.8	17.1	18.5	19.9	21.3	22.7	24.1	25.5	26.8	28.2	29.6			17
18								20.5	22.1	23.7	25.2	26.8	28.3	29.9	31.4	33.0	34.5		18
19								22.7	24.4	26.1	27.9	29.6	31.3	33.1	34.8	36.5	38.3		19
20								24.9	26.8	28.8	30.7	32.6	34.5	36.4	38.3	40.3	42.2	44.1	20
21								27.3	29.4	31.5	33.6	35.7	37.9	40.0	42.1	44.2	46.3	48.4	21
22								29.8	32.1	34.4	36.7	39.0	41.4	43.7	46.0	48.3	50.6	53.0	22
23										37.4	40.0	42.5	45.0	47.6	50.1	52.6	55.2	57.7	23
24										40.6	43.3	46.1	48.9	51.6	54.4	57.1	59.9	62.7	24
25										43.9	46.9	49.9	52.9	55.8	58.8	61.8	64.8	67.8	25
26										47.3	50.5	53.8	57.0	60.3	63.5	66.7	70.0	73.2	26
27										50.8	54.3	57.8	61.3	64.8	68.3	71.8	75.3	78.8	27
28										54.5	58.3	62.1	65.8	69.6	73.3	77.1	80.9	84.6	28
29										58.4	62.4	66.4	70.5	74.5	78.5	82.6	86.6	90.6	29
30										62.3	66.6	71.0	75.3	79.6	83.9	88.2	92.5	96.8	30
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Eucalitti**  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	60.2	62.8																	23
24	65.4	68.2																	24
25	70.8	73.8																	25
26	76.5	79.7																	26
27	82.3	85.8																	27
28	88.4	92.1																	28
29	94.7	98.7																	29
30	101.2	105.5																	30
31																			31
32																			32
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Eucalitti**  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.3	0.3	0.4	0.4	0.4	0.4													5
6	0.4	0.4	0.4	0.4	0.5	0.5													6
7	0.4	0.4	0.5	0.5	0.6	0.6													7
8			0.6	0.6	0.7	0.7	0.7	0.8											8
9			0.6	0.7	0.8	0.8	0.9	0.9											9
10				0.8	0.9	1.0	1.0	1.1											10
11				0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.6							11
12				1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9							12
13						1.5	1.6	1.7	1.8	2.0	2.1	2.2							13
14						1.7	1.8	1.9	2.1	2.2	2.4	2.5							14
15						1.9	2.0	2.2	2.4	2.5	2.7	2.9							15
16						2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.0			16
17						2.3	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4			17
18								3.1	3.3	3.5	3.8	4.0	4.2	4.5	4.7	5.0	5.2		18
19								3.4	3.7	3.9	4.2	4.4	4.7	5.0	5.2	5.5	5.8		19
20								3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.6	20
21								4.1	4.4	4.7	5.1	5.4	5.7	6.0	6.3	6.7	7.0	7.3	21
22								4.5	4.8	5.2	5.5	5.9	6.2	6.6	6.9	7.3	7.6	8.0	22
23										5.6	6.0	6.4	6.8	7.2	7.6	7.9	8.3	8.7	23
24										6.1	6.5	7.0	7.4	7.8	8.2	8.6	9.0	9.5	24
25										6.6	7.1	7.5	8.0	8.4	8.9	9.3	9.8	10.3	25
26										7.1	7.6	8.1	8.6	9.1	9.6	10.1	10.6	11.1	26
27										7.7	8.2	8.7	9.3	9.8	10.3	10.9	11.4	11.9	27
28										8.2	8.8	9.4	9.9	10.5	11.1	11.7	12.2	12.8	28
29										8.8	9.4	10.0	10.7	11.3	11.9	12.5	13.1	13.7	29
30										9.4	10.1	10.7	11.4	12.0	12.7	13.4	14.0	14.7	30
31																			31
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Eucalitti**  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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9																			9
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18																			18
19																			19
20																			20
21																			21
22																			22
23	9.1	9.5																	23
24	9.9	10.3																	24
25	10.7	11.2																	25
26	11.6	12.1																	26
27	12.5	13.0																	27
28	13.4	13.9																	28
29	14.3	14.9																	29
30	15.3	16.0																	30
31																			31
32																			32
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Eucalitti**  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.7	5.5	6.4	7.2	8.0	8.9													5
6	6.5	7.7	8.9	10.2	11.4	12.6													6
7	8.7	10.4	12.0	13.6	15.3	16.9													7
8			15.5	17.7	19.8	22.0	24.1	26.3											8
9			19.5	22.2	25.0	27.7	30.4	33.1											9
10				27.4	30.7	34.1	37.4	40.8											10
11				33.0	37.1	41.1	45.2	49.2	53.3	57.4	61.4	65.5							11
12				39.2	44.0	48.8	53.7	58.5	63.4	68.2	73.0	77.9							12
13					57.2	62.9	68.6	74.3	79.9	85.6	91.3								13
14						66.3	72.9	79.5	86.1	92.6	99.2	105.8							14
15						76.0	83.6	91.2	98.7	106.3	113.8	121.4							15
16						86.5	95.1	103.7	112.3	120.8	129.4	138.0	146.6	155.2	163.8	172.4			16
17						97.5	107.2	117.0	126.7	136.4	146.1	155.8	165.5	175.2	184.9	194.6			17
18								131.1	141.9	152.8	163.7	174.6	185.5	196.3	207.2	218.1	229.0		18
19								146.0	158.1	170.2	182.3	194.5	206.6	218.7	230.8	243.0	255.1		19
20								161.7	175.1	188.6	202.0	215.4	228.9	242.3	255.7	269.2	282.6	296.0	20
21								178.2	193.0	207.8	222.6	237.5	252.3	267.1	281.9	296.7	311.5	326.3	21
22								195.5	211.8	228.0	244.3	260.6	276.8	293.1	309.3	325.6	341.8	358.1	22
23										249.2	267.0	284.7	302.5	320.3	338.0	355.8	373.6	391.3	23
24										271.3	290.7	310.0	329.3	348.7	368.0	387.4	406.7	426.1	24
25										294.3	315.3	336.3	357.3	378.3	399.3	420.3	441.3	462.3	25
26										318.3	341.0	363.7	386.4	409.1	431.8	454.5	477.2	499.9	26
27										343.2	367.7	392.2	416.7	441.2	465.7	490.1	514.6	539.1	27
28										369.1	395.4	421.8	448.1	474.4	500.8	527.1	553.4	579.7	28
29										395.9	424.1	452.4	480.6	508.9	537.1	565.4	593.6	621.9	29
30										423.6	453.9	484.1	514.3	544.5	574.8	605.0	635.2	665.4	30
31																			31
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Eucalitti**  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	409.1	426.9																	23
24	445.4	464.7																	24
25	483.3	504.2																	25
26	522.6	545.4																	26
27	563.6	588.1																	27
28	606.1	632.4																	28
29	650.1	678.3																	29
30	695.7	725.9																	30
31																			31
32																			32
33																			33
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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***Fagus sylvatica* L.**

**Faggio**

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## Faggio

### Volume del fusto e dei rami grossi

$n = 91$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [8.1151 \cdot 10^{-1} \quad 3.8965 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.2573 & \\ -3.2331 \cdot 10^{-4} & 6.4872 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 5.1468 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 91$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-8.3814 \cdot 10^{-1} \quad 2.4865 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.3444 \cdot 10^{-1} & \\ -6.0288 \cdot 10^{-5} & 1.2097 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 9.5973 \cdot 10^{-6}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 91$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.5040 \quad 5.1283 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.2299 \cdot 10^{-1} & \\ -5.7344 \cdot 10^{-5} & 1.1506 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 9.1286 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 91$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-2.4959 \cdot 10^{-2} \quad 7.8153 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.8638 \cdot 10^{-3} & \\ -9.9359 \cdot 10^{-7} & 1.9936 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.5817 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 91$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.6409 \quad 3.0775 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.3292 \cdot 10^{-1} & \\ -1.3704 \cdot 10^{-4} & 2.7498 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.1816 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Faggio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	5.7	6.7	7.6	8.6	9.6	10.6													5
6	7.8	9.2	10.6	12.0	13.4	14.8													6
7	10.4	12.3	14.2	16.1	18.0	19.9													7
8	13.3	15.8	18.3	20.8	23.3	25.7	28.2	30.7	33.2	35.7									8
9	16.6	19.7	22.9	26.1	29.2	32.4	35.5	38.7	41.8	45.0									9
10	20.3	24.2	28.1	32.0	35.9	39.8	43.7	47.6	51.5	55.4									10
11	24.4	29.1	33.8	38.5	43.2	48.0	52.7	57.4	62.1	66.8									11
12		34.5	40.1	45.7	51.3	56.9	62.5	68.1	73.8	79.4	85.0	90.6	96.2	101.8					12
13				53.5	60.1	66.7	73.2	79.8	86.4	93.0	99.6	106.2	112.8	119.3					13
14				61.9	69.5	77.2	84.8	92.5	100.1	107.7	115.4	123.0	130.6	138.3					14
15				70.9	79.7	88.5	97.2	106.0	114.8	123.6	132.3	141.1	149.9	158.6					15
16				80.6	90.6	100.6	110.5	120.5	130.5	140.5	150.4	160.4	170.4	180.4					16
17				90.9	102.2	113.4	124.7	135.9	147.2	158.5	169.7	181.0	192.2	203.5	214.8	226.0	237.3	248.6	17
18								152.3	164.9	177.6	190.2	202.8	215.4	228.1	240.7	253.3	265.9	278.6	18
19								169.6	183.7	197.7	211.8	225.9	239.9	254.0	268.1	282.1	296.2	310.3	19
20								187.8	203.4	219.0	234.6	250.2	265.8	281.4	296.9	312.5	328.1	343.7	20
21								207.0	224.2	241.4	258.6	275.7	292.9	310.1	327.3	344.5	361.7	378.8	21
22								227.1	246.0	264.8	283.7	302.6	321.4	340.3	359.1	378.0	396.9	415.7	22
23									268.8	289.4	310.0	330.6	351.2	371.8	392.4	413.1	433.7	454.3	23
24									292.6	315.0	337.5	359.9	382.4	404.8	427.2	449.7	472.1	494.6	24
25									317.4	341.8	366.1	390.5	414.8	439.2	463.5	487.9	512.2	536.6	25
26										369.6	395.9	422.3	448.6	474.9	501.3	527.6	554.0	580.3	26
27										398.5	426.9	455.3	483.7	512.1	540.5	568.9	597.3	625.7	27
28										428.5	459.0	489.6	520.1	550.7	581.2	611.8	642.3	672.9	28
29											492.4	525.1	557.9	590.7	623.4	656.2	689.0	721.7	29
30											526.8	561.9	597.0	632.0	667.1	702.2	737.3	772.3	30
31											562.5	599.9	637.4	674.8	712.3	749.7	787.2	824.6	31
32											599.3	639.2	679.1	719.0	758.9	798.8	838.7	878.6	32
33											679.7	722.2	764.6	807.0	849.5	891.9	934.3	976.7	33
34											721.5	766.6	811.6	856.6	901.7	946.7	991.8	1 036.8	34
35											764.5	812.3	860.0	907.7	955.5	1 003.2	1 050.9	1 098.6	35
36											808.8	859.3	909.8	960.3	1 010.8	1 061.3	1 111.8	1 162.3	36
37											854.3	907.6	961.0	1 014.3	1 067.7	1 121.0	1 174.4	1 227.7	37
38												957.3	1 013.6	1 069.9	1 126.1	1 182.4	1 238.7	1 295.0	38
39												1 008.3	1 067.6	1 126.9	1 186.1	1 245.4	1 304.7	1 364.0	39
40												1 060.7	1 123.0	1 185.3	1 247.7	1 310.0	1 372.4	1 434.7	40
41													1 179.8	1 245.3	1 310.8	1 376.3	1 441.8	1 507.3	41
42													1 238.0	1 306.8	1 375.5	1 444.2	1 513.0	1 581.7	42
43													1 297.6	1 369.7	1 441.7	1 513.8	1 585.8	1 657.8	43
44													1 358.7	1 434.1	1 509.5	1 585.0	1 660.4	1 736.7	44
45														1 500.0	1 578.9	1 657.8	1 736.7	1 815.6	45
46															1 649.8	1 732.3	1 814.7	1 897.1	46
47															1 722.3	1 808.4	1 894.4	1 979.4	47
48																		1 975.9	48
49																		2 059.0	49
50																		2 143.9	50
51																		2 230.5	51
52																		2 318.8	52
53																			53
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Faggio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	474.9	495.5																	23
24	517.0	539.5																	24
25	560.9	585.3																	25
26	606.6	633.0																	26
27	654.1	682.5																	27
28	703.4	734.0	764.5	795.1															28
29	754.5	787.3	820.1	852.8															29
30	807.4	842.5	877.5	912.6															30
31	862.1	899.5	936.9	974.4															31
32	918.5	958.4	998.3	1 038.2	1 078.1	1 118.0													32
33	976.8	1 019.2	1 061.6	1 104.1	1 146.5	1 188.9													33
34	1 036.8	1 081.9	1 126.9	1 171.9	1 217.0	1 262.0													34
35	1 098.7	1 146.4	1 194.1	1 241.8	1 289.6	1 337.3													35
36	1 162.3	1 212.8	1 263.3	1 313.8	1 364.3	1 414.8													36
37	1 227.7	1 281.0	1 334.4	1 387.7	1 441.1	1 494.4													37
38	1 294.9	1 351.2	1 407.4	1 463.7	1 520.0	1 576.2	1 632.5	1 688.8	1 745.0	1 801.3									38
39	1 363.9	1 423.2	1 482.5	1 541.7	1 601.0	1 660.3	1 719.5	1 778.8	1 838.1	1 897.3									39
40	1 434.7	1 497.1	1 559.4	1 621.8	1 684.1	1 746.4	1 808.8	1 871.1	1 933.5	1 995.8									40
41	1 507.3	1 572.8	1 638.3	1 703.8	1 769.3	1 834.8	1 900.3	1 965.8	2 031.3	2 096.8									41
42	1 581.7	1 650.4	1 719.2	1 787.9	1 856.6	1 925.4	1 994.1	2 062.8	2 131.6	2 200.3									42
43	1 657.9	1 729.9	1 802.0	1 874.0	1 946.1	2 018.1	2 090.2	2 162.2	2 234.2	2 306.3									43
44	1 735.8	1 811.3	1 886.7	1 962.2	2 037.6	2 113.0	2 188.5	2 263.9	2 339.3	2 414.8									44
45	1 815.6	1 894.5	1 973.4	2 052.3	2 131.2	2 210.1	2 289.0	2 367.9	2 446.8	2 525.7									45
46	1 897.2	1 979.6	2 062.1	2 144.5	2 227.0	2 309.4	2 391.9	2 474.3	2 556.8	2 639.2									46
47	1 980.5	2 066.6	2 152.7	2 238.7	2 324.8	2 410.9	2 496.9	2 583.0	2 669.1	2 755.2									47
48	2 065.6	2 155.4	2 245.2	2 335.0	2 424.7	2 514.5	2 604.3	2 694.1	2 783.8	2 873.6	2 963.4	3 053.2							48
49	2 152.6	2 246.1	2 339.7	2 433.2	2 526.8	2 620.4	2 713.9	2 807.5	2 901.0	2 994.6	3 088.1	3 181.7							49
50	2 241.3	2 338.7	2 436.1	2 533.5	2 630.9	2 728.4	2 825.8	2 923.2	3 020.6	3 118.0	3 215.4	3 312.8							50
51	2 331.8	2 433.2	2 534.5	2 635.9	2 737.2	2 838.6	2 939.9	3 041.3	3 142.6	3 243.9	3 345.3	3 446.6							51
52	2 424.1	2 529.5	2 634.8	2 740.2	2 845.6	2 950.9	3 056.3	3 161.7	3 267.0	3 372.4	3 477.7	3 583.1							52
53		2 627.7	2 737.1	2 846.6	2 956.0	3 065.5	3 174.9	3 284.4	3 393.8	3 503.3	3 612.8	3 722.2							53
54		2 727.7	2 841.4	2 955.0	3 068.6	3 182.2	3 295.8	3 409.5	3 523.1	3 636.7	3 750.3	3 864.0							54
55		2 829.7	2 947.5	3 065.4	3 183.3	3 301.1	3 419.0	3 536.9	3 654.8	3 772.6	3 890.5	4 008.4							55
56		2 933.5	3 055.7	3 177.9	3 300.1	3 422.3	3 544.4	3 666.6	3 788.8	3 911.0	4 033.2	4 155.4							56
57		3 039.1	3 165.7	3 292.3	3 418.9	3 545.5	3 672.1	3 798.7	3 925.3	4 051.9	4 178.5	4 305.1							57
58		3 146.7	3 277.8	3 408.8	3 539.9	3 671.0	3 802.1	3 933.2	4 064.2	4 195.3	4 326.4	4 457.5							58
59		3 256.1	3 391.7	3 527.4	3 663.0	3 798.7	3 934.3	4 069.9	4 205.6	4 341.2	4 476.8	4 612.5							59
60		3 367.4	3 507.7	3 647.9	3 788.2	3 928.5	4 068.8	4 209.0	4 349.3	4 489.6	4 629.9	4 770.1							60
61		3 480.5	3 625.5	3 770.5	3 915.5	4 060.5	4 205.5	4 350.5	4 495.5	4 640.5	4 785.4	4 930.4							61
62		3 595.6	3 745.3	3 895.1	4 044.9	4 194.7	4 344.5	4 494.3	4 644.0	4 793.8	4 943.6	5 093.4							62
63				4 021.8	4 176.4	4 331.1	4 485.7	4 640.4	4 795.0	4 949.7	5 104.3	5 259.0							63
64				4 150.4	4 310.0	4 469.6	4 629.2	4 788.8	4 948.4	5 108.0	5 267.6	5 427.2							64
65				4 281.1	4 445.7	4 610.4	4 775.0	4 939.6	5 104.3	5 268.9	5 433.5	5 598.1							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Faggio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.3	2.9	3.5	4.1	4.8	5.4													5
6	3.6	4.5	5.4	6.3	7.2	8.1													6
7	5.3	6.5	7.7	8.9	10.1	11.3													7
8	7.1	8.7	10.3	11.9	13.5	15.1	16.7	18.3	19.8	21.4									8
9	9.2	11.2	13.3	15.3	17.3	19.3	21.3	23.3	25.3	27.4									9
10	11.6	14.1	16.6	19.1	21.5	24.0	26.5	29.0	31.5	34.0									10
11	14.2	17.2	20.2	23.2	26.2	29.2	32.3	35.3	38.3	41.3									11
12		20.6	24.2	27.8	31.4	35.0	38.5	42.1	45.7	49.3	52.9	56.5	60.0	63.6					12
13				32.8	37.0	41.2	45.4	49.6	53.8	58.0	62.2	66.4	70.6	74.8					13
14				38.2	43.0	47.9	52.8	57.6	62.5	67.4	72.3	77.1	82.0	86.9					14
15				43.9	49.5	55.1	60.7	66.3	71.9	77.5	83.1	88.7	94.3	99.9					15
16				50.1	56.5	62.8	69.2	75.5	81.9	88.3	94.6	101.0	107.4	113.7					16
17				56.6	63.8	71.0	78.2	85.4	92.6	99.8	107.0	114.1	121.3	128.5	135.7	142.9	150.1	157.3	17
18								95.8	103.9	111.9	120.0	128.1	136.1	144.2	152.2	160.3	168.3	176.4	18
19								106.9	115.9	124.8	133.8	142.8	151.8	160.7	169.7	178.7	187.7	196.6	19
20								118.5	128.5	138.4	148.4	158.3	168.2	178.2	188.1	198.1	208.0	218.0	20
21								130.7	141.7	152.7	163.6	174.6	185.6	196.5	207.5	218.5	229.4	240.4	21
22								143.6	155.6	167.6	179.7	191.7	203.8	215.8	227.8	239.9	251.9	263.9	22
23									170.2	183.3	196.5	209.6	222.8	235.9	249.1	262.2	275.4	288.5	23
24									185.4	199.7	214.0	228.3	242.6	257.0	271.3	285.6	299.9	314.3	24
25									201.2	216.7	232.3	247.8	263.4	278.9	294.4	310.0	325.5	341.1	25
26										234.5	251.3	268.1	284.9	301.7	318.5	335.3	352.1	369.0	26
27										252.9	271.1	289.2	307.3	325.4	343.6	361.7	379.8	397.9	27
28										272.1	291.6	311.1	330.6	350.1	369.6	389.0	408.5	428.0	28
29											312.8	333.7	354.7	375.6	396.5	417.4	438.3	459.2	29
30											334.8	357.2	379.6	402.0	424.4	446.7	469.1	491.5	30
31											357.6	381.5	405.4	429.3	453.2	477.1	501.0	524.9	31
32												406.6	432.0	457.5	482.9	508.4	533.9	559.3	32
33												432.4	459.5	486.6	513.6	540.7	567.8	594.9	33
34												459.1	487.8	516.6	545.3	574.0	602.8	631.5	34
35												486.5	517.0	547.4	577.9	608.4	638.8	669.3	35
36												514.8	547.0	579.2	611.4	643.7	675.9	708.1	36
37												543.8	577.8	611.9	645.9	680.0	714.0	748.0	37
38													609.5	645.5	681.4	717.3	753.2	789.1	38
39													642.1	679.9	717.7	755.6	793.4	831.2	39
40													675.5	715.3	755.1	794.8	834.6	874.4	40
41														751.5	793.3	835.1	876.9	918.7	41
42														788.7	832.5	876.4	920.3	964.1	42
43														826.7	872.7	918.7	964.6	1 010.6	43
44														865.7	913.8	961.9	1 010.1	1 058.2	44
45															955.8	1 006.2	1 056.5	1 106.9	45
46																1 051.4	1 104.1	1 156.7	46
47																1 097.7	1 152.6	1 207.6	47
48																		1 259.5	48
49																		1 312.6	49
50																		1 366.7	50
51																		1 422.0	51
52																		1 478.3	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Faggio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	301.7	314.8																	23
24	328.6	342.9																	24
25	356.6	372.1																	25
26	385.8	402.6																	26
27	416.1	434.2																	27
28	447.5	467.0	486.5	506.0															28
29	480.1	501.0	521.9	542.9															29
30	513.9	536.2	558.6	581.0															30
31	548.8	572.6	596.5	620.4															31
32	584.8	610.2	635.7	661.2	686.6	712.1													32
33	622.0	649.0	676.1	703.2	730.3	757.3													33
34	660.3	689.0	717.8	746.5	775.2	804.0													34
35	699.7	730.2	760.7	791.1	821.6	852.0													35
36	740.3	772.6	804.8	837.0	869.2	901.5													36
37	782.1	816.1	850.2	884.2	918.2	952.3													37
38	825.0	860.9	896.8	932.7	968.6	1 004.5	1 040.4	1 076.3	1 112.2	1 148.1									38
39	869.0	906.8	944.7	982.5	1 020.3	1 058.1	1 095.9	1 133.8	1 171.6	1 209.4									39
40	914.2	954.0	993.8	1 033.5	1 073.3	1 113.1	1 152.9	1 192.7	1 232.5	1 272.2									40
41	960.5	1 002.3	1 044.1	1 085.9	1 127.7	1 169.5	1 211.3	1 253.1	1 294.9	1 336.7									41
42	1 008.0	1 051.8	1 095.7	1 139.6	1 183.4	1 227.3	1 271.2	1 315.0	1 358.9	1 402.7									42
43	1 056.6	1 102.6	1 148.5	1 194.5	1 240.5	1 286.5	1 332.4	1 378.4	1 424.4	1 470.4									43
44	1 106.4	1 154.5	1 202.6	1 250.8	1 298.9	1 347.0	1 395.2	1 443.3	1 491.5	1 539.6									44
45	1 157.2	1 207.6	1 258.0	1 308.3	1 358.7	1 409.0	1 459.4	1 509.7	1 560.1	1 610.4									45
46	1 209.3	1 261.9	1 314.5	1 367.1	1 419.7	1 472.4	1 525.0	1 577.6	1 630.2	1 682.8									46
47	1 262.5	1 317.4	1 372.3	1 427.3	1 482.2	1 537.1	1 592.0	1 647.0	1 701.9	1 756.8									47
48	1 316.8	1 374.1	1 431.4	1 488.7	1 546.0	1 603.3	1 660.5	1 717.8	1 775.1	1 832.4	1 889.7	1 947.0							48
49	1 372.3	1 432.0	1 491.7	1 551.4	1 611.1	1 670.8	1 730.5	1 790.2	1 849.9	1 909.6	1 969.3	2 029.0							49
50	1 428.9	1 491.1	1 553.2	1 615.4	1 677.5	1 739.7	1 801.9	1 864.0	1 926.2	1 988.4	2 050.5	2 112.7							50
51	1 486.7	1 551.3	1 616.0	1 680.7	1 745.4	1 810.0	1 874.7	1 939.4	2 004.1	2 068.7	2 133.4	2 198.1							51
52	1 545.6	1 612.8	1 680.0	1 747.3	1 814.5	1 881.7	1 949.0	2 016.2	2 083.4	2 150.7	2 217.9	2 285.2							52
53	1 675.5	1 745.3	1 815.2	1 885.0	1 954.8	2 024.7	2 094.5	2 164.4	2 234.2	2 304.1	2 373.9								53
54	1 739.3	1 811.8	1 884.3	1 956.8	2 029.3	2 101.8	2 174.4	2 246.9	2 319.4	2 391.9	2 464.4								54
55	1 804.4	1 879.6	1 954.8	2 030.0	2 105.2	2 180.4	2 255.7	2 330.9	2 406.1	2 481.3	2 556.5								55
56	1 870.6	1 948.6	2 026.6	2 104.5	2 182.5	2 260.5	2 338.5	2 416.4	2 494.4	2 572.4	2 650.4								56
57	1 938.0	2 018.8	2 099.6	2 180.4	2 261.2	2 342.0	2 422.8	2 503.5	2 584.3	2 665.1	2 745.9								57
58	2 006.7	2 090.3	2 174.0	2 257.6	2 341.2	2 424.9	2 508.5	2 592.2	2 675.8	2 759.5	2 843.1								58
59	2 076.5	2 163.0	2 249.6	2 336.1	2 422.7	2 509.3	2 595.8	2 682.4	2 768.9	2 855.5	2 942.0								59
60	2 147.5	2 237.0	2 326.5	2 416.0	2 505.6	2 595.1	2 684.6	2 774.1	2 863.6	2 953.1	3 042.6								60
61	2 219.7	2 312.2	2 404.8	2 497.3	2 589.8	2 682.3	2 774.8	2 867.4	2 959.9	3 052.4	3 144.9								61
62	2 293.1	2 388.7	2 484.3	2 579.9	2 675.4	2 771.0	2 866.6	2 962.2	3 057.8	3 153.3	3 248.9								62
63			2 565.1	2 663.8	2 762.5	2 861.1	2 959.8	3 058.5	3 157.2	3 255.9	3 354.6								63
64			2 647.2	2 749.0	2 850.9	2 952.7	3 054.6	3 156.4	3 258.3	3 360.1	3 462.0								64
65			2 730.6	2 835.6	2 940.7	3 045.7	3 150.8	3 255.9	3 360.9	3 466.0	3 571.0								65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Faggio  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.1	3.3	3.4	3.5	3.7	3.8													5
6	3.4	3.6	3.8	4.0	4.2	4.4													6
7	3.8	4.0	4.3	4.5	4.8	5.0													7
8	4.1	4.5	4.8	5.1	5.5	5.8	6.1	6.4	6.8	7.1									8
9	4.6	5.0	5.4	5.8	6.2	6.7	7.1	7.5	7.9	8.3									9
10	5.1	5.6	6.1	6.6	7.1	7.6	8.1	8.7	9.2	9.7									10
11	5.6	6.2	6.8	7.5	8.1	8.7	9.3	10.0	10.6	11.2									11
12		6.9	7.7	8.4	9.2	9.9	10.6	11.4	12.1	12.8	13.6	14.3	15.1	15.8					12
13				9.4	10.3	11.2	12.0	12.9	13.8	14.6	15.5	16.4	17.2	18.1					13
14				10.5	11.6	12.6	13.6	14.6	15.6	16.6	17.6	18.6	19.6	20.6					14
15				11.7	12.9	14.0	15.2	16.4	17.5	18.7	19.8	21.0	22.1	23.3					15
16				13.0	14.3	15.6	16.9	18.3	19.6	20.9	22.2	23.5	24.8	26.1					16
17				14.4	15.8	17.3	18.8	20.3	21.8	23.3	24.7	26.2	27.7	29.2	30.7	32.1	33.6	35.1	17
18								22.4	24.1	25.8	27.4	29.1	30.8	32.4	34.1	35.7	37.4	39.1	18
19								24.7	26.6	28.4	30.3	32.1	34.0	35.8	37.7	39.5	41.4	43.2	19
20								27.1	29.2	31.2	33.3	35.3	37.4	39.4	41.5	43.5	45.6	47.6	20
21								29.6	31.9	34.2	36.4	38.7	41.0	43.2	45.5	47.7	50.0	52.3	21
22								32.3	34.8	37.3	39.7	42.2	44.7	47.2	49.7	52.1	54.6	57.1	22
23									37.8	40.5	43.2	45.9	48.6	51.3	54.0	56.8	59.5	62.2	23
24									40.9	43.9	46.8	49.8	52.7	55.7	58.6	61.6	64.5	67.5	24
25									44.2	47.4	50.6	53.8	57.0	60.2	63.4	66.6	69.8	73.0	25
26									51.0	54.5	58.0	61.4	64.9	68.4	71.8	75.3	78.8	82.2	26
27									54.8	58.6	62.3	66.1	69.8	73.5	77.3	81.0	84.8	88.5	27
28									58.8	62.8	66.8	70.9	74.9	78.9	82.9	86.9	91.0	95.0	28
29										67.2	71.5	75.8	80.1	84.4	88.8	93.1	97.4	101.7	29
30										71.7	76.4	81.0	85.6	90.2	94.8	99.4	104.0	108.6	30
31										76.4	81.4	86.3	91.2	96.1	101.1	106.0	110.9	115.8	31
32										81.3	86.5	91.8	97.0	102.3	107.5	112.8	118.0	123.3	32
33										91.9	97.4	103.0	108.6	114.2	119.8	125.4	131.0	136.6	33
34										97.4	103.3	109.2	115.1	121.1	127.0	132.9	138.8	144.7	34
35										103.0	109.3	115.6	121.9	128.1	134.4	140.7	147.0	153.3	35
36										108.8	115.5	122.1	128.8	135.4	142.1	148.7	155.4	162.1	36
37										114.8	121.9	128.9	135.9	142.9	149.9	157.0	164.0	171.0	37
38											128.4	135.8	143.2	150.6	158.0	165.4	172.8	180.2	38
39											135.1	142.9	150.7	158.5	166.3	174.1	181.9	189.7	39
40											142.0	150.2	158.4	166.6	174.8	183.0	191.2	199.4	40
41														157.7	166.3	174.9	183.5	192.2	41
42														165.3	174.4	183.4	192.5	201.5	42
43														173.2	182.7	192.1	201.6	211.1	43
44														181.2	191.1	201.1	211.0	220.9	44
45															199.8	210.2	220.6	231.0	45
46																219.5	230.4	241.2	46
47																229.1	240.4	251.7	47
48																		262.4	48
49																		273.4	49
50																		284.6	50
51																		296.0	51
52																		307.6	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
61																			61
62																			62
63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Faggio  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	64.9	67.6																	23
24	70.4	73.4																	24
25	76.2	79.4																	25
26	82.2	85.7																	26
27	88.5	92.2																	27
28	95.0	99.0	103.0	107.0															28
29	101.7	106.0	110.3	114.6															29
30	108.7	113.3	117.9	122.5															30
31	115.9	120.8	125.7	130.6															31
32	123.3	128.5	133.8	139.0	144.3	149.5													32
33	131.0	136.5	142.1	147.7	153.3	158.9													33
34	138.9	144.8	150.7	156.6	162.6	168.5													34
35	147.0	153.3	159.6	165.8	172.1	178.4													35
36	155.4	162.0	168.7	175.3	182.0	188.6													36
37	164.0	171.0	178.0	185.0	192.1	199.1													37
38	172.8	180.2	187.6	195.0	202.4	209.9	217.3	224.7	232.1	239.5									38
39	181.9	189.7	197.5	205.3	213.1	220.9	228.7	236.5	244.3	252.1									39
40	191.2	199.4	207.6	215.8	224.0	232.3	240.5	248.7	256.9	265.1									40
41	200.8	209.4	218.0	226.6	235.3	243.9	252.5	261.1	269.7	278.4									41
42	210.6	219.6	228.7	237.7	246.8	255.8	264.8	273.9	282.9	292.0									42
43	220.6	230.1	239.6	249.0	258.5	268.0	277.5	287.0	296.5	305.9									43
44	230.9	240.8	250.7	260.6	270.6	280.5	290.4	300.4	310.3	320.2									44
45	241.4	251.7	262.1	272.5	282.9	293.3	303.7	314.0	324.4	334.8									45
46	252.1	262.9	273.8	284.6	295.5	306.3	317.2	328.0	338.9	349.8									46
47	263.1	274.4	285.7	297.0	308.4	319.7	331.0	342.4	353.7	365.0									47
48	274.3	286.1	297.9	309.7	321.5	333.3	345.2	357.0	368.8	380.6	392.4	404.2							48
49	285.7	298.0	310.3	322.6	335.0	347.3	359.6	371.9	384.2	396.5	408.8	421.1							49
50	297.4	310.2	323.0	335.8	348.7	361.5	374.3	387.1	399.9	412.8	425.6	438.4							50
51	309.3	322.6	336.0	349.3	362.6	376.0	389.3	402.7	416.0	429.3	442.7	456.0							51
52	321.4	335.3	349.2	363.0	376.9	390.8	404.6	418.5	432.4	446.2	460.1	474.0							52
53	348.2	362.6	377.0	391.4	405.9	420.3	434.7	449.1	463.5	477.9	492.3								53
54	361.4	376.4	391.3	406.3	421.2	436.2	451.1	466.1	481.0	496.0	510.9								54
55	374.8	390.3	405.8	421.4	436.9	452.4	467.9	483.4	498.9	514.4	529.9								55
56	388.5	404.6	420.6	436.7	452.8	468.9	485.0	501.1	517.1	533.2	549.3								56
57	402.4	419.1	435.7	452.4	469.0	485.7	502.4	519.0	535.7	552.3	569.0								57
58	416.5	433.8	451.0	468.3	485.5	502.8	520.1	537.3	554.6	571.8	589.1								58
59	430.9	448.8	466.6	484.5	502.3	520.2	538.1	555.9	573.8	591.6	609.5								59
60	445.6	464.1	482.5	501.0	519.4	537.9	556.4	574.8	593.3	611.7	630.2								60
61	460.5	479.6	498.6	517.7	536.8	555.9	575.0	594.1	613.1	632.2	651.3								61
62	475.6	495.3	515.0	534.8	554.5	574.2	593.9	613.6	633.3	653.0	672.8								62
63			531.7	552.1	572.4	592.8	613.1	633.5	653.8	674.2	694.5								63
64			548.6	569.7	590.7	611.7	632.7	653.7	674.7	695.7	716.7								64
65			565.8	587.5	609.2	630.8	652.5	674.2	695.9	717.5	739.2								65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Faggio  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.2	0.2													5
6	0.1	0.1	0.2	0.2	0.2	0.3													6
7	0.2	0.2	0.2	0.3	0.3	0.4													7
8	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7									8
9	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9									9
10	0.4	0.4	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1									10
11	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3									11
12		0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0					12
13				1.0	1.2	1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.2	2.4					13
14				1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7					14
15				1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.1					15
16				1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6					16
17				1.8	2.0	2.2	2.5	2.7	2.9	3.1	3.4	3.6	3.8	4.0	4.3	4.5	4.7	4.9	17
18								3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.3	5.5	18
19								3.4	3.6	3.9	4.2	4.5	4.8	5.1	5.3	5.6	5.9	6.2	19
20								3.7	4.0	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.9	20
21								4.1	4.5	4.8	5.1	5.5	5.8	6.2	6.5	6.9	7.2	7.6	21
22								4.5	4.9	5.3	5.6	6.0	6.4	6.8	7.2	7.5	7.9	8.3	22
23									5.3	5.8	6.2	6.6	7.0	7.4	7.8	8.2	8.7	9.1	23
24									5.8	6.3	6.7	7.2	7.6	8.1	8.5	9.0	9.4	9.9	24
25									6.3	6.8	7.3	7.8	8.3	8.8	9.3	9.7	10.2	10.7	25
26										7.4	7.9	8.4	9.0	9.5	10.0	10.5	11.1	11.6	26
27										8.0	8.5	9.1	9.7	10.2	10.8	11.4	11.9	12.5	27
28										8.6	9.2	9.8	10.4	11.0	11.6	12.2	12.8	13.5	28
29											9.8	10.5	11.1	11.8	12.5	13.1	13.8	14.4	29
30											10.5	11.2	11.9	12.6	13.3	14.0	14.7	15.4	30
31											11.2	12.0	12.7	13.5	14.2	15.0	15.7	16.5	31
32											12.0	12.8	13.6	14.4	15.2	16.0	16.8	17.6	32
33												13.6	14.4	15.3	16.1	17.0	17.8	18.7	33
34												14.4	15.3	16.2	17.1	18.0	18.9	19.9	34
35												15.3	16.3	17.2	18.2	19.1	20.1	21.0	35
36												16.2	17.2	18.2	19.2	20.2	21.2	22.3	36
37												17.1	18.2	19.2	20.3	21.4	22.4	23.5	37
38													19.2	20.3	21.4	22.5	23.7	24.8	38
39													20.2	21.4	22.6	23.7	24.9	26.1	39
40													21.2	22.5	23.7	25.0	26.2	27.5	40
41														23.6	24.9	26.3	27.6	28.9	41
42														24.8	26.2	27.5	28.9	30.3	42
43														26.0	27.4	28.9	30.3	31.8	43
44														27.2	28.7	30.2	31.7	33.3	44
45															30.0	31.6	33.2	34.8	45
46																33.0	34.7	36.4	46
47																34.5	36.2	38.0	47
48																		39.6	48
49																		41.3	49
50																		43.0	50
51																		44.7	51
52																		46.5	52
53																			53
54																			54
55																			55
56																			56
57																			57
58																			58
59																			59
60																			60
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Faggio  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	9.5	9.9																	23
24	10.3	10.8																	24
25	11.2	11.7																	25
26	12.1	12.7																	26
27	13.1	13.6																	27
28	14.1	14.7	15.3	15.9															28
29	15.1	15.7	16.4	17.1															29
30	16.2	16.9	17.6	18.3															30
31	17.2	18.0	18.8	19.5															31
32	18.4	19.2	20.0	20.8	21.6	22.4													32
33	19.6	20.4	21.3	22.1	23.0	23.8													33
34	20.8	21.7	22.6	23.5	24.4	25.3													34
35	22.0	23.0	23.9	24.9	25.8	26.8													35
36	23.3	24.3	25.3	26.3	27.3	28.3													36
37	24.6	25.7	26.7	27.8	28.9	29.9													37
38	25.9	27.1	28.2	29.3	30.4	31.6	32.7	33.8	35.0	36.1									38
39	27.3	28.5	29.7	30.9	32.1	33.3	34.4	35.6	36.8	38.0									39
40	28.7	30.0	31.2	32.5	33.7	35.0	36.2	37.5	38.7	40.0									40
41	30.2	31.5	32.8	34.1	35.4	36.8	38.1	39.4	40.7	42.0									41
42	31.7	33.1	34.4	35.8	37.2	38.6	40.0	41.3	42.7	44.1									42
43	33.2	34.7	36.1	37.5	39.0	40.4	41.9	43.3	44.8	46.2									43
44	34.8	36.3	37.8	39.3	40.8	42.3	43.9	45.4	46.9	48.4									44
45	36.4	38.0	39.5	41.1	42.7	44.3	45.9	47.5	49.0	50.6									45
46	38.0	39.7	41.3	43.0	44.6	46.3	47.9	49.6	51.2	52.9									46
47	39.7	41.4	43.1	44.9	46.6	48.3	50.0	51.8	53.5	55.2									47
48	41.4	43.2	45.0	46.8	48.6	50.4	52.2	54.0	55.8	57.6	59.4	61.2							48
49	43.1	45.0	46.9	48.8	50.6	52.5	54.4	56.3	58.1	60.0	61.9	63.8							49
50	44.9	46.9	48.8	50.8	52.7	54.7	56.6	58.6	60.5	62.5	64.5	66.4							50
51	46.7	48.8	50.8	52.8	54.9	56.9	58.9	61.0	63.0	65.0	67.1	69.1							51
52	48.6	50.7	52.8	54.9	57.0	59.1	61.3	63.4	65.5	67.6	69.7	71.8							52
53		52.7	54.9	57.1	59.2	61.4	63.6	65.8	68.0	70.2	72.4	74.6							53
54		54.7	56.9	59.2	61.5	63.8	66.1	68.3	70.6	72.9	75.2	77.5							54
55		56.7	59.1	61.4	63.8	66.2	68.5	70.9	73.3	75.6	78.0	80.4							55
56		58.8	61.2	63.7	66.1	68.6	71.1	73.5	76.0	78.4	80.9	83.3							56
57		60.9	63.5	66.0	68.5	71.1	73.6	76.2	78.7	81.2	83.8	86.3							57
58		63.1	65.7	68.3	71.0	73.6	76.2	78.8	81.5	84.1	86.7	89.4							58
59		65.3	68.0	70.7	73.4	76.1	78.9	81.6	84.3	87.0	89.8	92.5							59
60		67.5	70.3	73.1	75.9	78.8	81.6	84.4	87.2	90.0	92.8	95.6							60
61		69.8	72.7	75.6	78.5	81.4	84.3	87.2	90.1	93.0	95.9	98.8							61
62		72.1	75.1	78.1	81.1	84.1	87.1	90.1	93.1	96.1	99.1	102.1							62
63				80.6	83.7	86.8	89.9	93.0	96.1	99.2	102.3	105.4							63
64				83.2	86.4	89.6	92.8	96.0	99.2	102.4	105.6	108.8							64
65				85.8	89.1	92.4	95.7	99.0	102.3	105.6	108.9	112.2							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Faggio  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	5.5	6.3	7.0	7.8	8.6	9.3													5
6	7.2	8.3	9.4	10.5	11.6	12.7													6
7	9.2	10.7	12.2	13.7	15.2	16.7													7
8	11.5	13.5	15.4	17.4	19.4	21.3	23.3	25.3	27.2	29.2									8
9	14.1	16.6	19.1	21.6	24.1	26.6	29.1	31.6	34.0	36.5									9
10	17.0	20.1	23.2	26.3	29.3	32.4	35.5	38.6	41.6	44.7									10
11	20.3	24.0	27.7	31.4	35.2	38.9	42.6	46.3	50.0	53.8									11
12		28.2	32.7	37.1	41.5	46.0	50.4	54.8	59.3	63.7	68.1	72.5	77.0	81.4					12
13				43.2	48.4	53.7	58.9	64.1	69.3	74.5	79.7	84.9	90.1	95.3					13
14				49.9	55.9	62.0	68.0	74.0	80.1	86.1	92.1	98.2	104.2	110.2					14
15				57.0	64.0	70.9	77.8	84.7	91.7	98.6	105.5	112.4	119.4	126.3					15
16				64.7	72.5	80.4	88.3	96.2	104.1	111.9	119.8	127.7	135.6	143.5					16
17				72.8	81.7	90.6	99.5	108.4	117.3	126.2	135.1	143.9	152.8	161.7	170.6	179.5	188.4	197.3	17
18								121.3	131.3	141.2	151.2	161.2	171.1	181.1	191.1	201.1	211.0	221.0	18
19								135.0	146.1	157.2	168.3	179.4	190.5	201.6	212.7	223.8	234.9	246.1	19
20								149.4	161.7	174.0	186.3	198.6	210.9	223.2	235.5	247.8	260.2	272.5	20
21								164.5	178.1	191.6	205.2	218.8	232.4	245.9	259.5	273.1	286.6	300.2	21
22								180.4	195.3	210.2	225.1	240.0	254.9	269.8	284.6	299.5	314.4	329.3	22
23									213.3	229.6	245.8	262.1	278.4	294.7	311.0	327.2	343.5	359.8	23
24									232.1	249.8	267.5	285.3	303.0	320.7	338.4	356.2	373.9	391.6	24
25									251.7	270.9	290.2	309.4	328.6	347.9	367.1	386.3	405.6	424.8	25
26										292.9	313.7	334.5	355.3	376.1	396.9	417.7	438.5	459.3	26
27										315.7	338.2	360.6	383.0	405.5	427.9	450.3	472.8	495.2	27
28										339.4	363.6	387.7	411.8	435.9	460.1	484.2	508.3	532.4	28
29											389.9	415.7	441.6	467.5	493.4	519.3	545.2	571.0	29
30											417.1	444.8	472.5	500.2	527.9	555.6	583.3	611.0	30
31											445.3	474.8	504.4	534.0	563.6	593.1	622.7	652.3	31
32											474.3	505.9	537.4	568.9	600.4	631.9	663.4	694.9	32
33											537.9	571.4	604.9	638.4	671.9	705.4	738.9	772.4	33
34											570.9	606.4	642.0	677.6	713.2	748.7	784.3	819.8	34
35											604.8	642.5	680.2	717.9	755.6	793.3	831.0	868.7	35
36											639.8	679.7	719.6	759.4	799.3	839.2	879.1	919.0	36
37											675.7	717.9	760.0	802.1	844.3	886.4	928.5	970.6	37
38												757.1	801.5	846.0	890.4	934.9	979.3	1023.7	38
39												797.4	844.2	891.0	937.8	984.6	1031.4	1078.2	39
40												838.7	888.0	937.2	986.4	1035.7	1084.9	1134.2	40
41													932.8	984.6	1036.3	1088.0	1139.8	1191.6	41
42													978.8	1033.1	1087.4	1141.7	1196.0	1250.3	42
43													1025.9	1082.8	1139.7	1196.6	1253.5	1310.4	43
44													1074.1	1133.7	1193.2	1252.8	1312.4	1371.9	44
45														1185.7	1248.0	1310.3	1372.7	1435.0	45
46															1304.0	1369.2	1434.3	1499.4	46
47															1361.3	1429.3	1497.2	1565.1	47
48																		1561.6	48
49																		1627.2	49
50																		1694.3	50
51																		1762.6	51
52																		1832.4	52
53																			53
54																			54
55																			55
56																			56
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Faggio  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	376.1	392.4																	23
24	409.3	427.1																	24
25	444.0	463.3																	25
26	480.1	500.9																	26
27	517.6	540.1																	27
28	556.6	580.7	604.8	629.0															28
29	596.9	622.8	648.7	674.6															29
30	638.7	666.4	694.1	721.8															30
31	681.9	711.4	741.0	770.6															31
32	726.5	758.0	789.5	821.0	852.5	884.0													32
33	772.5	806.0	839.5	873.0	906.5	940.0													33
34	819.9	855.5	891.0	926.6	962.2	997.8													34
35	868.7	906.4	944.1	981.8	1 019.5	1 057.2													35
36	919.0	958.9	998.8	1 038.6	1 078.5	1 118.4													36
37	970.7	1 012.8	1 054.9	1 097.0	1 139.2	1 181.3													37
38	1 023.7	1 068.2	1 112.6	1 157.1	1 201.5	1 245.9	1 290.4	1 334.8	1 379.3	1 423.7									38
39	1 078.2	1 125.1	1 171.9	1 218.7	1 265.5	1 312.3	1 359.1	1 405.9	1 452.7	1 499.5									39
40	1 134.2	1 183.4	1 232.6	1 281.9	1 331.1	1 380.4	1 429.6	1 478.8	1 528.1	1 577.3									40
41	1 191.5	1 243.2	1 295.0	1 346.7	1 398.4	1 450.2	1 501.9	1 553.6	1 605.4	1 657.1									41
42	1 250.2	1 304.5	1 358.8	1 413.1	1 467.4	1 521.7	1 576.0	1 630.3	1 684.5	1 738.8									42
43	1 310.4	1 367.3	1 424.2	1 481.1	1 538.0	1 594.9	1 651.8	1 708.7	1 765.6	1 822.5									43
44	1 372.0	1 431.6	1 491.2	1 550.7	1 610.3	1 669.9	1 729.5	1 789.1	1 848.6	1 908.2									44
45	1 435.0	1 497.3	1 559.6	1 621.9	1 684.3	1 746.6	1 808.9	1 871.2	1 933.5	1 995.9									45
46	1 499.4	1 564.5	1 629.6	1 694.8	1 759.9	1 825.0	1 890.1	1 955.2	2 020.4	2 085.5									46
47	1 565.2	1 633.2	1 701.2	1 769.2	1 837.2	1 905.1	1 973.1	2 041.1	2 109.1	2 177.1									47
48	1 632.5	1 703.4	1 774.3	1 845.2	1 916.1	1 987.0	2 057.9	2 128.8	2 199.7	2 270.6	2 341.5	2 412.4							48
49	1 701.1	1 775.0	1 848.9	1 922.8	1 996.7	2 070.6	2 144.5	2 218.4	2 292.3	2 366.1	2 440.0	2 513.9							49
50	1 771.2	1 848.1	1 925.1	2 002.0	2 079.0	2 155.9	2 232.8	2 309.8	2 386.7	2 463.6	2 540.6	2 617.5							50
51	1 842.7	1 922.7	2 002.8	2 082.8	2 162.9	2 242.9	2 323.0	2 403.0	2 483.1	2 563.1	2 643.2	2 723.2							51
52	1 915.6	1 998.8	2 082.0	2 165.2	2 248.5	2 331.7	2 414.9	2 498.1	2 581.3	2 664.5	2 747.8	2 831.0							52
53		2 076.4	2 162.8	2 249.3	2 335.7	2 422.2	2 508.6	2 595.1	2 681.5	2 767.9	2 854.4	2 940.8							53
54		2 155.4	2 245.1	2 334.9	2 424.6	2 514.4	2 604.1	2 693.8	2 783.6	2 873.3	2 963.1	3 052.8							54
55		2 235.9	2 329.0	2 422.1	2 515.2	2 608.3	2 701.4	2 794.5	2 887.6	2 980.7	3 073.8	3 166.8							55
56		2 317.9	2 414.4	2 510.9	2 607.4	2 703.9	2 800.4	2 897.0	2 993.5	3 090.0	3 186.5	3 283.0							56
57		2 401.4	2 501.3	2 601.3	2 701.3	2 801.3	2 901.3	3 001.3	3 101.3	3 201.3	3 301.2	3 401.2							57
58		2 486.3	2 589.8	2 693.3	2 796.9	2 900.4	3 003.9	3 107.5	3 211.0	3 314.5	3 418.0	3 521.6							58
59		2 572.7	2 679.8	2 787.0	2 894.1	3 001.2	3 108.3	3 215.5	3 322.6	3 429.7	3 536.9	3 644.0							59
60		2 660.6	2 771.4	2 882.2	2 993.0	3 103.8	3 214.6	3 325.3	3 436.1	3 546.9	3 657.7	3 768.5							60
61		2 750.0	2 864.5	2 979.0	3 093.5	3 208.0	3 322.5	3 437.1	3 551.6	3 666.1	3 780.6	3 895.1							61
62		2 840.8	2 959.1	3 077.4	3 195.7	3 314.0	3 432.3	3 550.6	3 668.9	3 787.2	3 905.5	4 023.8							62
63				3 177.4	3 299.6	3 421.7	3 543.9	3 666.0	3 788.2	3 910.3	4 032.5	4 154.6							63
64				3 279.1	3 405.1	3 531.2	3 657.2	3 783.3	3 909.3	4 035.4	4 161.4	4 287.5							64
65				3 382.3	3 512.3	3 642.3	3 772.3	3 902.4	4 032.4	4 162.4	4 292.4	4 422.5							65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Fraxinus* spp.**

**Frassini**

*Fraxinus excelsior* L.  
Frassino maggiore

*Fraxinus ornus* L.  
Orniello

*Fraxinus angustifolia* Vahl.  
Frassino ossifillo



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## Frassini

### Volume del fusto e dei rami grossi

$$n = 33 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.1137 \cdot 10^{-1} \quad 3.9108 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 8.5868 \cdot 10^{-1} & \\ -5.8468 \cdot 10^{-4} & 2.0480 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 5.4447 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$$n = 33 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-6.5463 \cdot 10^{-1} \quad 2.5364 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 2.2408 \cdot 10^{-1} & \\ -1.5258 \cdot 10^{-4} & 5.3445 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.4209 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$$n = 33 \quad p = 2$$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.7854 \quad 6.8597 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.2200 \cdot 10^{-1} & \\ -1.5116 \cdot 10^{-4} & 5.2949 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.4077 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^{*2} (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 33$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [5.8578 \cdot 10^{-2} \quad 7.2562 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 4.8087 \cdot 10^{-3} & \\ -3.2742 \cdot 10^{-6} & 1.1469 \cdot 10^{-8} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.0491 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^{*2} (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 33$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [2.1893 \quad 3.2949 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.0877 \cdot 10^{-1} & \\ -3.4642 \cdot 10^{-4} & 1.2135 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.2260 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^{*2} (d_i^2 h_i)^2$$

Frassini  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.8	5.8	6.7	7.7	8.7	9.7	10.6	11.6											5
6	6.9	8.3	9.7	11.2	12.6	14.0	15.4	16.8											6
7	9.5	11.4	13.3	15.2	17.1	19.1	21.0	22.9											7
8				19.9	22.4	24.9	27.4	29.9	32.4	34.9	37.4	39.9							8
9				25.2	28.4	31.6	34.7	37.9	41.1	44.2	47.4	50.6							9
10				31.2	35.1	39.0	42.9	46.8	50.7	54.6	58.6	62.5							10
11				37.7	42.5	47.2	51.9	56.7	61.4	66.1	70.9	75.6							11
12				44.9	50.6	56.2	61.8	67.5	73.1	78.7	84.4	90.0							12
13						66.0	72.6	79.2	85.8	92.4	99.0	105.6	112.2	118.9					13
14						76.5	84.2	91.9	99.5	107.2	114.9	122.5	130.2	137.9					14
15						87.9	96.7	105.5	114.3	123.1	131.9	140.7	149.5	158.3					15
16						100.0	110.0	120.0	130.0	140.1	150.1	160.1	170.1	180.1					16
17						112.9	124.2	135.5	146.8	158.1	169.4	180.7	192.0	203.3					17
18								151.9	164.6	177.3	190.0	202.6	215.3	228.0	240.6	253.3	266.0	278.7	18
19								169.3	183.4	197.5	211.7	225.8	239.9	254.0	268.1	282.2	296.4	310.5	19
20								187.6	203.3	218.9	234.5	250.2	265.8	281.5	297.1	312.8	328.4	344.0	20
21								206.8	224.1	241.3	258.6	275.8	293.1	310.3	327.6	344.8	362.1	379.3	21
22								227.0	246.0	264.9	283.8	302.7	321.7	340.6	359.5	378.5	397.4	416.3	22
23										289.5	310.2	330.9	351.6	372.3	393.0	413.7	434.3	455.0	23
24										315.3	337.8	360.3	382.8	405.4	427.9	450.4	472.9	495.5	24
25										342.1	366.5	391.0	415.4	439.9	464.3	488.7	513.2	537.6	25
26										370.0	396.4	422.9	449.3	475.8	502.2	528.6	555.1	581.5	26
27										399.0	427.5	456.0	484.6	513.1	541.6	570.1	598.6	627.1	27
28												490.5	521.1	551.8	582.4	613.1	643.8	674.4	28
29												526.1	559.0	591.9	624.8	657.7	690.6	723.5	29
30												563.0	598.2	633.4	668.6	703.8	739.0	774.2	30
31												601.2	638.8	676.4	714.0	751.5	789.1	826.7	31
32												640.6	680.7	720.7	760.8	800.8	840.9	880.9	32
33														766.5	809.1	851.7	894.2	936.8	33
34														813.6	858.9	904.1	949.3	994.5	34
35														862.2	910.1	958.0	1 005.9	1 053.8	35
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Frassini  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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18																			18
19																			19
20																			20
21																			21
22																			22
23	475.7	496.4																	23
24	518.0	540.5																	24
25	562.1	586.5																	25
26	607.9	634.4																	26
27	655.6	684.1																	27
28	705.1	735.7	766.4	797.1															28
29	756.4	789.2	822.1	855.0															29
30	809.4	844.6	879.8	915.0															30
31	864.3	901.9	939.5	977.0															31
32	921.0	961.0	1 001.1	1 041.1															32
33	979.4	1 022.0	1 064.6	1 107.2															33
34	1 039.7	1 084.9	1 130.1	1 175.3															34
35	1 101.8	1 149.7	1 197.6	1 245.5															35
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Frassini  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.5	3.1	3.8	4.4	5.1	5.7	6.3	7.0											5
6	3.9	4.8	5.7	6.7	7.6	8.5	9.4	10.3											6
7	5.6	6.8	8.0	9.3	10.5	11.8	13.0	14.3											7
8				12.3	14.0	15.6	17.2	18.8	20.4	22.1	23.7	25.3							8
9				15.8	17.8	19.9	21.9	24.0	26.1	28.1	30.2	32.2							9
10				19.6	22.2	24.7	27.2	29.8	32.3	34.9	37.4	39.9							10
11				23.9	27.0	30.0	33.1	36.2	39.2	42.3	45.4	48.5							11
12				28.6	32.2	35.9	39.5	43.2	46.8	50.5	54.1	57.8							12
13					42.2	46.5	50.8	55.1	59.4	63.6	67.9	72.2	76.5						13
14					49.1	54.0	59.0	64.0	68.9	73.9	78.9	83.9	88.8						14
15					56.4	62.1	67.8	73.5	79.2	84.9	90.7	96.4	102.1						15
16					64.3	70.8	77.3	83.8	90.2	96.7	103.2	109.7	116.2						16
17					72.6	80.0	87.3	94.6	102.0	109.3	116.6	124.0	131.3						17
18							98.0	106.2	114.4	122.6	130.8	139.1	147.3	155.5	163.7	171.9	180.1		18
19							109.2	118.4	127.5	136.7	145.8	155.0	164.2	173.3	182.5	191.6	200.8		19
20							121.1	131.2	141.4	151.5	161.7	171.8	182.0	192.1	202.3	212.4	222.5		20
21							133.6	144.8	155.9	167.1	178.3	189.5	200.7	211.9	223.1	234.2	245.4		21
22							146.7	158.9	171.2	183.5	195.8	208.0	220.3	232.6	244.9	257.1	269.4		22
23									187.2	200.6	214.0	227.4	240.9	254.3	267.7	281.1	294.5		23
24									203.9	218.5	233.1	247.7	262.3	276.9	291.5	306.1	320.8		24
25									221.3	237.1	253.0	268.8	284.7	300.5	316.4	332.2	348.1		25
26									239.4	256.5	273.7	290.8	308.0	325.1	342.3	359.4	376.6		26
27									258.2	276.7	295.2	313.7	332.2	350.7	369.2	387.6	406.1		27
28											317.5	337.4	357.3	377.2	397.1	416.9	436.8		28
29											340.6	362.0	383.3	404.6	426.0	447.3	468.6		29
30											364.6	387.4	410.2	433.1	455.9	478.7	501.6		30
31											389.3	413.7	438.1	462.5	486.8	511.2	535.6		31
32											414.9	440.9	466.9	492.8	518.8	544.8	570.7		32
33													496.5	524.2	551.8	579.4	607.0		33
34														527.1	556.4	585.8	615.1	644.4	34
35														558.6	589.7	620.8	651.8	682.9	35
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Frassini  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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20																			20
21																			21
22																			22
23	307.9	321.4																	23
24	335.4	350.0																	24
25	364.0	379.8																	25
26	393.7	410.9																	26
27	424.6	443.1																	27
28	456.7	476.6	496.5	516.4															28
29	490.0	511.3	532.6	554.0															29
30	524.4	547.2	570.0	592.9															30
31	560.0	584.3	608.7	633.1															31
32	596.7	622.7	648.7	674.6															32
33	634.6	662.3	689.9	717.5															33
34	673.7	703.0	732.4	761.7															34
35	714.0	745.0	776.1	807.2															35
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Frassini  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.6	3.8	4.0	4.2	4.3	4.5	4.7	4.8											5
6	4.0	4.3	4.5	4.8	5.0	5.3	5.5	5.7											6
7	4.5	4.8	5.1	5.5	5.8	6.1	6.5	6.8											7
8				6.3	6.7	7.2	7.6	8.1	8.5	8.9	9.4	9.8							8
9				7.2	7.8	8.3	8.9	9.5	10.0	10.6	11.1	11.7							9
10				8.3	9.0	9.6	10.3	11.0	11.7	12.4	13.1	13.8							10
11				9.4	10.3	11.1	11.9	12.7	13.6	14.4	15.2	16.1							11
12				10.7	11.7	12.7	13.7	14.6	15.6	16.6	17.6	18.6							12
13					14.4	15.5	16.7	17.9	19.0	20.2	21.3	22.5	23.7						13
14					16.2	17.6	18.9	20.3	21.6	23.0	24.3	25.6	27.0						14
15					18.2	19.8	21.3	22.9	24.4	25.9	27.5	29.0	30.6						15
16					20.3	22.1	23.9	25.6	27.4	29.1	30.9	32.6	34.4						16
17					22.6	24.6	26.6	28.6	30.5	32.5	34.5	36.5	38.5						17
18							29.5	31.7	33.9	36.1	38.3	40.6	42.8	45.0	47.2	49.5	51.7		18
19							32.5	35.0	37.5	39.9	42.4	44.9	47.4	49.8	52.3	54.8	57.3		19
20							35.7	38.5	41.2	43.9	46.7	49.4	52.2	54.9	57.7	60.4	63.2		20
21							39.1	42.1	45.1	48.2	51.2	54.2	57.2	60.3	63.3	66.3	69.3		21
22							42.6	45.9	49.3	52.6	55.9	59.2	62.5	65.9	69.2	72.5	75.8		22
23									53.6	57.2	60.8	64.5	68.1	71.7	75.4	79.0	82.6		23
24									58.1	62.1	66.0	70.0	73.9	77.9	81.8	85.8	89.7		24
25									62.8	67.1	71.4	75.7	80.0	84.2	88.5	92.8	97.1		25
26									67.7	72.3	77.0	81.6	86.3	90.9	95.5	100.2	104.8		26
27									72.8	77.8	82.8	87.8	92.8	97.8	102.8	107.8	112.8		27
28											88.8	94.2	99.6	105.0	110.3	115.7	121.1		28
29											95.1	100.9	106.6	112.4	118.2	123.9	129.7		29
30											101.6	107.7	113.9	120.1	126.3	132.4	138.6		30
31											108.3	114.9	121.4	128.0	134.6	141.2	147.8		31
32											115.2	122.2	129.2	136.2	143.3	150.3	157.3		32
33											137.2	144.7	152.2	159.7	167.1				33
34													145.5	153.5	161.4	169.3	177.2		34
35													154.0	162.4	170.8	179.3	187.7		35
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Frassini  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	86.2	89.9																	23
24	93.7	97.6																	24
25	101.4	105.7																	25
26	109.4	114.1																	26
27	117.8	122.8																	27
28	126.5	131.9	137.2	142.6															28
29	135.5	141.2	147.0	152.8															29
30	144.8	151.0	157.1	163.3															30
31	154.4	161.0	167.6	174.2															31
32	164.3	171.4	178.4	185.4															32
33	174.6	182.1	189.5	197.0															33
34	185.2	193.1	201.0	209.0															34
35	196.1	204.5	212.9	221.3															35
36																			36
37																			37
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Frassini  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3											5
6	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4											6
7	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5											7
8				0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8							8
9				0.5	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0							9
10				0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2							10
11				0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5							11
12				0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7							12
13						1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.1	2.3					13
14						1.5	1.6	1.8	1.9	2.0	2.2	2.3	2.5	2.6					14
15						1.7	1.9	2.0	2.2	2.3	2.5	2.7	2.8	3.0					15
16						1.9	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4					16
17						2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8					17
18								2.9	3.1	3.3	3.6	3.8	4.1	4.3	4.5	4.8	5.0	5.2	18
19								3.2	3.5	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.6	5.8	19
20								3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.4	20
21								3.9	4.2	4.5	4.9	5.2	5.5	5.8	6.1	6.5	6.8	7.1	21
22								4.3	4.6	5.0	5.3	5.7	6.0	6.4	6.7	7.1	7.4	7.8	22
23										5.4	5.8	6.2	6.6	7.0	7.4	7.7	8.1	8.5	23
24										5.9	6.3	6.7	7.2	7.6	8.0	8.4	8.8	9.3	24
25										6.4	6.9	7.3	7.8	8.2	8.7	9.1	9.6	10.0	25
26										6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.4	10.8	26
27										7.5	8.0	8.5	9.1	9.6	10.1	10.6	11.2	11.7	27
28												9.2	9.7	10.3	10.9	11.4	12.0	12.6	28
29												9.8	10.4	11.0	11.7	12.3	12.9	13.5	29
30												10.5	11.2	11.8	12.5	13.1	13.8	14.4	30
31												11.2	11.9	12.6	13.3	14.0	14.7	15.4	31
32												11.9	12.7	13.4	14.2	14.9	15.7	16.4	32
33														14.3	15.1	15.9	16.7	17.4	33
34														15.2	16.0	16.8	17.7	18.5	34
35														16.1	16.9	17.8	18.7	19.6	35
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Frassini  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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22																			22
23	8.9	9.3																	23
24	9.7	10.1																	24
25	10.5	10.9																	25
26	11.3	11.8																	26
27	12.2	12.8																	27
28	13.1	13.7	14.3	14.8															28
29	14.1	14.7	15.3	15.9															29
30	15.1	15.7	16.4	17.0															30
31	16.1	16.8	17.5	18.2															31
32	17.1	17.9	18.6	19.4															32
33	18.2	19.0	19.8	20.6															33
34	19.4	20.2	21.0	21.9															34
35	20.5	21.4	22.3	23.2															35
36																			36
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Frassini  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	6.3	7.1	8.0	8.8	9.6	10.4	11.3	12.1											5
6	8.1	9.3	10.5	11.7	12.9	14.1	15.2	16.4											6
7	10.3	11.9	13.5	15.1	16.7	18.3	19.9	21.6											7
8				19.1	21.2	23.3	25.4	27.5	29.6	31.7	33.8	35.9							8
9				23.5	26.2	28.9	31.5	34.2	36.9	39.6	42.2	44.9							9
10				28.5	31.8	35.1	38.4	41.7	45.0	48.3	51.6	54.9							10
11				34.1	38.1	42.1	46.0	50.0	54.0	58.0	62.0	66.0							11
12				40.1	44.9	49.6	54.4	59.1	63.9	68.6	73.4	78.1							12
13					57.9	63.4	69.0	74.6	80.1	85.7	91.3	96.9	102.4						13
14						66.8	73.2	79.7	86.1	92.6	99.1	105.5	112.0	118.4					14
15							76.3	83.7	91.2	98.6	106.0	113.4	120.8	128.2	135.6				15
16							86.5	95.0	103.4	111.8	120.3	128.7	137.1	145.6	154.0				16
17							97.4	106.9	116.5	126.0	135.5	145.0	154.5	164.1	173.6				17
18								130.3	141.0	151.6	162.3	173.0	183.7	194.3	205.0	215.7	226.4	237.0	18
19								144.9	156.8	168.7	180.6	192.5	204.4	216.3	228.2	240.1	252.0	263.9	19
20								160.3	173.5	186.7	199.9	213.1	226.2	239.4	252.6	265.8	279.0	292.1	20
21								176.6	191.1	205.6	220.1	234.7	249.2	263.7	278.3	292.8	307.3	321.9	21
22								193.6	209.5	225.5	241.4	257.3	273.3	289.2	305.2	321.1	337.1	353.0	22
23										246.2	263.6	281.1	298.5	315.9	333.4	350.8	368.2	385.6	23
24										267.9	286.9	305.8	324.8	343.8	362.8	381.8	400.7	419.7	24
25										290.5	311.1	331.7	352.3	372.9	393.5	414.1	434.6	455.2	25
26										314.0	336.3	358.6	380.8	403.1	425.4	447.7	469.9	492.2	26
27										338.5	362.5	386.5	410.5	434.5	458.6	482.6	506.6	530.6	27
28												415.5	441.3	467.2	493.0	518.8	544.7	570.5	28
29												445.6	473.3	501.0	528.7	556.4	584.1	611.8	29
30												476.7	506.3	536.0	565.6	595.3	624.9	654.6	30
31												508.8	540.5	572.1	603.8	635.5	667.1	698.8	31
32												542.0	575.8	609.5	643.2	677.0	710.7	744.5	32
33													648.1	683.9	719.8	755.7	791.6	827.5	33
34														687.8	725.9	764.0	802.1	840.1	34
35														728.7	769.1	809.4	849.8	890.2	35
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Frassini  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	403.1	420.5																	23
24	438.7	457.7																	24
25	475.8	496.4																	25
26	514.5	536.8																	26
27	554.6	578.7																	27
28	596.3	622.2	648.0	673.8															28
29	639.5	667.2	694.9	722.7															29
30	684.2	713.9	743.5	773.2															30
31	730.5	762.1	793.8	825.5															31
32	778.2	811.9	845.7	879.4															32
33	827.5	863.3	899.2	935.1															33
34	878.2	916.3	954.4	992.5															34
35	930.5	970.9	1 011.3	1 051.6															35
36																			36
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Quercus cerris* L.**

**Cerro**

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## Cerro

### Volume del fusto e dei rami grossi

$n = 88$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-4.3221 \cdot 10^{-2} \quad 3.8079 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 4.5573 \cdot 10^{-1} & \\ -1.8540 \cdot 10^{-4} & 3.6935 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 2.5866 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 88$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-1.3658 \quad 2.5533 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 2.3325 \cdot 10^{-1} & \\ -9.4891 \cdot 10^{-5} & 1.8904 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_*^2 = 1.3238 \cdot 10^{-5}$$

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 88$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.7649 \quad 4.5457 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.4525 \cdot 10^{-1} & \\ -5.9089 \cdot 10^{-5} & 1.1772 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 8.2437 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 88$        $p = 2$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [1.1733 \cdot 10^{-1} \quad 6.7201 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.7517 \cdot 10^{-3} & \\ -1.1195 \cdot 10^{-6} & 2.2302 \cdot 10^{-9} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.5618 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 88$        $p = 2$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [5.1651 \cdot 10^{-1} \quad 3.0751 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 4.9006 \cdot 10^{-1} & \\ -1.9937 \cdot 10^{-4} & 3.9718 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.7814 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$



**Cerro**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.7	5.7	6.6	7.6															5
6	6.8	8.2	9.6	10.9															6
7	9.3	11.2	13.0	14.9															7
8	12.1	14.6	17.0	19.5	21.9	24.3	26.8	29.2											8
9	15.4	18.5	21.5	24.6	27.7	30.8	33.9	37.0											9
10	19.0	22.8	26.6	30.4	34.2	38.0	41.8	45.7											10
11	23.0	27.6	32.2	36.8	41.4	46.0	50.6	55.2	59.9	64.5	69.1								11
12	27.4	32.9	38.3	43.8	49.3	54.8	60.3	65.8	71.2	76.7	82.2								12
13				51.4	57.9	64.3	70.7	77.2	83.6	90.1	96.5	102.9							13
14				59.7	67.1	74.6	82.1	89.5	97.0	104.4	111.9	119.4							14
15				68.5	77.1	85.6	94.2	102.8	111.3	119.9	128.5	137.0							15
16				77.9	87.7	97.4	107.2	116.9	126.7	136.4	146.2	155.9							16
17				88.0	99.0	110.0	121.0	132.0	143.0	154.0	165.0	176.0	187.0	198.0	209.0	220.1	231.1	242.1	17
18								148.0	160.3	172.7	185.0	197.4	209.7	222.0	234.4	246.7	259.0	271.4	18
19								164.9	178.7	192.4	206.2	219.9	233.6	247.4	261.1	274.9	288.6	302.4	19
20								182.7	198.0	213.2	228.4	243.7	258.9	274.1	289.4	304.6	319.8	335.1	20
21								201.5	218.3	235.1	251.8	268.6	285.4	302.2	319.0	335.8	352.6	369.4	21
22								221.1	239.5	258.0	276.4	294.8	313.3	331.7	350.1	368.6	387.0	405.4	22
23										282.0	302.1	322.3	342.4	362.5	382.7	402.8	423.0	443.1	23
24										307.0	329.0	350.9	372.8	394.8	416.7	438.6	460.6	482.5	24
25										333.1	356.9	380.7	404.5	428.3	452.1	475.9	499.7	523.5	25
26										360.3	386.1	411.8	437.6	463.3	489.0	514.8	540.5	566.3	26
27										388.6	416.4	444.1	471.9	499.6	527.4	555.1	582.9	610.7	27
28												477.6	507.5	537.3	567.2	597.0	626.9	656.7	28
29												512.3	544.4	576.4	608.4	640.4	672.5	704.5	29
30												548.3	582.6	616.8	651.1	685.4	719.6	753.9	30
31												585.5	622.1	658.6	695.2	731.8	768.4	805.0	31
32												623.8	662.8	701.8	740.8	779.8	818.8	857.8	32
33														746.4	787.8	829.3	870.8	912.3	33
34														792.3	836.3	880.3	924.4	968.4	34
35														839.6	886.2	932.9	979.5	1 026.2	35
36														888.3	937.6	987.0	1 036.3	1 085.7	36
37														938.3	990.4	1 042.6	1 094.7	1 146.8	37
38														989.7	1 044.7	1 099.7	1 154.7	1 209.7	38
39														1 042.5	1 100.4	1 158.3	1 216.2	1 274.2	39
40														1 096.6	1 157.6	1 218.5	1 279.4	1 340.3	40
41														1 152.2	1 216.2	1 280.2	1 344.2	1 408.2	41
42														1 209.0	1 276.2	1 343.4	1 410.6	1 477.7	42
43																1 408.1	1 478.5	1 548.9	43
44																1 474.4	1 548.1	1 621.8	44
45																1 542.2	1 619.3	1 696.4	45
46																1 611.5	1 692.0	1 772.6	46
47																1 682.3	1 766.4	1 850.5	47
48																1 754.6	1 842.4	1 930.1	48
49																1 828.5	1 919.9	2 011.4	49
50																1 903.9	1 999.1	2 094.3	50
51																1 980.8	2 079.9	2 178.9	51
52																2 059.3	2 162.2	2 265.2	52
53																2 139.2	2 246.2	2 353.2	53
54																2 220.7	2 331.8	2 442.8	54
55																2 303.7	2 418.9	2 534.1	55
56																			56
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cerro  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	463.3	483.4																	23
24	504.4	526.4																	24
25	547.3	571.1																	25
26	592.0	617.8																	26
27	638.4	666.2																	27
28	686.6	716.5	746.3	776.2	806.0	835.9													28
29	736.5	768.5	800.6	832.6	864.6	896.6													29
30	788.2	822.5	856.7	891.0	925.3	959.5													30
31	841.6	878.2	914.8	951.4	988.0	1 024.6													31
32	896.8	935.8	974.8	1 013.8	1 052.8	1 091.8													32
33	953.7	995.2	1 036.7	1 078.1	1 119.6	1 161.1	1 202.5	1 244.0											33
34	1 012.4	1 056.4	1 100.4	1 144.5	1 188.5	1 232.5	1 276.5	1 320.5											34
35	1 072.8	1 119.5	1 166.1	1 212.8	1 259.4	1 306.1	1 352.7	1 399.4											35
36	1 135.0	1 184.4	1 233.7	1 283.1	1 332.4	1 381.8	1 431.1	1 480.5											36
37	1 199.0	1 251.1	1 303.2	1 355.3	1 407.5	1 459.6	1 511.7	1 563.9											37
38	1 264.6	1 319.6	1 374.6	1 429.6	1 484.6	1 539.6	1 594.6	1 649.5											38
39	1 332.1	1 390.0	1 447.9	1 505.8	1 563.7	1 621.7	1 679.6	1 737.5											39
40	1 401.3	1 462.2	1 523.1	1 584.0	1 645.0	1 705.9	1 766.8	1 827.7											40
41	1 472.2	1 536.2	1 600.2	1 664.2	1 728.2	1 792.3	1 856.3	1 920.3											41
42	1 544.9	1 612.1	1 679.2	1 746.4	1 813.6	1 880.8	1 947.9	2 015.1											42
43	1 619.3	1 689.8	1 760.2	1 830.6	1 901.0	1 971.4	2 041.8	2 112.2											43
44	1 695.5	1 769.3	1 843.0	1 916.7	1 990.4	2 064.1	2 137.9	2 211.6											44
45	1 773.5	1 850.6	1 927.7	2 004.8	2 081.9	2 159.0	2 236.1	2 313.3											45
46	1 853.2	1 933.8	2 014.3	2 094.9	2 175.5	2 256.1	2 336.6	2 417.2											46
47	1 934.6	2 018.8	2 102.9	2 187.0	2 271.1	2 355.2	2 439.3	2 523.5											47
48	2 017.8	2 105.6	2 193.3	2 281.0	2 368.8	2 456.5	2 544.2	2 632.0											48
49	2 102.8	2 194.2	2 285.6	2 377.1	2 468.5	2 559.9	2 651.4	2 742.8											49
50	2 189.5	2 284.7	2 379.9	2 475.1	2 570.3	2 665.5	2 760.7	2 855.9											50
51	2 278.0	2 377.0	2 476.0	2 575.1	2 674.1	2 773.2	2 872.2	2 971.3											51
52	2 368.2	2 471.1	2 574.1	2 677.1	2 780.0	2 883.0	2 986.0	3 088.9											52
53	2 460.1	2 567.1	2 674.1	2 781.0	2 888.0	2 994.9	3 101.9	3 208.9											53
54	2 553.8	2 664.9	2 775.9	2 887.0	2 998.0	3 109.0	3 220.1	3 331.1											54
55	2 649.3	2 764.5	2 879.7	2 994.9	3 110.1	3 225.2	3 340.4	3 455.6											55
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cerro  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	1.8	2.5	3.1	3.7															5
6	3.2	4.1	5.1	6.0															6
7	4.9	6.1	7.4	8.6															7
8	6.8	8.4	10.1	11.7	13.3	15.0	16.6	18.2											8
9	9.0	11.0	13.1	15.2	17.2	19.3	21.4	23.5											9
10	11.4	14.0	16.5	19.1	21.6	24.2	26.7	29.3											10
11	14.1	17.2	20.3	23.4	26.4	29.5	32.6	35.7	38.8	41.9	45.0								11
12	17.0	20.7	24.4	28.0	31.7	35.4	39.1	42.8	46.4	50.1	53.8								12
13				33.2	37.5	41.8	46.1	50.4	54.7	59.0	63.4	67.7							13
14				38.7	43.7	48.7	53.7	58.7	63.7	68.7	73.7	78.7							14
15				44.6	50.3	56.1	61.8	67.6	73.3	79.1	84.8	90.6							15
16				50.9	57.5	64.0	70.5	77.1	83.6	90.1	96.7	103.2							16
17				57.7	65.0	72.4	79.8	87.2	94.6	101.9	109.3	116.7	124.1	131.5	138.8	146.2	153.6	161.0	17
18								97.9	106.2	114.5	122.7	131.0	139.3	147.5	155.8	164.1	172.4	180.6	18
19								109.2	118.5	127.7	136.9	146.1	155.3	164.5	173.8	183.0	192.2	201.4	19
20								121.2	131.4	141.6	151.8	162.0	172.3	182.5	192.7	202.9	213.1	223.3	20
21								133.8	145.0	156.3	167.5	178.8	190.1	201.3	212.6	223.8	235.1	246.4	21
22								146.9	159.3	171.6	184.0	196.4	208.7	221.1	233.4	245.8	258.2	270.5	22
23										187.7	201.2	214.7	228.3	241.8	255.3	268.8	282.3	295.8	23
24										204.5	219.2	233.9	248.7	263.4	278.1	292.8	307.5	322.2	24
25										222.0	238.0	254.0	269.9	285.9	301.8	317.8	333.8	349.7	25
26										240.3	257.5	274.8	292.1	309.3	326.6	343.8	361.1	378.4	26
27										259.2	277.8	296.5	315.1	333.7	352.3	370.9	389.5	408.1	27
28												318.9	338.9	359.0	379.0	399.0	419.0	439.0	28
29												342.2	363.7	385.2	406.6	428.1	449.6	471.0	29
30												366.3	389.3	412.3	435.2	458.2	481.2	504.2	30
31												391.2	415.8	440.3	464.8	489.4	513.9	538.5	31
32												417.0	443.1	469.3	495.4	521.6	547.7	573.8	32
33												499.1	526.9	554.7	582.5	610.4	638.2	666.0	33
34												529.9	559.4	589.0	618.5	648.0	677.5	707.0	34
35												561.6	592.9	624.2	655.5	686.7	717.9	749.1	35
36												594.3	627.4	660.4	693.5	726.6	759.7	792.8	36
37												627.8	662.8	697.7	732.7	767.6	802.5	837.4	37
38												662.3	699.2	736.0	772.9	809.8	846.6	883.4	38
39												697.7	736.5	775.3	814.2	853.0	891.8	930.6	39
40												734.0	774.8	815.7	856.5	897.4	938.2	979.0	40
41												771.2	814.1	857.1	900.0	942.9	985.7	1028.5	41
42												809.4	854.4	899.4	944.5	989.5	1034.5	1079.5	42
43														942.8	990.1	1 037.3	1 084.6	1 131.9	43
44														987.3	1 036.7	1 086.1	1 135.5	1 184.9	44
45														1 032.7	1 084.4	1 136.1	1 187.8	1 239.5	45
46														1 079.2	1 133.2	1 187.2	1 241.2	1 295.1	46
47														1 126.7	1 183.1	1 239.5	1 295.9	1 352.2	47
48														1 175.2	1 234.0	1 292.9	1 351.7	1 410.5	48
49														1 224.7	1 286.0	1 347.3	1 408.5	1 469.7	49
50														1 275.3	1 339.1	1 402.9	1 466.6	1 530.3	50
51														1 326.9	1 393.3	1 459.7	1 526.0	1 592.3	51
52														1 379.5	1 448.5	1 517.5	1 586.4	1 655.3	52
53														1 433.1	1 504.8	1 576.5	1 648.1	1 719.7	53
54														1 487.7	1 562.2	1 636.6	1 710.9	1 785.2	54
55														1 543.4	1 620.6	1 697.9	1 775.0	1 852.1	55
56																			56
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cerro  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	309.3	322.8																	23
24	336.9	351.6																	24
25	365.7	381.6																	25
26	395.6	412.9																	26
27	426.7	445.4																	27
28	459.0	479.1	499.1	519.1	539.1	559.1													28
29	492.5	514.0	535.5	556.9	578.4	599.9													29
30	527.2	550.1	573.1	596.1	619.1	642.1													30
31	563.0	587.5	612.1	636.6	661.1	685.7													31
32	600.0	626.1	652.3	678.4	704.6	730.7													32
33	638.2	666.0	693.8	721.6	749.4	777.2	805.0	832.8											33
34	677.5	707.0	736.5	766.1	795.6	825.1	854.6	884.1											34
35	718.0	749.3	780.6	811.9	843.1	874.4	905.7	937.0											35
36	759.7	792.8	825.9	859.0	892.1	925.2	958.3	991.4											36
37	802.6	837.5	872.5	907.5	942.4	977.4	1 012.3	1 047.3											37
38	846.6	883.5	920.4	957.2	994.1	1 031.0	1 067.9	1 104.7											38
39	891.9	930.7	969.5	1 008.4	1 047.2	1 086.0	1 124.9	1 163.7											39
40	938.2	979.1	1 020.0	1 060.8	1 101.7	1 142.5	1 183.4	1 224.2											40
41	985.8	1 028.7	1 071.7	1 114.6	1 157.5	1 200.4	1 243.3	1 286.3											41
42	1 034.6	1 079.6	1 124.6	1 169.7	1 214.7	1 259.8	1 304.8	1 349.8											42
43	1 084.5	1 131.7	1 178.9	1 226.1	1 273.3	1 320.5	1 367.7	1 414.9											43
44	1 135.6	1 185.0	1 234.4	1 283.9	1 333.3	1 382.7	1 432.2	1 481.6											44
45	1 187.8	1 239.5	1 291.2	1 342.9	1 394.7	1 446.4	1 498.1	1 549.8											45
46	1 241.3	1 295.3	1 349.3	1 403.4	1 457.4	1 511.4	1 565.4	1 619.5											46
47	1 295.9	1 352.3	1 408.7	1 465.1	1 521.5	1 577.9	1 634.3	1 690.7											47
48	1 351.7	1 410.5	1 469.3	1 528.2	1 587.0	1 645.8	1 704.6	1 763.5											48
49	1 408.6	1 469.9	1 531.3	1 592.6	1 653.9	1 715.2	1 776.5	1 837.8											49
50	1 466.8	1 530.6	1 594.4	1 658.3	1 722.1	1 785.9	1 849.8	1 913.6											50
51	1 526.1	1 592.5	1 658.9	1 725.3	1 791.7	1 858.2	1 924.6	1 991.0											51
52	1 586.6	1 655.6	1 724.7	1 793.7	1 862.7	1 931.8	2 000.8	2 069.9											52
53	1 648.2	1 720.0	1 791.7	1 863.4	1 935.1	2 006.9	2 078.6	2 150.3											53
54	1 711.1	1 785.5	1 860.0	1 934.4	2 008.9	2 083.4	2 157.8	2 232.3											54
55	1 775.1	1 852.3	1 929.6	2 006.8	2 084.0	2 161.3	2 238.5	2 315.8											55
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cerro  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.3	2.4	2.6	2.7															5
6	2.6	2.7	2.9	3.1															6
7	2.9	3.1	3.3	3.5															7
8	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3											8
9	3.6	4.0	4.3	4.7	5.1	5.4	5.8	6.2											9
10	4.0	4.5	4.9	5.4	5.9	6.3	6.8	7.2											10
11	4.5	5.1	5.6	6.2	6.7	7.3	7.8	8.4	8.9	9.5	10.0								11
12	5.0	5.7	6.3	7.0	7.7	8.3	9.0	9.6	10.3	10.9	11.6								12
13				7.9	8.7	9.4	10.2	11.0	11.8	12.5	13.3	14.1							13
14				8.9	9.8	10.7	11.6	12.5	13.3	14.2	15.1	16.0							14
15				9.9	11.0	12.0	13.0	14.0	15.1	16.1	17.1	18.1							15
16				11.1	12.2	13.4	14.6	15.7	16.9	18.1	19.2	20.4							16
17				12.3	13.6	14.9	16.2	17.5	18.8	20.2	21.5	22.8	24.1	25.4	26.7	28.0	29.4	30.7	17
18								19.4	20.9	22.4	23.9	25.3	26.8	28.3	29.7	31.2	32.7	34.2	18
19								21.5	23.1	24.7	26.4	28.0	29.7	31.3	32.9	34.6	36.2	37.9	19
20								23.6	25.4	27.2	29.0	30.9	32.7	34.5	36.3	38.1	39.9	41.8	20
21								25.8	27.8	29.8	31.8	33.8	35.8	37.8	39.9	41.9	43.9	45.9	21
22								28.2	30.4	32.6	34.8	37.0	39.2	41.4	43.6	45.8	48.0	50.2	22
23										35.4	37.8	40.2	42.6	45.0	47.5	49.9	52.3	54.7	23
24										38.4	41.0	43.7	46.3	48.9	51.5	54.1	56.7	59.4	24
25										41.5	44.4	47.2	50.1	52.9	55.7	58.6	61.4	64.3	25
26										44.8	47.9	50.9	54.0	57.1	60.1	63.2	66.3	69.4	26
27										48.2	51.5	54.8	58.1	61.4	64.7	68.0	71.4	74.7	27
28												58.8	62.3	65.9	69.5	73.0	76.6	80.2	28
29												62.9	66.8	70.6	74.4	78.2	82.0	85.9	29
30												67.2	71.3	75.4	79.5	83.6	87.7	91.8	30
31												71.7	76.0	80.4	84.8	89.1	93.5	97.9	31
32												76.2	80.9	85.6	90.2	94.9	99.5	104.2	32
33														90.9	95.8	100.8	105.7	110.7	33
34														96.4	101.6	106.9	112.1	117.4	34
35														102.0	107.6	113.1	118.7	124.3	35
36														107.8	113.7	119.6	125.5	131.4	36
37														113.8	120.0	126.2	132.4	138.7	37
38														119.9	126.5	133.0	139.6	146.2	38
39														126.2	133.1	140.0	147.0	153.9	39
40														132.7	140.0	147.2	154.5	161.8	40
41														139.3	147.0	154.6	162.2	169.9	41
42														146.1	154.1	162.1	170.2	178.2	42
43																169.9	178.3	186.7	43
44																177.8	186.6	195.4	44
45																185.9	195.1	204.3	45
46																194.1	203.8	213.4	46
47																202.6	212.6	222.7	47
48																211.2	221.7	232.2	48
49																220.0	231.0	241.9	49
50																229.0	240.4	251.8	50
51																238.2	250.1	261.9	51
52																247.6	259.9	272.2	52
53																257.1	269.9	282.7	53
54																266.9	280.1	293.4	54
55																276.8	290.5	304.3	55
56																			56
57																			57
58																			58
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cerro  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	57.1	59.5																	23
24	62.0	64.6																	24
25	67.1	70.0																	25
26	72.4	75.5																	26
27	78.0	81.3																	27
28	83.7	87.3	90.9	94.4	98.0	101.6													28
29	89.7	93.5	97.3	101.2	105.0	108.8													29
30	95.9	100.0	104.0	108.1	112.2	116.3													30
31	102.2	106.6	111.0	115.3	119.7	124.1													31
32	108.8	113.5	118.1	122.8	127.4	132.1													32
33	115.6	120.6	125.5	130.5	135.4	140.4	145.3	150.3											33
34	122.6	127.9	133.1	138.4	143.6	148.9	154.2	159.4											34
35	129.8	135.4	141.0	146.5	152.1	157.7	163.3	168.8											35
36	137.3	143.2	149.0	154.9	160.8	166.7	172.6	178.5											36
37	144.9	151.1	157.3	163.6	169.8	176.0	182.2	188.5											37
38	152.7	159.3	165.9	172.4	179.0	185.6	192.1	198.7											38
39	160.8	167.7	174.6	181.5	188.4	195.4	202.3	209.2											39
40	169.0	176.3	183.6	190.9	198.1	205.4	212.7	220.0											40
41	177.5	185.2	192.8	200.4	208.1	215.7	223.4	231.0											41
42	186.2	194.2	202.2	210.2	218.3	226.3	234.3	242.3											42
43	195.1	203.5	211.9	220.3	228.7	237.1	245.5	253.9											43
44	204.2	213.0	221.8	230.6	239.4	248.2	257.0	265.8											44
45	213.5	222.7	231.9	241.1	250.3	259.5	268.7	277.9											45
46	223.0	232.6	242.2	251.9	261.5	271.1	280.7	290.3											46
47	232.7	242.8	252.8	262.8	272.9	282.9	293.0	303.0											47
48	242.7	253.1	263.6	274.1	284.5	295.0	305.5	316.0											48
49	252.8	263.7	274.6	285.5	296.4	307.4	318.3	329.2											49
50	263.1	274.5	285.9	297.2	308.6	320.0	331.3	342.7											50
51	273.7	285.5	297.3	309.2	321.0	332.8	344.6	356.5											51
52	284.5	296.8	309.1	321.3	333.6	345.9	358.2	370.5											52
53	295.4	308.2	321.0	333.8	346.5	359.3	372.1	384.8											53
54	306.6	319.9	333.1	346.4	359.7	372.9	386.2	399.4											54
55	318.0	331.8	345.5	359.3	373.0	386.8	400.5	414.3											55
56																			56
57																			57
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Cerro  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.2	0.3															5
6	0.2	0.3	0.3	0.3															6
7	0.3	0.3	0.3	0.4															7
8	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6											8
9	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.8											9
10	0.5	0.5	0.6	0.7	0.7	0.8	0.9	0.9											10
11	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.3								11
12	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6								12
13				1.0	1.1	1.3	1.4	1.5	1.6	1.7	1.8	1.9							13
14				1.2	1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.2							14
15				1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4	2.5							15
16				1.5	1.7	1.8	2.0	2.2	2.4	2.5	2.7	2.9							16
17				1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	17
18								2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.3	4.5	4.7	4.9	18
19								3.0	3.3	3.5	3.8	4.0	4.2	4.5	4.7	5.0	5.2	5.5	19
20								3.3	3.6	3.9	4.1	4.4	4.7	5.0	5.2	5.5	5.8	6.0	20
21								3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.7	6.0	6.3	6.6	21
22								4.0	4.3	4.7	5.0	5.3	5.6	6.0	6.3	6.6	6.9	7.3	22
23										5.1	5.4	5.8	6.2	6.5	6.9	7.2	7.6	7.9	23
24										5.5	5.9	6.3	6.7	7.1	7.5	7.9	8.2	8.6	24
25										6.0	6.4	6.8	7.3	7.7	8.1	8.5	8.9	9.4	25
26										6.5	6.9	7.4	7.8	8.3	8.7	9.2	9.7	10.1	26
27										7.0	7.5	8.0	8.4	8.9	9.4	9.9	10.4	10.9	27
28												8.5	9.1	9.6	10.1	10.7	11.2	11.7	28
29												9.2	9.7	10.3	10.9	11.4	12.0	12.6	29
30												9.8	10.4	11.0	11.6	12.2	12.8	13.4	30
31												10.5	11.1	11.7	12.4	13.0	13.7	14.3	31
32												11.1	11.8	12.5	13.2	13.9	14.6	15.3	32
33														13.3	14.0	14.8	15.5	16.2	33
34														14.1	14.9	15.7	16.4	17.2	34
35														14.9	15.8	16.6	17.4	18.2	35
36														15.8	16.7	17.5	18.4	19.3	36
37														16.7	17.6	18.5	19.4	20.4	37
38														17.6	18.6	19.5	20.5	21.5	38
39														18.5	19.5	20.6	21.6	22.6	39
40														19.5	20.5	21.6	22.7	23.8	40
41														20.5	21.6	22.7	23.8	25.0	41
42														21.5	22.6	23.8	25.0	26.2	42
43																25.0	26.2	27.5	43
44																26.1	27.4	28.7	44
45																27.3	28.7	30.1	45
46																28.6	30.0	31.4	46
47																29.8	31.3	32.8	47
48																31.1	32.6	34.2	48
49																32.4	34.0	35.6	49
50																33.7	35.4	37.1	50
51																35.1	36.8	38.6	51
52																36.5	38.3	40.1	52
53																37.9	39.8	41.6	53
54																39.3	41.3	43.2	54
55																40.8	42.8	44.8	55
56																			56
57																			57
58																			58
59																			59
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cerro  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	8.3	8.6																	23
24	9.0	9.4																	24
25	9.8	10.2																	25
26	10.6	11.0																	26
27	11.4	11.9																	27
28	12.2	12.8	13.3	13.8	14.3	14.9													28
29	13.1	13.7	14.2	14.8	15.4	15.9													29
30	14.0	14.6	15.2	15.8	16.4	17.1													30
31	15.0	15.6	16.3	16.9	17.6	18.2													31
32	15.9	16.6	17.3	18.0	18.7	19.4													32
33	16.9	17.7	18.4	19.1	19.9	20.6	21.3	22.1											33
34	18.0	18.8	19.5	20.3	21.1	21.9	22.6	23.4											34
35	19.1	19.9	20.7	21.5	22.3	23.2	24.0	24.8											35
36	20.1	21.0	21.9	22.8	23.6	24.5	25.4	26.2											36
37	21.3	22.2	23.1	24.0	25.0	25.9	26.8	27.7											37
38	22.4	23.4	24.4	25.3	26.3	27.3	28.3	29.2											38
39	23.6	24.6	25.7	26.7	27.7	28.7	29.8	30.8											39
40	24.8	25.9	27.0	28.1	29.1	30.2	31.3	32.4											40
41	26.1	27.2	28.4	29.5	30.6	31.7	32.9	34.0											41
42	27.4	28.6	29.8	30.9	32.1	33.3	34.5	35.7											42
43	28.7	29.9	31.2	32.4	33.7	34.9	36.2	37.4											43
44	30.0	31.3	32.6	33.9	35.2	36.5	37.8	39.1											44
45	31.4	32.8	34.1	35.5	36.9	38.2	39.6	40.9											45
46	32.8	34.2	35.7	37.1	38.5	39.9	41.4	42.8											46
47	34.3	35.7	37.2	38.7	40.2	41.7	43.2	44.7											47
48	35.7	37.3	38.8	40.4	41.9	43.5	45.0	46.6											48
49	37.2	38.8	40.5	42.1	43.7	45.3	46.9	48.5											49
50	38.8	40.4	42.1	43.8	45.5	47.2	48.8	50.5											50
51	40.3	42.1	43.8	45.6	47.3	49.1	50.8	52.6											51
52	41.9	43.7	45.5	47.4	49.2	51.0	52.8	54.6											52
53	43.5	45.4	47.3	49.2	51.1	53.0	54.9	56.7											53
54	45.2	47.1	49.1	51.1	53.0	55.0	56.9	58.9											54
55	46.9	48.9	50.9	53.0	55.0	57.0	59.1	61.1											55
56																			56
57																			57
58																			58
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64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Cerro  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.4	5.1	5.9	6.7															5
6	6.1	7.2	8.3	9.4															6
7	8.1	9.6	11.1	12.6															7
8	10.4	12.3	14.3	16.3	18.2	20.2	22.2	24.1											8
9	13.0	15.5	18.0	20.4	22.9	25.4	27.9	30.4											9
10	15.9	19.0	22.0	25.1	28.2	31.3	34.3	37.4											10
11	19.1	22.8	26.6	30.3	34.0	37.7	41.4	45.2	48.9	52.6	56.3								11
12	22.7	27.1	31.5	35.9	40.4	44.8	49.2	53.7	58.1	62.5	66.9								12
13				42.1	47.3	52.5	57.7	62.9	68.1	73.3	78.5	83.7							13
14				48.7	54.8	60.8	66.8	72.8	78.9	84.9	90.9	97.0							14
15				55.9	62.8	69.7	76.6	83.5	90.5	97.4	104.3	111.2							15
16				63.5	71.4	79.2	87.1	95.0	102.9	110.7	118.6	126.5							16
17				71.6	80.5	89.4	98.3	107.2	116.0	124.9	133.8	142.7	151.6	160.5	169.4	178.3	187.1	196.0	17
18								120.1	130.0	140.0	150.0	159.9	169.9	179.9	189.8	199.8	209.7	219.7	18
19								133.7	144.8	155.9	167.0	178.1	189.2	200.3	211.4	222.5	233.6	244.7	19
20								148.1	160.4	172.7	185.0	197.3	209.6	221.9	234.2	246.5	258.8	271.1	20
21								163.3	176.8	190.4	203.9	217.5	231.1	244.6	258.2	271.7	285.3	298.9	21
22								179.1	194.0	208.9	223.8	238.7	253.5	268.4	283.3	298.2	313.1	328.0	22
23										228.3	244.5	260.8	277.1	293.3	309.6	325.9	342.1	358.4	23
24										248.5	266.2	283.9	301.6	319.3	337.1	354.8	372.5	390.2	24
25										269.6	288.8	308.0	327.2	346.5	365.7	384.9	404.1	423.3	25
26										291.5	312.3	333.1	353.9	374.7	395.5	416.3	437.1	457.8	26
27										314.4	336.8	359.2	381.6	404.0	426.4	448.9	471.3	493.7	27
28												386.3	410.4	434.5	458.6	482.7	506.8	530.9	28
29												414.3	440.2	466.0	491.9	517.7	543.6	569.5	29
30												443.3	471.0	498.7	526.4	554.0	581.7	609.4	30
31												473.3	502.9	532.4	562.0	591.6	621.1	650.7	31
32												504.3	535.8	567.3	598.8	630.3	661.8	693.3	32
33												603.3	636.8	670.3	703.8	737.2	770.7	804.2	33
34												640.4	675.9	711.5	747.0	782.6	818.1	853.7	34
35												678.6	716.2	753.9	791.6	829.3	867.0	904.7	35
36												717.9	757.7	797.6	837.4	877.3	917.1	957.0	36
37												758.3	800.4	842.5	884.6	926.7	968.8	1010.9	37
38												799.8	844.2	888.6	933.0	977.4	1021.8	1066.2	38
39												842.4	889.2	936.0	982.7	1029.5	1076.3	1123.1	39
40												886.1	935.3	984.5	1033.8	1083.0	1132.2	1181.4	40
41												931.0	982.7	1034.4	1086.1	1137.7	1189.4	1241.1	41
42												976.9	1031.2	1085.4	1139.7	1193.9	1248.2	1302.5	42
43														1137.7	1194.5	1251.4	1308.2	1365.0	43
44														1191.2	1250.7	1310.3	1370.0	1429.6	44
45														1245.9	1308.2	1370.5	1432.8	1495.1	45
46														1301.9	1367.0	1432.0	1497.0	1562.0	46
47														1359.1	1427.0	1495.0	1563.0	1631.0	47
48														1417.5	1488.4	1559.2	1630.0	1701.0	48
49														1477.2	1551.0	1624.8	1700.0	1775.0	49
50														1538.1	1614.9	1691.8	1770.0	1848.0	50
51														1600.2	1680.2	1760.2	1842.0	1924.0	51
52														1663.5	1746.7	1829.8	1915.0	2000.0	52
53														1728.1	1814.5	1900.9	1990.0	2080.0	53
54														1793.9	1883.6	1973.3	2066.0	2160.0	54
55														1861.0	1954.0	2047.0	2144.0	2240.0	55
56																			56
57																			57
58																			58
59																			59
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63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Cerro  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	374.7	390.9																	23
24	407.9	425.6																	24
25	442.6	461.8																	25
26	478.6	499.4																	26
27	516.1	538.5																	27
28	555.0	579.1	603.2	627.3	651.5	675.6													28
29	595.3	621.2	647.1	672.9	698.8	724.6													29
30	637.1	664.7	692.4	720.1	747.8	775.4													30
31	680.2	709.8	739.3	768.9	798.4	828.0													31
32	724.8	756.3	787.7	819.2	850.7	882.2													32
33	770.7	804.2	837.7	871.2	904.7	938.2	971.7	1 005.2											33
34	818.1	853.7	889.2	924.8	960.3	995.9	1 031.4	1 067.0											34
35	866.9	904.6	942.3	979.9	1 017.6	1 055.3	1 092.9	1 130.6											35
36	917.1	957.0	996.8	1 036.7	1 076.6	1 116.4	1 156.3	1 196.1											36
37	968.8	1 010.9	1 053.0	1 095.1	1 137.2	1 179.3	1 221.4	1 263.5											37
38	1 021.8	1 066.2	1 110.6	1 155.0	1 199.4	1 243.8	1 288.2	1 332.6											38
39	1 076.3	1 123.1	1 169.8	1 216.6	1 263.4	1 310.1	1 356.9	1 403.7											39
40	1 132.2	1 181.4	1 230.6	1 279.8	1 329.0	1 378.2	1 427.4	1 476.6											40
41	1 189.4	1 241.1	1 292.8	1 344.5	1 396.2	1 447.9	1 499.6	1 551.3											41
42	1 248.1	1 302.4	1 356.6	1 410.9	1 465.1	1 519.4	1 573.6	1 627.9											42
43	1 308.3	1 365.1	1 422.0	1 478.8	1 535.7	1 592.6	1 649.4	1 706.3											43
44	1 369.8	1 429.3	1 488.9	1 548.4	1 607.9	1 667.5	1 727.0	1 786.5											44
45	1 432.7	1 495.0	1 557.3	1 619.6	1 681.8	1 744.1	1 806.4	1 868.6											45
46	1 497.1	1 562.2	1 627.2	1 692.3	1 757.4	1 822.5	1 887.5	1 952.6											46
47	1 562.9	1 630.8	1 698.7	1 766.7	1 834.6	1 902.5	1 970.5	2 038.4											47
48	1 630.1	1 700.9	1 771.8	1 842.6	1 913.5	1 984.3	2 055.2	2 126.0											48
49	1 698.7	1 772.5	1 846.3	1 920.2	1 994.0	2 067.8	2 141.7	2 215.5											49
50	1 768.7	1 845.6	1 922.5	1 999.3	2 076.2	2 153.1	2 230.0	2 306.8											50
51	1 840.1	1 920.1	2 000.1	2 080.1	2 160.1	2 240.1	2 320.0	2 400.0											51
52	1 913.0	1 996.1	2 079.3	2 162.4	2 245.6	2 328.7	2 411.9	2 495.0											52
53	1 987.2	2 073.6	2 160.0	2 246.4	2 332.8	2 419.1	2 505.5	2 591.9											53
54	2 062.9	2 152.6	2 242.3	2 331.9	2 421.6	2 511.3	2 600.9	2 690.6											54
55	2 140.0	2 233.0	2 326.1	2 419.1	2 512.1	2 605.1	2 698.1	2 791.2											55
56																			56
57																			57
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Quercus ilex* L.**

**Leccio**

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## Leccio

### Volume del fusto e dei rami grossi

$n = 83$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.2219 \quad 3.9685 \cdot 10^{-2} \quad 6.2762 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 8.9968 & & \\ 4.6303 \cdot 10^{-3} & 3.9302 \cdot 10^{-6} & \\ -1.6058 & -9.3376 \cdot 10^{-4} & 3.0078 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 6.0915 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 83$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.6095 \quad 3.1220 \cdot 10^{-2} \quad 3.9794 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 3.6561 & & \\ 1.8816 \cdot 10^{-3} & 1.5971 \cdot 10^{-6} & \\ -6.5256 \cdot 10^{-1} & -3.7946 \cdot 10^{-4} & 1.2223 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 2.4754 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 83$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [8.3687 \quad 1.1971 \cdot 10^{-2} \quad -1.0175]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 5.0096 & & \\ 2.5782 \cdot 10^{-3} & 2.1884 \cdot 10^{-6} & \\ -8.9414 \cdot 10^{-1} & -5.1994 \cdot 10^{-4} & 1.6748 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.3919 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 83$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [3.9692 \cdot 10^{-1} \quad 1.0406 \cdot 10^{-3} \quad -9.1902 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.1895 \cdot 10^{-2} & & \\ 1.1268 \cdot 10^{-5} & 9.5646 \cdot 10^{-9} & \\ -3.9080 \cdot 10^{-3} & -2.2724 \cdot 10^{-6} & 7.3198 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.4824 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 83$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [6.1561 \quad 4.4232 \cdot 10^{-2} \quad -7.1143 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 1.0780 \cdot 10 & & \\ 5.5480 \cdot 10^{-3} & 4.7092 \cdot 10^{-6} & \\ -1.9241 & -1.1188 \cdot 10^{-3} & 3.6039 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 7.2989 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Leccio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6			11.5	13.0	14.4	15.8													6
7			15.8	17.7	19.7	21.6	23.6												7
8			20.6	23.1	25.7	28.2	30.7	33.3											8
9			25.9	29.1	32.4	35.6	38.8	42.0											9
10			31.8	35.8	39.8	43.7	47.7	51.7	55.6										10
11			38.3	43.1	47.9	52.7	57.5	62.3	67.1										11
12			45.3	51.0	56.7	62.5	68.2	73.9	79.6										12
13			52.9	59.6	66.3	73.0	79.7	86.4	93.1	99.8									13
14			61.0	68.8	76.6	84.3	92.1	99.9	107.7	115.5									14
15				78.6	87.6	96.5	105.4	114.3	123.3	132.2									15
16				89.1	99.3	109.4	119.6	129.7	139.9	150.1									16
17				100.2	111.7	123.1	134.6	146.1	157.5	169.0									17
18					137.7	150.5	163.4	176.2	189.1	201.9	214.8	227.7	240.5						18
19					153.0	167.3	181.6	195.9	210.3	224.6	238.9	253.2	267.6						19
20					169.1	184.9	200.8	216.7	232.6	248.4	264.3	280.2	296.1						20
21					186.0	203.5	221.0	238.5	256.0	273.5	291.0	308.5	326.0						21
22					203.7	222.9	242.1	261.3	280.5	299.7	318.9	338.1	357.3						22
23							264.1	285.1	306.1	327.1	348.1	369.1	390.1	411.1	432.1				23
24							287.1	310.0	332.9	355.7	378.6	401.4	424.3	447.2	470.0				24
25							311.1	335.9	360.7	385.5	410.3	435.1	459.9	484.7	509.5				25
26							336.0	362.8	389.7	416.5	443.3	470.2	497.0	523.8	550.6				26
27							361.9	390.8	419.7	448.7	477.6	506.5	535.5	564.4	593.3				27
28									450.9	482.0	513.2	544.3	575.4	606.5	637.6	668.7	699.8		28
29									483.2	516.6	550.0	583.4	616.7	650.1	683.5	716.9	750.2		29
30									516.6	552.4	588.1	623.8	659.5	695.2	730.9	766.7	802.4		30
31									551.2	589.3	627.4	665.6	703.7	741.8	780.0	818.1	856.3		31
32									586.8	627.4	668.1	708.7	749.3	790.0	830.6	871.2	911.9		32
33									623.5	666.7	710.0	753.2	796.4	839.6	882.8	926.0	969.3		33
34									661.4	707.3	753.1	799.0	844.9	890.8	936.6	982.5	1 028.4		34
35									700.3	749.0	797.6	846.2	894.8	943.4	992.0	1 040.6	1 089.3		35
36									740.4	791.8	843.3	894.7	946.1	997.6	1 049.0	1 100.4	1 151.9		36
37									781.6	835.9	890.3	944.6	998.9	1 053.2	1 107.6	1 161.9	1 216.2		37
38									823.9	881.2	938.5	995.8	1 053.1	1 110.4	1 167.7	1 225.0	1 282.3		38
39									867.3	927.7	988.0	1 048.4	1 108.8	1 169.1	1 229.5	1 289.8	1 350.2		39
40									911.8	975.3	1 038.8	1 102.3	1 165.8	1 229.3	1 292.8	1 356.3	1 419.8		40
41									957.5	1 024.2	1 090.9	1 157.6	1 224.3	1 291.0	1 357.7	1 424.4	1 491.1		41
42									1 004.2	1 074.2	1 144.2	1 214.2	1 284.2	1 354.2	1 424.2	1 494.2	1 564.2		42
43									1 052.1	1 125.4	1 198.8	1 272.2	1 345.6	1 418.9	1 492.3	1 565.7	1 639.1		43
44									1 101.0	1 177.8	1 254.7	1 331.5	1 408.3	1 485.2	1 562.0	1 638.8	1 715.7		44
45									1 151.1	1 231.5	1 311.8	1 392.2	1 472.5	1 552.9	1 633.3	1 713.6	1 794.0		45
46									1 202.3	1 286.3	1 370.2	1 454.2	1 538.2	1 622.1	1 706.1	1 790.1	1 874.1		46
47									1 254.6	1 342.2	1 429.9	1 517.6	1 605.2	1 692.9	1 780.6	1 868.2	1 955.9		47
48									1 308.0	1 399.4	1 490.9	1 582.3	1 673.7	1 765.2	1 856.6	1 948.0	2 039.5		48
49									1 362.5	1 457.8	1 553.1	1 648.4	1 743.6	1 838.9	1 934.2	2 029.5	2 124.8		49
50									1 418.1	1 517.3	1 616.6	1 715.8	1 815.0	1 914.2	2 013.4	2 112.6	2 211.8		50
51									1 474.9	1 578.1	1 681.3	1 784.5	1 887.8	1 991.0	2 094.2	2 197.4	2 300.6		51
52									1 532.7	1 640.0	1 747.3	1 854.7	1 962.0	2 069.3	2 176.6	2 283.9	2 391.2		52
53									1 591.7	1 703.2	1 814.6	1 926.1	2 037.6	2 149.1	2 260.5	2 372.0	2 483.5		53
54									1 651.8	1 767.5	1 883.2	1 998.9	2 114.7	2 230.4	2 346.1	2 461.8	2 577.5		54
55									1 713.0	1 833.0	1 953.1	2 073.1	2 193.1	2 313.2	2 433.2	2 553.3	2 673.3		55
56																			56
57																			57
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Leccio  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Leccio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6			7.6	8.8	9.9	11.0													6
7			10.9	12.4	13.9	15.5	17.0												7
8			14.6	16.6	18.6	20.6	22.6	24.6											8
9			18.7	21.2	23.7	26.3	28.8	31.3											9
10			23.2	26.3	29.5	32.6	35.7	38.8	42.0										10
11			28.2	32.0	35.8	39.5	43.3	47.1	50.9										11
12			33.6	38.1	42.6	47.1	51.6	56.1	60.6										12
13			39.5	44.8	50.0	55.3	60.6	65.9	71.2	76.4									13
14			45.8	51.9	58.0	64.2	70.3	76.4	82.5	88.6									14
15				59.6	66.6	73.6	80.6	87.7	94.7	101.7									15
16				67.7	75.7	83.7	91.7	99.7	107.7	115.7									16
17				76.3	85.4	94.4	103.4	112.4	121.4	130.5									17
18					105.7	115.8	125.9	136.1	146.2	156.3	166.4	176.5	186.6						18
19					117.7	128.9	140.2	151.5	162.7	174.0	185.3	196.5	207.8						19
20					130.2	142.7	155.2	167.7	180.2	192.7	205.2	217.6	230.1						20
21					143.4	157.2	171.0	184.7	198.5	212.3	226.0	239.8	253.6						21
22					157.2	172.4	187.5	202.6	217.7	232.8	247.9	263.0	278.1						22
23							204.7	221.2	237.8	254.3	270.8	287.3	303.8	320.3	336.9				23
24							222.7	240.7	258.7	276.7	294.7	312.6	330.6	348.6	366.6				24
25							241.5	261.0	280.5	300.0	319.5	339.1	358.6	378.1	397.6				25
26							261.0	282.1	303.2	324.3	345.4	366.5	387.6	408.7	429.8				26
27							281.2	304.0	326.8	349.5	372.3	395.0	417.8	440.6	463.3				27
28									351.2	375.7	400.2	424.6	449.1	473.6	498.1	522.5	547.0		28
29									376.5	402.8	429.0	455.3	481.5	507.8	534.1	560.3	586.6		29
30									402.7	430.8	458.9	487.0	515.1	543.2	571.3	599.4	627.5		30
31									429.8	459.8	489.8	519.8	549.8	579.8	609.8	639.8	669.8		31
32									457.7	489.7	521.6	553.6	585.6	617.5	649.5	681.5	713.4		32
33									486.5	520.5	554.5	588.5	622.5	656.5	690.5	724.5	758.5		33
34									516.2	552.3	588.4	624.5	660.5	696.6	732.7	768.8	804.9		34
35									546.7	585.0	623.2	661.5	699.7	738.0	776.2	814.5	852.7		35
36									578.2	618.6	659.1	699.6	740.0	780.5	820.9	861.4	901.9		36
37									610.5	653.2	696.0	738.7	781.4	824.2	866.9	909.7	952.4		37
38									643.7	688.7	733.8	778.9	824.0	869.1	914.1	959.2	1 004.3		38
39									677.7	725.2	772.7	820.2	867.7	915.1	962.6	1 010.1	1 057.6		39
40									712.6	762.6	812.5	862.5	912.4	962.4	1 012.3	1 062.3	1 112.3		40
41									748.4	800.9	853.4	905.9	958.4	1 010.8	1 063.3	1 115.8	1 168.3		41
42									785.1	840.2	895.3	950.3	1 005.4	1 060.5	1 115.5	1 170.6	1 225.7		42
43									822.7	880.4	938.1	995.8	1 053.6	1 111.3	1 169.0	1 226.7	1 284.5		43
44									861.1	921.5	982.0	1 042.4	1 102.9	1 163.3	1 223.7	1 284.2	1 344.6		44
45									900.4	963.6	1 026.8	1 090.0	1 153.3	1 216.5	1 279.7	1 342.9	1 406.1		45
46									940.6	1 006.6	1 072.7	1 138.7	1 204.8	1 270.9	1 336.9	1 403.0	1 469.0		46
47									981.6	1 050.6	1 119.5	1 188.5	1 257.5	1 326.4	1 395.4	1 464.4	1 533.3		47
48									1 023.5	1 095.5	1 167.4	1 239.3	1 311.2	1 383.2	1 455.1	1 527.0	1 599.0		48
49									1 066.3	1 141.3	1 216.2	1 291.2	1 366.2	1 441.1	1 516.1	1 591.0	1 666.0		49
50									1 110.0	1 188.0	1 266.1	1 344.1	1 422.2	1 500.2	1 578.3	1 656.3	1 734.4		50
51									1 154.5	1 235.7	1 316.9	1 398.1	1 479.3	1 560.5	1 641.7	1 723.0	1 804.2		51
52									1 199.9	1 284.4	1 368.8	1 453.2	1 537.6	1 622.0	1 706.5	1 790.9	1 875.3		52
53									1 246.2	1 333.9	1 421.6	1 509.3	1 597.0	1 684.7	1 772.4	1 860.1	1 947.8		53
54									1 293.4	1 384.4	1 475.5	1 566.5	1 657.6	1 748.6	1 839.6	1 930.7	2 021.7		54
55									1 341.4	1 435.9	1 530.3	1 624.8	1 719.2	1 813.6	1 908.1	2 002.5	2 097.0		55
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Leccio  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Leccio  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6			5.3	5.7	6.1	6.6													6
7			5.4	5.9	6.5	7.1	7.7												7
8			5.6	6.4	7.1	7.9	8.7	9.4											8
9			6.0	7.0	7.9	8.9	9.9	10.8											9
10			6.6	7.8	9.0	10.2	11.4	12.6	13.8										10
11			7.3	8.8	10.2	11.7	13.1	14.6	16.0										11
12			8.2	9.9	11.7	13.4	15.1	16.8	18.6										12
13			9.3	11.3	13.3	15.4	17.4	19.4	21.4	23.5									13
14			10.5	12.9	15.2	17.6	19.9	22.3	24.6	27.0									14
15				14.7	17.3	20.0	22.7	25.4	28.1	30.8									15
16				16.6	19.7	22.7	25.8	28.9	31.9	35.0									16
17				18.7	22.2	25.7	29.1	32.6	36.0	39.5									17
18						28.8	32.7	36.6	40.5	44.4	48.2	52.1	56.0	59.9					18
19						32.3	36.6	40.9	45.2	49.5	53.9	58.2	62.5	66.8					19
20						35.9	40.7	45.5	50.3	55.1	59.8	64.6	69.4	74.2					20
21						39.8	45.1	50.4	55.6	60.9	66.2	71.5	76.7	82.0					21
22						43.9	49.7	55.5	61.3	67.1	72.9	78.7	84.5	90.3					22
23								61.0	67.3	73.6	80.0	86.3	92.6	99.0	105.3	111.6			23
24								66.7	73.6	80.5	87.4	94.3	101.2	108.1	115.0	121.9			24
25								72.7	80.2	87.7	95.2	102.6	110.1	117.6	125.1	132.6			25
26								79.0	87.1	95.2	103.3	111.4	119.5	127.6	135.7	143.8			26
27								85.6	94.3	103.1	111.8	120.5	129.3	138.0	146.7	155.4			27
28										111.3	120.7	130.0	139.4	148.8	158.2	167.6	177.0	186.4	28
29										119.8	129.9	139.9	150.0	160.1	170.1	180.2	190.3	200.3	29
30										128.7	139.5	150.2	161.0	171.8	182.5	193.3	204.1	214.9	30
31										137.9	149.4	160.9	172.4	183.9	195.4	206.9	218.4	229.9	31
32										147.4	159.7	171.9	184.2	196.5	208.7	221.0	233.2	245.5	32
33										157.3	170.3	183.4	196.4	209.4	222.5	235.5	248.6	261.6	33
34										167.5	181.4	195.2	209.0	222.9	236.7	250.5	264.4	278.2	34
35										178.1	192.7	207.4	222.1	236.7	251.4	266.0	280.7	295.4	35
36										188.9	204.5	220.0	235.5	251.0	266.5	282.0	297.5	313.1	36
37										200.2	216.5	232.9	249.3	265.7	282.1	298.5	314.9	331.3	37
38										211.7	229.0	246.3	263.6	280.9	298.1	315.4	332.7	350.0	38
39										223.6	241.8	260.0	278.2	296.4	314.6	332.8	351.1	369.3	39
40										235.8	255.0	274.1	293.3	312.4	331.6	350.7	369.9	389.0	40
41										248.4	268.5	288.6	308.7	328.9	349.0	369.1	389.2	409.4	41
42										261.3	282.4	303.5	324.6	345.7	366.9	388.0	409.1	430.2	42
43										274.5	296.6	318.8	340.9	363.0	385.2	407.3	429.4	451.6	43
44										288.1	311.2	334.4	357.6	380.8	403.9	427.1	450.3	473.5	44
45										302.0	326.2	350.4	374.7	398.9	423.2	447.4	471.6	495.9	45
46										316.2	341.5	366.9	392.2	417.5	442.8	468.2	493.5	518.8	46
47										330.8	357.2	383.6	410.1	436.5	463.0	489.4	515.9	542.3	47
48										345.7	373.2	400.8	428.4	456.0	483.6	511.2	538.7	566.3	48
49										360.9	389.6	418.4	447.1	475.9	504.6	533.4	562.1	590.8	49
50										376.5	406.4	436.3	466.3	496.2	526.1	556.0	586.0	615.9	50
51										392.4	423.5	454.7	485.8	516.9	548.1	579.2	610.3	641.5	51
52										408.6	441.0	473.4	505.7	538.1	570.5	602.9	635.2	667.6	52
53										425.2	458.8	492.5	526.1	559.7	593.3	627.0	660.6	694.2	53
54										442.1	477.0	511.9	546.9	581.8	616.7	651.6	686.5	721.4	54
55										459.4	495.6	531.8	568.0	604.2	640.4	676.7	712.9	749.1	55
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Leccio  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Leccio  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6			0.1	0.1	0.2	0.2													6
7			0.1	0.2	0.2	0.3	0.3												7
8			0.1	0.2	0.3	0.3	0.4	0.5											8
9			0.2	0.2	0.3	0.4	0.5	0.6											9
10			0.2	0.3	0.4	0.5	0.6	0.7	0.8										10
11			0.3	0.4	0.5	0.6	0.8	0.9	1.0										11
12			0.3	0.5	0.6	0.8	0.9	1.1	1.2										12
13			0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.7									13
14			0.5	0.7	0.9	1.1	1.4	1.6	1.8	2.0									14
15				0.9	1.1	1.4	1.6	1.8	2.1	2.3									15
16				1.1	1.3	1.6	1.9	2.1	2.4	2.7									16
17				1.2	1.5	1.8	2.1	2.4	2.7	3.0									17
18						2.1	2.5	2.8	3.1	3.5	3.8	4.1	4.5	4.8					18
19						2.4	2.8	3.2	3.5	3.9	4.3	4.7	5.0	5.4					19
20						2.7	3.1	3.6	4.0	4.4	4.8	5.2	5.6	6.1					20
21						3.1	3.5	4.0	4.4	4.9	5.4	5.8	6.3	6.7					21
22						3.4	3.9	4.4	4.9	5.4	5.9	6.4	6.9	7.4					22
23								4.9	5.4	6.0	6.5	7.1	7.6	8.2	8.7	9.3			23
24								5.4	6.0	6.6	7.2	7.8	8.4	9.0	9.6	10.2			24
25								5.9	6.6	7.2	7.9	8.5	9.2	9.8	10.5	11.1			25
26								6.4	7.2	7.9	8.6	9.3	10.0	10.7	11.4	12.1			26
27								7.0	7.8	8.5	9.3	10.1	10.8	11.6	12.3	13.1			27
28										9.2	10.1	10.9	11.7	12.5	13.3	14.1	15.0	15.8	28
29										10.0	10.9	11.7	12.6	13.5	14.4	15.2	16.1	17.0	29
30										10.8	11.7	12.6	13.6	14.5	15.4	16.4	17.3	18.2	30
31										11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	31
32										12.4	13.4	14.5	15.6	16.6	17.7	18.8	19.8	20.9	32
33										13.2	14.4	15.5	16.6	17.8	18.9	20.0	21.2	22.3	33
34										14.1	15.3	16.5	17.7	18.9	20.1	21.3	22.5	23.7	34
35										15.0	16.3	17.6	18.9	20.1	21.4	22.7	23.9	25.2	35
36										16.0	17.3	18.7	20.0	21.4	22.7	24.1	25.4	26.8	36
37										16.9	18.4	19.8	21.2	22.6	24.1	25.5	26.9	28.3	37
38										17.9	19.4	20.9	22.4	24.0	25.5	27.0	28.5	30.0	38
39										19.0	20.6	22.1	23.7	25.3	26.9	28.5	30.1	31.6	39
40										20.0	21.7	23.4	25.0	26.7	28.4	30.0	31.7	33.3	40
41										21.1	22.9	24.6	26.4	28.1	29.9	31.6	33.4	35.1	41
42										22.2	24.1	25.9	27.7	29.6	31.4	33.2	35.1	36.9	42
43										23.4	25.3	27.2	29.2	31.1	33.0	34.9	36.9	38.8	43
44										24.6	26.6	28.6	30.6	32.6	34.6	36.6	38.7	40.7	44
45										25.8	27.9	30.0	32.1	34.2	36.3	38.4	40.5	42.6	45
46										27.0	29.2	31.4	33.6	35.8	38.0	40.2	42.4	44.6	46
47										28.3	30.6	32.9	35.2	37.5	39.8	42.1	44.3	46.6	47
48										29.6	31.9	34.3	36.7	39.1	41.5	43.9	46.3	48.7	48
49										30.9	33.4	35.9	38.4	40.9	43.4	45.9	48.4	50.9	49
50										32.2	34.8	37.4	40.0	42.6	45.2	47.8	50.4	53.0	50
51										33.6	36.3	39.0	41.7	44.4	47.1	49.8	52.5	55.3	51
52										35.0	37.8	40.6	43.5	46.3	49.1	51.9	54.7	57.5	52
53										36.4	39.4	42.3	45.2	48.1	51.1	54.0	56.9	59.8	53
54										37.9	41.0	44.0	47.0	50.1	53.1	56.1	59.2	62.2	54
55										39.4	42.6	45.7	48.9	52.0	55.2	58.3	61.4	64.6	55
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Leccio  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Leccio  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5																			5
6			13.0	14.6	16.2	17.8													6
7			16.3	18.5	20.7	22.8	25.0												7
8			20.3	23.1	25.9	28.8	31.6	34.4											8
9			24.8	28.4	32.0	35.6	39.2	42.7											9
10			30.0	34.4	38.9	43.3	47.7	52.1	56.5										10
11			35.8	41.1	46.5	51.9	57.2	62.6	67.9										11
12			42.2	48.6	54.9	61.3	67.7	74.1	80.4										12
13			49.2	56.7	64.2	71.7	79.1	86.6	94.1	101.6									13
14			56.9	65.6	74.2	82.9	91.6	100.2	108.9	117.6									14
15				75.1	85.1	95.0	105.0	114.9	124.9	134.8									15
16				85.4	96.7	108.0	119.3	130.7	142.0	153.3									16
17				96.3	109.1	121.9	134.7	147.5	160.2	173.0									17
18					136.7	151.0	165.3	179.7	194.0	208.3	222.6	237.0	251.3						18
19					152.3	168.3	184.3	200.2	216.2	232.2	248.1	264.1	280.1						19
20					168.9	186.5	204.2	221.9	239.6	257.3	275.0	292.7	310.4						20
21					186.3	205.8	225.3	244.8	264.3	283.8	303.3	322.8	342.3						21
22					204.6	226.0	247.4	268.8	290.2	311.6	333.0	354.4	375.9						22
23							270.6	294.0	317.4	340.8	364.2	387.6	411.0	434.4	457.8				23
24							294.8	320.3	345.8	371.2	396.7	422.2	447.7	473.2	498.6				24
25							320.1	347.8	375.4	403.0	430.7	458.3	486.0	513.6	541.3				25
26							346.5	376.4	406.3	436.2	466.1	496.0	525.9	555.8	585.7				26
27							373.9	406.1	438.4	470.6	502.9	535.1	567.4	599.6	631.9				27
28									471.7	506.4	541.1	575.8	610.4	645.1	679.8	714.5	749.1		28
29									506.3	543.5	580.7	617.9	655.1	692.3	729.5	766.7	803.9		29
30									542.1	581.9	621.8	661.6	701.4	741.2	781.0	820.8	860.6		30
31									579.2	621.7	664.2	706.7	749.2	791.7	834.2	876.7	919.3		31
32									617.5	662.8	708.1	753.4	798.7	844.0	889.3	934.6	979.8		32
33									657.0	705.2	753.4	801.5	849.7	897.9	946.1	994.2	1 042.4		33
34									697.8	749.0	800.1	851.2	902.3	953.5	1 004.6	1 055.7	1 106.9		34
35									739.8	794.0	848.2	902.4	956.6	1 010.8	1 064.9	1 119.1	1 173.3		35
36									783.1	840.4	897.7	955.1	1 012.4	1 069.7	1 127.0	1 184.4	1 241.7		36
37									827.6	888.1	948.7	1 009.2	1 069.8	1 130.4	1 190.9	1 251.5	1 312.0		37
38									873.3	937.2	1 001.1	1 064.9	1 128.8	1 192.7	1 256.5	1 320.4	1 384.3		38
39									920.3	987.6	1 054.8	1 122.1	1 189.4	1 256.7	1 323.9	1 391.2	1 458.5		39
40									968.5	1 039.3	1 110.0	1 180.8	1 251.6	1 322.4	1 393.1	1 463.9	1 534.7		40
41									1 017.9	1 092.3	1 166.7	1 241.0	1 315.4	1 389.7	1 464.1	1 538.4	1 612.8		41
42									1 068.6	1 146.7	1 224.7	1 302.7	1 380.7	1 458.8	1 536.8	1 614.8	1 692.8		42
43									1 120.6	1 202.3	1 284.1	1 365.9	1 447.7	1 529.5	1 611.3	1 693.0	1 774.8		43
44									1 173.7	1 259.4	1 345.0	1 430.6	1 516.2	1 601.9	1 687.5	1 773.1	1 858.8		44
45									1 228.1	1 317.7	1 407.3	1 496.8	1 586.4	1 676.0	1 765.5	1 855.1	1 944.7		45
46									1 283.8	1 377.4	1 470.9	1 564.5	1 658.1	1 751.7	1 845.3	1 938.9	2 032.5		46
47									1 340.6	1 438.3	1 536.1	1 633.8	1 731.5	1 829.2	1 926.9	2 024.6	2 122.3		47
48									1 398.8	1 500.7	1 602.6	1 704.5	1 806.4	1 908.3	2 010.2	2 112.1	2 214.0		48
49									1 458.1	1 564.3	1 670.5	1 776.7	1 882.9	1 989.1	2 095.3	2 201.5	2 307.7		49
50									1 518.7	1 629.3	1 739.9	1 850.4	1 961.0	2 071.6	2 182.2	2 292.8	2 403.3		50
51									1 580.5	1 695.6	1 810.6	1 925.7	2 040.7	2 155.8	2 270.8	2 385.9	2 500.9		51
52									1 643.6	1 763.2	1 882.8	2 002.4	2 122.0	2 241.6	2 361.2	2 480.8	2 600.4		52
53									1 707.9	1 832.2	1 956.4	2 080.7	2 204.9	2 329.2	2 453.4	2 577.7	2 701.9		53
54									1 773.5	1 902.4	2 031.4	2 160.4	2 289.4	2 418.4	2 547.3	2 676.3	2 805.3		54
55									1 840.3	1 974.1	2 107.9	2 241.7	2 375.5	2 509.3	2 643.1	2 776.9	2 910.7		55
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Leccio  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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***Quercus pubescens* Willd.**

**Roverella**

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## Roverella

### Volume del fusto e dei rami grossi

$n = 117$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [5.1025 \cdot 10^{-1} \quad 4.5184 \cdot 10^{-2} \quad -3.6026 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 6.9756 & & \\ 2.2392 \cdot 10^{-3} & 1.1797 \cdot 10^{-6} & \\ -1.0597 & -3.7630 \cdot 10^{-4} & 1.6787 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 3.1732 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 117$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [1.0832 \quad 2.9634 \cdot 10^{-2} \quad -4.9794 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 2.7137 & & \\ 8.7110 \cdot 10^{-4} & 4.5892 \cdot 10^{-7} & \\ -4.1226 \cdot 10^{-1} & -1.4639 \cdot 10^{-4} & 6.5307 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.2345 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 117$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-8.2101 \quad 3.0396 \cdot 10^{-3} \quad 1.7561]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.2052 & & \\ 7.0789 \cdot 10^{-4} & 3.7293 \cdot 10^{-7} & \\ -3.3501 \cdot 10^{-1} & -1.1896 \cdot 10^{-4} & 5.3070 \cdot 10^{-2} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.0032 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$$n = 117 \quad p = 3$$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 [\text{kg}], d [\text{cm}], h [\text{m}])$$

vettore dei coefficienti

$$\mathbf{b}' = [-4.7534 \cdot 10^{-2} \quad 6.2568 \cdot 10^{-4} \quad 4.1211 \cdot 10^{-3}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 3.0432 \cdot 10^{-2} & & \\ 9.7686 \cdot 10^{-6} & 5.1464 \cdot 10^{-9} & \\ -4.6231 \cdot 10^{-3} & -1.6417 \cdot 10^{-6} & 7.3236 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 1.3843 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$$n = 117 \quad p = 3$$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 [\text{kg}], d [\text{cm}], h [\text{m}])$$

vettore dei coefficienti

$$\mathbf{b}' = [-7.1745 \quad 3.3299 \cdot 10^{-2} \quad 1.2623]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s^2 = \begin{bmatrix} 6.7950 & & \\ 2.1812 \cdot 10^{-3} & 1.1491 \cdot 10^{-6} & \\ -1.0323 & -3.6656 \cdot 10^{-4} & 1.6353 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 3.0910 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

Roverella  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	4.4	5.5	6.6	7.7	8.9	10.0													5
6	6.5	8.1	9.7	11.4	13.0	14.6													6
7	9.1	11.3	13.5	15.7	17.9	20.1													7
8	12.1	15.0	17.9	20.8	23.7	26.5	29.4	32.3											8
9	15.6	19.2	22.9	26.5	30.2	33.9	37.5	41.2											9
10	19.5	24.0	28.5	33.1	37.6	42.1	46.6	51.1											10
11	23.9	29.4	34.8	40.3	45.8	51.2	56.7	62.2											11
12	28.7	35.2	41.7	48.2	54.7	61.3	67.8	74.3	80.8	87.3	93.8								12
13				56.9	64.6	72.2	79.8	87.5	95.1	102.7	110.4	118.0							13
14				66.3	75.2	84.0	92.9	101.7	110.6	119.5	128.3	137.2							14
15				76.4	86.6	96.8	106.9	117.1	127.3	137.4	147.6	157.8							15
16				87.3	98.9	110.4	122.0	133.6	145.1	156.7	168.3	179.8							16
17				98.9	111.9	125.0	138.0	151.1	164.1	177.2	190.3	203.3							17
18						140.4	155.1	169.7	184.3	199.0	213.6	228.3	242.9	257.5	272.2	286.8			18
19						156.8	173.1	189.4	205.7	222.0	238.3	254.6	271.0	287.3	303.6	319.9			19
20						174.0	192.1	210.2	228.3	246.3	264.4	282.5	300.6	318.6	336.7	354.8			20
21						192.2	212.1	232.1	252.0	271.9	291.8	311.8	331.7	351.6	371.5	391.5			21
22						211.3	233.1	255.0	276.9	298.8	320.6	342.5	364.4	386.2	408.1	430.0			22
23								279.1	303.0	326.9	350.8	374.7	398.6	422.5	446.4	470.3	494.2	518.1	23
24								304.2	330.2	356.2	382.3	408.3	434.3	460.3	486.4	512.4	538.4	564.4	24
25								330.4	358.6	386.9	415.1	443.3	471.6	499.8	528.1	556.3	584.5	612.8	25
26								357.7	388.2	418.8	449.3	479.9	510.4	540.9	571.5	602.0	632.6	663.1	26
27								386.1	419.0	451.9	484.9	517.8	550.7	583.7	616.6	649.6	682.5	715.4	27
28								415.5	450.9	486.4	521.8	557.2	592.6	628.1	663.5	698.9	734.3	769.8	28
29								446.1	484.1	522.1	560.1	598.1	636.1	674.1	712.1	750.1	788.1	826.1	29
30								477.7	518.4	559.0	599.7	640.4	681.0	721.7	762.3	803.0	843.7	884.3	30
31								510.4	553.8	597.2	640.7	684.1	727.5	770.9	814.4	857.8	901.2	944.6	31
32									590.5	636.7	683.0	729.3	775.5	821.8	868.1	914.4	960.6	1 006.9	32
33									628.3	677.5	726.7	775.9	825.1	874.3	923.5	972.7	1 021.9	1 071.1	33
34									667.3	719.5	771.8	824.0	876.2	928.5	980.7	1 032.9	1 085.1	1 137.4	34
35									707.5	762.8	818.2	873.5	928.9	984.2	1 039.6	1 094.9	1 150.3	1 205.6	35
36									748.8	807.4	865.9	924.5	983.0	1 041.6	1 100.2	1 158.7	1 217.3	1 275.8	36
37										853.2	915.0	976.9	1 038.7	1 100.6	1 162.5	1 224.3	1 286.2	1 348.0	37
38										900.3	965.5	1 030.8	1 096.0	1 161.2	1 226.5	1 291.7	1 357.0	1 422.2	38
39										948.6	1 017.3	1 086.1	1 154.8	1 223.5	1 292.2	1 361.0	1 429.7	1 498.4	39
40										998.2	1 070.5	1 142.8	1 215.1	1 287.4	1 359.7	1 432.0	1 504.3	1 576.6	40
41										1 049.1	1 125.1	1 201.0	1 277.0	1 352.9	1 428.9	1 504.8	1 580.8	1 656.7	41
42										1 101.2	1 180.9	1 260.7	1 340.4	1 420.1	1 499.8	1 579.5	1 659.2	1 738.9	42
43										1 154.7	1 238.2	1 321.7	1 405.3	1 488.8	1 572.4	1 655.9	1 739.5	1 823.0	43
44										1 209.3	1 296.8	1 384.3	1 471.8	1 559.2	1 646.7	1 734.2	1 821.7	1 909.1	44
45										1 265.3	1 356.8	1 448.3	1 539.8	1 631.3	1 722.8	1 814.3	1 905.7	1 997.2	45
46										1 322.5	1 418.1	1 513.7	1 609.3	1 704.9	1 800.5	1 896.1	1 991.7	2 087.3	46
47										1 380.9	1 480.7	1 580.6	1 680.4	1 780.2	1 880.0	1 979.8	2 079.6	2 179.4	47
48												1 648.9	1 753.0	1 857.1	1 961.2	2 065.3	2 169.4	2 273.5	48
49												1 718.6	1 827.1	1 935.6	2 044.1	2 152.6	2 261.1	2 369.6	49
50												1 789.9	1 902.8	2 015.8	2 128.7	2 241.7	2 354.7	2 467.6	50
51												1 862.5	1 980.0	2 097.6	2 215.1	2 332.6	2 450.1	2 567.7	51
52												1 936.6	2 058.8	2 181.0	2 303.1	2 425.3	2 547.5	2 669.7	52
53												2 012.2	2 139.1	2 266.0	2 392.9	2 519.9	2 646.8	2 773.7	53
54												2 089.2	2 220.9	2 352.7	2 484.4	2 616.2	2 747.9	2 879.7	54
55												2 167.6	2 304.3	2 441.0	2 577.6	2 714.3	2 851.0	2 987.7	55
56																			56
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66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Roverella  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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27																			27
28	805.2	840.6																	28
29	864.1	902.1																	29
30	925.0	965.7																	30
31	988.0	1 031.5																	31
32	1 053.2	1 099.4																	32
33	1 120.3	1 169.6	1 218.8	1 268.0															33
34	1 189.6	1 241.8	1 294.1	1 346.3															34
35	1 261.0	1 316.3	1 371.7	1 427.0															35
36	1 334.4	1 392.9	1 451.5	1 510.1															36
37	1 409.9	1 471.7	1 533.6	1 595.5															37
38	1 487.5	1 552.7	1 618.0	1 683.2															38
39	1 567.1	1 635.9	1 704.6	1 773.3															39
40	1 648.9	1 721.2	1 793.5	1 865.8															40
41	1 732.7	1 808.6	1 884.6	1 960.6															41
42	1 818.6	1 898.3	1 978.0	2 057.7															42
43	1 906.6	1 990.1	2 073.6	2 157.2															43
44	1 996.6	2 084.1	2 171.6	2 259.0															44
45	2 088.7	2 180.2	2 271.7	2 363.2															45
46	2 183.0	2 278.6	2 374.2	2 469.8															46
47	2 279.2	2 379.1	2 478.9	2 578.7															47
48	2 377.6	2 481.7	2 585.8	2 689.9															48
49	2 478.1	2 586.5	2 695.0	2 803.5															49
50	2 580.6	2 693.5	2 806.5	2 919.5															50
51	2 685.2	2 802.7	2 920.2	3 037.8															51
52	2 791.9	2 914.0	3 036.2	3 158.4															52
53	2 900.6	3 027.5	3 154.5	3 281.4															53
54	3 011.5	3 143.2	3 275.0	3 406.7															54
55	3 124.4	3 261.1	3 397.7	3 534.4															55
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Roverella  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.3	3.0	3.8	4.5	5.3	6.0													5
6	3.4	4.5	5.6	6.6	7.7	8.8													6
7	4.9	6.3	7.8	9.2	10.7	12.1													7
8	6.6	8.5	10.4	12.3	14.2	16.1	18.0	19.9											8
9	8.6	11.0	13.4	15.8	18.2	20.6	23.0	25.4											9
10	10.9	13.9	16.8	19.8	22.8	25.7	28.7	31.7											10
11	13.5	17.1	20.7	24.3	27.9	31.5	35.0	38.6											11
12	16.4	20.7	25.0	29.2	33.5	37.8	42.0	46.3	50.6	54.9	59.1								12
13				34.7	39.7	44.7	49.7	54.7	59.7	64.7	69.7	74.7							13
14				40.6	46.4	52.2	58.0	63.8	69.6	75.4	81.2	87.0							14
15				47.0	53.6	60.3	67.0	73.6	80.3	87.0	93.6	100.3							15
16				53.8	61.4	69.0	76.6	84.2	91.7	99.3	106.9	114.5							16
17				61.1	69.7	78.3	86.8	95.4	104.0	112.5	121.1	129.6							17
18						88.1	97.7	107.3	116.9	126.5	136.1	145.7	155.3	164.9	174.5	184.1			18
19						98.6	109.3	120.0	130.7	141.4	152.1	162.8	173.5	184.2	194.9	205.6			19
20						109.7	121.5	133.4	145.2	157.1	168.9	180.8	192.6	204.5	216.3	228.2			20
21						121.3	134.4	147.4	160.5	173.6	186.7	199.7	212.8	225.9	238.9	252.0			21
22						133.6	147.9	162.2	176.6	190.9	205.3	219.6	234.0	248.3	262.6	277.0			22
23								177.7	193.4	209.1	224.8	240.5	256.1	271.8	287.5	303.2	318.8	334.5	23
24								194.0	211.0	228.1	245.2	262.2	279.3	296.4	313.4	330.5	347.6	364.7	24
25								210.9	229.4	247.9	266.5	285.0	303.5	322.0	340.5	359.1	377.6	396.1	25
26								228.5	248.6	268.6	288.6	308.7	328.7	348.7	368.8	388.8	408.8	428.9	26
27								246.9	268.5	290.1	311.7	333.3	354.9	376.5	398.1	419.7	441.3	462.9	27
28								265.9	289.2	312.4	335.6	358.9	382.1	405.3	428.6	451.8	475.0	498.3	28
29								285.7	310.6	335.6	360.5	385.4	410.3	435.2	460.2	485.1	510.0	534.9	29
30								306.2	332.9	359.5	386.2	412.9	439.5	466.2	492.9	519.6	546.2	572.9	30
31								327.4	355.9	384.3	412.8	441.3	469.8	498.3	526.7	555.2	583.7	612.2	31
32								379.6	410.0	440.3	470.7	501.0	531.4	561.7	592.1	622.4	652.7	683.0	32
33								404.2	436.5	468.7	501.0	533.3	565.5	597.8	630.1	662.4	694.6	726.9	33
34								429.5	463.7	498.0	532.3	566.5	600.8	635.0	669.3	703.5	737.8	772.0	34
35								455.6	491.9	528.2	564.5	600.8	637.1	673.4	709.7	746.0	782.3	818.6	35
36								482.4	520.8	559.2	597.6	636.1	674.5	712.9	751.3	789.7	828.1	866.5	36
37								550.6	591.2	631.8	672.3	712.9	753.5	794.0	834.6	875.2	915.8	956.4	37
38								581.2	624.0	666.8	709.6	752.4	795.2	838.0	880.8	923.6	966.4	1009.2	38
39								612.7	657.8	702.8	747.9	793.0	838.1	883.1	928.2	973.3	1018.4	1063.5	39
40								645.0	692.4	739.8	787.2	834.6	882.0	929.5	976.9	1024.3	1071.7	1119.1	40
41								678.1	727.9	777.7	827.5	877.3	927.1	977.0	1026.8	1076.6	1126.4	1176.2	41
42								712.0	764.3	816.6	868.8	921.1	973.4	1025.7	1077.9	1130.2	1182.5	1234.8	42
43								746.8	801.6	856.4	911.2	966.0	1020.7	1075.5	1130.3	1185.1	1240.0	1294.8	43
44								782.4	839.7	897.1	954.5	1011.9	1069.2	1126.6	1184.0	1241.3	1300.0	1358.7	44
45								818.8	878.8	938.8	998.8	1058.8	1118.8	1178.9	1238.9	1298.9	1358.9	1418.9	45
46								856.1	918.8	981.5	1044.2	1106.9	1169.6	1232.3	1295.0	1357.7	1420.4	1483.1	46
47								894.1	959.6	1025.1	1090.5	1156.0	1221.4	1286.9	1352.4	1417.8	1483.3	1548.8	47
48												1069.6	1137.9	1206.2	1274.4	1342.7	1411.0	1479.3	48
49												1115.1	1186.3	1257.4	1328.6	1399.7	1470.9	1542.0	49
50												1161.5	1235.6	1309.7	1383.8	1457.9	1532.0	1606.1	50
51												1208.9	1286.0	1363.1	1440.2	1517.2	1594.3	1671.4	51
52												1257.3	1337.4	1417.5	1497.6	1577.7	1657.8	1738.1	52
53												1306.6	1389.8	1473.0	1556.3	1639.5	1722.8	1806.0	53
54												1356.8	1443.2	1529.6	1616.0	1702.4	1788.9	1875.3	54
55												1408.0	1497.6	1587.3	1676.9	1766.6	1856.2	1945.8	55
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Roverella  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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24																			24
25																			25
26																			26
27																			27
28	521.5	544.7																	28
29	559.9	584.8																	29
30	599.6	626.2																	30
31	640.6	669.1																	31
32	683.1	713.4																	32
33	726.9	759.2	791.4	823.7															33
34	772.1	806.3	840.6	874.8															34
35	818.6	854.9	891.2	927.5															35
36	866.5	904.9	943.3	981.7															36
37	915.7	956.3	996.9	1 037.5															37
38	966.4	1 009.2	1 051.9	1 094.7															38
39	1 018.3	1 063.4	1 108.5	1 153.6															39
40	1 071.7	1 119.1	1 166.5	1 213.9															40
41	1 126.4	1 176.2	1 226.0	1 275.9															41
42	1 182.5	1 234.8	1 287.0	1 339.3															42
43	1 239.9	1 294.7	1 349.5	1 404.3															43
44	1 298.7	1 356.1	1 413.5	1 470.8															44
45	1 358.9	1 418.9	1 478.9	1 538.9															45
46	1 420.4	1 483.1	1 545.8	1 608.5															46
47	1 483.3	1 548.8	1 614.2	1 679.7															47
48	1 547.5	1 615.8	1 684.1	1 752.4															48
49	1 613.2	1 684.3	1 755.5	1 826.6															49
50	1 680.1	1 754.2	1 828.3	1 902.4															50
51	1 748.5	1 825.6	1 902.6	1 979.7															51
52	1 818.2	1 898.3	1 978.4	2 058.6															52
53	1 889.3	1 972.5	2 055.7	2 139.0															53
54	1 961.7	2 048.1	2 134.5	2 220.9															54
55	2 035.5	2 125.1	2 214.8	2 304.4															55
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Roverella  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	1.0	1.0	1.1	1.2	1.3	1.3													5
6	2.9	3.0	3.1	3.2	3.3	3.4													6
7	4.8	5.0	5.1	5.3	5.4	5.6													7
8	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2											8
9	8.8	9.1	9.3	9.6	9.8	10.1	10.3	10.5											9
10	10.9	11.2	11.5	11.8	12.1	12.4	12.7	13.0											10
11	12.9	13.3	13.7	14.0	14.4	14.8	15.2	15.5											11
12	15.1	15.5	15.9	16.4	16.8	17.2	17.7	18.1	18.6	19.0	19.4								12
13				18.7	19.2	19.8	20.3	20.8	21.3	21.8	22.3	22.8							13
14				21.1	21.7	22.3	22.9	23.5	24.1	24.7	25.3	25.9							14
15				23.6	24.3	25.0	25.7	26.3	27.0	27.7	28.4	29.1							15
16				26.1	26.9	27.7	28.4	29.2	30.0	30.8	31.6	32.3							16
17				28.7	29.5	30.4	31.3	32.2	33.1	33.9	34.8	35.7							17
18						33.2	34.2	35.2	36.2	37.2	38.2	39.2	40.1	41.1	42.1	43.1			18
19						36.1	37.2	38.3	39.4	40.5	41.6	42.7	43.8	44.9	46.0	47.1			19
20						39.1	40.3	41.5	42.7	43.9	45.1	46.4	47.6	48.8	50.0	51.2			20
21						42.1	43.4	44.8	46.1	47.4	48.8	50.1	51.5	52.8	54.1	55.5			21
22						45.1	46.6	48.1	49.5	51.0	52.5	54.0	55.4	56.9	58.4	59.8			22
23								51.5	53.1	54.7	56.3	57.9	59.5	61.1	62.7	64.3	65.9	67.6	23
24								54.9	56.7	58.4	60.2	61.9	63.7	65.5	67.2	69.0	70.7	72.5	24
25								58.5	60.4	62.3	64.2	66.1	68.0	69.9	71.8	73.7	75.6	77.5	25
26								62.1	64.2	66.2	68.3	70.3	72.4	74.4	76.5	78.5	80.6	82.7	26
27								65.8	68.0	70.2	72.4	74.7	76.9	79.1	81.3	83.5	85.7	88.0	27
28								69.6	71.9	74.3	76.7	79.1	81.5	83.9	86.2	88.6	91.0	93.4	28
29								73.4	75.9	78.5	81.1	83.6	86.2	88.7	91.3	93.8	96.4	99.0	29
30								77.3	80.0	82.8	85.5	88.2	91.0	93.7	96.5	99.2	101.9	104.7	30
31								81.3	84.2	87.1	90.0	93.0	95.9	98.8	101.7	104.7	107.6	110.5	31
32								88.4	91.6	94.7	97.8	100.9	104.0	107.1	110.2	113.3	116.5	119.6	32
33								92.8	96.1	99.4	102.7	106.0	109.3	112.6	115.9	119.3	122.6	125.9	33
34								97.2	100.7	104.2	107.7	111.2	114.7	118.3	121.8	125.3	128.8	132.3	34
35								101.7	105.4	109.1	112.8	116.6	120.3	124.0	127.7	131.4	135.2	138.9	35
36								106.2	110.2	114.1	118.0	122.0	125.9	129.9	133.8	137.7	141.7	145.6	36
37								115.0	119.2	123.3	127.5	131.7	135.8	140.0	144.2	148.3	152.4	156.5	37
38								120.0	124.4	128.7	133.1	137.5	141.9	146.3	150.7	155.1	159.5	163.9	38
39								125.0	129.6	134.2	138.9	143.5	148.1	152.7	157.4	162.0	166.6	171.2	39
40								130.1	135.0	139.8	144.7	149.6	154.4	159.3	164.2	169.0	173.9	178.8	40
41								135.3	140.4	145.5	150.7	155.8	160.9	166.0	171.1	176.2	181.3	186.4	41
42								140.6	146.0	151.3	156.7	162.1	167.4	172.8	178.1	183.5	188.8	194.1	42
43								146.0	151.6	157.2	162.8	168.5	174.1	179.7	185.3	190.9	196.5	202.1	43
44								151.4	157.3	163.2	169.1	175.0	180.9	186.8	192.6	198.5	204.4	210.3	44
45								157.0	163.1	169.3	175.5	181.6	187.8	193.9	200.1	206.2	212.3	218.4	45
46								162.6	169.0	175.5	181.9	188.3	194.8	201.2	207.6	214.1	220.5	227.0	46
47								168.3	175.0	181.8	188.5	195.2	201.9	208.6	215.3	222.0	228.7	235.4	47
48										188.1	195.1	202.1	209.1	216.1	223.2	230.2	237.2	244.3	48
49										194.6	201.9	209.2	216.5	223.8	231.1	238.4	245.7	253.0	49
50										201.2	208.8	216.4	224.0	231.6	239.2	246.8	254.4	262.0	50
51										207.8	215.8	223.7	231.6	239.5	247.4	255.3	263.2	271.1	51
52										214.6	222.8	231.1	239.3	247.5	255.7	263.9	272.1	280.3	52
53										221.5	230.0	238.6	247.1	255.6	264.2	272.7	281.2	289.7	53
54										228.4	237.3	246.2	255.0	263.9	272.8	281.6	290.5	299.4	54
55										235.5	244.7	253.9	263.1	272.3	281.5	290.7	299.9	309.1	55
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Roverella  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
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22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	95.8	98.2																	28
29	101.5	104.1																	29
30	107.4	110.1																	30
31	113.4	116.3																	31
32	119.6	122.7																	32
33	125.9	129.2	132.5	135.8															33
34	132.3	135.8	139.3	142.9															34
35	138.9	142.6	146.3	150.1															35
36	145.6	149.6	153.5	157.4															36
37	152.5	156.6	160.8	165.0															37
38	159.5	163.9	168.3	172.6															38
39	166.6	171.2	175.9	180.5															39
40	173.9	178.8	183.6	188.5															40
41	181.3	186.4	191.5	196.6															41
42	188.9	194.2	199.6	205.0															42
43	196.6	202.2	207.8	213.4															43
44	204.4	210.3	216.2	222.1															44
45	212.4	218.5	224.7	230.8															45
46	220.5	226.9	233.4	239.8															46
47	228.8	235.5	242.2	248.9															47
48	237.2	244.2	251.2	258.2															48
49	245.7	253.0	260.3	267.6															49
50	254.4	262.0	269.6	277.2															50
51	263.2	271.1	279.0	286.9															51
52	272.1	280.4	288.6	296.8															52
53	281.2	289.8	298.3	306.9															53
54	290.5	299.3	308.2	317.1															54
55	299.9	309.1	318.2	327.4															55
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Roverella  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.1	0.1													5
6	0.1	0.1	0.1	0.2	0.2	0.2													6
7	0.1	0.2	0.2	0.2	0.3	0.3													7
8	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5											8
9	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6											9
10	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7											10
11	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9											11
12	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4								12
13				0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7							13
14				1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.8	2.0							14
15				1.1	1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.3							15
16				1.3	1.5	1.6	1.8	1.9	2.1	2.3	2.4	2.6							16
17				1.5	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.9							17
18						2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1			18
19						2.3	2.5	2.7	3.0	3.2	3.4	3.6	3.9	4.1	4.3	4.5			19
20						2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0			20
21						2.8	3.1	3.4	3.6	3.9	4.2	4.5	4.7	5.0	5.3	5.6			21
22						3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1			22
23								4.0	4.4	4.7	5.0	5.3	5.7	6.0	6.3	6.7	7.0	7.3	23
24								4.4	4.7	5.1	5.5	5.8	6.2	6.5	6.9	7.3	7.6	8.0	24
25								4.7	5.1	5.5	5.9	6.3	6.7	7.1	7.5	7.9	8.3	8.7	25
26								5.1	5.6	6.0	6.4	6.8	7.2	7.7	8.1	8.5	8.9	9.4	26
27								5.5	6.0	6.4	6.9	7.4	7.8	8.3	8.7	9.2	9.6	10.1	27
28								6.0	6.4	6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.4	10.9	28
29								6.4	6.9	7.4	8.0	8.5	9.0	9.5	10.1	10.6	11.1	11.6	29
30								6.8	7.4	8.0	8.5	9.1	9.6	10.2	10.8	11.3	11.9	12.5	30
31								7.3	7.9	8.5	9.1	9.7	10.3	10.9	11.5	12.1	12.7	13.3	31
32								8.4	9.1	9.7	10.3	11.0	11.6	12.3	12.9	13.5	14.2	32	
33								8.9	9.6	10.3	11.0	11.7	12.4	13.0	13.7	14.4	15.1	33	
34								9.5	10.2	10.9	11.7	12.4	13.1	13.8	14.6	15.3	16.0	34	
35								10.1	10.8	11.6	12.4	13.1	13.9	14.7	15.4	16.2	17.0	35	
36								10.6	11.5	12.3	13.1	13.9	14.7	15.5	16.3	17.1	17.9	36	
37								12.1	13.0	13.8	14.7	15.5	16.4	17.2	18.1	18.9	37		
38								12.8	13.7	14.6	15.5	16.4	17.3	18.2	19.1	20.0	38		
39								13.4	14.4	15.3	16.3	17.2	18.2	19.1	20.1	21.0	39		
40								14.1	15.1	16.1	17.1	18.1	19.1	20.1	21.1	22.1	40		
41								14.8	15.9	16.9	18.0	19.1	20.1	21.2	22.2	23.3	41		
42								15.6	16.7	17.8	18.9	20.0	21.1	22.2	23.3	24.4	42		
43								16.3	17.5	18.6	19.8	21.0	22.1	23.3	24.4	25.6	43		
44								17.1	18.3	19.5	20.7	21.9	23.1	24.4	25.6	26.8	44		
45								17.9	19.1	20.4	21.7	22.9	24.2	25.5	26.7	28.0	45		
46								18.7	20.0	21.3	22.6	24.0	25.3	26.6	27.9	29.3	46		
47								19.5	20.9	22.3	23.6	25.0	26.4	27.8	29.2	30.6	47		
48										23.2	24.7	26.1	27.5	29.0	30.4	31.9	48		
49										24.2	25.7	27.2	28.7	30.2	31.7	33.2	49		
50										25.2	26.7	28.3	29.9	31.4	33.0	34.6	50		
51										26.2	27.8	29.5	31.1	32.7	34.3	36.0	51		
52										27.2	28.9	30.6	32.3	34.0	35.7	37.4	52		
53										28.3	30.0	31.8	33.6	35.3	37.1	38.8	53		
54										29.4	31.2	33.0	34.8	36.7	38.5	40.3	54		
55										30.5	32.4	34.2	36.1	38.0	39.9	41.8	55		
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66																	66		
67																	67		
68																	68		
69																	69		
70																	70		
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Roverella  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	11.4	11.8																	28
29	12.2	12.7																	29
30	13.0	13.6																	30
31	13.9	14.5																	31
32	14.8	15.5																	32
33	15.8	16.4	17.1	17.8															33
34	16.7	17.5	18.2	18.9															34
35	17.7	18.5	19.3	20.0															35
36	18.8	19.6	20.4	21.2															36
37	19.8	20.7	21.5	22.4															37
38	20.9	21.8	22.7	23.6															38
39	22.0	23.0	23.9	24.9															39
40	23.1	24.1	25.1	26.1															40
41	24.3	25.4	26.4	27.5															41
42	25.5	26.6	27.7	28.8															42
43	26.7	27.9	29.1	30.2															43
44	28.0	29.2	30.4	31.6															44
45	29.3	30.5	31.8	33.1															45
46	30.6	31.9	33.2	34.6															46
47	31.9	33.3	34.7	36.1															47
48	33.3	34.7	36.2	37.6															48
49	34.7	36.2	37.7	39.2															49
50	36.1	37.7	39.3	40.8															50
51	37.6	39.2	40.8	42.5															51
52	39.1	40.8	42.5	44.2															52
53	40.6	42.4	44.1	45.9															53
54	42.1	44.0	45.8	47.6															54
55	43.7	45.6	47.5	49.4															55
56																			56
57																			57
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65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Roverella  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.3	4.1	5.0	5.8	6.6	7.5													5
6	6.4	7.6	8.8	10.0	11.2	12.4													6
7	9.8	11.5	13.1	14.7	16.3	18.0													7
8	13.6	15.7	17.8	20.0	22.1	24.2	26.4	28.5											8
9	17.7	20.4	23.1	25.8	28.5	31.2	33.9	36.6											9
10	22.1	25.4	28.8	32.1	35.4	38.7	42.1	45.4											10
11	26.9	30.9	34.9	38.9	43.0	47.0	51.0	55.1											11
12	31.9	36.7	41.5	46.3	51.1	55.9	60.7	65.5	70.3	75.1	79.9								12
13				54.3	59.9	65.5	71.1	76.8	82.4	88.0	93.6	99.3							13
14				62.7	69.2	75.8	82.3	88.8	95.3	101.9	108.4	114.9							14
15				71.7	79.2	86.7	94.2	101.7	109.2	116.7	124.1	131.6							15
16				81.2	89.7	98.3	106.8	115.3	123.8	132.4	140.9	149.4							16
17				91.3	100.9	110.5	120.1	129.8	139.4	149.0	158.6	168.3							17
18						123.4	134.2	145.0	155.8	166.6	177.4	188.2	199.0	209.7	220.5	231.3			18
19						137.0	149.0	161.1	173.1	185.1	197.1	209.1	221.2	233.2	245.2	257.2			19
20						151.3	164.6	177.9	191.2	204.5	217.9	231.2	244.5	257.8	271.1	284.5			20
21						166.2	180.9	195.6	210.2	224.9	239.6	254.3	269.0	283.7	298.3	313.0			21
22						181.8	197.9	214.0	230.1	246.2	262.3	278.5	294.6	310.7	326.8	342.9			22
23								233.2	250.9	268.5	286.1	303.7	321.3	338.9	356.5	374.2	391.8	409.4	23
24								253.3	272.5	291.6	310.8	330.0	349.2	368.4	387.5	406.7	425.9	445.1	24
25								274.1	294.9	315.7	336.6	357.4	378.2	399.0	419.8	440.6	461.4	482.2	25
26								295.8	318.3	340.8	363.3	385.8	408.3	430.8	453.3	475.8	498.4	520.9	26
27								318.2	342.5	366.8	391.0	415.3	439.6	463.9	488.1	512.4	536.7	561.0	27
28								341.4	367.6	393.7	419.8	445.9	472.0	498.1	524.2	550.3	576.4	602.5	28
29								365.5	393.5	421.5	449.5	477.5	505.5	533.5	561.5	589.5	617.5	645.5	29
30								390.3	420.3	450.3	480.2	510.2	540.2	570.1	600.1	630.1	660.0	690.0	30
31								416.0	448.0	480.0	512.0	544.0	576.0	608.0	640.0	672.0	704.0	736.0	31
32								476.5	510.6	544.7	578.8	612.9	647.0	681.1	715.2	749.3	783.4	817.5	32
33								505.9	542.2	578.4	614.7	650.9	687.2	723.5	759.7	796.0	832.3	868.6	33
34								536.2	574.7	613.1	651.6	690.1	728.6	767.1	805.6	844.1	882.6	921.1	34
35								567.3	608.1	648.9	689.7	730.5	771.2	812.0	852.8	893.6	934.4	975.2	35
36								599.3	642.4	685.6	728.8	771.9	815.1	858.2	901.4	944.5	987.7	1030.8	36
37								677.7	723.3	768.9	814.5	860.1	905.7	951.3	996.8	1042.4	1087.9	1133.5	37
38								714.0	762.0	810.1	858.2	906.3	954.4	1002.5	1050.6	1098.6	1146.7	1194.8	38
39								751.1	801.8	852.4	903.1	953.7	1004.4	1055.0	1105.7	1156.3	1207.0	1257.7	39
40								789.2	842.5	895.8	949.1	1002.3	1055.6	1108.9	1162.2	1215.4	1268.7	1322.0	40
41								828.2	884.2	940.2	996.2	1052.1	1108.1	1164.1	1220.1	1276.0	1332.0	1388.0	41
42								868.2	926.9	985.7	1044.4	1103.2	1161.9	1220.6	1279.4	1338.1	1396.9	1455.6	42
43								909.1	970.7	1032.2	1093.8	1155.4	1216.9	1278.5	1340.1	1401.6	1463.2	1524.8	43
44								950.9	1015.4	1079.8	1144.3	1208.8	1273.2	1337.7	1402.2	1466.6	1531.1	1595.6	44
45								993.7	1061.1	1128.5	1195.9	1263.4	1330.8	1398.2	1465.7	1533.1	1600.5	1668.0	45
46								1037.3	1107.8	1178.3	1248.7	1319.2	1389.6	1460.1	1530.6	1601.0	1671.5	1742.0	46
47								1082.0	1155.5	1229.1	1302.6	1376.2	1449.7	1523.3	1596.9	1670.4	1744.0	1817.5	47
48										1281.0	1357.7	1434.4	1511.1	1587.8	1664.6	1741.3	1818.0	1894.8	48
49										1333.9	1413.8	1493.8	1573.7	1653.7	1733.6	1813.6	1893.5	1973.5	49
50										1387.9	1471.1	1554.4	1637.6	1720.9	1804.1	1887.4	1970.7	2054.0	50
51										1443.0	1529.6	1616.2	1702.8	1789.4	1876.0	1962.6	2049.2	2135.8	51
52										1499.1	1589.2	1679.2	1769.2	1859.3	1949.3	2039.4	2129.4	2219.5	52
53										1556.3	1649.9	1743.4	1836.9	1930.5	2024.0	2117.5	2211.1	2304.6	53
54										1614.6	1711.7	1808.8	1905.9	2003.0	2100.1	2197.2	2294.3	2391.4	54
55										1673.9	1774.7	1875.4	1976.1	2076.8	2177.6	2278.3	2379.0	2479.7	55
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Roverella  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
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21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	628.6	654.7																	28
29	673.5	701.5																	29
30	720.0	750.0																	30
31	768.0	800.0																	31
32	817.5	851.6																	32
33	868.5	904.8	941.0	977.3															33
34	921.1	959.6	998.1	1 036.6															34
35	975.2	1 016.0	1 056.8	1 097.6															35
36	1 030.8	1 074.0	1 117.2	1 160.3															36
37	1 088.0	1 133.6	1 179.2	1 224.8															37
38	1 146.7	1 194.8	1 242.9	1 291.0															38
39	1 207.0	1 257.6	1 308.2	1 358.9															39
40	1 268.7	1 322.0	1 375.3	1 428.6															40
41	1 332.0	1 388.0	1 444.0	1 499.9															41
42	1 396.8	1 455.6	1 514.3	1 573.1															42
43	1 463.2	1 524.8	1 586.4	1 647.9															43
44	1 531.1	1 595.6	1 660.0	1 724.5															44
45	1 600.5	1 668.0	1 735.4	1 802.8															45
46	1 671.5	1 741.9	1 812.4	1 882.9															46
47	1 744.0	1 817.5	1 891.1	1 964.6															47
48	1 818.0	1 894.7	1 971.4	2 048.2															48
49	1 893.5	1 973.5	2 053.5	2 133.4															49
50	1 970.6	2 053.9	2 137.1	2 220.4															50
51	2 049.2	2 135.9	2 222.5	2 309.1															51
52	2 129.4	2 219.4	2 309.5	2 399.5															52
53	2 211.1	2 304.6	2 398.1	2 491.7															53
54	2 294.3	2 391.4	2 488.5	2 585.6															54
55	2 379.0	2 479.8	2 580.5	2 681.2															55
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57																			57
58																			58
59																			59
60																			60
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63																			63
64																			64
65																			65
66																			66
67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Robinia pseudoacacia* L.**

**Robinia**



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## Robinia

### Volume del fusto e dei rami grossi

$n = 50$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.1214 \quad 3.7123 \cdot 10^{-2} \quad 1.4296 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 6.1856 & & \\ 2.4814 \cdot 10^{-3} & 1.4962 \cdot 10^{-6} & \\ -1.1639 & -5.1519 \cdot 10^{-4} & 2.3041 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 1.4833 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 50$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-3.1067 \quad 2.1606 \cdot 10^{-2} \quad 2.4442 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 2.8265 & & \\ 1.1339 \cdot 10^{-3} & 6.8371 \cdot 10^{-7} & \\ -5.3183 \cdot 10^{-1} & -2.3542 \cdot 10^{-4} & 1.0529 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 6.7778 \cdot 10^{-6}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 50$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-6.7308 \quad 2.1132 \cdot 10^{-3} \quad 1.8967]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 3.9733 & & \\ 1.5939 \cdot 10^{-3} & 9.6109 \cdot 10^{-7} & \\ -7.4760 \cdot 10^{-1} & -3.3093 \cdot 10^{-4} & 1.4801 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 9.5276 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 50$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-2.7664 \cdot 10^{-1} \quad 3.2284 \cdot 10^{-4} \quad 6.5335 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 1.9252 \cdot 10^{-2} & & \\ 7.7229 \cdot 10^{-6} & 4.6567 \cdot 10^{-9} & \\ -3.6223 \cdot 10^{-3} & -1.6034 \cdot 10^{-6} & 7.1713 \cdot 10^{-4} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 4.6164 \cdot 10^{-8}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 50$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.0114 \cdot 10 \quad 2.4042 \cdot 10^{-2} \quad 2.2065]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 8.6155 & & \\ 3.4562 \cdot 10^{-3} & 2.0840 \cdot 10^{-6} & \\ -1.6211 & -7.1757 \cdot 10^{-4} & 3.2093 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 2.0659 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Robinia**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.2	4.2	5.1	6.0	6.9	7.9													5
6	5.4	6.8	8.1	9.4	10.8	12.1													6
7	8.0	9.8	11.6	13.4	15.3	17.1													7
8				18.0	20.4	22.8	25.2	27.5	29.9	32.3									8
9				23.2	26.2	29.2	32.2	35.2	38.3	41.3									9
10				29.0	32.7	36.4	40.1	43.9	47.6	51.3									10
11				35.4	39.9	44.4	48.9	53.4	57.8	62.3									11
12				42.4	47.7	53.1	58.4	63.7	69.1	74.4									12
13					62.5	68.7	75.0	81.3	87.6	93.8	100.1	106.4	112.7						13
14					72.6	79.9	87.2	94.5	101.7	109.0	116.3	123.6	130.8						14
15					83.5	91.9	100.3	108.6	117.0	125.3	133.7	142.0	150.4						15
16					95.2	104.7	114.2	123.7	133.2	142.7	152.2	161.7	171.2						16
17					107.6	118.3	129.1	139.8	150.5	161.2	172.0	182.7	193.4						17
18							144.8	156.8	168.8	180.9	192.9	204.9	217.0	229.0	241.0				18
19							161.4	174.8	188.2	201.6	215.0	228.4	241.8	255.2	268.6				19
20							178.9	193.8	208.6	223.5	238.3	253.2	268.0	282.9	297.7				20
21							197.3	213.7	230.1	246.4	262.8	279.2	295.6	311.9	328.3				21
22							216.6	234.6	252.6	270.5	288.5	306.5	324.4	342.4	360.4				22
23									276.1	295.7	315.4	335.0	354.7	374.3	393.9	413.6	433.2		23
24									300.7	322.1	343.4	364.8	386.2	407.6	429.0	450.3	471.7		24
25									326.3	349.5	372.7	395.9	419.1	442.3	465.5	488.7	511.9		25
26									352.9	378.0	403.1	428.2	453.3	478.4	503.5	528.6	553.7		26
27									380.6	407.7	434.7	461.8	488.9	515.9	543.0	570.1	597.1		27
28											467.6	496.7	525.8	554.9	584.0	613.1	642.2		28
29											501.6	532.8	564.0	595.2	626.4	657.7	688.9		29
30											536.7	570.1	603.6	637.0	670.4	703.8	737.2		30
31											573.1	608.8	644.5	680.1	715.8	751.5	787.2		31
32											610.7	648.7	686.7	724.7	762.7	800.7	838.8		32
33											730.3	770.7	811.1	851.6	892.0				33
34											775.2	818.1	861.0	903.9	946.9				34
35											821.4	866.9	912.4	957.9	1 003.3				35
36											869.0	917.1	965.3	1 013.4	1 061.5				36
37											918.0	968.8	1 019.6	1 070.4	1 121.2				37
38											968.2	1 021.8	1 075.4	1 129.0	1 182.6				38
39											1 019.8	1 076.3	1 132.7	1 189.2	1 245.7				39
40											1 072.7	1 132.1	1 191.5	1 250.9	1 310.3				40
41											1 127.0	1 189.4	1 251.8	1 314.2	1 376.6				41
42											1 182.6	1 248.1	1 313.6	1 379.1	1 444.6				42
43													1 376.8	1 445.5	1 514.1				43
44													1 441.6	1 513.4	1 585.3				44
45													1 507.8	1 583.0	1 658.1				45
46																			46
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Robinia  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	452.8	472.5																	23
24	493.1	514.5																	24
25	535.1	558.3																	25
26	578.8	603.9	629.0	654.1															26
27	624.2	651.2	678.3	705.4															27
28	671.3	700.4	729.5	758.6															28
29	720.1	751.3	782.5	813.8															29
30	770.6	804.0	837.4	870.8															30
31	822.8	858.5	894.2	929.9															31
32	876.8	914.8	952.8	990.8															32
33	932.4	972.8	1 013.3	1 053.7	1 094.1	1 134.6													33
34	989.8	1 032.7	1 075.6	1 118.5	1 161.4	1 204.3													34
35	1 048.8	1 094.3	1 139.8	1 185.2	1 230.7	1 276.2													35
36	1 109.6	1 157.7	1 205.8	1 253.9	1 302.0	1 350.1													36
37	1 172.1	1 222.9	1 273.7	1 324.5	1 375.3	1 426.2													37
38	1 236.2	1 289.8	1 343.5	1 397.1	1 450.7	1 504.3													38
39	1 302.1	1 358.6	1 415.1	1 471.5	1 528.0	1 584.4													39
40	1 369.7	1 429.1	1 488.5	1 547.9	1 607.3	1 666.7													40
41	1 439.0	1 501.4	1 563.8	1 626.2	1 688.6	1 751.0													41
42	1 510.0	1 575.5	1 641.0	1 706.5	1 772.0	1 837.5													42
43	1 582.8	1 651.4	1 720.0	1 788.7	1 857.3	1 926.0													43
44	1 657.2	1 729.1	1 800.9	1 872.8	1 944.7	2 016.5													44
45	1 733.3	1 808.5	1 883.7	1 958.8	2 034.0	2 109.2													45
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Robinia  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.8	1.4	1.9	2.4	3.0	3.5													5
6	2.2	3.0	3.8	4.6	5.4	6.1													6
7	3.9	5.0	6.0	7.1	8.1	9.2													7
8				9.9	11.3	12.7	14.1	15.4	16.8	18.2									8
9				13.1	14.8	16.6	18.3	20.1	21.8	23.6									9
10				16.6	18.8	20.9	23.1	25.3	27.4	29.6									10
11				20.5	23.1	25.7	28.3	31.0	33.6	36.2									11
12				24.7	27.8	30.9	34.1	37.2	40.3	43.4									12
13					36.6	40.2	43.9	47.5	51.2	54.8	58.5	62.1	65.8						13
14					42.7	46.9	51.1	55.4	59.6	63.8	68.1	72.3	76.5						14
15					49.2	54.0	58.9	63.8	68.6	73.5	78.3	83.2	88.1						15
16					56.1	61.6	67.2	72.7	78.2	83.8	89.3	94.8	100.4						16
17					63.5	69.7	76.0	82.2	88.5	94.7	101.0	107.2	113.4						17
18							85.3	92.3	99.3	106.3	113.3	120.3	127.3	134.3	141.3				18
19							95.1	102.9	110.7	118.5	126.3	134.1	141.9	149.7	157.5				19
20							105.5	114.1	122.8	131.4	140.1	148.7	157.3	166.0	174.6				20
21							116.4	125.9	135.4	144.9	154.5	164.0	173.5	183.1	192.6				21
22							127.8	138.2	148.7	159.1	169.6	180.0	190.5	201.0	211.4				22
23									162.5	174.0	185.4	196.8	208.2	219.7	231.1	242.5	254.0		23
24									177.0	189.4	201.9	214.3	226.8	239.2	251.7	264.1	276.6		24
25									192.1	205.6	219.1	232.6	246.1	259.6	273.1	286.6	300.1		25
26									207.7	222.3	236.9	251.5	266.2	280.8	295.4	310.0	324.6		26
27									224.0	239.8	255.5	271.3	287.0	302.8	318.5	334.3	350.0		27
28											274.8	291.7	308.6	325.6	342.5	359.5	376.4		28
29											294.7	312.9	331.1	349.2	367.4	385.6	403.7		29
30											315.4	334.8	354.2	373.7	393.1	412.6	432.0		30
31											336.7	357.4	378.2	399.0	419.7	440.5	461.3		31
32											358.7	380.8	403.0	425.1	447.2	469.3	491.5		32
33													428.5	452.0	475.5	499.1	522.6		33
34													454.8	479.8	504.7	529.7	554.7		34
35													481.9	508.3	534.8	561.3	587.7		35
36													509.7	537.7	565.7	593.7	621.7		36
37													538.4	567.9	597.5	627.1	656.7		37
38													567.8	599.0	630.2	661.4	692.6		38
39													598.0	630.8	663.7	696.5	729.4		39
40													628.9	663.5	698.1	732.6	767.2		40
41													660.7	697.0	733.3	769.6	805.9		41
42													693.2	731.3	769.4	807.5	845.6		42
43															806.4	846.3	886.3		43
44															844.2	886.1	927.9		44
45															882.9	926.7	970.4		45
46																			46
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Robinia  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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18																			18
19																			19
20																			20
21																			21
22																			22
23	265.4	276.8																	23
24	289.0	301.4																	24
25	313.6	327.1																	25
26	339.2	353.8	368.4	383.0															26
27	365.8	381.5	397.3	413.0															27
28	393.3	410.3	427.2	444.2															28
29	421.9	440.1	458.2	476.4															29
30	451.5	470.9	490.4	509.8															30
31	482.0	502.8	523.6	544.3															31
32	513.6	535.7	557.8	580.0															32
33	546.1	569.7	593.2	616.7	640.2	663.8													33
34	579.7	604.6	629.6	654.6	679.6	704.5													34
35	614.2	640.7	667.1	693.6	720.1	746.5													35
36	649.7	677.7	705.7	733.7	761.7	789.7													36
37	686.2	715.8	745.4	775.0	804.6	834.1													37
38	723.8	755.0	786.2	817.4	848.6	879.8													38
39	762.3	795.1	828.0	860.9	893.7	926.6													39
40	801.8	836.3	870.9	905.5	940.0	974.6													40
41	842.3	878.6	914.9	951.2	987.5	1 023.9													41
42	883.8	921.9	960.0	998.1	1 036.2	1 074.3													42
43	926.2	966.2	1 006.1	1 046.1	1 086.0	1 126.0													43
44	969.7	1 011.5	1 053.4	1 095.2	1 137.0	1 178.9													44
45	1 014.2	1 057.9	1 101.7	1 145.4	1 189.2	1 233.0													45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Robinia  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.0	3.1	3.1	3.2	3.2	3.3													5
6	5.0	5.1	5.2	5.3	5.3	5.4													6
7	7.1	7.2	7.3	7.4	7.5	7.6													7
8				9.5	9.7	9.8	9.9	10.1	10.2	10.3									8
9				11.7	11.9	12.1	12.2	12.4	12.6	12.7									9
10				13.9	14.1	14.3	14.6	14.8	15.0	15.2									10
11				16.2	16.4	16.7	16.9	17.2	17.5	17.7									11
12				18.5	18.8	19.1	19.4	19.7	20.0	20.3									12
13						21.5	21.9	22.2	22.6	22.9	23.3	23.6	24.0	24.4					13
14						24.0	24.4	24.8	25.2	25.6	26.0	26.4	26.9	27.3					14
15						26.5	26.9	27.4	27.9	28.4	28.9	29.3	29.8	30.3					15
16						29.0	29.6	30.1	30.6	31.2	31.7	32.3	32.8	33.4					16
17						31.6	32.2	32.8	33.5	34.1	34.7	35.3	35.9	36.5					17
18								35.6	36.3	37.0	37.7	38.4	39.0	39.7	40.4	41.1			18
19								38.5	39.2	40.0	40.7	41.5	42.3	43.0	43.8	44.6			19
20								41.3	42.2	43.0	43.9	44.7	45.6	46.4	47.3	48.1			20
21								44.3	45.2	46.1	47.1	48.0	48.9	49.9	50.8	51.7			21
22								47.3	48.3	49.3	50.3	51.4	52.4	53.4	54.4	55.5			22
23										52.5	53.7	54.8	55.9	57.0	58.1	59.3	60.4	61.5	23
24										55.8	57.0	58.3	59.5	60.7	61.9	63.1	64.4	65.6	24
25										59.2	60.5	61.8	63.1	64.5	65.8	67.1	68.4	69.7	25
26										62.6	64.0	65.4	66.9	68.3	69.7	71.2	72.6	74.0	26
27										66.0	67.6	69.1	70.7	72.2	73.8	75.3	76.8	78.4	27
28												72.9	74.5	76.2	77.9	79.5	81.2	82.8	28
29												76.7	78.5	80.3	82.0	83.8	85.6	87.4	29
30												80.6	82.5	84.4	86.3	88.2	90.1	92.0	30
31												84.6	86.6	88.6	90.7	92.7	94.7	96.7	31
32												88.6	90.8	92.9	95.1	97.2	99.4	101.6	32
33														97.3	99.6	101.9	104.2	106.5	33
34														101.7	104.2	106.6	109.1	111.5	34
35														106.2	108.8	111.4	114.0	116.6	35
36														110.8	113.6	116.3	119.1	121.8	36
37														115.5	118.4	121.3	124.2	127.1	37
38														120.3	123.3	126.4	129.4	132.5	38
39														125.1	128.3	131.5	134.7	138.0	39
40														130.0	133.4	136.8	140.1	143.5	40
41														135.0	138.5	142.1	145.6	149.2	41
42														140.0	143.8	147.5	151.2	154.9	42
43																153.0	156.9	160.8	43
44																158.5	162.6	166.7	44
45																164.2	168.5	172.8	45
46																			46
47																			47
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Robinia  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
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16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	62.6	63.7																	23
24	66.8	68.0																	24
25	71.1	72.4																	25
26	75.4	76.9	78.3	79.7															26
27	79.9	81.5	83.0	84.5															27
28	84.5	86.1	87.8	89.5															28
29	89.1	90.9	92.7	94.5															29
30	93.9	95.8	97.7	99.6															30
31	98.8	100.8	102.8	104.9															31
32	103.7	105.9	108.1	110.2															32
33	108.8	111.1	113.4	115.7	118.0	120.3													33
34	113.9	116.4	118.8	121.3	123.7	126.2													34
35	119.2	121.8	124.4	127.0	129.5	132.1													35
36	124.5	127.3	130.0	132.8	135.5	138.2													36
37	130.0	132.9	135.8	138.7	141.6	144.5													37
38	135.5	138.6	141.6	144.7	147.7	150.8													38
39	141.2	144.4	147.6	150.8	154.0	157.2													39
40	146.9	150.3	153.7	157.0	160.4	163.8													40
41	152.7	156.3	159.8	163.4	166.9	170.5													41
42	158.7	162.4	166.1	169.9	173.6	177.3													42
43	164.7	168.6	172.5	176.4	180.3	184.2													43
44	170.8	174.9	179.0	183.1	187.2	191.3													44
45	177.0	181.3	185.6	189.9	194.2	198.4													45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Robinia  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.1	0.1	0.1	0.1	0.1	0.1													5
6	0.2	0.2	0.2	0.2	0.2	0.2													6
7	0.3	0.3	0.3	0.3	0.3	0.3													7
8				0.4	0.4	0.5	0.5	0.5	0.5	0.5									8
9				0.5	0.5	0.6	0.6	0.6	0.7	0.7									9
10				0.6	0.7	0.7	0.7	0.8	0.8	0.8									10
11				0.8	0.8	0.8	0.9	0.9	0.9	1.0									11
12				0.9	0.9	1.0	1.0	1.1	1.1	1.2									12
13						1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.6					13
14						1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8					14
15						1.4	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0					15
16						1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3					16
17						1.8	1.9	2.0	2.0	2.1	2.2	2.3	2.4	2.5					17
18								2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0			18
19								2.4	2.5	2.6	2.7	2.8	2.9	3.1	3.2	3.3			19
20								2.6	2.7	2.8	3.0	3.1	3.2	3.4	3.5	3.6			20
21								2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	3.9			21
22								3.0	3.2	3.3	3.5	3.7	3.8	4.0	4.1	4.3			22
23										3.6	3.8	4.0	4.1	4.3	4.5	4.6	4.8	5.0	23
24										3.9	4.1	4.3	4.5	4.6	4.8	5.0	5.2	5.4	24
25										4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	25
26										4.5	4.7	4.9	5.1	5.4	5.6	5.8	6.0	6.2	26
27										4.8	5.0	5.3	5.5	5.7	6.0	6.2	6.4	6.7	27
28												5.6	5.9	6.1	6.4	6.6	6.9	7.1	28
29												6.0	6.2	6.5	6.8	7.0	7.3	7.6	29
30												6.3	6.6	6.9	7.2	7.5	7.8	8.1	30
31												6.7	7.0	7.3	7.6	8.0	8.3	8.6	31
32												7.1	7.4	7.8	8.1	8.4	8.8	9.1	32
33														8.2	8.6	8.9	9.3	9.6	33
34														8.7	9.0	9.4	9.8	10.2	34
35														9.1	9.5	9.9	10.3	10.7	35
36														9.6	10.0	10.4	10.9	11.3	36
37														10.1	10.5	11.0	11.4	11.9	37
38														10.6	11.1	11.5	12.0	12.5	38
39														11.1	11.6	12.1	12.6	13.1	39
40														11.6	12.2	12.7	13.2	13.7	40
41														12.2	12.7	13.3	13.8	14.3	41
42														12.7	13.3	13.9	14.4	15.0	42
43																14.5	15.1	15.7	43
44																15.1	15.7	16.3	44
45																15.7	16.4	17.0	45
46																			46
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70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Robinia  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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18																			18
19																			19
20																			20
21																			21
22																			22
23	5.2	5.3																	23
24	5.6	5.8																	24
25	6.0	6.2																	25
26	6.4	6.7	6.9	7.1															26
27	6.9	7.1	7.4	7.6															27
28	7.4	7.6	7.9	8.1															28
29	7.9	8.1	8.4	8.7															29
30	8.4	8.7	8.9	9.2															30
31	8.9	9.2	9.5	9.8															31
32	9.4	9.7	10.1	10.4															32
33	10.0	10.3	10.7	11.0	11.4	11.7													33
34	10.5	10.9	11.3	11.6	12.0	12.4													34
35	11.1	11.5	11.9	12.3	12.7	13.1													35
36	11.7	12.1	12.5	13.0	13.4	13.8													36
37	12.3	12.7	13.2	13.6	14.1	14.5													37
38	12.9	13.4	13.9	14.3	14.8	15.3													38
39	13.6	14.1	14.5	15.0	15.5	16.0													39
40	14.2	14.7	15.3	15.8	16.3	16.8													40
41	14.9	15.4	16.0	16.5	17.1	17.6													41
42	15.6	16.1	16.7	17.3	17.8	18.4													42
43	16.3	16.9	17.5	18.1	18.6	19.2													43
44	17.0	17.6	18.2	18.8	19.5	20.1													44
45	17.7	18.4	19.0	19.7	20.3	21.0													45
46																			46
47																			47
48																			48
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Robinia  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.9	4.5	5.1	5.7	6.3	6.9													5
6	7.5	8.3	9.2	10.0	10.9	11.8													6
7	11.2	12.4	13.6	14.8	15.9	17.1													7
8				19.8	21.4	22.9	24.5	26.0	27.5	29.1									8
9				25.3	27.3	29.2	31.2	33.1	35.1	37.0									9
10				31.2	33.6	36.0	38.4	40.8	43.2	45.6									10
11				37.4	40.3	43.2	46.2	49.1	52.0	54.9									11
12				44.1	47.5	51.0	54.4	57.9	61.4	64.8									12
13					59.2	63.3	67.3	71.4	75.5	79.5	83.6	87.6	91.7						13
14					67.9	72.6	77.3	82.0	86.7	91.5	96.2	100.9	105.6						14
15						77.1	82.5	87.9	93.3	98.7	104.1	109.5	114.9	120.4					15
16						86.7	92.9	99.0	105.2	111.4	117.5	123.7	129.8	136.0					16
17						96.9	103.8	110.8	117.7	124.7	131.6	138.6	145.5	152.5					17
18								123.1	130.9	138.7	146.4	154.2	162.0	169.8	177.6	185.4			18
19								136.0	144.6	153.3	162.0	170.7	179.4	188.0	196.7	205.4			19
20								149.4	159.0	168.7	178.3	187.9	197.5	207.1	216.7	226.4			20
21								163.5	174.1	184.7	195.3	205.9	216.5	227.1	237.7	248.3			21
22								178.1	189.7	201.3	213.0	224.6	236.2	247.9	259.5	271.2			22
23										218.7	231.4	244.1	256.8	269.6	282.3	295.0	307.7	320.4	23
24										236.7	250.6	264.4	278.3	292.1	306.0	319.8	333.7	347.5	24
25										255.4	270.4	285.5	300.5	315.5	330.5	345.6	360.6	375.6	25
26										274.8	291.0	307.3	323.5	339.8	356.1	372.3	388.6	404.8	26
27										294.8	312.4	329.9	347.4	364.9	382.5	400.0	417.5	435.0	27
28												353.3	372.1	390.9	409.8	428.6	447.5	466.3	28
29												377.4	397.6	417.8	438.0	458.3	478.5	498.7	29
30												402.3	423.9	445.6	467.2	488.8	510.5	532.1	30
31												428.0	451.1	474.2	497.3	520.4	543.5	566.6	31
32												454.4	479.0	503.6	528.3	552.9	577.5	602.1	32
33														534.0	560.2	586.3	612.5	638.7	33
34														565.2	593.0	620.8	648.6	676.3	34
35														597.2	626.7	656.1	685.6	715.0	35
36														630.2	661.3	692.5	723.6	754.8	36
37														664.0	696.9	729.8	762.7	795.6	37
38														698.6	733.3	768.1	802.8	837.5	38
39														734.2	770.7	807.3	843.9	880.4	39
40														770.6	809.0	847.5	886.0	924.4	40
41														807.8	848.2	888.6	929.1	969.5	41
42														845.9	888.4	930.8	973.2	1 015.6	42
43																973.8	1 018.3	1 062.7	43
44																1 017.9	1 064.4	1 111.0	44
45																1 062.9	1 111.6	1 160.2	45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Robinia  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
6																			6
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10																			10
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17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23	333.2	345.9																	23
24	361.4	375.2																	24
25	390.7	405.7																	25
26	421.1	437.3	453.6	469.8															26
27	452.6	470.1	487.6	505.2															27
28	485.2	504.0	522.9	541.7															28
29	518.9	539.1	559.4	579.6															29
30	553.8	575.4	597.0	618.7															30
31	589.7	612.8	635.9	659.0															31
32	626.7	651.4	676.0	700.6															32
33	664.9	691.1	717.2	743.4	769.6	795.8													33
34	704.1	731.9	759.7	787.5	815.3	843.1													34
35	744.5	773.9	803.4	832.9	862.3	891.8													35
36	786.0	817.1	848.3	879.4	910.6	941.8													36
37	828.5	861.5	894.4	927.3	960.2	993.1													37
38	872.2	906.9	941.6	976.4	1 011.1	1 045.8													38
39	917.0	953.6	990.1	1 026.7	1 063.3	1 099.8													39
40	962.9	1 001.4	1 039.8	1 078.3	1 116.8	1 155.2													40
41	1 009.9	1 050.3	1 090.7	1 131.1	1 171.5	1 212.0													41
42	1 058.0	1 100.4	1 142.8	1 185.2	1 227.6	1 270.0													42
43	1 107.2	1 151.7	1 196.1	1 240.6	1 285.0	1 329.5													43
44	1 157.5	1 204.1	1 250.6	1 297.2	1 343.7	1 390.2													44
45	1 208.9	1 257.6	1 306.3	1 355.0	1 403.7	1 452.4													45
46																			46
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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***Salix* spp.**

**Salici**

*Salix alba* L.  
Salice bianco

*Salix caprea* L.  
Salicone

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## Salici

### Volume del fusto e dei rami grossi

$n = 38$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-2.3140 \quad 3.8926 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 4.6133 & \\ -1.6242 \cdot 10^{-3} & 1.1914 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 2.3544 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 38$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [8.9159 \cdot 10^{-1} \quad 1.6329 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}' \mathbf{W}^{-1} \mathbf{X})^{-1} s^2 = \begin{bmatrix} 2.5774 & \\ -9.0742 \cdot 10^{-4} & 6.6563 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s^2 = 1.3154 \cdot 10^{-5}$$

$$s_i^2 = s^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 38$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [7.4672 \quad 4.4069 \cdot 10^{-3}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})s_*^2 = \begin{bmatrix} 1.7331 \\ -6.1016 \cdot 10^{-4} & 4.4757 \cdot 10^{-7} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 8.8448 \cdot 10^{-6}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 38$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_3 = b_1 + b_2 d^2 h \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

$$\mathbf{b}' = [6.9724 \cdot 10^{-1} \quad 3.5095 \cdot 10^{-4}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 4.3302 \cdot 10^{-2} \\ -1.5245 \cdot 10^{-5} & 1.1183 \cdot 10^{-8} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.2099 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 38$        $p = 2$

equazione di previsione

vettore dei coefficienti

$$dw_4 = b_1 + b_2 d^2 h \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

$$\mathbf{b}' = [9.0561 \quad 2.1087 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_*^2 = \begin{bmatrix} 5.7855 \\ -2.0369 \cdot 10^{-3} & 1.4941 \cdot 10^{-6} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s^2 = 2.9526 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_*^2 (d_i^2 h_i)^2$$



**Salici**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.6	3.5	4.5	5.5	6.4	7.4													5
6	4.7	6.1	7.5	8.9	10.3	11.7													6
7	7.2	9.1	11.0	12.9	14.9	16.8													7
8	10.1	12.6	15.1	17.6	20.1	22.6	25.1	27.6											8
9	13.5	16.6	19.8	22.9	26.1	29.2	32.4	35.5											9
10	17.1	21.0	24.9	28.8	32.7	36.6	40.5	44.4											10
11	21.2	25.9	30.7	35.4	40.1	44.8	49.5	54.2											11
12	25.7	31.3	36.9	42.5	48.1	53.7	59.3	65.0	70.6	76.2									12
13				50.3	56.9	63.5	70.0	76.6	83.2	89.8	96.4	102.9							13
14				58.7	66.4	74.0	81.6	89.2	96.9	104.5	112.1	119.8							14
15				67.8	76.5	85.3	94.0	102.8	111.5	120.3	129.1	137.8							15
16				77.4	87.4	97.3	107.3	117.3	127.2	137.2	147.2	157.1							16
17				87.7	98.9	110.2	121.4	132.7	143.9	155.2	166.4	177.7	188.9	200.2	211.4	222.7			17
18						123.8	136.4	149.0	161.6	174.3	186.9	199.5	212.1	224.7	237.3	249.9			18
19						138.2	152.3	166.3	180.4	194.4	208.5	222.5	236.6	250.6	264.7	278.7			19
20						153.4	169.0	184.5	200.1	215.7	231.2	246.8	262.4	278.0	293.5	309.1			20
21						169.3	186.5	203.7	220.8	238.0	255.2	272.3	289.5	306.7	323.8	341.0			21
22						186.1	204.9	223.8	242.6	261.4	280.3	299.1	318.0	336.8	355.6	374.5			22
23								244.8	265.4	286.0	306.6	327.2	347.7	368.3	388.9	409.5	430.1	450.7	23
24								266.7	289.2	311.6	334.0	356.4	378.8	401.3	423.7	446.1	468.5	491.0	24
25								289.6	314.0	338.3	362.6	386.9	411.3	435.6	459.9	484.3	508.6	532.9	25
26								313.5	339.8	366.1	392.4	418.7	445.0	471.3	497.7	524.0	550.3	576.6	26
27								338.2	366.6	395.0	423.3	451.7	480.1	508.5	536.9	565.2	593.6	622.0	27
28								363.9	394.4	424.9	455.5	486.0	516.5	547.0	577.5	608.0	638.6	669.1	28
29								390.5	423.3	456.0	488.7	521.5	554.2	586.9	619.7	652.4	685.2	717.9	29
30								418.1	453.1	488.2	523.2	558.2	593.3	628.3	663.3	698.4	733.4	768.4	30
31								446.6	484.0	521.4	558.8	596.2	633.6	671.0	708.4	745.8	783.3	820.7	31
32								476.0	515.9	555.7	595.6	635.4	675.3	715.2	755.0	794.9	834.8	874.6	32
33									591.2	633.5	675.9	718.3	760.7	803.1	845.5	887.9	930.3		33
34									627.7	672.7	717.7	762.7	807.7	852.7	897.7	942.7	987.7		34
35									665.3	713.0	760.6	808.3	856.0	903.7	951.4	999.1	1 046.7		35
36									704.0	754.4	804.9	855.3	905.8	956.2	1 006.6	1 057.1	1 107.5		36
37									743.7	797.0	850.3	903.6	956.9	1 010.2	1 063.5	1 116.8	1 170.1		37
38									784.6	840.8	897.0	953.2	1 009.5	1 065.7	1 121.9	1 178.1	1 234.3		38
39									826.6	885.8	945.0	1 004.2	1 063.4	1 122.6	1 181.8	1 241.0	1 300.2		39
40											994.2	1 056.5	1 118.8	1 181.0	1 243.3	1 305.6	1 367.9		40
41											1 044.6	1 110.1	1 175.5	1 240.9	1 306.4	1 371.8	1 437.2		41
42											1 096.3	1 165.0	1 233.7	1 302.3	1 371.0	1 439.7	1 508.3		42
43											1 149.3	1 221.2	1 293.2	1 365.2	1 437.2	1 509.1	1 581.1		43
44											1 203.5	1 278.8	1 354.2	1 429.5	1 504.9	1 580.3	1 655.6		44
45											1 258.9	1 337.7	1 416.5	1 495.4	1 574.2	1 653.0	1 731.8		45
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68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Salici**  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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24																			24
25																			25
26																			26
27																			27
28	699.6	730.1																	28
29	750.6	783.4																	29
30	803.5	838.5																	30
31	858.1	895.5																	31
32	914.5	954.3																	32
33	972.7	1 015.1																	33
34	1 032.7	1 077.6																	34
35	1 094.4	1 142.1																	35
36	1 158.0	1 208.4																	36
37	1 223.3	1 276.6																	37
38	1 290.5	1 346.7																	38
39	1 359.4	1 418.6																	39
40	1 430.2	1 492.4																	40
41	1 502.7	1 568.1																	41
42	1 577.0	1 645.7																	42
43	1 653.1	1 725.1																	43
44	1 731.0	1 806.3																	44
45	1 810.7	1 889.5																	45
46																			46
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Salici**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	2.9	3.3	3.7	4.2	4.6	5.0													5
6	3.8	4.4	5.0	5.6	6.2	6.8													6
7	4.9	5.7	6.5	7.3	8.1	8.9													7
8	6.1	7.2	8.2	9.3	10.3	11.3	12.4	13.4											8
9	7.5	8.8	10.2	11.5	12.8	14.1	15.4	16.8											9
10	9.1	10.7	12.3	14.0	15.6	17.2	18.9	20.5											10
11	10.8	12.7	14.7	16.7	18.7	20.6	22.6	24.6											11
12	12.6	15.0	17.4	19.7	22.1	24.4	26.8	29.1	31.5	33.8									12
13				23.0	25.7	28.5	31.2	34.0	36.8	39.5	42.3	45.0							13
14				26.5	29.7	32.9	36.1	39.3	42.5	45.7	48.9	52.1							14
15				30.3	34.0	37.6	41.3	45.0	48.7	52.3	56.0	59.7							15
16				34.3	38.5	42.7	46.9	51.1	55.2	59.4	63.6	67.8							16
17				38.6	43.4	48.1	52.8	57.5	62.2	67.0	71.7	76.4	81.1	85.8	90.6	95.3			17
18						53.8	59.1	64.4	69.7	75.0	80.3	85.5	90.8	96.1	101.4	106.7			18
19						59.8	65.7	71.6	77.5	83.4	89.3	95.2	101.1	107.0	112.9	118.8			19
20						66.2	72.7	79.3	85.8	92.3	98.9	105.4	111.9	118.5	125.0	131.5			20
21						72.9	80.1	87.3	94.5	101.7	108.9	116.1	123.3	130.5	137.7	144.9			21
22						79.9	87.8	95.7	103.6	111.5	119.4	127.3	135.2	143.1	151.1	159.0			22
23								104.5	113.2	121.8	130.5	139.1	147.7	156.4	165.0	173.7	182.3	190.9	23
24								113.8	123.2	132.6	142.0	151.4	160.8	170.2	179.6	189.0	198.4	207.8	24
25								123.4	133.6	143.8	154.0	164.2	174.4	184.6	194.8	205.0	215.2	225.4	25
26								133.4	144.4	155.4	166.5	177.5	188.5	199.6	210.6	221.7	232.7	243.7	26
27								143.7	155.6	167.5	179.4	191.4	203.3	215.2	227.1	239.0	250.9	262.8	27
28								154.5	167.3	180.1	192.9	205.7	218.5	231.3	244.1	256.9	269.7	282.5	28
29								165.7	179.4	193.1	206.9	220.6	234.3	248.1	261.8	275.5	289.3	303.0	29
30								177.2	191.9	206.6	221.3	236.0	250.7	265.4	280.1	294.8	309.5	324.2	30
31								189.2	204.9	220.6	236.3	252.0	267.7	283.4	299.0	314.7	330.4	346.1	31
32								201.5	218.3	235.0	251.7	268.4	285.1	301.9	318.6	335.3	352.0	368.8	32
33								249.8	267.6	285.4	303.2	321.0	338.8	356.5	374.3	392.1			33
34								265.2	284.0	302.9	321.8	340.7	359.5	378.4	397.3	416.2			34
35								280.9	300.9	320.9	340.9	360.9	380.9	401.0	421.0	441.0			35
36								297.2	318.3	339.5	360.7	381.8	403.0	424.1	445.3	466.5			36
37								313.9	336.2	358.6	380.9	403.3	425.6	448.0	470.3	492.7			37
38								331.0	354.6	378.2	401.7	425.3	448.9	472.5	496.1	519.6			38
39								348.6	373.4	398.3	423.1	447.9	472.8	497.6	522.5	547.3			39
40								418.9	445.0	471.2	497.3	523.4	549.5	575.7					40
41										440.1	467.5	495.0	522.4	549.9	577.3	604.8			41
42										461.8	490.6	519.4	548.2	577.0	605.8	634.6			42
43										484.0	514.2	544.4	574.5	604.7	634.9	665.1			43
44										506.7	538.3	569.9	601.5	633.2	664.8	696.4			44
45										530.0	563.0	596.1	629.1	662.2	695.3	728.3			45
46																			46
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Salici**  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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25																			25
26																			26
27																			27
28	295.3	308.1																	28
29	316.7	330.5																	29
30	338.9	353.6																	30
31	361.8	377.5																	31
32	385.5	402.2																	32
33	409.9	427.7																	33
34	435.0	453.9																	34
35	461.0	481.0																	35
36	487.6	508.8																	36
37	515.0	537.4																	37
38	543.2	566.8																	38
39	572.1	597.0																	39
40	601.8	627.9																	40
41	632.2	659.7																	41
42	663.4	692.2																	42
43	695.3	725.5																	43
44	728.0	759.6																	44
45	761.4	794.5																	45
46																			46
47																			47
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Salici**  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	8.0	8.1	8.2	8.3	8.5	8.6													5
6	8.3	8.4	8.6	8.7	8.9	9.1													6
7	8.5	8.8	9.0	9.2	9.4	9.6													7
8	8.9	9.2	9.4	9.7	10.0	10.3	10.6	10.9											8
9	9.3	9.6	10.0	10.3	10.7	11.0	11.4	11.8											9
10	9.7	10.1	10.6	11.0	11.4	11.9	12.3	12.8											10
11	10.1	10.7	11.2	11.7	12.3	12.8	13.3	13.9											11
12	10.6	11.3	11.9	12.5	13.2	13.8	14.4	15.1	15.7	16.4									12
13				13.4	14.2	14.9	15.7	16.4	17.1	17.9	18.6	19.4							13
14				14.4	15.2	16.1	17.0	17.8	18.7	19.6	20.4	21.3							14
15				15.4	16.4	17.4	18.4	19.4	20.4	21.3	22.3	23.3							15
16				16.5	17.6	18.7	19.9	21.0	22.1	23.3	24.4	25.5							16
17				17.7	18.9	20.2	21.5	22.8	24.0	25.3	26.6	27.8	29.1	30.4	31.7	32.9			17
18						21.7	23.2	24.6	26.0	27.5	28.9	30.3	31.7	33.2	34.6	36.0			18
19						23.4	25.0	26.6	28.1	29.7	31.3	32.9	34.5	36.1	37.7	39.3			19
20						25.1	26.9	28.6	30.4	32.1	33.9	35.7	37.4	39.2	41.0	42.7			20
21						26.9	28.8	30.8	32.7	34.7	36.6	38.6	40.5	42.4	44.4	46.3			21
22						28.8	30.9	33.1	35.2	37.3	39.5	41.6	43.7	45.9	48.0	50.1			22
23								35.4	37.8	40.1	42.4	44.8	47.1	49.4	51.8	54.1	56.4	58.8	23
24								37.9	40.5	43.0	45.5	48.1	50.6	53.2	55.7	58.2	60.8	63.3	24
25								40.5	43.3	46.0	48.8	51.5	54.3	57.0	59.8	62.6	65.3	68.1	25
26								43.2	46.2	49.2	52.2	55.1	58.1	61.1	64.1	67.0	70.0	73.0	26
27								46.0	49.2	52.4	55.7	58.9	62.1	65.3	68.5	71.7	74.9	78.1	27
28								48.9	52.4	55.8	59.3	62.7	66.2	69.7	73.1	76.6	80.0	83.5	28
29								51.9	55.6	59.4	63.1	66.8	70.5	74.2	77.9	81.6	85.3	89.0	29
30								55.1	59.0	63.0	67.0	70.9	74.9	78.9	82.8	86.8	90.8	94.7	30
31								58.3	62.5	66.8	71.0	75.2	79.5	83.7	87.9	92.2	96.4	100.6	31
32								61.6	66.1	70.6	75.2	79.7	84.2	88.7	93.2	97.7	102.2	106.7	32
33								74.7	79.5	84.3	89.1	93.9	98.7	103.4	108.2	113.0			33
34								78.8	83.9	89.0	94.1	99.2	104.3	109.4	114.4	119.5			34
35								83.0	88.4	93.8	99.2	104.6	110.0	115.4	120.8	126.2			35
36								87.4	93.1	98.8	104.6	110.3	116.0	121.7	127.4	133.1			36
37								91.9	98.0	104.0	110.0	116.1	122.1	128.1	134.2	140.2			37
38								96.6	102.9	109.3	115.6	122.0	128.4	134.7	141.1	147.5			38
39								101.3	108.0	114.7	121.4	128.1	134.8	141.5	148.2	154.9			39
40										120.3	127.3	134.4	141.4	148.5	155.5	162.6			40
41										126.0	133.4	140.8	148.2	155.6	163.0	170.4			41
42										131.8	139.6	147.4	155.2	162.9	170.7	178.5			42
43										137.8	146.0	154.1	162.3	170.4	178.6	186.7			43
44										144.0	152.5	161.0	169.6	178.1	186.6	195.2			44
45										150.3	159.2	168.1	177.0	185.9	194.9	203.8			45
46																			46
47																			47
48																			48
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Salici**  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27																			27
28	86.9	90.4																	28
29	92.7	96.4																	29
30	98.7	102.7																	30
31	104.9	109.1																	31
32	111.3	115.8																	32
33	117.8	122.6																	33
34	124.6	129.7																	34
35	131.6	137.0																	35
36	138.8	144.5																	36
37	146.2	152.3																	37
38	153.8	160.2																	38
39	161.6	168.3																	39
40	169.6	176.7																	40
41	177.9	185.3																	41
42	186.3	194.0																	42
43	194.9	203.0																	43
44	203.7	212.2																	44
45	212.7	221.6																	45
46																			46
47																			47
48																			48
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67																			67
68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

**Salici**  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.7	0.7	0.8	0.8	0.8	0.8													5
6	0.8	0.8	0.8	0.8	0.8	0.8													6
7	0.8	0.8	0.8	0.8	0.8	0.9	0.9												7
8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0											8
9	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0											9
10	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1											10
11	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2											11
12	0.9	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4									12
13				1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6							13
14				1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8							14
15				1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0							15
16				1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.0	2.1							16
17				1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7			17
18						1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.9	3.0			18
19						2.0	2.1	2.2	2.3	2.5	2.6	2.7	2.9	3.0	3.1	3.2			19
20						2.1	2.2	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.4	3.5			20
21						2.2	2.4	2.6	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.8			21
22						2.4	2.6	2.7	2.9	3.1	3.2	3.4	3.6	3.8	3.9	4.1			22
23								2.9	3.1	3.3	3.5	3.7	3.9	4.0	4.2	4.4	4.6	4.8	23
24								3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	24
25								3.3	3.5	3.8	4.0	4.2	4.4	4.6	4.9	5.1	5.3	5.5	25
26								3.5	3.8	4.0	4.3	4.5	4.7	5.0	5.2	5.4	5.7	5.9	26
27								3.8	4.0	4.3	4.5	4.8	5.0	5.3	5.6	5.8	6.1	6.3	27
28								4.0	4.3	4.5	4.8	5.1	5.4	5.6	5.9	6.2	6.5	6.8	28
29								4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	29
30								4.5	4.8	5.1	5.4	5.8	6.1	6.4	6.7	7.0	7.3	7.6	30
31								4.7	5.1	5.4	5.8	6.1	6.4	6.8	7.1	7.4	7.8	8.1	31
32								5.0	5.4	5.7	6.1	6.4	6.8	7.2	7.5	7.9	8.2	8.6	32
33									6.0	6.4	6.8	7.2	7.6	8.0	8.3	8.7	9.1		33
34									6.4	6.8	7.2	7.6	8.0	8.4	8.8	9.2	9.6		34
35									6.7	7.1	7.6	8.0	8.4	8.9	9.3	9.7	10.2		35
36									7.1	7.5	8.0	8.4	8.9	9.3	9.8	10.2	10.7		36
37									7.4	7.9	8.4	8.9	9.3	9.8	10.3	10.8	11.3		37
38									7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.8		38
39									8.2	8.7	9.2	9.8	10.3	10.8	11.4	11.9	12.4		39
40											9.7	10.2	10.8	11.4	11.9	12.5	13.1		40
41											10.1	10.7	11.3	11.9	12.5	13.1	13.7		41
42											10.6	11.2	11.8	12.5	13.1	13.7	14.3		42
43											11.1	11.7	12.4	13.0	13.7	14.3	15.0		43
44											11.6	12.2	12.9	13.6	14.3	15.0	15.6		44
45											12.1	12.8	13.5	14.2	14.9	15.6	16.3		45
46																			46
47																			47
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Salici**  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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25																			25
26																			26
27																			27
28	7.0	7.3																	28
29	7.5	7.8																	29
30	8.0	8.3																	30
31	8.5	8.8																	31
32	9.0	9.3																	32
33	9.5	9.9																	33
34	10.0	10.4																	34
35	10.6	11.0																	35
36	11.2	11.6																	36
37	11.7	12.2																	37
38	12.4	12.9																	38
39	13.0	13.5																	39
40	13.6	14.2																	40
41	14.3	14.9																	41
42	14.9	15.6																	42
43	15.6	16.3																	43
44	16.3	17.0																	44
45	17.0	17.8																	45
46																			46
47																			47
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68																			68
69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



**Salici**  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	11.7	12.2	12.7	13.3	13.8	14.3													5
6	12.9	13.6	14.4	15.1	15.9	16.6													6
7	14.2	15.3	16.3	17.3	18.4	19.4													7
8	15.8	17.2	18.5	19.9	21.2	22.6	23.9	25.3											8
9	17.6	19.3	21.0	22.7	24.4	26.1	27.8	29.6											9
10	19.6	21.7	23.8	25.9	28.0	30.1	32.3	34.4											10
11	21.8	24.4	26.9	29.5	32.0	34.6	37.1	39.7											11
12	24.2	27.3	30.3	33.3	36.4	39.4	42.5	45.5	48.5	51.6									12
13				37.6	41.1	44.7	48.3	51.8	55.4	58.9	62.5	66.1							13
14				42.1	46.3	50.4	54.5	58.7	62.8	66.9	71.1	75.2							14
15				47.0	51.8	56.5	61.2	66.0	70.7	75.5	80.2	85.0							15
16				52.2	57.6	63.0	68.4	73.8	79.2	84.6	90.0	95.4							16
17				57.8	63.9	70.0	76.1	82.2	88.3	94.4	100.5	106.6	112.7	118.8	124.8	130.9			17
18						77.4	84.2	91.0	97.9	104.7	111.5	118.4	125.2	132.0	138.9	145.7			18
19						85.2	92.8	100.4	108.0	115.6	123.2	130.9	138.5	146.1	153.7	161.3			19
20						93.4	101.8	110.3	118.7	127.1	135.6	144.0	152.4	160.9	169.3	177.8			20
21						102.0	111.3	120.6	129.9	139.2	148.5	157.8	167.1	176.4	185.7	195.0			21
22						111.1	121.3	131.5	141.7	151.9	162.1	172.4	182.6	192.8	203.0	213.2			22
23								142.9	154.1	165.2	176.4	187.5	198.7	209.8	221.0	232.2	243.3	254.5	23
24								154.8	167.0	179.1	191.2	203.4	215.5	227.7	239.8	252.0	264.1	276.3	24
25								167.2	180.4	193.6	206.7	219.9	233.1	246.3	259.5	272.6	285.8	299.0	25
26								180.1	194.4	208.6	222.9	237.1	251.4	265.6	279.9	294.2	308.4	322.7	26
27								193.5	208.9	224.3	239.6	255.0	270.4	285.8	301.1	316.5	331.9	347.2	27
28								207.4	224.0	240.5	257.0	273.6	290.1	306.6	323.2	339.7	356.2	372.8	28
29								221.9	239.6	257.3	275.1	292.8	310.5	328.3	346.0	363.7	381.5	399.2	29
30								236.8	255.8	274.8	293.7	312.7	331.7	350.7	369.6	388.6	407.6	426.6	30
31								252.2	272.5	292.8	313.0	333.3	353.6	373.8	394.1	414.3	434.6	454.9	31
32								268.2	289.8	311.4	333.0	354.5	376.1	397.7	419.3	440.9	462.5	484.1	32
33								330.5	353.5	376.5	399.4	422.4	445.4	468.3	491.3	514.3			33
34								350.3	374.7	399.1	423.5	447.8	472.2	496.6	521.0	545.3			34
35								370.7	396.5	422.4	448.2	474.0	499.9	525.7	551.5	577.4			35
36								391.7	419.0	446.3	473.6	501.0	528.3	555.6	583.0	610.3			36
37								413.2	442.1	470.9	499.8	528.7	557.6	586.4	615.3	644.2			37
38								435.4	465.8	496.3	526.7	557.1	587.6	618.0	648.5	678.9			38
39								458.1	490.2	522.2	554.3	586.4	618.4	650.5	682.6	714.7			39
40										548.9	582.6	616.4	650.1	683.8	717.6	751.3			40
41										576.2	611.7	647.1	682.6	718.0	753.4	788.9			41
42										604.2	641.4	678.6	715.8	753.0	790.2	827.4			42
43										632.9	671.9	710.9	749.9	788.9	827.8	866.8			43
44										662.2	703.1	743.9	784.7	825.5	866.4	907.2			44
45										692.3	735.0	777.7	820.4	863.1	905.8	948.5			45
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69																			69
70																			70
d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

**Salici**  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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23																			23
24																			24
25																			25
26																			26
27																			27
28	389.3	405.8																	28
29	416.9	434.7																	29
30	445.6	464.5																	30
31	475.1	495.4																	31
32	505.7	527.3																	32
33	537.2	560.2																	33
34	569.7	594.1																	34
35	603.2	629.0																	35
36	637.6	664.9																	36
37	673.0	701.9																	37
38	709.4	739.8																	38
39	746.7	778.8																	39
40	785.1	818.8																	40
41	824.3	859.8																	41
42	864.6	901.8																	42
43	905.8	944.8																	43
44	948.0	988.8																	44
45	991.2	1033.9																	45
46																			46
47																			47
48																			48
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69																			69
70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



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## Altre latifoglie

*Laburnum alpinum* (Mill.) Bercht. et Presl  
Maggiociondolo alpino

*Populus canescens* (Ait.) Smith  
Pioppo grigio

*Populus nigra* L.  
Pioppo nero

*Populus tremula* L.  
Pioppo tremulo

*Prunus avium* L.  
Ciliegio

*Sorbus aria* (L.) Crantz  
Sorbo montano

*Tilia cordata* Mill.  
Tiglio selvatico

*Tilia platyphyllos* Scop.  
Tiglio nostrale

*Ulmus minor* Miller  
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## Altre latifoglie

### Volume del fusto e dei rami grossi

$n = 22$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$v = b_1 + b_2 d^2 h + b_3 d \quad (v [\text{dm}^3], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [2.3118 \quad 3.1278 \cdot 10^{-2} \quad 3.7159 \cdot 10^{-1}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 1.5377 \cdot 10 & & \\ 8.9101 \cdot 10^{-3} & 9.7080 \cdot 10^{-6} & \\ -2.6997 & -1.8132 \cdot 10^{-3} & 4.9690 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 4.0506 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) del fusto e dei rami grossi

$n = 22$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_1 = b_1 + b_2 d^2 h + b_3 d \quad (w_1 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-9.1098 \quad 7.3484 \cdot 10^{-3} \quad 2.3666]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_e^2 = \begin{bmatrix} 9.4963 & & \\ 5.5027 \cdot 10^{-3} & 5.9955 \cdot 10^{-6} & \\ -1.6673 & -1.1198 \cdot 10^{-3} & 3.0687 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

varianza residua (valori originali)

$$s_e^2 = 2.5016 \cdot 10^{-5}$$

$$s_i^2 = s_e^2 (d_i^2 h_i)^2$$

### Fitomassa (peso secco) della ramaglia

$n = 22$        $p = 3$

equazione di previsione

vettore dei coefficienti

$$dw_2 = b_1 + b_2 d^2 h + b_3 d \quad (dw_2 [\text{kg}], d [\text{cm}], h [\text{m}])$$

$$\mathbf{b}' = [-3.6118 \quad 4.3190 \cdot 10^{-3} \quad 7.4127 \cdot 10^{-1}]$$

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matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 4.9607 & & \\ 2.8745 \cdot 10^{-3} & 3.1319 \cdot 10^{-6} & \\ -8.7096 \cdot 10^{-1} & -5.8498 \cdot 10^{-4} & 1.6031 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 1.3068 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) della ceppaia**

$n = 22$        $p = 3$

equazione di previsione

$$dw_3 = b_1 + b_2 d^2 h + b_3 d \quad (dw_3 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.0365 \cdot 10^{-1} \quad 3.2592 \cdot 10^{-4} \quad 4.7418 \cdot 10^{-2}]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 8.1241 \cdot 10^{-2} & & \\ 4.7076 \cdot 10^{-5} & 5.1291 \cdot 10^{-8} & \\ -1.4264 \cdot 10^{-2} & -9.5800 \cdot 10^{-6} & 2.6253 \cdot 10^{-3} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 2.1401 \cdot 10^{-7}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

**Fitomassa (peso secco) arborea epigea**

$n = 22$        $p = 3$

equazione di previsione

$$dw_4 = b_1 + b_2 d^2 h + b_3 d \quad (dw_4 \text{ [kg]}, d \text{ [cm]}, h \text{ [m]})$$

vettore dei coefficienti

$$\mathbf{b}' = [-1.2825 \cdot 10 \quad 1.1993 \cdot 10^{-2} \quad 3.1553]$$

matrice di varianza e covarianza dei coefficienti

$$(\mathbf{X}'\mathbf{W}^{-1}\mathbf{X})^{-1} s_z^2 = \begin{bmatrix} 8.8135 & & \\ 5.1070 \cdot 10^{-3} & 5.5643 \cdot 10^{-6} & \\ -1.5474 & -1.0393 \cdot 10^{-3} & 2.8481 \cdot 10^{-1} \end{bmatrix}$$

varianza residua (valori ponderati)

$$s_z^2 = 2.3217 \cdot 10^{-5}$$

varianza residua (valori originali)

$$s_i^2 = s_z^2 (d_i^2 h_i)^2$$

Altre latifoglie  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	8.1	8.9	9.6	10.4	11.2	12.0													5
6	10.2	11.3	12.4	13.5	14.7	15.8													6
7	12.6	14.1	15.6	17.2	18.7	20.2													7
8	15.3	17.3	19.3	21.3	23.3	25.3	27.3	29.3											8
9	18.3	20.9	23.4	25.9	28.5	31.0	33.5	36.1											9
10	21.7	24.8	27.9	31.1	34.2	37.3	40.4	43.6											10
11	25.3	29.1	32.9	36.7	40.5	44.2	48.0	51.8											11
12	29.3	33.8	38.3	42.8	47.3	51.8	56.3	60.8											12
13				49.4	54.7	60.0	65.3	70.6	75.9	81.1									13
14				56.6	62.7	68.8	74.9	81.1	87.2	93.3									14
15				64.2	71.2	78.3	85.3	92.3	99.4	106.4									15
16				72.3	80.3	88.3	96.3	104.3	112.4	120.4									16
17				80.9	90.0	99.0	108.1	117.1	126.1	135.2									17
18						110.3	120.5	130.6	140.7	150.9	161.0	171.1	181.3	191.4					18
19						122.3	133.6	144.9	156.2	167.5	178.7	190.0	201.3	212.6					19
20						134.9	147.4	159.9	172.4	184.9	197.4	209.9	222.4	234.9					20
21						148.1	161.8	175.6	189.4	203.2	217.0	230.8	244.6	258.4					21
22						161.9	177.0	192.1	207.3	222.4	237.6	252.7	267.8	283.0					22
23								209.4	226.0	242.5	259.0	275.6	292.1	308.7	325.2	341.8	358.3	374.9	23
24								227.4	245.4	263.5	281.5	299.5	317.5	335.5	353.5	371.6	389.6	407.6	24
25								246.2	265.7	285.3	304.8	324.4	343.9	363.5	383.0	402.6	422.1	441.7	25
26								265.7	286.8	308.0	329.1	350.3	371.4	392.6	413.7	434.9	456.0	477.1	26
27								286.0	308.8	331.6	354.4	377.2	400.0	422.8	445.6	468.4	491.2	514.0	27
28										356.0	380.5	405.1	429.6	454.1	478.6	503.2	527.7	552.2	28
29										381.4	407.7	434.0	460.3	486.6	512.9	539.2	565.5	591.8	29
30										407.6	435.7	463.9	492.0	520.2	548.3	576.5	604.6	632.8	30
31										434.6	464.7	494.8	524.8	554.9	584.9	615.0	645.1	675.1	31
32										462.6	494.6	526.7	558.7	590.7	622.7	654.8	686.8	718.8	32
33														627.7	661.7	695.8	729.9	763.9	33
34														665.8	701.9	738.1	774.3	810.4	34
35														705.0	743.3	781.6	819.9	858.3	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Altre latifoglie  
Volume fusto e rami grossi (dm<sup>3</sup>)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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28	576.7	601.2	625.8	650.3															28
29	618.1	644.4	670.7	697.0															29
30	660.9	689.1	717.2	745.4															30
31	705.2	735.2	765.3	795.3															31
32	750.9	782.9	814.9	846.9															32
33	798.0	832.1	866.1	900.2	934.2	968.3													33
34	846.6	882.7	918.9	955.0	991.2	1 027.4													34
35	896.6	934.9	973.2	1 011.5	1 049.8	1 088.2													35
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)



Altre latifoglie  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	3.6	3.8	4.0	4.2	4.4	4.6													5
6	6.4	6.7	6.9	7.2	7.5	7.7													6
7	9.3	9.6	10.0	10.3	10.7	11.1													7
8	12.2	12.6	13.1	13.6	14.1	14.5	15.0	15.5											8
9	15.2	15.8	16.4	17.0	17.5	18.1	18.7	19.3											9
10	18.2	19.0	19.7	20.4	21.2	21.9	22.6	23.4											10
11	21.4	22.3	23.1	24.0	24.9	25.8	26.7	27.6											11
12	24.6	25.6	26.7	27.8	28.8	29.9	30.9	32.0											12
13				31.6	32.8	34.1	35.3	36.6	37.8	39.0									13
14				35.5	37.0	38.4	39.9	41.3	42.7	44.2									14
15				39.6	41.3	42.9	44.6	46.2	47.9	49.5									15
16				43.8	45.7	47.6	49.4	51.3	53.2	55.1									16
17				48.1	50.2	52.4	54.5	56.6	58.7	60.9									17
18						57.3	59.7	62.1	64.4	66.8	69.2	71.6	74.0	76.3					18
19						62.4	65.0	67.7	70.3	73.0	75.6	78.3	81.0	83.6					19
20						67.6	70.6	73.5	76.4	79.4	82.3	85.3	88.2	91.1					20
21						73.0	76.2	79.5	82.7	86.0	89.2	92.4	95.7	98.9					21
22						78.5	82.1	85.6	89.2	92.7	96.3	99.9	103.4	107.0					22
23								92.0	95.9	99.7	103.6	107.5	111.4	115.3	119.2	123.1	127.0	130.8	23
24								98.5	102.7	106.9	111.2	115.4	119.6	123.9	128.1	132.3	136.6	140.8	24
25								105.2	109.8	114.4	118.9	123.5	128.1	132.7	137.3	141.9	146.5	151.1	25
26								112.0	117.0	122.0	126.9	131.9	136.9	141.8	146.8	151.8	156.7	161.7	26
27								119.1	124.4	129.8	135.1	140.5	145.9	151.2	156.6	161.9	167.3	172.6	27
28										137.8	143.6	149.3	155.1	160.9	166.6	172.4	178.1	183.9	28
29										146.0	152.2	158.4	164.6	170.8	176.9	183.1	189.3	195.5	29
30										154.5	161.1	167.7	174.3	180.9	187.5	194.2	200.8	207.4	30
31										163.1	170.2	177.2	184.3	191.4	198.4	205.5	212.6	219.6	31
32										172.0	179.5	187.0	194.5	202.1	209.6	217.1	224.6	232.2	32
33														213.0	221.0	229.0	237.0	245.0	33
34														224.3	232.8	241.2	249.7	258.2	34
35														235.8	244.8	253.8	262.8	271.8	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Altre latifoglie  
Fitomassa fusto e rami grossi (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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28	189.7	195.4	201.2	206.9															28
29	201.7	207.8	214.0	220.2															29
30	214.0	220.6	227.2	233.8															30
31	226.7	233.7	240.8	247.9															31
32	239.7	247.2	254.7	262.3															32
33	253.0	261.0	269.0	277.1	285.1	293.1													33
34	266.7	275.2	283.7	292.2	300.7	309.2													34
35	280.8	289.8	298.8	307.8	316.8	325.8													35
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Altre latifoglie  
Fitomassa ramaglia (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.6	0.7	0.9	1.0	1.1	1.2													5
6	1.6	1.8	1.9	2.1	2.2	2.4													6
7	2.6	2.8	3.1	3.3	3.5	3.7													7
8	3.7	4.0	4.3	4.5	4.8	5.1	5.4	5.6											8
9	4.8	5.2	5.5	5.9	6.2	6.6	6.9	7.3											9
10	6.0	6.4	6.8	7.3	7.7	8.1	8.6	9.0											10
11	7.2	7.7	8.2	8.7	9.2	9.8	10.3	10.8											11
12	8.4	9.0	9.6	10.3	10.9	11.5	12.1	12.7											12
13				11.9	12.6	13.3	14.1	14.8	15.5	16.2									13
14				13.5	14.4	15.2	16.1	16.9	17.8	18.6									14
15				15.3	16.3	17.2	18.2	19.2	20.1	21.1									15
16				17.1	18.2	19.3	20.4	21.5	22.6	23.7									16
17				19.0	20.2	21.5	22.7	24.0	25.2	26.5									17
18						23.7	25.1	26.5	27.9	29.3	30.7	32.1	33.5	34.9					18
19						26.1	27.6	29.2	30.7	32.3	33.9	35.4	37.0	38.5					19
20						28.5	30.2	31.9	33.7	35.4	37.1	38.9	40.6	42.3					20
21						31.0	32.9	34.8	36.7	38.6	40.5	42.4	44.3	46.2					21
22						33.6	35.7	37.8	39.9	42.0	44.1	46.1	48.2	50.3					22
23								40.9	43.1	45.4	47.7	50.0	52.3	54.6	56.8	59.1	61.4	63.7	23
24								44.0	46.5	49.0	51.5	54.0	56.5	59.0	61.4	63.9	66.4	68.9	24
25								47.3	50.0	52.7	55.4	58.1	60.8	63.5	66.2	68.9	71.6	74.3	25
26								50.7	53.6	56.5	59.5	62.4	65.3	68.2	71.1	74.1	77.0	79.9	26
27								54.2	57.3	60.5	63.6	66.8	69.9	73.1	76.2	79.4	82.5	85.7	27
28										64.5	67.9	71.3	74.7	78.1	81.5	84.9	88.3	91.6	28
29										68.7	72.4	76.0	79.6	83.3	86.9	90.5	94.2	97.8	29
30										73.0	76.9	80.8	84.7	88.6	92.5	96.4	100.3	104.1	30
31										77.5	81.6	85.8	89.9	94.1	98.2	102.4	106.5	110.7	31
32										82.0	86.4	90.9	95.3	99.7	104.1	108.6	113.0	117.4	32
33														105.5	110.2	114.9	119.6	124.3	33
34														111.5	116.5	121.4	126.4	131.4	34
35														117.6	122.9	128.1	133.4	138.7	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Altre latifoglie  
Fitomassa ramaglia (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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23																			23
24																			24
25																			25
26																			26
27																			27
28	95.0	98.4	101.8	105.2															28
29	101.4	105.1	108.7	112.3															29
30	108.0	111.9	115.8	119.7															30
31	114.8	119.0	123.1	127.3															31
32	121.8	126.3	130.7	135.1															32
33	129.0	133.7	138.4	143.1	147.8	152.5													33
34	136.4	141.4	146.4	151.4	156.4	161.4													34
35	144.0	149.3	154.6	159.9	165.2	170.5													35
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70																			70
d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Altre latifoglie  
Fitomassa ceppaie (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)
5	0.2	0.2	0.2	0.2	0.2	0.2													5
6	0.2	0.3	0.3	0.3	0.3	0.3													6
7	0.3	0.3	0.3	0.4	0.4	0.4													7
8	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5											8
9	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6											9
10	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8											10
11	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9											11
12	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0											12
13				1.0	1.0	1.1	1.1	1.2	1.2	1.3									13
14				1.1	1.1	1.2	1.3	1.3	1.4	1.5									14
15				1.2	1.3	1.3	1.4	1.5	1.6	1.6									15
16				1.3	1.4	1.5	1.6	1.7	1.7	1.8									16
17				1.5	1.6	1.6	1.7	1.8	1.9	2.0									17
18						1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.7					18
19						2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9					19
20						2.1	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2					20
21						2.3	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5					21
22						2.5	2.7	2.8	3.0	3.1	3.3	3.5	3.6	3.8					22
23								3.1	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.4	4.6	4.8	23
24								3.3	3.5	3.7	3.9	4.0	4.2	4.4	4.6	4.8	5.0	5.2	24
25								3.5	3.7	3.9	4.1	4.3	4.5	4.7	5.0	5.2	5.4	5.6	25
26								3.8	4.0	4.2	4.4	4.7	4.9	5.1	5.3	5.5	5.8	6.0	26
27								4.0	4.3	4.5	4.7	5.0	5.2	5.5	5.7	5.9	6.2	6.4	27
28										4.8	5.1	5.3	5.6	5.8	6.1	6.3	6.6	6.8	28
29										5.1	5.4	5.7	5.9	6.2	6.5	6.8	7.0	7.3	29
30										5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	30
31										5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.3	31
32										6.1	6.4	6.8	7.1	7.4	7.8	8.1	8.4	8.8	32
33														7.8	8.2	8.6	8.9	9.3	33
34														8.3	8.7	9.0	9.4	9.8	34
35														8.7	9.1	9.5	9.9	10.3	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)

Altre latifoglie  
Fitomassa ceppaie (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
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26																			26
27																			27
28	7.1	7.4	7.6	7.9															28
29	7.6	7.8	8.1	8.4															29
30	8.1	8.4	8.7	8.9															30
31	8.6	8.9	9.2	9.5															31
32	9.1	9.4	9.8	10.1															32
33	9.6	10.0	10.3	10.7	11.0	11.4													33
34	10.2	10.6	10.9	11.3	11.7	12.1													34
35	10.7	11.1	11.5	11.9	12.3	12.7													35
36																			36
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)

Altre latifoglie  
Fitomassa epigea totale (kg)

h (m) d (cm)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	h (m) d (cm)	
5	4.5	4.8	5.1	5.4	5.6	5.9													5	
6	8.3	8.7	9.1	9.6	10.0	10.4													6	
7	12.2	12.8	13.4	14.0	14.6	15.1													7	
8	16.3	17.0	17.8	18.6	19.3	20.1	20.9	21.6											8	
9	20.4	21.4	22.4	23.3	24.3	25.3	26.3	27.2											9	
10	24.7	25.9	27.1	28.3	29.5	30.7	31.9	33.1											10	
11	29.1	30.6	32.0	33.5	34.9	36.4	37.8	39.3											11	
12	33.7	35.4	37.1	38.9	40.6	42.3	44.0	45.8											12	
13				44.4	46.4	48.5	50.5	52.5	54.5	56.6									13	
14				50.2	52.5	54.9	57.2	59.6	61.9	64.3									14	
15				56.1	58.8	61.5	64.2	66.9	69.6	72.3									15	
16				62.2	65.3	68.4	71.4	74.5	77.6	80.6									16	
17				68.5	72.0	75.5	78.9	82.4	85.9	89.3									17	
18						82.8	86.7	90.6	94.5	98.4	102.3	106.1	110.0	113.9					18	
19						90.4	94.7	99.1	103.4	107.7	112.1	116.4	120.7	125.1					19	
20						98.3	103.1	107.8	112.6	117.4	122.2	127.0	131.8	136.6					20	
21						106.3	111.6	116.9	122.2	127.5	132.8	138.1	143.3	148.6					21	
22						114.6	120.4	126.2	132.1	137.9	143.7	149.5	155.3	161.1					22	
23								135.9	142.2	148.6	154.9	161.3	167.6	173.9	180.3	186.6	193.0	199.3	23	
24								145.8	152.7	159.6	166.5	173.4	180.3	187.2	194.2	201.1	208.0	214.9	24	
25								156.0	163.5	171.0	178.5	186.0	193.5	201.0	208.5	216.0	223.5	231.0	25	
26								166.5	174.6	182.7	190.8	198.9	207.0	215.1	223.3	231.4	239.5	247.6	26	
27								177.3	186.0	194.8	203.5	212.3	221.0	229.7	238.5	247.2	256.0	264.7	27	
28										207.2	216.6	226.0	235.4	244.8	254.2	263.6	273.0	282.4	28	
29										219.9	230.0	240.1	250.1	260.2	270.3	280.4	290.5	300.6	29	
30										232.9	243.7	254.5	265.3	276.1	286.9	297.7	308.5	319.3	30	
31										246.3	257.9	269.4	280.9	292.4	304.0	315.5	327.0	338.5	31	
32										260.1	272.4	284.6	296.9	309.2	321.5	333.8	346.0	358.3	32	
33															326.4	339.4	352.5	365.6	378.6	33
34															344.0	357.9	371.7	385.6	399.5	34
35															362.1	376.7	391.4	406.1	420.8	35
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d (cm) h (m)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	d (cm) h (m)	

Altre latifoglie  
Fitomassa epigea totale (kg)

h (m) d (cm)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	h (m) d (cm)
5																			5
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26																			26
27																			27
28	291.8	301.2	310.6	320.0															28
29	310.7	320.7	330.8	340.9															29
30	330.1	340.9	351.7	362.5															30
31	350.1	361.6	373.1	384.6															31
32	370.6	382.9	395.2	407.4															32
33	391.7	404.7	417.8	430.9	443.9	457.0													33
34	413.3	427.2	441.1	454.9	468.8	482.6													34
35	435.5	450.2	464.9	479.6	494.3	509.0													35
36																			36
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d (cm) h (m)	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	d (cm) h (m)





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