

# ***Englerodendron korupense* (Fabaceae, Caesalpinioideae), a new tree species from Korup National Park, Cameroon**

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## **ABSTRACT**

*Englerodendron korupense* Burgt (Fabaceae, Caesalpinioideae), a new tree species from the southern part of Korup National Park in Cameroon, is described and illustrated. Only 16 trees of this new species have been found up to the present. The largest of them was 36 m high and had a stem diameter of 83 cm. The inflorescence is a terminal pendulous panicle, up to 64 cm long, on twigs and branches of up to c. 10 cm diameter. The flowers are 5-merous; the petals are light red and almost equal in size; there are also 5 staminodes. The leaves are usually paripinnate with 2-5 pairs of opposite leaflets; the leaflets are elliptic but those of the lowest pair are ovate.

**KEY WORDS**  
Fabaceae,  
Caesalpinioideae,  
*Englerodendron*,  
Korup,  
Cameroon,  
new species.

## **RÉSUMÉ**

*Englerodendron korupense* (Fabaceae, Caesalpinioideae), une nouvelle espèce d'arbre du Parc national de Korup au Cameroun.

*Englerodendron korupense* Burgt (Fabaceae, Caesalpinioideae), une nouvelle espèce d'arbre du sud du Parc national de Korup au Cameroun, est décrite et illustrée. Seuls 16 arbres de cette espèce ont été trouvés jusqu'à présent. Le

**MOTS CLÉS**  
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plus grand d'entre eux mesurait 36 m de hauteur et 83 cm de diamètre du tronc. L'inflorescence est une panicule terminale pendante, avec une longueur maximale de 64 cm, sur des rameaux et des branches mesurant jusqu'à 10 cm de diamètre. Les fleurs sont pentamères, les pétales sont de couleur rouge clair et ont une taille presque uniforme. Il y a aussi 5 staminodes. Les feuilles sont normalement paripennées avec 2-5 paires de folioles opposées et elliptiques; les folioles de la première paire sont ovées.

## INTRODUCTION

Korup National Park in the South-West Province of Cameroon is covered by a mosaic of diverse primary rainforests. A part of the southern section of this forest is characterized by stands of large trees of the subfamily Caesalpinioideae, forming distinct patches, where more than half of the trees with a diameter of  $\geq 50$  cm belong to species from this subfamily (Newbery & Van der Burgt unpubl. data). The Caesalpinioideae-rich forest also contains many tree species from other families, although usually at lower densities compared to the surrounding forest.

The Caesalpinioideae-rich forest was selected in 1990 for a long-term study of the ecology and dynamics of several locally dominant Caesalpinioideae tree species (Newbery *et al.* 1998). For this purpose, two plots were set up in this forest, in 1990-1991 and in 2002-2003. In the two plots, all trees  $\geq 50$  cm diameter were registered; smaller trees were registered in subplots located at random inside the plots. Some of the Caesalpinioideae tree species occur very abundantly in the plots, but others are rare. One of the rare Caesalpinioideae species, with only six trees  $\geq 50$  cm diameter registered, appears to represent an undescribed species.

## SYSTEMATICS

*Englerodendron korupense* Burgt, sp. nov.  
 (Figs 1; 2)

*Differt a Englerodendro gabunensi* (J.Léonard) Breteler *petiolis longioribus* (4-13 mm), *foliis infimis petiolulatis ovatis* (3-6-9(-13) cm *longis stipulas non simulantibus*;

*floribus majoribus bracteolis 9-12 mm, petalis 11-15 mm longis et staminodiis 5.*

**TYPUS.** — **Cameroon.** Southwest Province, Korup National Park, NW plot near P transect, subplot 44LN, tree number NW0901, 5°01'N, 8°47'E, alt. *c.* 100 m, 6.IV.2005, fl., *van der Burgt 741* (holo-, WAG; iso-, BR, G, K, MO, P, SCA, YA).

**PARATYPES.** — **Cameroon.** Southwest Province, Korup National Park, NW plot near P transect, subplot 44LN, tree number NW0901, 5°01'N, 8°47'E, alt. *c.* 100 m, 27.III.2004, y.inflor., *van der Burgt & Eyakwe 684* (SCA, WAG). — Korup National Park, P plot, subplot 33C, tree number P6987, 5°01'N, 8°47'E, alt. *c.* 100 m, 11.IX.2004, fr. and young seedlings, *van der Burgt & Eyakwe 711* (BR, G, K, MO, P, SCA, WAG, YA). — Korup National Park, P plot, subplot 33C, tree number P6987, 15.IV.2005, sterile twigs and older seedlings, *van der Burgt 747* (BR, G, K, MO, P, SCA, WAG, YA). — Korup National Park, NW plot near P transect, subplot 44LN, tree number NW0901, 8.V.2005, y.fr., *van der Burgt 760* (BR, G, K, MO, P, SCA, WAG, YA).

## DESCRIPTION

Tree, to 36 m high, to 83 cm in stem diameter at 1.3 m height; no buttresses. Bark light brown, smooth, a few flakes. Indumentum of simple, dark golden brown, to 0.5 mm long hairs on twig, stipule, petiole, rachis, young leaf beneath, flower bud and fruit.

Stipules linear, 6-7 mm long, 1 mm wide, to 3 mm wide at base.

Leaves alternate, paripinnate, sometimes imparipinnate; petiole 0.4-1.3 cm long; rachis (3-)-4-14(-20) cm long; petiolules 0.2-0.6 cm long; leaflets (2-)-3-4(-5) pairs, opposite or almost so, glabrous above, sparse hairs beneath; midrib impressed and glabrous above, prominent and hairy beneath; leaflets of lowest pair ovate, (3-)-6-9(-13) cm long,



FIG. 1. — *Englerodendron korupense* Burgt: **A**, leaf; **B**, leaf axil; **C**, inflorescence; **D**, detail of a lateral inflorescence axis; **E**, flower; **F**, calyx, corolla, stamens and staminodes; **G**, pistil; **H**, fruit; **I**, young seedling. A-G, van der Burgt 741; H, I, van der Burgt & Eyakwe 711. Drawing by Hans de Vries. Scale bars: A, C, H, 3 cm; B, E-G, 3 mm; D, 1 mm; I, 1 cm.

(2-)3-5(-9) cm wide, 4-6 pairs of lateral nerves; leaflets of other pairs elliptic, (7-)10-19(-27) cm long, (3-)4-7(-11) cm wide, 5-7 pairs of lateral nerves; apex acuminate with acumen 0.5-2.2 cm long.

Inflorescence a panicle, terminal, on twigs and branches of up to *c.* 10 cm diameter, pendulous, (18-)30-64 cm long; lateral axes 1-7(-21) cm long, 8-15 flowers/cm.

Flowers bisexual; basal bract persistent, triangular, to 2 mm long; pedicel 3-6 mm long, hairy; bracteoles 2, light green, 9-12 × 7-9 mm, hairy outside, short hairy inside; receptacle glabrous, 4-5 mm high, 2 mm diameter at base, 6 mm diameter at top; sepals 5, light green with pink edge, 9-12 × 5-6 mm, abaxial sepal ciliolate, sometimes one or more other sepals also ciliolate; the 2 adaxial sepals slightly united at base; petals 5, alternate to sepals, light red, oblanceolate, glabrous, almost equal in size, 11-15 × 4-5 mm; fertile stamens 5, alternate to petals; filaments light red, 20-26 mm long, sparse hairs on lower part; anthers brown, 3 mm long; staminodes 5, opposite to petals, 4-6 mm long; ovary white, hairy, 6 mm long; style 15-21 mm long, stigma capitellate. Flowers have a weak fruity scent.

Infrutescence to 64 cm long, with 0-3 or probably more fruits.

Fruits: pods, brown, dense golden brown hairs, 15-37 × 5-7.5 cm, upper suture winged 8-14 mm wide, 1-6 seeded.

Seeds: *c.* 3.3 × 2.8 × 0.9 cm, seed coat brown, outside turning mucilaginous (slimy) when wet.

Seedlings: hypocotyl short; cotyledons fleshy, green, at soil level; epicotyl absent.

#### REMARKS

Considering the characteristics of the stem and leaves, the six trees that were registered in the two plots in Korup National Park were thought to belong to the genus *Anthonotha* P.Beauv. or *Berlinia* Sol. ex Hook.f. & Benth. After flowers were collected from one of the six trees, they were identified to an undescribed species in the monotypic genus *Leonardendron* Aubrév., taking into account a number of flower characteristics such as the actinomorphic nature of the flowers, the five sepals, the five light red petals and the outer whorl of five fertile stamens.

The genus *Leonardendron* (Aubréville 1968) and the species *Anthonotha conchyliophora* (Pellegr.) J.Léonard were recently transferred to the previously monotypic East African genus *Englerodendron* Harms (Breteler 2006). The resulting three species in the genus *Englerodendron*, *E. gabunense* (J.Léonard) Breteler, *E. conchyliophorum* (Pellegr.) Breteler, and *E. usambarensis* Harms (Brenan 1967), may be distinguished from the new species by the key given below, adapted from Breteler (2006).

Sterile samples of the new species *E. korupense* can be separated from samples of *E. gabunense* by observing the shape and size of the lowest pair of leaflets. These leaflets are ovate and usually 6-9 cm long in *E. korupense* and cordiform and 1.2-4 cm long in *E. gabunense*. The floral parts of *E. korupense* are larger than those of *E. gabunense*. For example, the petals of *E. korupense* are up to 15 mm long while those of *E. gabunense* are up to 8 mm long.

#### DISTRIBUTION

Cameroon: Southwest Province, Korup National Park. Up to the present, *E. korupense* has been found only in the Caesalpinioideae-rich forest in the southern part of Korup National Park.

#### HABITAT

Primary rainforest on well drained sandy soil, alt. *c.* 100 m. The rainfall at the Bulu weather station, *c.* 12 km southeast of the type locality, ranged from 4023 to 6146 mm/y, and averaged 5029 mm/y (1984-2004). The climate is strongly seasonal with one distinct dry season from December to February (average monthly rainfall less than 100 mm).

#### CONSERVATION STATUS

In total 16 trees of *E. korupense* were found (see below); 12 of them were mature because old pods were found on the forest floor beneath the trees. The species should be classified as "Critically endangered, CR D" (IUCN 2001), because less than 50 mature trees were found up to the present.

#### ECOLOGY

*Englerodendron korupense* has only been found inside and near the two plots in the Caesalpinioideae-rich forest in the southern part of Korup National Park.



FIG. 2. — *Englerodendron korupense* Burgt: **A**, inflorescence; **B**, fruits; **C**, seedlings; **D**, stem base of the tree from which the type was collected. A, van der Burgt 741; B, van der Burgt 760; C, van der Burgt & Eyakwe 711.

TABLE 1. — Average annual diameter increment of five trees of *Englerodendron korupense* Burgt over the period 1991-2005. The diameters and diameter increments were calculated from girths taken at 1.3 m height.

Tree tag no.	1991		2005		Diameter increment (mm/y)
	Diameter (cm)	Date	Diameter (cm)	Date	
P6937	11.5	30.I.1991	11.7	3.XII.2005	0.2
P6905	16.2	30.I.1991	16.1	3.XII.2005	-0.1
P6898	21.3	30.I.1991	21.4	3.XII.2005	0.0
P6987	56.4	21.III.1991	61.1	12.III.2005	3.3
P6982	65.0	21.III.1991	65.7	12.III.2005	0.5

These two plots have a total size of 155.75 ha. Of the 3181 registered trees  $\geq 50$  cm stem diameter, six trees were identified as *E. korupense*. Trees between 10 and 50 cm diameter were registered in 56 random located subplots (size 0.25 ha per subplot; total size 14 ha) inside the plots. Of the 5755 registered trees between 10 and 50 cm diameter, three trees were identified as *E. korupense*. Seven more trees were found in south Korup, by chance. In total 16 trees of *E. korupense* were found. The type was collected from the largest of the 16 trees; a tree 36 m high, with a stem diameter of 83 cm at 1.3 m height (Fig. 2).

Diameter increment data over the period 1991-2005 is available for five trees (Table 1). The diameter increment of the fastest growing tree was 3.3 mm/y. Many old pods and many seedlings were found on the forest floor beneath this tree, indicating that the tree was a healthy mature individual. The three smallest trees from Table 1 have hardly grown at all in *c.* 15 years, presumably because their crowns are beneath the closed canopy of larger trees.

Trees of *E. korupense* flower during a period of several weeks. The flowers are open during the day and are visited, and probably pollinated, by bees.

The seeds of *E. korupense* are dispersed by way of ballistic seed dispersal. When a mature pod is exposed to sunshine or dry air, tension builds up between the two valves until the pod bursts open and the seeds are thrown away. The maximum ballistic seed dispersal distance was estimated by looking for seedlings near adult trees. Seedlings were usually found up to 15 m away from the edge of the crown of parent trees, in directions where there were no other conspecific trees. The furthest seedling was found 19 m away from the edge of the crown. The maximum ballistic seed dispersal distance may be at least 19 m, assuming that the seed from which this seedling grew was not subject to secondary seed dispersal by animals.

*Englerodendron korupense* usually grows in small groups. Nine of the 16 trees registered were located in an area of only 0.5 ha, at distances of 12-25 m to one another. The other seven trees were found in four localities. The tendency of trees of this species to grow in small groups is probably related to the limited possibilities of the ballistic seed dispersal method. The five localities are at 280 to 1470 m distance to each other. This may indicate the existence of secondary seed dispersal across distances in this range.

#### KEY TO THE SPECIES OF *ENGLERODENDRON* HARMS

1. Stipules 10-45 mm long, enveloping the leaf axil. Bracteoles 15-20 mm long. Petals narrowly obovate (15-)20-30 mm long, 5-10 mm wide,  $\pm$  as long as the fertile stamens. Lower Guinea ..... *E. conchyliophorum*
- Stipules 1-7 mm long, not enveloping the leaf axil. Bracteoles 5-12 mm long. Petals oblanceolate 7-15 mm long, 1-5 mm wide, distinctly shorter than the fertile stamens. Lower Guinea and Tanzania ..... 2
2. Largest leaflets to 10.8(-12.5) cm long. Inflorescences 9-13 cm long. Flowers 6-7-merous. Tanzania ..... *E. usambarensis*

- Largest leaflets to 19(-27) cm long. Inflorescences 18-78 cm long. Flowers 5-merous. Lower Guinea ..... 3
- 3. Petiole 2-4 mm long. Leaflets of lowest pair sessile, cordiform, 1.2-4 cm long, resembling large leafy stipules. Bracteoles 5-7 mm long. Petals 7-8 mm long. Staminodes 0-2 ..... *E. gabunense*
- Petiole 4-13 mm long. Leaflets of lowest pair petiolulate, ovate, (3-)6-9(-13) cm long, not resembling stipules. Bracteoles 9-12 mm long. Petals 11-15 mm long. Staminodes 5 ....  
..... *E. korupense*

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advice and critically read the manuscript. H. de Vries made the drawing.

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