

# FLORA OF NEW ZEALAND

## SEED PLANTS

### COTONEASTER



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**D. GLENNY**

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Cover image: *Cotoneaster bullatus*, fruit and leaves.

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## Introduction

Koehne (1893, pp. 224–226) distinguished two sections, *Chaenopetalum* and *Orthopetalum* (= section *Cotoneaster*), which were raised to subgenera by Klotz (1982). Subgenus *Chaenopetalum* has species with petals spreading and white when open. Subgenus *Cotoneaster* has species with petals erect or closed and pink to dark red (Fryer & Hylmö 2009, pp. 14–15). However, Lo & Donoghue (2012, p. 234), in a DNA sequencing study of the *Rosaceae* subfamily *Pyreae*, found that “Within the *Cotoneaster* clade ... the species are divided into two well-supported subclades, which both contain species assigned to the two subgenera, *Chaenopetalum* and *Cotoneaster* (Fryer & Hylmö 2009), implying that neither one is monophyletic.” For instance, *Cotoneaster franchetii* and *C. pannosus* are vegetatively very similar and both are in the same clade, but they are assigned to different subgenera because their flowers differ, one with erect petals, the other spreading. Lo & Donoghue’s (2012) analysis suggests that two pollination syndromes have arisen repeatedly rather than once, as implied by the subgeneric classification above. That classification is therefore not used here.

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## **Cotoneaster Medik., *Philos. Bot. (Medikus), 154 (1789)***

**Type taxon:** *Cotoneaster integerrimus* Medik.

Shrubs to small trees; erect, procumbent or prostrate; deciduous, semi-deciduous or evergreen. Branches unarmed, red-brown or grey-brown. Leaves alternate or alternate on short fascicles, simple, shortly petiolate; stipules subulate, red or green; margin of leaf blade entire. Inflorescences terminal and axillary, on short fascicles of 2–6 leaves; solitary, in simple corymbs, or forming compound corymbs. Hypanthium adnate to ovary. Sepals 5, persistent, usually invested in hairs. Petals 5, erect or spreading, imbricate in bud, white, pink or red, with or without a tuft of hairs near the inner base. Stamens 10–20(22), inserted in mouth of the hypanthium. Ovary inferior or semi-inferior, 2–5-loculed; carpels 2–5, free, rarely 2 fused into 1; styles 1 per carpel, free; stigmas dilated. Fruit a pome, red, orange or purple-black, with persistent, incurved, fleshy sepals, containing pyrenes; pyrenes 1–5, stony, 1-seeded; seeds hemispherical or triangular in cross-section, style at apex or with an umbo above the style attachment point.

Names in brackets are species not currently known to be present in New Zealand but were formerly present and may still be in cultivation.

- |   |   |                           |
|---|---|---------------------------|
| 1 | leaf undersurface dense with fine, woolly hairs which completely hide the underleaf surface, the hairs persisting throughout the life of the leaf, the woolly layer of old leaves often dirty grey or brown ..... | 2                         |
|   | leaf undersurface with sparse to moderately dense hairs, underleaf surface easily visible, particularly in old leaves .....   | 5                         |
| 2 | petals spreading, white; pyrenes (1)2 per fruit, style attached at pyrene apex .....  | <i>C. pannosus</i>        |
|   | petals erect, white, pink, or red centrally and pink on margins; styles/pyrenes 2–4(5) per fruit, style attached below pyrene apex .....  | 3                         |
| 3 | styles/pyrenes (3)4(5); plants deciduous .....  | [ <i>C. dielsianus</i> ]  |
|   | styles/pyrenes 2–3; plants evergreen or semi-deciduous .....  | 4                         |
| 4 | leaf lamina 17–20 × 9–10 mm; fruit 5.9–6.0 mm diameter; petals 2.8 mm wide, white with slight pink tinting on some petals; styles/pyrenes 3 ....  | <i>C. amoenus</i>         |
|   | leaf lamina 30–38 × 13–22 mm; fruit 7.0–9.6 mm diameter; petals 3.4–3.7 mm wide; styles/pyrenes equally 2 or 3 .....  | <i>C. franchetii</i>      |
| 5 | leaves rugose to some degree (lamina weakly to strongly convex between veins, seen from above) .....  | 6                         |
|   | leaves not rugose (veins may be impressed but lamina is not convex between the veins seen from above) .....   | 12                        |
| 6 | leaves strongly rugose, slightly glaucous or not glaucous on underside of leaf, deciduous .....   | 7                         |
|   | leaves moderately to weakly rugose, distinctly glaucous on underside of leaf, evergreen .....   | 8                         |
| 7 | fruit red; inflorescence of 5–37 flowers; styles/pyrenes 4–5 .....  | <i>C. bullatus</i>        |
|   | fruit black; inflorescence of 5–9 flowers; styles/pyrenes 2–3(4) ....   | [ <i>C. moupinensis</i> ] |
| 8 | leaves elliptical to obovate, apex obtuse; style usually attached 0.4–0.8 mm below pyrene apex, pyrene umbonate .....   | 9                         |
|   | leaves elliptical to narrowly elliptical, apex acute; pyrene with acute apex terminating in the style .....   | 10                        |

<b>9</b>	lamina 64–92 mm × 31–50 mm, tending obovate, not V-shaped in cross-section, surface weakly but distinctly rugose, olive green to dark green, never with a red-brown margin, midvein on leaf underside never red-tinted in autumn and winter; fruit 6.2–8.4 mm in diameter .....	<i>C. coriaceus</i>	
	leaves 58–69 mm × 24–33 mm, tending elliptical, often distinctly V-shaped in cross-section, surface very weakly rugose or plane, olive green, commonly with a red-brown margin, midvein on leaf underside usually red-tinted in autumn and winter; fruit 4.5–6.4 mm in diameter .....		<i>C. glaucophyllus</i>
<b>10</b>	leaves elliptical, 19–39(44) mm wide, moderately rugose, leaf margins not or indistinctly recurved; fruit 10–11 mm in diameter .....		<i>C. ×watereri</i>
	leaves narrowly elliptical, 13–26 mm wide, strongly rugose, leaf margins recurved; fruit 5–7 mm in diameter .....		11
<b>11</b>	petals white and spreading .....	<i>C. salicifolius</i>	
	petals pink and semi-erect .....	<i>C. hylmoei</i>	
<b>12</b>	leaf undersurface not glaucous, with sparse, coarse, straight hairs that persist; petals pink to red and erect; anthers white; style inserted below the ovary apex; styles/pyrenes 2–4 .....		13
	leaf undersurface distinctly glaucous, hairs on underside either coarse, straight, and persistent or fine, woolly, and not persistent on old leaves; petals pink or white and erect or spreading; style inserted at pyrene apex or below apex; styles/pyrenes 1–5 .....		17
<b>13</b>	branches in flattened planes; stipules not persistent or obvious; stamens 11–15; filaments dark pink to red; fruit vivid red to vivid reddish-orange, navel closed; styles/pyrenes 2–3(4) .....		14
	branches not in flattened planes; stipules persistent and obvious; stamens 18–20; filaments white, turning pink; fruit vivid reddish-orange, navel open due to calyx lobes projecting; styles/pyrenes 3–4 .....		16
<b>14</b>	plant an upright shrub; leaves densely but not distichously arranged on ultimate branchlets; leaves plane or only slightly V-shaped in cross-section, 12–31 mm long, 8–17 mm wide, moderately glossy, stamens 11–15; styles/pyrenes 2–4 .....	<i>C. divaricatus</i>	
	plant more or less prostrate and spreading or cascading; leaves glossy, plane or V-shaped in cross-section; stamens 8–17; styles/pyrenes 2–3(4) .....		15
<b>15</b>	leaves distinctly V-shaped in cross-section, elliptic, lamina 10–14 mm long, 6–8 mm wide, upper surface very glossy; stamens 8–11; fruit 5.8–6.4 mm diameter, styles/pyrenes invariably 3 .....	<i>C. perpusillus</i>	
	leaves plane, orbicular, largest leaves with lamina 12–29 mm long, 9–16 mm wide, upper surface glossy; stamens 12–17; fruit 6.0–10.0 mm diameter, styles/pyrenes equally 2 or 3, rarely 4 .....	<i>C. horizontalis</i>	
<b>16</b>	leaves semi-deciduous, lamina 24–35 mm long, 15–19 mm wide, thick (250–400 µm); branches stiffly erect to spreading; styles/pyrenes 3–4 .....	<i>C. simonsii</i>	
	leaves deciduous, 18–23 mm long, 8.5–11.0 mm wide, thin (210–240 µm); branches spreading horizontally and drooping toward their tips; styles/pyrenes 3–4 .....	<i>C. marquandii</i>	
<b>17</b>	plant a low or prostrate shrub, commonly with divaricating (springy, interlacing branches); leaves mostly small (leaf lamina 5–27 mm long), with straight, persistent hairs .....		18
	plant an erect shrub to small tree, branches spreading and often arching; leaves commonly medium to large (leaf lamina most commonly over 50 mm long, but as small as 14 mm long), with woolly hairs that become sparse on old leaves .....		22

18	leaves small, lamina 5–10 mm long, upper leaf surface very glossy, apex emarginate .....	19
	leaves medium, lamina 10–51 mm long, upper leaf surface glossy to dull, apex acute to obtuse, sometimes appearing emarginate due to V-shape in cross-section .....	20
19	leaf lamina 5.3–10.0 mm long, 3.3–6.0 mm wide .....	<i>C. microphyllus</i>
	leaf lamina 5.4–5.6 mm long, 2.3–2.9 mm wide .....	<i>C. thymifolius</i>
20	styles/pyrenes invariably 2; leaf lamina 10–18(21) mm long, 4.5–10 mm wide, apex acute to emarginate .....	<i>C. integrifolius</i>
	styles/pyrenes 2–4(5); leaf lamina 15–27 mm long, 7.2–27 mm wide; apex obtuse .....	21
21	styles/pyrenes (4)5; leaf lamina 23–51 mm long; flower pedicel 3–23 mm long .....	<i>C. dammeri</i>
	styles/pyrenes 2–4 and variable on the same plant; leaf lamina 15–27 mm long; flower pedicel 1.5–10 mm long .....	<i>C. ×suecicus</i>
22	erect, deciduous tree; leaves large (lamina 56–114 mm long, 30–75 mm wide), leaf underside slightly glaucous; styles/pyrenes 2, pyrene hairs dense .....	23
	erect deciduous or evergreen shrub; leaves medium-sized (lamina 14–40 mm long, 11–26 mm wide), dull above, leaf underside glaucous; styles/pyrenes 1–5; pyrene hairs sparse .....	24
23	leaves dull on upper surface; petals with hair tuft present or absent; anthers purple; fruit red, navel closed .....	<i>C. frigidus</i>
	leaves semi-glossy on upper surface; petals with hair tuft present; anthers white; fruit purple-black, navel wide open .....	<i>C. bacillaris</i>
24	leaf lamina 14–20 × 10–11 mm .....	<i>C. sherriffii</i>
	leaf lamina 22–46 × 18–26 mm .....	25
25	leaf glossy above, evergreen; petals erect, pink, glabrous; filaments pink; anthers white, pyrenes (1)2 .....	[ <i>C. roseus</i> ]
	leaf dull or semi-glossy above, deciduous; petals spreading, white, with tuft of hairs; filaments white; anthers white, pink, or purple; pyrenes 1 or 2 .....	26
26	lamina 31–46 mm long, elliptical; hypanthium hairs sparse; stamens 19–20; anthers pink to pinkish-purple, styles/pyrenes 1(2) .....	<i>C. hebephyllus</i>
	lamina 22–30 mm long, orbicular; hypanthium hairs dense; stamens 13–15; anthers white; styles/pyrenes 2 .....	<i>C. soongoricus</i>

**Distribution:** About 90–500 species that are widespread in temperate North Africa, Asia, Central America (Mexico), and Europe, most abundant in the Chinese Himalaya (Szechuan and Yunnan provinces).

**Biostatus:** Exotic; fully naturalised.

**Table 1:** Number of species and named hybrids in New Zealand within *Cotoneaster* Medik.

Category	Number
Exotic: Fully Naturalised	10
Exotic: Casual	8
Exotic: Cultivated	6
<b>Total</b>	<b>24</b>

**Cytology:**  $n = 17$  is regarded as basic (Fryer & Hylmö 2009),  $2n = 34$  diploid,  $2n = 51$  triploid,  $2n = 68$  tetraploid,  $2n = 85$  pentaploid,  $2n = 102$  hexaploid. Fryer & Hylmö (2009) state that 10% of species are diploid, 70% tetraploid, 15% pentaploid, and a few have higher ploidy than pentaploid. They also conclude that diploid species are outbreeding and variable while tetraploid species are apomictic and uniform in morphology. Dickoré & Kasperek (2010) believe apomixis has usually been inferred from the uniformity of seed progeny rather than investigation of how the embryo is created. Triploidy is extremely difficult to achieve in plants, and most cases of triploidy are in fact hexaploids. The presence of so-called triploids in *Cotoneaster* suggests that the base number in *Cotoneaster* is lower than 17 and that the triploids are actually hexaploids (P. Heenan, pers. comm.).

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**Notes:** Webb et al. (1988) provided descriptions of 5 fully naturalised and 2 casual *Cotoneaster* species. This treatment provides descriptions of 12 fully naturalised and 5 casual *Cotoneaster* species or hybrids. This increase over 29 years reflects the tendency of species in the genus to escape from cultivation and to naturalise. For this reason, a further 6 species in cultivation have been included.

Flowers and fruit can be used equally well to determine the number of embryos per flower or fruit. Therefore this feature is cited in the key as “styles/pyrenes”. The number of embryos per flower or fruit varies on a plant. It is therefore best to count the styles or pyrenes of c. 6–8 flowers or fruit to establish the average embryo number.

Fresh leaf thickness is given in microns, because perception of leaf thickness is influenced by leaf size; larger leaves give the impression of being thinner than they actually are.

The following qualifiers are used for hair density. Dense = surface not visible; moderately dense = surface partly obscured but still visible; sparse = hairs scattered across the surface.

Flowers per corymb refers to the number of flowers per lateral fascicle; the number on the terminal fascicle is always much greater.

RHS colour numbers follow the RHS colour charts (Royal Horticultural Society 1966). Colour names are Universal Colour Language names (Kelly & Judd 1976; <http://www.december.com/html/spec/colorucl.html>). RHS colour charts are available online at the Royal Horticultural Society website (<http://rhscf.orgfree.com>) and the Azalea Society of America website (<http://azaleas.org/index.pl/rhsmacfan1.html>). Both vary in terms of how well they match RHS printed colour charts: they are reasonably accurate in the reds but a poor match in the greens.

### ***Cotoneaster amoenus* E.H.Wilson, *Gard. Chron., ser. 3 51: 2 (1912)***

Type: taken from a cultivated plant raised from seed collected by E. H. Wilson in Yunnan, near Mengzi, 10 Nov. 1899. Holotype: A, not seen.

Erect shrub c. 1 m tall, semi-deciduous (many leaves yellowing by May), branchlets red-brown, with peeling cuticle, lenticels sparse. Branchlet hairs dense, white to pale yellow, semi-strigose. Stipules 2.5 mm long, red, densely hairy with white hairs. Leaves crowded, elliptical to slightly ovate, plane to slightly V-shaped, 22–25 mm long, lamina 17–20 mm long, 9.5–10.0 mm wide, petiole 5 mm long, petiole hairs dense, pale yellow; leaf base cuneate; leaf apex acute with a straight apiculus; lateral veins in 3–4 pairs, midvein and base of lateral veins impressed on upper surface and projecting on lower surface, upper leaf surface smooth, dark yellowish-green, young leaves pale due to upper-surface hairs, old leaves glossy after hairs have gone; upper surfaces of young leaves with moderately dense, white, straight, fine hairs; old leaves glabrous on upper surface; leaf margins plane, with hairs dense, white; lower surface with very dense, white, woolly hairs, becoming dirty on old leaves.

Inflorescence in corymbs of 4–8 flowers, with fascicles of 4 leaves, corymb 18–27 mm long, rachis hairs dense, white, woolly. Flowers sessile (hypanthium long-tapering) at flowering, pedicel after flowering 1–4 mm long, 5.3–6.0 mm diameter when open. Hypanthium hairs dense, white, woolly; sepals 2.0–2.5 mm long, 2.1–2.3 mm wide, green, erect, hairs dense, white, woolly. Petals pink in bud, when open erect, white, sometimes tinged with pink, 2.9–4.5 mm long, 2.7–2.8 mm wide, petal margins entire or irregular, lacking a hair tuft. Stamens 19–20, filaments 1.8–2.5 mm long, white; anthers dark pink, 0.8–0.9 mm long. Styles 2–3, c. 2.0 mm long. Fruit vivid reddish-orange (RHS 42A), ovoid, 8.0–9.0 mm long, including calyx, 5.9–6.0 mm diameter, calyx closed, the skin with dense, white, woolly hairs. Pyrenes invariably 3 per fruit, 4.2–5.1 mm long, 2.8–3.5 mm wide, hairs sparse, umbonate, style attached c. 1.0 mm below apex.

**Taxonomy:** A synonym of *Cotoneaster franchetii* according to Lu & Brach (2003) and a synonym of *C. pannosus* according to Dickoré & Kasperek (2010). Recognised as a species by Fryer & Hylmö (2009), who say the petals are “semispreading to erect” and “off-white with small pink dots”. Their description has it somewhat intermediate between *C. franchetii* and *C. pannosus*.

**Distribution:** Present in Dunedin Botanic Gardens (2014–2015) as a single plant, and in Abberley Park, Christchurch (2016), as a single plant. Eastwoodhill Arboretum, W.R. Sykes, 23 Oct. 1968, CHR 186265. Not listed in New Zealand horticultural trade catalogues.

**Region of origin:** China: Yunnan province.

**Biostatus:** Exotic; cultivated.

**Recognition:** Recognition by the white petals that are erect and longer than wide, 2–3 styles per flower and 2–3 pyrenes per fruit, with the style having its origin well below the pyrene apex. The leaves are elliptical and c. 25 mm long. The upper leaf surface has moderately dense woolly hairs,

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which are lost with age. The lower leaf surface has dense, white, woolly hairs that completely obscure the lower leaf surface, which has a felted appearance. The felted surface becomes dirty with age. There are only 4–8 flowers per inflorescence. Two distinctive features of *C. amoenus* fruit are that the calyx projects, giving the fruit an ellipsoidal shape, and the fruit tends to be densely hairy.

Most similar to *Cotoneaster franchetii* in leaf shape and leaf hairs; the flowers have erect petals, and the fruit have similar pyrenes, 2–3, and the style is attached well below the apex. The leaves of *C. amoenus* are smaller, 22–25 × 10 mm rather than 30–42 × 13–22 mm. The flowers of *C. amoenus* have petals that are white with pink tinging on parts exposed when in bud, not dark pink to red centrally and pink on the margins. The fruit are smaller than those of *C. franchetii*: 5.9–6.0 mm in diameter rather than 7.0–9.6 mm in diameter.

Also very similar in appearance to *Cotoneaster pannosus*. The leaves are similar in shape and hair distribution to those of *C. pannosus* but are smaller, 22–25 × 10 mm rather than 27–48 × 11–19 mm long. *Cotoneaster amoenus* has 2–3 styles per flower and pyrenes per fruit, while *C. pannosus* invariably has 2. *Cotoneaster amoenus* has the style originating from the inner face of the pyrene rather than from its apex, as in *C. pannosus*.

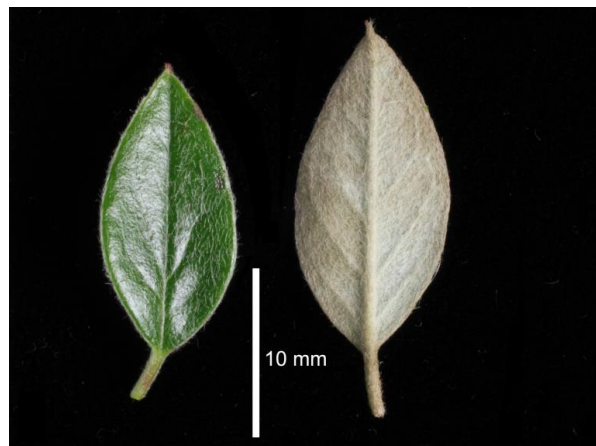
Similar to *Cotoneaster dielsianus* in leaf size and dense hairs on the underside of the leaf. *Cotoneaster dielsianus* has been cultivated in New Zealand in the past, e.g., Eastwoodhill (1966) and Christchurch City (1987), but is not currently known to be present. *Cotoneaster amoenus* is evergreen while *C. dielsianus* is deciduous. *Cotoneaster amoenus* has white, spreading petals while *C. dielsianus* has erect petals that are red centrally with a paler border. *Cotoneaster amoenus* has 3 styles/pyrenes, whereas *C. dielsianus* has (3)4(5) per flower or fruit.

**Phenology:** Flowering: December; Fruiting: April onwards

**Cytology:** Tetraploid (Fryer & Hylmö 2009, p. 242), confirmed by flow cytometry using CHR 638084.



**Fig. 1:** *Cotoneaster amoenus*: Dorsal view of branch.



**Fig. 2:** *Cotoneaster amoenus*: Leaves, upper and lower surfaces.





**Fig. 3:** *Cotoneaster amoenus*: Upper leaf surface hairs.



**Fig. 4:** *Cotoneaster amoenus*: Flower.



**Fig. 5:** *Cotoneaster amoenus*: Fruit and autumn leaves.



**Fig. 6:** *Cotoneaster amoenus*: Pyrenes.

### ***Cotoneaster bacillaris* Wall. ex Lindl., *Edwards's Bot. Reg.*, 5, t. 1229 (1829)**

≡ *Cotoneaster affinis* var. *bacillaris* (Wall. ex Lindl.) C.K.Schneid. (1906)

Type: North India, Kumaon, herb. East India Company, Wallich 660. K 758578, image seen; BM 602278, image seen; E 288256, image seen; GZU 283035, image seen; LD 1486003, image seen; M 213723, image seen; NY 418629, image seen. Notes: Fryer & Hylmö (2009) state that K 758578 is the lectotype. K 758578 and LD 1486003 both state "isotype". NY and GZU types state "legit Robert Blinkworth" but also "Wallich 660". Leaves are consistently acute in K and LD types, but obtuse to emarginate on M 213723.

Erect tree, deciduous, to 8 m tall. Branchlets green-brown, with peeling cuticle, sparse lenticels, and dense pale yellow tomentum. Stipules 4.0 mm long, green, early-deciduous. Leaves 68–106 mm long, lamina 56–99 mm long, 33–61 mm wide, petiole 7–13 mm long with sparse to moderately dense white hairs; leaf lamina slightly obovate, plane, base cuneate to obtuse, apex round, obtuse, or emarginate, apiculus straight or curved downwards; lateral veins 5–6 pairs, midvein or midvein and lateral veins impressed on upper surface and projecting on lower surface; upper surface dark bluish-green (RHS 131A), dull to semi-glossy, with sparse white hairs when young, present in the midvein groove, glabrous when old; margins plane, hairs absent; leaf underside slightly glaucous, with sparse, fine, straight white hairs.

Inflorescence a compound corymb of 19–22 flowers, 45 mm long with 3–4 leaves. Flowers 7–10 mm diameter. Hypanthium green, with moderately dense white tomentum, sepals 2.5 mm long, 1.2 mm wide. Petals white in bud, spreading and white when open, 3.7 mm long, 3.4 mm wide, not clawed at

the base, with a hair tuft, margin entire but crisped. Stamens 20, filaments 3.0 mm long, white, anthers cream, 0.9 mm long. Styles 2, 2.3 mm long. Fruit dark violet, obovoid, 7.0 mm long, 7.1 mm wide, glabrous except at pedicel and calyx. Pyrenes 2, 5.5–5.7 mm long, 4.7–5.0 wide, hairs dense at pyrene apex, stigma attached at apex.

**Distribution:** Known in cultivation in Gisborne (Eastwoodhill Arboretum), Canterbury (Woodham Park, Hororātā, Diamond Harbour).

**Region of origin:** India (Uttar Pradesh), Nepal.

**Biostatus:** Exotic; cultivated.

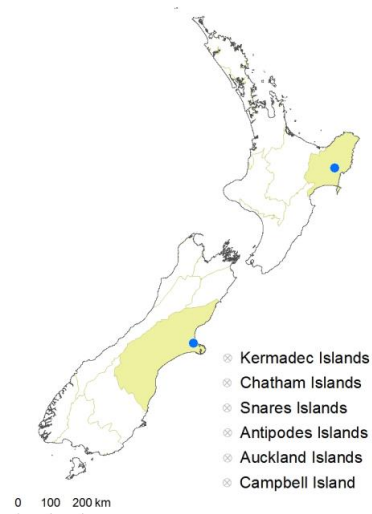
**Recognition:** By the black fruit with 2 pyrenes visible at the apex of the ripe fruit because of the open navel, the style at the pyrene apex, hairs rather dense on the apical half of the pyrene, flowers have white spreading petals that have a tuft of hairs at their base, anthers are purple, the tree has a single tall trunk and the leaves are deciduous.

Most similar to *Cotoneaster affinis* in being an erect tree, having large leaves (50–90 mm long) that are slightly glaucous and become glabrous underneath, black fruit, white spreading petals with a hair tuft near the base. Differs from that species in having purple anthers (rather than white anthers that age to purple), the style is at the apex of the pyrene rather than below the apex, and it has an open navel so that the pyrenes are visible at the fruit apex (pyrenes are not visible in *C. affinis*). The hypanthium of *C. affinis* is densely pilose-strigose, while that of *C. bacillaris* is sparsely pilose-strigose. *Cotoneaster affinis* is probably not present in New Zealand. Gaddum 2001 (p. 63) states it is present in New Zealand, and some specimens at CHR were formerly identified as *C. affinis* but are all *C. bacillaris*.

Similar to *C. frigidus* in size and form of tree and leaf size and leaf hair distribution. *Cotoneaster frigidus* differs in having red, not black, fruit.

**Phenology:** Flowering: November, Fruiting: February onwards

**Cytology:** Triploid based on flow cytometry of CHR 638097. Reported to be variably 2x, 3x, and 4x, possibly due to misidentifications (Fryer & Hylmö 2009, p. 81).



**Fig. 7:** *Cotoneaster bacillaris* distribution map based on databased records at CHR.

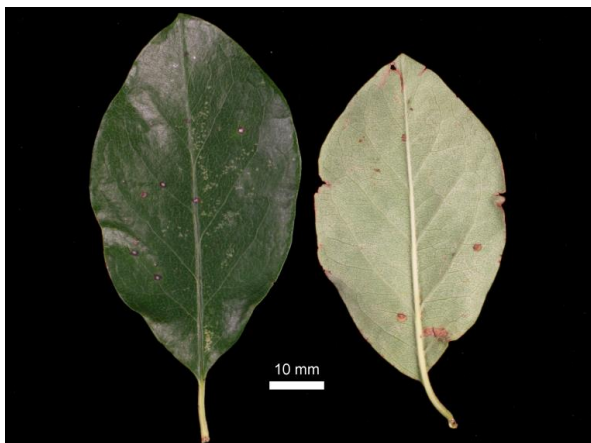


**Fig. 8:** *Cotoneaster bacillaris*: Mature tree with multiple trunks.



**Fig. 9:** *Cotoneaster bacillaris*: Branch with fruit.





**Fig. 10:** *Cotoneaster bacillaris*: Leaves, upper and lower surfaces.



**Fig. 11:** *Cotoneaster bacillaris*: Flower.



**Fig. 12:** *Cotoneaster bacillaris*: Fruit and leaf.



**Fig. 13:** *Cotoneaster bacillaris*: Lower leaf surface.



**Fig. 14:** *Cotoneaster bacillaris*: Navel of ripe fruit.



**Fig. 15:** *Cotoneaster bacillaris*: Pyrene and fruit in longitudinal section.

***Cotoneaster bullatus* Bois in Vilmorin & de Bois, *Frutic. Vilmor.*, 119 (1904)**

Lectotype (chosen by Fryer & Hylmö 2009, p. 222): cultivated in Les Barres garden, France, 25 Sept. 1902, herb. Maurice L. de Vilmorin, P. Not seen.

**Biostatus:** Exotic; fully naturalised.

## ***Cotoneaster bullatus* Bois in Vilmorin & de Bois, *Frutic. Vilmor.*, 119 (1904) var. *bullatus***

Erect shrub to 3 m tall, deciduous. Branches in flattened planes or not; branchlets grey-brown to red-brown, lenticels present, sometimes striate, sometimes with peeling cuticle, branchlet hairs sparse, yellow; stipule 3.2–4.0 mm long, red, hair moderately dense to dense, yellow to brown. Leaves crowded on branches, 50–128 mm long, lamina 48–125 mm long, 33–68 mm wide, elliptical, plane or slightly V-shaped, 150–240 µm thick, petiole 2–7 mm long, hairs moderately dense, pale yellow; leaf base obtuse; leaf apex acute, acuminate or obtuse, apiculus straight, occasionally bent downwards; lateral veins in 6–10 pairs, midvein and lateral veins impressed above and projecting below, upper surface rugose, dull, upper surface hairs sparse; margins plane, hairs absent to moderately dense, white or yellow; lower surface glaucous or not, hairs moderately dense, yellow, densest on midvein and lateral veins.

Inflorescence a corymb or compound corymb of 5–37 flowers, 25–64 mm long, rachis hairs moderately dense, yellow; pedicels 1–9 mm long, hairs absent or sparse, yellow. Flowers 4.5–5.5 mm diameter. Hypanthium green, sepals 1.5–2.0 mm long, 2.3–2.5 mm wide, sepal margins sometimes red, hairs absent to sparse, yellow. Petals pink to red in bud, when open erect, red centrally with pink or white margins, 3.0–4.5 mm long, 3.0–3.2 mm wide, base somewhat clawed, glabrous, margins entire to torn. Stamens 17–22; filaments 1.6–2.7 mm long, white to pink; anthers white, 1.0–1.1 mm long; styles 4–5, 1.5–2.3 mm long. Fruit vivid red (RHS 45A), slightly obovoid to obovoid, 8.5–10.5 mm long, 8.0–10.4 mm diameter, calyx closed, glabrous except for a few hairs at base and calyx. Pyrenes 4–5, 4.5–6.0 mm long, 2.2–3.4 mm wide, hairs sparse to moderately dense in upper third at apex, umbonate, style attached 2.0–2.9 mm below pyrene apex (i.e., c. halfway between base and apex).

**Taxonomy:** Lu & Brach (2003) recognise *Cotoneaster bullatus* var. *macrophyllus*. Dickoré & Kasperek (2010) do not recognise the variety. Fryer & Hylmö (2009), Fryer et al. (2014), and Verloove (2014) recognise it as a species (*C. rehderi* Pojarkova). Some New Zealand specimens have been identified as *C. bullatus* var. *macrophyllus*. Principal components analysis using lamina length, width, pyrene number, and 18 New Zealand specimens at CHR show that variation in specimens is mostly due to variation in leaf length, with variation in style/pyrene number not correlated to leaf length or width. Specimens formed a single group in the analysis. It appears that in New Zealand there is one variable entity, best regarded as *C. bullatus* var. *bullatus*.

**Distribution:** Canterbury (Hanmer—Conical Hill, 1988; Port Hills—Victoria Park, 1997), Otago (Queenstown, 1982), Southland (Monowai, 2015; Invercargill—Thomsons Bush, 1986), Stewart Island (Halfmoon Bay, 2005–2008)

**Region of origin:** China (Sichuan province)

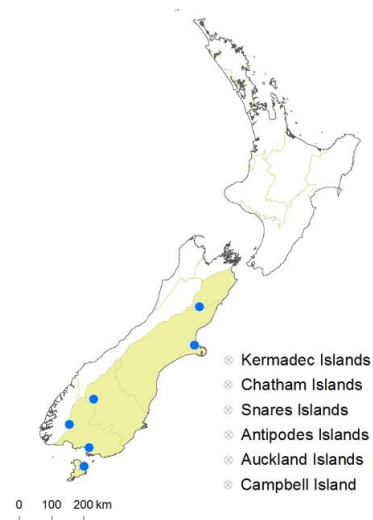
**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 461288, W.R. Sykes 139/82, 13 March 1982, Queenstown Government Gardens, in scrub under *Pseudotsuga* plantation

**Recognition:** A large-leaved deciduous shrub to 2 m tall, strongly rugose, veins prominent below, 5–11 flowers per corymb. Petals erect with a small opening, white with a red cross. Styles/pyrenes 4–5 per flower/fruit, usually variable on a single plant but sometimes 5 per flower/fruit.

*Cotoneaster moupinensis* is also deciduous, with leaves rugose (although less strongly so), and has leaves comparable in size to small-leaved specimens of *C. bullatus* (lamina c. 63–71 × 32–40 mm, cf. lamina 48–125 mm long, 33–68 mm wide in *C. bullatus*). Both have erect petals that are red centrally and white at the margins. The fruit of *C. moupinensis* is black (not vivid red) and pyrenes 2–3 (not 4–5). *Cotoneaster moupinensis* is not currently known to be present in New Zealand.

*Cotoneaster coriaceus* has rather similar hairs that tend to be yellow or yellow-brown. It has thicker-textured leaves than *C. bullatus*, which are only slightly rugose, and they are evergreen, not deciduous. *Cotoneaster coriaceus* has pink-tinted petals, rather than white petals, with a distinctive red central cross. It has 2 pyrenes per fruit, not 4–5.



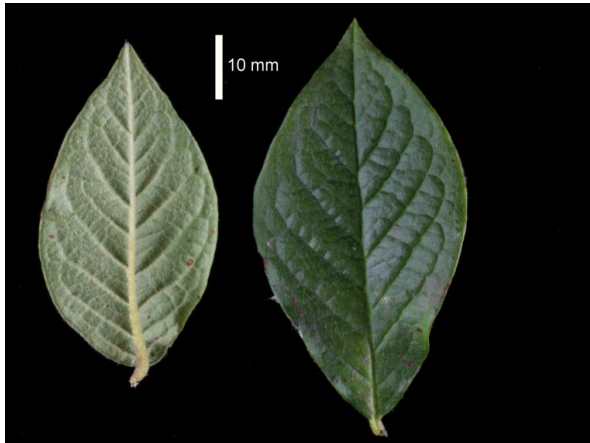
**Fig. 16:** *Cotoneaster bullatus* distribution map based on databased records at CHR.



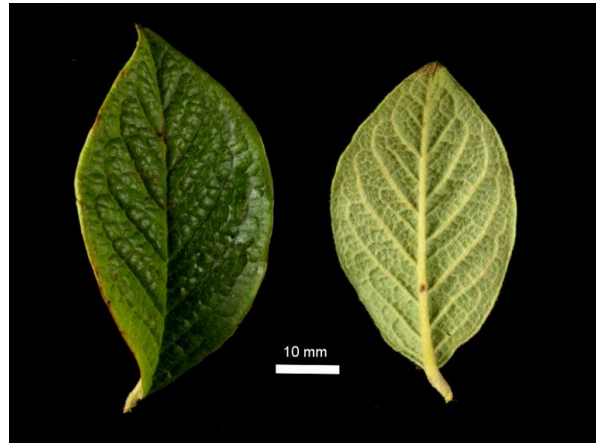
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**Phenology:** Flowering: mid October to early January; Fruiting: March onwards, not persisting over winter

**Cytology:** Tetraploid (Fryer & Hylmö 2009, p. 223)



**Fig. 17:** *Cotoneaster bullatus*: Leaves, upper and lower surfaces.



**Fig. 18:** *Cotoneaster bullatus*: Leaves, upper and lower surfaces.



**Fig. 19:** *Cotoneaster bullatus*: Flower.



**Fig. 20:** *Cotoneaster bullatus*: View inside flower.



**Fig. 21:** *Cotoneaster bullatus*: Fruit and leaves.



**Fig. 22:** *Cotoneaster bullatus*: Pyrenes.

## ***Cotoneaster coriaceus* Franch., *Pl. Delavay*. 3, 222 (1890)**

Holotype: China, Yunnan, in thickets at Choui-tsin-you, near Tapin-tze, 9 June 1889, J. Delavay 3712, P601305, image seen.

= *Cotoneaster lacteus* W.W.Sm., *Notes Roy. Bot. Gard. Edinburgh* 10: 23 (1917)

Type: China, Yunnan, descendent to the Yangtze from the eastern boundary of Lijiang Valley, July 1913, G. Forrest 10419 (holotype E 10966, image seen. Isotypes BM, K).

Erect shrub to small tree 2–5(6) m tall, evergreen; branches arching, branchlets reddish-brown to grey-brown, lenticels present, branchlets with dense yellow tomentum when young, ageing to white later in season. Stipules 3.3–6.5 mm long, green or red. Leaves crowded on branches, 65–105 mm long, lamina 52–92 mm long, 31–50 mm wide, elliptical to obovate, plane to distinctly V-shaped, thick (240–350  $\mu\text{m}$ ), petiole 3–12 mm long with hairs dense, white, or yellow; lamina base cuneate; apex obtuse to rounded, apiculus straight; lateral veins 6–9 pairs, midvein and lateral veins impressed on upper leaf surface and projecting on lower surface, upper surface slightly rugose, moderate olive green to dark green (RHS 136A–137A), semi-glossy, hairs sparse when young, old leaves glabrous above; margins slightly recurved; lower surface glaucous, young leaves densely white tomentose, tomentum sparse and white on old leaves.

Inflorescence a compound corymb of 50–92 flowers 40–105 mm long, rachis dense with pale yellow tomentum becoming white later in season. Pedicels 2–6 mm long with dense, pale yellow hairs becoming white with age. Flower 7.2–8.5 mm diameter. Hypanthium green, red at sepal tips, densely lanate with pale yellow hairs, sepals 1.0–1.5 mm long, 1.5–2.2 mm wide. Petals in bud white, occasionally pink, spreading and white when open, 2.7–3.0 mm long, 2.8–3.1 mm wide, slightly clawed, hair tuft present or absent, margins entire or toothed. Stamens (19)20, filaments 2.8–3.0 mm long, white, anthers 0.80–0.85 mm long, red-purple. Styles 2(3), 2.3–2.5 mm long. Fruit vivid red (RHS 44A), slightly obovoid, 6.0–9.0 mm long, 6.2–8.4 mm diameter, calyx closed, glabrous or hairs confined to calyx and pedicel. Pyrenes invariably 2, 3.6–4.3 mm long, 2.9–3.2 mm wide, hairs moderately dense, umbonate, style attached 0.4–0.8 mm below pyrene apex.

**Taxonomy:** *Cotoneaster lacteus* is treated as a synonym of *C. coriaceus* by Lu & Brach (2003) and Dickoré & Kasperek (2010), but Fryer & Hylmö (2009) recognise both species. Fryer et al. (2014, p. 455) say “*Cotoneaster lacteus* sometimes is synonymised with *C. coriaceus* Franchet (for example, L. Lingdi and A. R. Brach 2003). As treated here, plants of this species are ... with adaxial surfaces bulging between lateral veins.... Plants of *C. coriaceus* ... with flat adaxial surfaces ...”. Lu & Brach (2003) and Dickoré & Kasperek (2010) are followed here. If two species are accepted, New Zealand material belongs to *C. lacteus* as the leaves are slightly rugose. A mature tree in the grounds of Auckland University (incorrectly labelled on the tree *C. harrovianus*, CHR 637375) has non-rugose leaves and would then represent *C. coriaceus*.

**Distribution:** By 1988 a number of wild plants had been collected in urban situations in Christchurch and one in Wellington City.

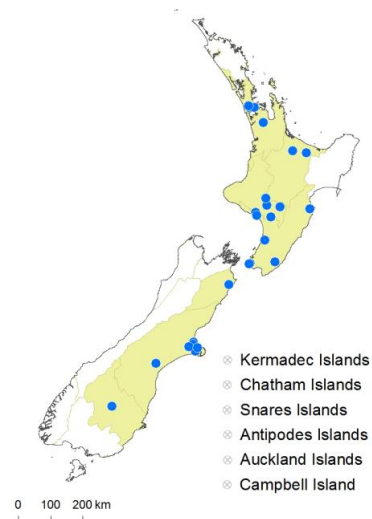
Auckland (Auckland City, 1987–2015), Volcanic Plateau (Ngongotahā, 1994; Mt Tarawera, 1980; Raetihi, 2015; Taihape), Southern North Island (Kai-iwi, 2002; Parapara Road, 1990; Masterton, 2004; Whanganui, 2006; Hunterville, 1995; Te Mata Peak Road, 2002; Levin, 1989; Wellington City, 1999), Marlborough (Waimā R, 2015), Canterbury (Christchurch City, 2000; Prices Valley, 2007; Port Levy, 2014), Otago (Alexandra, 1993). Common in cultivation throughout New Zealand.

**Region of origin:** China (Gansu, Hubei, Sichuan, Yunnan, Guizhou, Xizang, and Sichuan provinces)

**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 436402, D.R. Given 14252, 15 Mar. 1986, Christchurch, Jeffreys Road.

**Recognition:** An evergreen shrub with arching branches; leaves 20–45 mm long, elliptic, lateral veins impressed, in 7–10 pairs, young leaves distinctly yellow-tomentose below, old leaves slightly glaucous below; corymbs of many (50–104) flowers, petals white and spreading, stamens c. 20, fruit red. Styles/pyrenes 2(3), style inserted 0.4–0.8 mm below pyrene apex.



**Fig. 23:** *Cotoneaster coriaceus* distribution map based on databased records at CHR.



Most similar to *Cotoneaster glaucophyllus*. Both are moderately large shrubs with arching branches, both have medium-sized leaves that are elliptical to obovate and have few or no hairs on the upper surface and dense tomentum on the lower surface of new leaves, which disappears so that old leaves are glabrous or sparsely hairy on the lower surface. Both have compound corymbs of flowers that have white spreading petals that lack a hair tuft. Stamens in both species are 20, filaments white and anthers purple. Styles are 2 per flower in both. Fruit in both species are relatively small (4–6 mm long), vivid reddish-orange, and always with 2 pyrenes with the style attached only slightly below the pyrene apex. Both mature their fruit in autumn (late March to April) and so are the two last *Cotoneaster* species to mature their fruit.

*Cotoneaster coriaceus* has larger leaves (lamina 64–92 mm × 31–50 mm rather than 58–69 mm × 24–33 mm in *C. glaucophyllus*), the margins are recurved (not plane), the lateral veins more impressed on the upper surface and more prominent on the lower surface, the leaves are a darker green when old (usually mid yellow-green to mid green in *C. glaucophyllus*), and they are slightly obovate rather than elliptic. Flowers are more numerous per inflorescence (50–104, rather than 16–60). Fruit are larger (6.2–8.4 mm in diameter, rather than 4.5–6.4 mm in diameter). *Cotoneaster coriaceus* is much less common in the wild than *C. glaucophyllus*.

**Phenology:** Flowering: late November to early December; Fruiting: March to July

**Cytology:** Tetraploid (Fryer & Hylmö 2009, p. 48), confirmed by flow cytometry using CHR 638100.



**Fig. 24:** *Cotoneaster coriaceus*: Leaves and current year's branchlets.



**Fig. 25:** *Cotoneaster coriaceus*: Leaves, upper and lower surfaces.



**Fig. 26:** *Cotoneaster coriaceus*: Hairs on lower leaf surface.



**Fig. 27:** *Cotoneaster coriaceus*: Compound corymb of flowers.



Fig. 28: *Cotoneaster coriaceus*: Flower.



Fig. 29: *Cotoneaster coriaceus*: Corymbs of fruit and leaves.

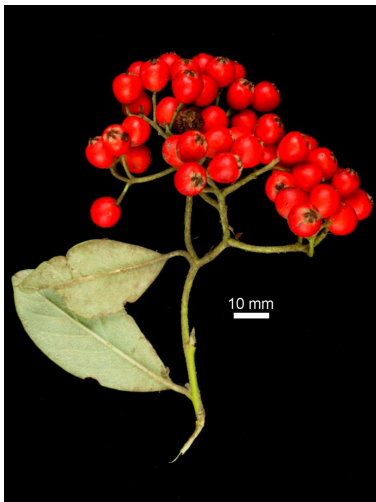


Fig. 30: *Cotoneaster coriaceus*: Compound corymb of fruit.



Fig. 31: *Cotoneaster coriaceus*: Pyrenes.

***Cotoneaster dammeri* C.K.Schneid., *Ill. Handb. Laubholz.* 1, 761, f. 429 h–k. (1906)**

Type: China, W. Hubei, without locality, June 1900, Veitch expedition, E. H. Wilson 1966. Holotype W. Isotypes A, B, HGB 511009, image seen; K 758563, image seen; NY 418626, image seen.

Prostrate shrub 15 cm tall, evergreen. Branches not in planes; branchlets red-brown, lenticels present, branchlet hairs sparse to moderately dense; stipule 2.3–6.0 mm long, green, sparse, white. Leaves crowded on branches, 27–60 mm long, lamina 23–51 mm long, 13–27 mm wide, elliptic to obovate, plane to slightly V-shaped, texture thick (230–320  $\mu\text{m}$ ), petiole 3–11 mm long, hairs sparse to moderately dense, leaf base cuneate; apex obtuse, sometimes appearing emarginate, apiculus bent downwards; lateral veins in 5–8 pairs, midvein and lateral veins impressed above and projecting below; upper surface smooth or slightly rugose, mid to dark green, semi-glossy, upper-surface hairs absent or sparse when young; margins plane or recurved, hairs moderately dense; lower surface glaucous, hairs sparse to moderately dense.

Inflorescence of 1–2 flowers, 40–65 mm long with 2–4 leaves, rachis hairs sparse, white; pedicel 3.0–23 mm long, hairs sparse to dense. Flowers 10.0–12.2 mm diameter. Hypanthium green, sepals 1.0–1.5 mm long, 2.1–2.5 mm wide, hairs sparse to moderately dense. Petals pink in bud, white and spreading when open, 3.8–4.1 mm long, 3.8–4.6 mm wide, base clawed, tuft of hairs absent, margins entire, minutely papillose. Stamens 21–25; filaments 2.8–3.6 mm long, white, pink before flower opening; anthers dark pink, 0.9–1.1 mm long; styles (4)5, 3.7–4.0 mm long. Fruit vivid red, spherical to



obovoid, 5.3–8 mm long, 6.5–7.8 mm diameter, calyx closed, glabrous except at calyx. Pyrenes (4)5, 3.5–4.3 mm long, 2.5–2.6 mm wide, hairs moderately dense at apex, style attached at pyrene apex or up to 0.7 mm below apex.

**Distribution:** Volcanic Plateau (Raetihi), Southern North Island (Wellington—Khandallah). Known in cultivation in Whangārei and Christchurch, but probably in many other places.

**Region of origin:** China (Gansu, Guizhou, Hubei, Sichuan, Yunnan provinces), Tibet

**Biostatus:** Exotic; casual.

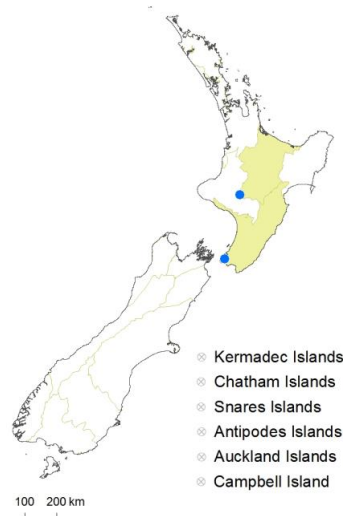
**First record:** C.C. Ogle, Raetihi camping ground, 2 July 2004, CHR 570614A–C. The identity of the plant is uncertain: whether it is *Cotoneaster dammeri* or *C. ×suecicus*. CHR 570614, collected in July 2004, has 4–5 pyrenes per fruit, while CHR 536439, collected from the same plant in January 2000, has (2)3(4) pyrenes per fruit.

**Recognition:** A prostrate or cascading shrub. Branchlets glossy red-brown with lenticels. Flowers solitary or paired. Pedicels may be very long (up to 23 mm long). Petals pink in bud, white and spreading when open. Stamens 21–25, filaments white, anthers dark pink. Leaves medium-sized (lamina 24–37 mm long), midvein and lateral veins impressed, semi-glossy on upper surface, glaucous with moderately dense, fine hairs below. Fruit vivid red, pyrenes (4)5 per fruit, style attachment at or near to apex. At Christchurch Botanic Gardens growing as an erect, standard plant, possibly grafted onto an erect-growing species.

Most similar to *Cotoneaster ×suecicus*, a hybrid that has *C. dammeri* as one of its parents. Both have a prostrate or cascading form. Both have leaves glaucous beneath with fine hairs that are not persistent, and both have white, spreading petals. They differ in leaf size: in *C. dammeri* the lamina is 23–51 mm long, 13–27 mm wide (cf. 15–27 × 7.2–15 mm in *C. ×suecicus*), the leaf lateral veins are impressed in *C. dammeri* but not in *C. ×suecicus*; in *C. dammeri* there are (4)5 pyrenes per fruit (cf. 2–4(5) in *C. ×suecicus*). *Cotoneaster dammeri* has pedicels that are sometimes very long (3.0–23 mm), while in *C. ×suecicus* they are 1.5–10 mm long.

**Phenology:** Flowering: (September) November to February; Fruiting: January to July, persisting over winter

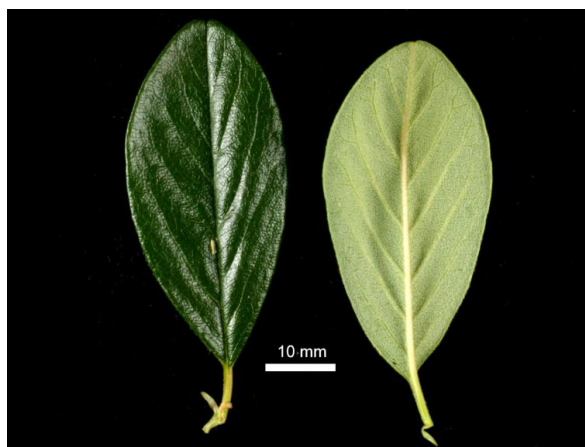
**Cytology:** Diploid (Fryer & Hylmö 2009, p. 136), confirmed by flow cytometry results using CHR 635247 and CHR 637386.



**Fig. 32:** *Cotoneaster dammeri* distribution map based on databased records at CHR.



**Fig. 33:** *Cotoneaster dammeri*: Foliage.



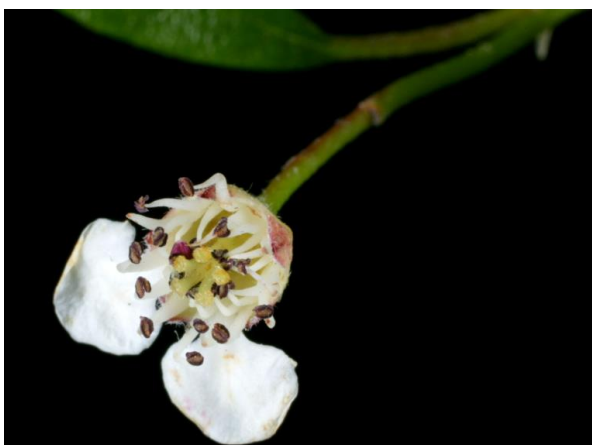
**Fig. 34:** *Cotoneaster dammeri*: Leaves, upper and lower surfaces.



**Fig. 35:** *Cotoneaster dammeri*: Flowers in bud, leaves.



**Fig. 36:** *Cotoneaster dammeri*: Flower.



**Fig. 37:** *Cotoneaster dammeri*: Flower on long petiole.



**Fig. 38:** *Cotoneaster dammeri*: Fruit and remains of flower

***Cotoneaster divaricatus* Rehder & E.H.Wilson in Sargent, *Pl. Wilson.* 1(2), 157 (1912)**

Type: China, W Hubei [Hupeh], Xingshan Xian 5–6,000 ft, Sept. 1907, E. H. Wilson 232 (holotype A 26234 image seen, isotype K 758549, image seen).

Erect shrub, 1.0 to 1.5 tall, deciduous. Branches in flattened planes; branchlets purple-brown, peeling cuticle present, branchlet hairs moderately dense, pale yellow; stipule 2.0–4.0 mm long, dark red, stipule hairs sparse or none. Leaves crowded on branches, 16–31.5 mm long, lamina 13–29 mm long, 8.5–17 mm wide, elliptical to obovate, slightly V-shaped, 160–170  $\mu$ m thick, petiole 2.0–4.0 mm long, petiole hairs moderately dense, pale yellow, leaf base obtuse or cuneate, leaf apex obtuse (smaller, narrower leaves sometimes acute), cuspidate, apiculus straight; lateral veins in 3–5 pairs, midvein impressed in lower half only; upper surface smooth, mid- to dark green, glossy, upper surface hairs sparse or none; margins plane, hairs sparse; lower surface not glaucous, hairs sparse, straight.

Inflorescence of 1–3 flowers, 9–10 mm long, rachis hairs moderately dense; pedicel 0.5 to 2 mm long, hairs moderately dense. Flowers 3.5–6 mm diameter. Hypanthium green with red sepal margins or apices, the hypanthium and sepals turning red after flowering finishes, sepals 1.3 to 1.7 mm long, 1.3 to 2 mm wide, hairs sparse to moderately dense, pale yellow. Petals erect, pink, dark pink at base when open, 4.0–4.5 mm long, 3.1–3.8 mm wide, base clawed, a small tuft of hairs on inside base, margins uneven. Stamens 11–15; filaments 2.5 mm long, pink to dark pink, especially at base; anthers white, 0.7 to 1.0 mm long; styles 2(3), 2.1–2.2 mm long. Fruit vivid red, obovoid, 6.5–7.5 mm long, 6.1–8.9 mm diameter, calyx closed, skin hairs absent. Pyrenes 2(3), 4.9–5.3 mm long, 3.5–4.2 mm wide, hairs moderately dense at apex, umbonate, style attached 1.1–2.0 mm below pyrene apex.



**Distribution:** Canterbury (Port Hills—Victoria Park, 1998–2016), Southland (Lake Manapōuri, 1997)

**Region of origin:** China (Anhui, Gansu, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang provinces)

**Biostatus:** Exotic; casual.

**First record:** CHR 513206A–B, W.R. Sykes, 12 Jan. 1997, Lake Manapōuri east side, “Adventive”. Given’s (1982) first record of this species is based on a specimen of *C. simonsii*, CHR 353781.

**Recognition:** An erect shrub to 1.5 m, deciduous, branchlets in one plane but branching not dense. Leaf lamina 13–29 mm long, 8.5–17 mm wide, orbicular with rounded but apiculate apex, thin-textured, plane, undersurface not glaucous, hairs sparse, straight. Flowers 1–4 per corymb, petals erect, red centrally, pink or white marginally, filaments pink, anthers white, fruit oblong-ellipsoidal to obovoid.

*Cotoneaster divaricatus* belongs in a group of three very similar species: *C. horizontalis*, *C. perpusillus*, and *C. divaricatus*. All three are low or prostrate shrubs with small to medium-sized leaves that are not glaucous on the undersurface. All three have sparse, straight (strigose) hairs on the leaves, flowers with erect red petals and white anthers. Of the three, *C. divaricatus* is the tallest, reaching about 1.5 m tall; *C. perpusillus* is prostrate, and *C. horizontalis* is intermediate in form, reaching c. 0.6 m, rarely 1.5 m. *Cotoneaster divaricatus* has acute leaf apices whereas the other two have obtuse apices with a cuspidate tip.

Similar to *C. simonsii* but that species forms a taller shrub with more erect branches rather than horizontal main branches. Pyrene number overlaps in the two species, but *C. simonsii* has (2)3(4) pyrenes, while *C. divaricatus* has only 2(3) per fruit.

Similar to *Cotoneaster marquandii* in plant size, leaf size, shape and hairs. *Cotoneaster marquandii* leaves are acute and cuspidate, whereas in *C. divaricatus* they are obtuse and often cuspidate. The flowers are very similar: petals erect, red centrally, and pink to white marginally, but stamen number is 11–15 in *C. divaricatus*, not 20 as in *C. marquandii*. *Cotoneaster marquandii* has orange fruit that resemble those of *C. simonsii* and have an open navel, whereas *C. divaricatus* has red fruit with a closed navel. *Cotoneaster divaricatus* has 2, occasionally 3 pyrenes, whereas *C. marquandii* has 3–4 pyrenes.

**Phenology:** Flowering: second half of October; Fruiting: January to May, not persisting over winter

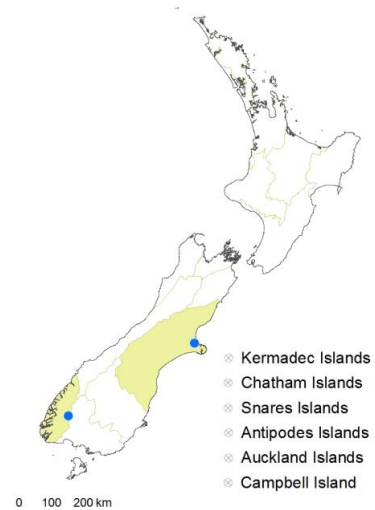
**Cytology:** Tetraploid (Fryer & Hylmö 2009, p. 178)



**Fig. 40:** *Cotoneaster divaricatus*: Autumn foliage.



**Fig. 41:** *Cotoneaster divaricatus*: Leaves, upper and lower surfaces.



**Fig. 39:** *Cotoneaster divaricatus* distribution map based on databased records at CHR.



**Fig. 42:** *Cotoneaster divaricatus*: Leaf, lower surface.



**Fig. 43:** *Cotoneaster divaricatus*: Flowers and foliage.



**Fig. 44:** *Cotoneaster divaricatus*: Flower with one petal removed.



**Fig. 45:** *Cotoneaster divaricatus*: Flower at early anthesis.



**Fig. 46:** *Cotoneaster divaricatus*: Petal.



**Fig. 47:** *Cotoneaster divaricatus*: Pyrenes.

***Cotoneaster franchetii* Bois, *Rev. Hort.* 74: 380, fig. 159–161 (1902)**

Lectotype (chosen by Fryer & Hylmö 2009, p. 242): “*Cotoneaster* 4535”, from cultivation, from seed 1342, Les Barres Garden, June 1900, herb. Maurice de Vilmorin, 24 Sept 1900. P. Not seen.



Erect shrub 1–2 m tall, evergreen. Branches arched; branchlets red-brown, glossy, branchlet hairs dense, white; stipule 2.0–3.8 mm long, red, hairs sparse to dense. Leaves crowded on branches, 30–42 mm long, lamina 19–36(46) mm long, 13–22 mm wide, elliptic, plane, (150–280 µm thick), petiole 3–6 mm long with hairs dense, white to pale yellow, leaf base usually cuneate, occasionally rounded, leaf apex acute, apiculus straight; lateral veins in 3–5 pairs, midvein and lateral veins impressed above and projecting below; upper surface smooth or slightly rugose between lateral veins, moderate olive-green (RHS 137A–B), semi-glossy but dull when young due to hairs, upper surface hairs sparse to moderately dense, white, on young leaves, not persisting; margins plane, hairs dense and white; lower surface not visible due to dense white hairs that persist but become dirty, hairs over the midvein often yellow.

Inflorescence a corymb of (3)7–9(15) flowers, 13–68 mm long, rachis hairs dense, white or yellow; pedicel 1.0–2.0 mm long, hairs dense, white, flowers 5.5–6.0 mm diameter. Hypanthium green, sepals 1.8–2.1 mm long, 1.7–2.8 mm wide, with green or red margins, hairs dense, white. Petals pink to red in bud, when open erect, red centrally, pink on the margins, 4.2–4.8 mm long, 3.4–3.7 mm wide, base clawed, without a tuft of hairs, margins slightly irregular. Stamens 19–21; filaments 1.9–3.0 mm long, pink both before and after opening; anthers 0.6–1.7 mm long, pink to dark pink; styles 2–3, 2.2–3.2 mm long. Fruit vivid reddish-orange to vivid red (RHS 34A–45A), obovoid, 7.8–10.5 mm long, 7.0–9.6 mm in diameter, calyx closed, hairs confined to petiole and calyx, rarely evenly sparse. Pyrenes 2–3 (in about equal proportions on a single plant), 4.6–5.4 mm long, 2.3–4.5 mm wide, hairs abundant at apex, apex umbonate, style attached (0.9)1.4–2.0 mm below pyrene apex.

**Distribution:** Northland (Punakitere, 1984), Auckland (Campbells Bay, 1983; Auckland City), Gisborne (Mātawai, 1979; Eastwoodhill, 1989; Ngatāpa, 1989), Volcanic Plateau (Wairākei, 2006; Taurewa, 1985; Hautapu R, 2003; Taihape, 1990; Raetihi, 1996), Taranaki (Waitaanga Plateau, 1989; Ōakura, 1999), Southern North Island (Whanganui City, 2003; Turakina, 2004; Mt Bruce, 1946; Hutt Valley, 1953; Paremata, 1985; Wellington City, 1993, 1999), Sounds–Nelson (Aniseed Valley, 1991; Nelson City, 1977; Torrent Bay, 1996), Marlborough (Waimā R, 2009), Westland (Owen R, 1997; Greymouth, 1972; Jacksons, 1976), Canterbury (Christchurch City, 1954–2014; Travis Wetland, 2002; Tai Tapu, 1966; Lincoln, 2001; Duvauchelle, 1987; Diamond Harbour, 1987; Little Akaloa, 1987; Bealey Spur, 2016; Arthur’s Pass, 1998; Hororātā, 1986–1989; Peel Forest, 1984; Lake Ōhau, 2004, 2006), Otago (Moeraki, 1997, 2003; Roxburgh, 1957, 1982; Hāwea, 2001; Port Chalmers, 1987; Flagstaff, 2004), Stewart Island (Halfmoon Bay, 2008). Common in cultivation throughout New Zealand.

**Region of origin:** China (Guizhou, Sichuan, Yunnan provinces), Tibet, Thailand

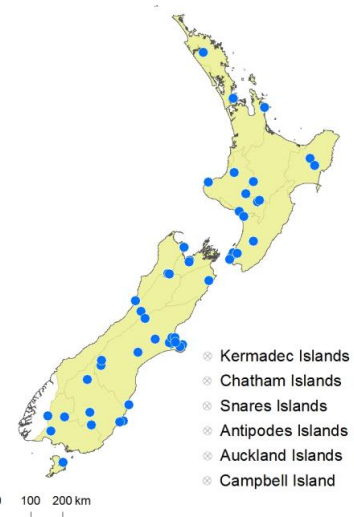
**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 54298, M.E. Roberts, 1946, Mt Bruce north of Masterton, in Healy (1958, p. 535)

**Recognition:** An upright shrub, 1–2 m tall with spreading, arched branches, leaves 38–42 mm long, elliptic, base and apex acute with a straight apiculus. The leaves are densely white-tomentose on the lower surface, but pale yellow-tomentose on the midvein. The upper leaf surface is rather sparsely hairy and somewhat glossy. Flowers are in small corymbs of 3–15 flowers. Petals are erect, dark pink centrally with pink margins, the petal margins irregular, stamens c. 20, filaments pink, anthers dark pink, styles/pyrenes 2–3, variable in number on a plant, style attached below pyrene apex.

Most similar to *Cotoneaster pannosus* in being an upright shrub with spreading arched branches, leaves medium-sized and dull, and slightly rugose on the upper surface, the lower leaf surface dense with soft white hairs. *Cotoneaster pannosus* has leaves indistinguishable from *C. franchetii* (lamina 14–38 mm × 11–19 mm vs 30–38 × 13–22 mm), and the flowers have erect pink petals, not white spreading petals. Anthers are pink to purple, not white. When sterile the two are virtually indistinguishable, but see notes under *C. pannosus*.

Also very similar to *Cotoneaster amoenus*, a much less common species that is not recognised as distinct by some authors, notably Lu & Brach (2003). Both have the same leaf shape and leaf hairs, flowers have erect petals, and the fruit have similar pyrenes, 2–3, with the style attached well below the pyrene apex. The leaves of *Cotoneaster amoenus* are smaller, c. 25 × 10 mm rather than



**Fig. 48:** *Cotoneaster franchetii* distribution map based on databased records at CHR.

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30–42 × 13–22 mm. The flowers of *C. amoenus* have petals that are white and only slightly pink tinged, not dark pink to red centrally and pink on the margins.

**Phenology:** Flowering: early August to late January; Fruiting: March to June, not persisting on plants over winter. Occasional pale orange-fruited forms are seen in cultivation in Auckland.

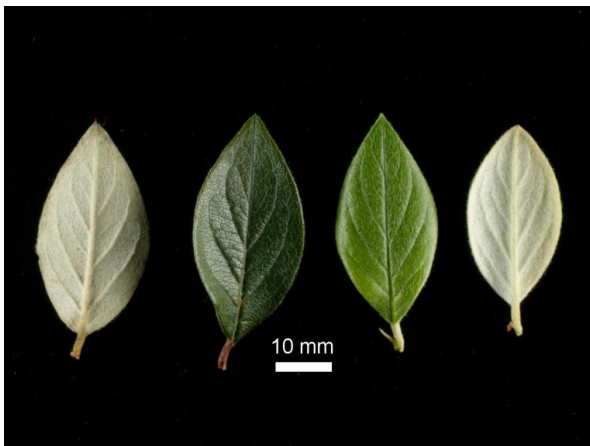
**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 635012



**Fig. 49:** *Cotoneaster franchetii*: Wild shrub.



**Fig. 50:** *Cotoneaster franchetii*: Upper surface of leaves.



**Fig. 51:** *Cotoneaster franchetii*: Leaves, upper and lower surfaces.



**Fig. 52:** *Cotoneaster franchetii*: Leaves and flowers.



**Fig. 53:** *Cotoneaster franchetii*: Flower.



**Fig. 54:** *Cotoneaster franchetii*: Flower in female phase.





Fig. 55: *Cotoneaster franchetii*: Fruit.



Fig. 56: *Cotoneaster franchetii*: Pyrenes.

***Cotoneaster frigidus* Wall. ex Lindl., *Edwards's Bot. Reg.*, t. 1229 (1829)**

Type: Northern Nepal in the alpine zone of Gosainkunda, Herb. East India Company, Wallich's collectors, Wallich 657 (K). Not seen.

Erect shrub to small tree, 2–5 m tall, deciduous to almost deciduous. Branches arching; branchlets grey-brown to red-brown, lenticels sparse, cuticle peeling, branchlet hairs dense, yellow, becoming sparse in autumn; stipule red, 3.0–6.5 mm long, hairs dense, yellow. Leaves crowded on branches, 78–117 mm long, lamina 71–114 mm long, 30–75 mm wide, ovate to elliptic, (220–280  $\mu$ m), petiole 3–11 mm long, dense, yellow or white, persistent, leaf base cuneate, leaf apex acute to obtuse, apiculus straight; lateral veins in 7–10(12) pairs, midvein only, or also rarely base of lateral veins, impressed above and projecting below; upper surface slightly and very finely rugose, moderate yellowish-green (RHS 139B), dull with waxy bloom that rubs off, upper surface hairs sparse on young leaves, none on old leaves; margins plane, hairs dense white hairs on young leaves, absent from old leaves; lower surface glaucous (may not appear so late in season), hairs dense on young leaves, sparse on old leaves or confined to midvein, white or very pale yellow, fine and crinkled.

Inflorescence a compound corymb of 22–51 flowers, 58–200 mm long, rachis hairs moderately dense, yellow; pedicel 0.5–5.0 mm long, hairs dense, white or yellow, persistent. Flowers 8.0–10.0 mm diameter. Hypanthium green, sepals 1.0 mm long, 2.0–2.8 mm wide, hairs dense, white. Petals spreading, pale green to white in bud, white when open, 3.2–4.0 mm long, 2.2–4.0 mm wide, base slightly clawed, a tuft of hairs, a few hairs present near the base or glabrous, petal margins irregular but not torn. Stamens 18–20; filaments 2.3–4.0 mm long, white; anthers dark purple, 0.6–1.0 mm long; styles invariably 2, 2.0–2.5 mm long. Fruit vivid red (RHS 45A) or vivid reddish-orange (RHS 34A), often the colour varying over the fruit surface, slightly obovate to spherical, 7.0–9.2 mm long, 6.6–9.0 mm diameter, calyx closed or calyx lobes abscising, hairs dense on young fruit, later confined to calyx lobes and base of fruit. Pyrenes 2 [very rarely 2(3)], pyrenes sometimes fused, 4.0–6.8 mm long, 3.3–4.6 mm wide, hairs dense at apex, slightly umbonate, style attached 0.4–0.9 mm below pyrene apex or at apex.

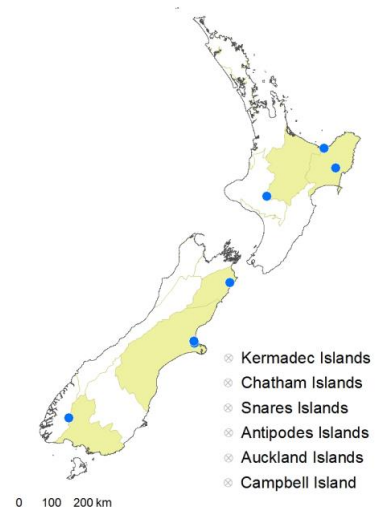
**Distribution:** Gisborne (near Eastwoodhill Arboretum, 1989, Ōpōtiki, 1975), Volcanic Plateau (Raetihi, 2016), Christchurch (Victoria Park, 1996). Uncommon in cultivation.

**Region of origin:** Tibet, Nepal, India (Sikkim, Himachal Pradesh, Uttaranchal Pradesh, Tamil Nadu)

**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 370871, M. Heginbotham, Nov. 1975, Woodlands, Ōpōtiki. "Roadside".

**Recognition:** An erect tree. Leaves large (lamina 78–117 mm long, 30–75 mm wide), soft in texture, not leathery. Upper leaf surface dull and smooth. Hairs on upper surface confined to the midvein. Marginal hairs dense in young leaves, sparse to absent in old leaves. Lower leaf surface glaucous, hairs on lower surface dense, cottony in young leaves, becoming sparse on old leaves. Flowers in compound corymbs. Petals white, spreading, without a tuft of hairs. Filaments white, anthers dark purple. Style and pyrene number invariably 2. Pyrenes slightly umbonate, with style usually below apex but sometimes at apex. Hair on upper free part of pyrene dense. Fruit globose, hairs dense but rubbing off at maturity.



**Fig. 57:** *Cotoneaster frigidus* distribution map based on databased records at CHR.

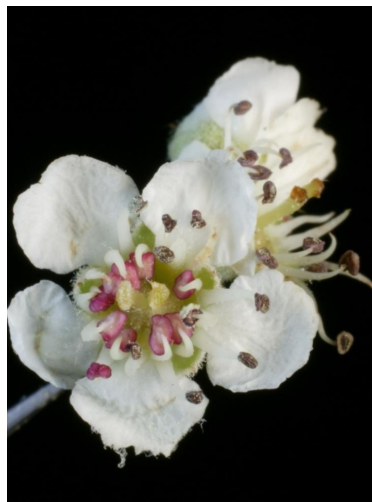
Most similar to *Cotoneaster salicifolius* in size and shape of the leaves and size of the plants. *Cotoneaster frigidus* has leaves that are soft in texture (thin and pliable, not stiff and leathery), the margins are not recurved, the leaves are smooth and dull on the upper leaf surface, while *C. salicifolius* has leathery, glossy, moderately rugose leaves that are often slightly recurved on the margins. *Cotoneaster frigidus* almost invariably has 2 pyrenes per fruit and the style is usually attached below the pyrene apex, while *C. salicifolius* has an equal mixture of 2 and 3 pyrenes per fruit, and the style is always attached at the pyrene apex.

**Phenology:** Flowering: mid-October to December; Fruiting: February to May, not persisting over winter

**Cytology:** Diploid (Fryer & Hylmö 2009), confirmed by flow cytometry of CHR 635025 and CHR 638091.



**Fig. 58:** *Cotoneaster frigidus*: Flowers and foliage.



**Fig. 59:** *Cotoneaster frigidus*: Flower.

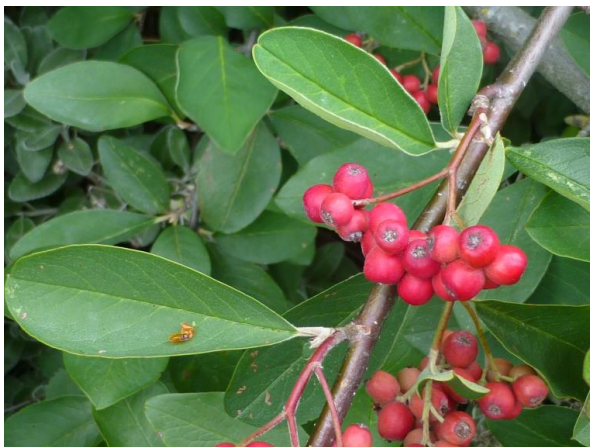




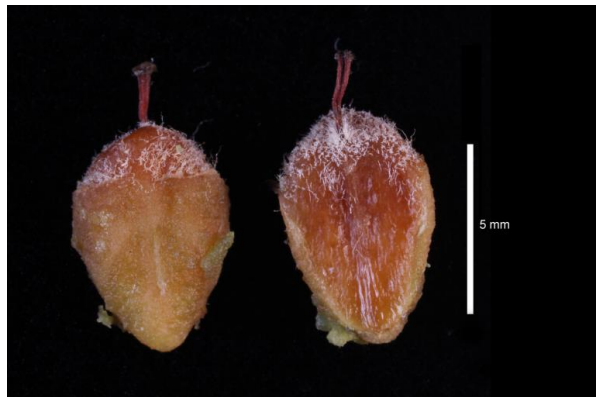
**Fig. 60:** *Cotoneaster frigidus*: Petal with a few hairs at base.



**Fig. 61:** *Cotoneaster frigidus*: Branches laden with fruit.



**Fig. 62:** *Cotoneaster frigidus*: Corymbs of fruit.



**Fig. 63:** *Cotoneaster frigidus*: Pyrenes.

### ***Cotoneaster glaucophyllus* Franch., *Pl. Delavay.* 3, 222 (1890)**

Type: China, Yunnan Province, Kiao-che-tong, near Hee-chan-men, 6 Dec. 1884, J. Delavay 3747. Holotype P 601215, image seen. Isotype: P 601216, image seen. K 758567 may be material removed from the holotype.

**Biostatus:** Exotic; fully naturalised.

### ***Cotoneaster glaucophyllus* var. *serotinus* (Hutch.) L.T.Lu & Brach, *Novon* 12: 495 (2002)**

≡ *Cotoneaster serotinus* Hutch., *Bot. Mag.* 146: pl. 8854 (1920)

≡ *Cotoneaster glaucophyllus* f. *serotinus* (Hutch.) Stapf, *Bot. Mag.* 153: pl. 9171 (1929)

Lectotype (chosen by Fryer & Hylmö 2009, p. 53): China, Yunnan, Hoching Valley, G. Forrest 6754, November 1910, E 10971, image seen.

Erect shrub 1.3–4 m tall, evergreen. Branches arched; branchlets red-brown to purple-brown, peeling cuticle present, branchlet hairs dense on young branches, becoming glabrous; stipule 5.0–6.5 mm long, green turning red, stipule hairs dense to sparse, white. Leaves sparse to crowded on branches, 30–71 mm long, lamina (32)36–69 mm long, (18)24–33 mm wide, elliptic, plane or V-shaped, sometimes slightly channelled and slightly to distinctly cupped at apex, 250–350 µm thick, petiole 3–10 mm long, sparse to dense, white; leaf base obtuse; leaf apex obtuse, apiculus straight; lateral veins in 4–9 pairs, midvein and base of lateral veins impressed above and projecting below, upper surface smooth to very slightly rugose, dark to moderate yellowish-green (RHS 139A–B), dull to glossy, upper surface hairs none or sparse; margins plane to very slightly recurved, hairs dense on young leaves, none on old leaves; lower surface glaucous, hairs dense, white, straight, fine, appressed, not persisting on old leaves.

Inflorescence a compound corymb of 16–104 flowers, 55–140 mm long, rachis hairs dense, white; pedicel 1.7–3.5 mm long, hairs dense, white. Flowers 6.5–9.0 mm diameter. Hypanthium green, sepals 1.2–1.7 mm long, 1.4–2.0 mm wide, hairs dense, straight, fine, white to pale yellow. Petals white in bud, when open spreading, white, 2.5 mm long, 2.8 mm wide, base slightly clawed, tuft of hairs usually present, margins entire or toothed. Stamens 11–20; filaments 2.1–2.8 mm long, white; anthers dark pink to red-purple, 0.5–0.9 mm long; styles invariably 2, 1.6–2.9 mm long. Fruit vivid reddish-orange (RHS 33A), oblate to obovate, 4.5–5.4 mm long, 4.5–6.4 mm diameter, calyx closed or open, glabrous. Pyrenes invariably 2, 3.3–4.3 mm long, 2.6–3.0 mm wide, hairs moderately dense at apex, umbonate, style attached at pyrene apex or up to 0.6 mm below apex.

**Taxonomy:** Lu & Brach (2003) recognise four varieties in *Cotoneaster glaucophyllus*. Var. *serotinus* is distinguished by having inflorescences with white tomentum and up to 40 flowers, rather than pale yellow tomentum and up to or more than 50 flowers in var. *glaucophyllus*. The two other varieties, var. *vestitus* and var. *meiophyllus*, have smaller leaves (15–30 mm long rather than 30–60 mm).

Fryer & Hylmö (2009) describe *C. glaucophyllus* as having the hypanthium glabrous except at base, while *C. serotinus* is described as having dense silky hairs on the hypanthium (visible on the type). All N.Z. material has dense hairs on the hypanthium and corymb branches and therefore matches *C. serotinus* rather than *C. glaucophyllus* (sensu Fryer & Hylmö 2009). I have not seen any herbarium material of *C. glaucophyllus* var. *glaucophyllus* other than the type, which is in the fruiting stage. The type of var. *glaucophyllus* almost completely lacks hairs on the corymb branches, consistent with the description of Fryer & Hylmö (2009).

The name *Cotoneaster glaucophyllus* f. *serotinus* has been in common use in New Zealand (e.g., Given 1982).

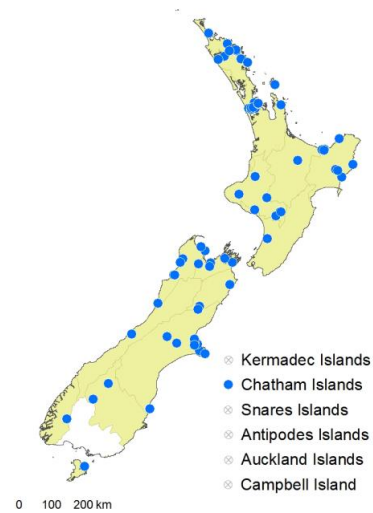
**Distribution:** Northland (Perpendicular Point, 1992; Kaikohe, 1984; Kaio, 1975; Ōpua, 1986; Waimate North, 1981; Paihia, 1988; Whakapara, 1987; Ngunguru, 1987; Baylys Beach, 1970), Auckland (Waimamaku, 1989; Browns Bay, 1979; Campbells Bay, 1978; Auckland City, 1976, 1987; Rangitoto Island, 1994; Great Barrier Island, 1986; Titirangi Beach, 1987; Waitakere Range, 1974; Whitianga, 1985), Gisborne (Whanarua Bay, 1997; Tolaga Bay, 2001; Ōpōtiki, 1975; Ngātapa, 1989; Hangaroa, 1989), Volcanic Plateau (Mt Tarawera, Waiotapu, 1979; Raetihi, 1996), Taranaki (Ahiitī, 1983; Waitaanga Plateau, 1998; Stratford, 1977; Taihape, 1993; Mangaweka, 1997; Rangitikei R, 1993), Southern North Island (Maxwell, 1994; Kōputaroa, 1975), Western Nelson (Karamea, 1985; Ngākawau, 2008; Ngākawau Gorge, 1975, 1979; Westport, 1977), Sounds–Nelson (Nelson City, 1986; Aniseed Valley, 1991; Torrent Bay, 1996; Pelorus Sound, 1999; Picton, 1997), Marlborough (Waimā R, 2010), Westland (Dunollie, 1965; Ōkārito, 2003), Canterbury (Hanmer, 1988; Christchurch City, 1987, 1993; Port Hills, 1986, 2001; Sumner, 1987; Cooptown, 1987; Hinewai, 1995; Hororātā, 1989; Lake Coleridge, 1998), Otago (Hāwea, 2001; Queenstown, 1989; Moeraki, 1987, 2003; Waipori Falls, 1977), Fiordland (Lake Manapōuri, 1997), Stewart Island (Halfmoon Bay, 1980, 2008), Chatham Islands (Waihī, 2007; Kaingaroa, 2006; Owenga Road, 2007). Common in cultivation throughout New Zealand.

**Region of origin:** China (Guangxi, Guizhou, Sichuan, Yunnan provinces)

**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 157684, I. Robbins, July 1965, Dunollie, in Given (1982) as *C. glaucophyllus* forma *serotinus* (Hutch.) Stapf

**Recognition:** Evergreen erect shrub. Leaf lamina 30–60 mm long, upper surface glossy, lateral veins lightly impressed, lower surface glaucous, in young leaves densely hairy but hairs soon lost to become only sparsely hairy with fine white or silvery hairs. Flowers in compound corymbs of usually 15–40 flowers but rarely up to c. 100 flowers. Petals white, spreading, with a small hair tuft. Filaments white, anthers purple. Fruit relatively small (4.5–5.5 mm in diameter, most other species have fruit 6–10 mm in diameter), reddish-pale yellow or dull red, globose, oblate or oblong, glabrous except at base and calyx. Pyrenes invariably 2 per fruit, style at pyrene apex or up to 0.4 mm below.



**Fig. 64:** *Cotoneaster glaucophyllus* var. *serotinus* distribution map based on databased records at CHR.



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Most similar to *Cotoneaster coriaceus*. Both are large shrubs, eventually becoming small trees, with arching branches; both have leaves with few or no hairs on the upper surface and dense tomentum on the lower surface of new leaves that disappears so that old leaves have sparse hair to none on the lower surface. Both have compound corymbs of flowers that have white spreading petals that commonly have a hair tuft. Stamens number in both species is c. 20; filaments are white and anthers red-purple. Both have 2 styles per flower and 2 pyrenes per fruit. Fruit in both species are relatively small (4–6 mm long), with pyrenes that have the style attached only slightly below the pyrene apex. Both mature their fruit in autumn (late March to April) and so are the last species to ripen their fruit.

*Cotoneaster glaucophyllus* differs in the lateral leaf veins, being either lightly impressed or not impressed, and the old leaves are almost glabrous on the undersurface (sparsely hairy in *C. coriaceus*). The leaves are often yellow-green on the upper surfaces while in *C. coriaceus* they are usually mid to dark green. Plants of *C. glaucophyllus* with mid green leaves are also common and are more difficult to distinguish from *C. coriaceus*, particularly in early summer when hairs are dense on the leaves of both species. The leaf and stem hairs in *C. glaucophyllus* are white or appear silvery, while in *C. coriaceus* they are pale yellow in early summer, becoming white or silvery late in summer. The leaves of *C. glaucophyllus* are elliptic, while in *C. coriaceus* they are obovate. In *C. glaucophyllus* they are slightly folded or channelled (plane in *C. coriaceus*), and the margins are not recurved (recurved in *C. coriaceus*).

Similar to *Cotoneaster frigidus* in having leaf undersides that are densely woolly-hairy in young leaves but become sparsely hairy with age, and in having many flowers and fruit per corymb. Leaves are on average smaller, lamina (32)36–69 mm long in *C. glaucophyllus* rather than 71–114 mm long in *C. frigidus*.

**Phenology:** Flowering: early September, peaking late November to early December, rarely late December; Fruiting: February to July, not persisting over winter

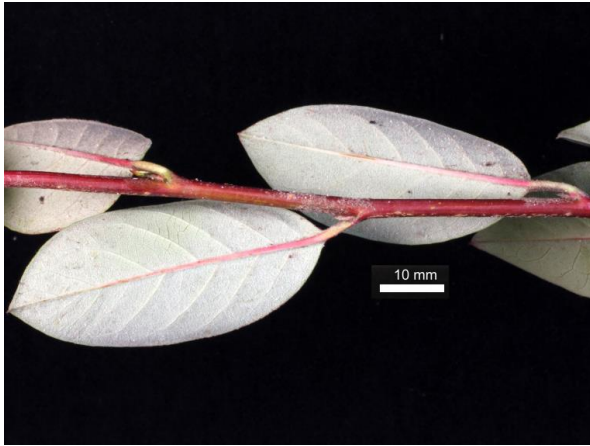
**Cytology:** Tetraploid, based on flow cytometry results from three plants in cultivation: CHR 638088, CHR 638100, and CHR 638089. Ploidy not stated by Fryer & Hylmö (2009).



**Fig. 65:** *Cotoneaster glaucophyllus*: Multiple trunks on mature tree.



**Fig. 66:** *Cotoneaster glaucophyllus*: Wild shrub on Taranaki roadside.



**Fig. 67:** *Cotoneaster glaucophyllus*: Underside of leaves in autumn.



**Fig. 68:** *Cotoneaster glaucophyllus*: Hairs on lower leaf surface.



**Fig. 69:** *Cotoneaster glaucophyllus*: Corymb of flowers in bud.



**Fig. 70:** *Cotoneaster glaucophyllus*: Flower.



**Fig. 71:** *Cotoneaster glaucophyllus*: Fruit and late season foliage.



**Fig. 72:** *Cotoneaster glaucophyllus*: Pyrenes.



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## ***Cotoneaster hebephyllus* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 273 (1912)**

Syntypes: China, Yunnan, north end of Zhongdian plateau on pass leading to Yangtze River valley, 14,000 ft, Sep. 1904, G. Forrest 283. E10951, image seen; China, Yunnan North end of Lichiang Valley, NW Yunnan, G. Forrest 2110, May 1906, K75673, image seen.

= *Cotoneaster hebephyllus* var. *monopyrenus* W.W.Sm., Notes Roy. Bot. Gard. Edinburgh 10: 23 (1917)

≡ *Cotoneaster monopyrenus* (W.W.Sm.) Flink & B.Hylmö, Bot. Not. 119: 459 (1966)

Type: China, G. Forrest 11422, 15 Sept. 1913, holotype E 10953, image seen. Isotype A 26248, image seen.

Erect shrub 2.5–5 m tall, deciduous. Branches arched and spreading; branchlets red-brown to purple-brown, glossy, peeling cuticle present, branchlet hairs dense to sparse, white, woolly; stipule 2.5–5.5 mm long, red, with hairs moderately dense to sparse, white. Leaves sparse on branches, 36–57 mm long, lamina 31–46 mm long, 18–24 mm wide, ellipsoidal to obovate, plane or slightly V-shaped, 220–250 µm thick, petiole 5–14 mm long, hairs dense, white; leaf base obtuse; leaf apex obtuse and cuspidate with a straight apiculus; lateral veins in 4–7 pairs, midvein and base of lateral veins impressed above and projecting below; upper surface smooth, dark yellowish-green (RHS 136B), dull, upper surface hairs either confined to midvein or sparse on the surface; margins plane, hairs dense, white; lower surface glaucous, hairs moderately dense to dense, white, fine, straight to woolly.

Inflorescence a compound corymb of 19–24 flowers, 33–35 mm long, rachis hairs moderately dense, white; pedicel 2.5–3.0 mm long, hairs moderately dense, white. Flowers 9.0 mm diameter. Hypanthium green, sepals 1.0–1.3 mm long, 2.2–2.5 mm wide, red at apex, hairs sparse to moderately dense, white. Petals white in bud, spreading and white when open, 2.9 mm long, 3.1–3.2 mm wide, base slightly clawed, tuft of hairs present, margins entire. Stamens 19–20; filaments 2.0 mm long, white; anthers pink to pinkish-purple, 0.8–0.9 mm long; styles 1, rarely 2, 2.0–2.5 mm long. Fruit vivid reddish-orange (RHS 34A), obovoid, 6.6–7.0 mm long, 6.7–7.9 mm diameter, calyx closed, hairs glabrous. Pyrenes 1, rarely 2, 3.5–3.8 mm long, 3.0–4.7 mm wide, hairs sparse at apex, style attached at centre of pyrene apex.

**Distribution:** Gisborne (Eastwoodhill Arboretum) and Canterbury (Victoria Park). In Victoria Park it grows under low forest of mixed native and non-native trees and appears to be self-seeded as plants are small (1 m or less). In cultivation at Abberley Park, Christchurch (2016), Victoria Park (2016), Christchurch City, Cashel Street (1987), Christchurch Botanic Gardens (1962–1987).

**Region of origin:** China (Yunnan province), Tibet

**Biostatus:** Exotic; casual.

Listed as casual in Heenan et al. (1999, p. 637 as “*Cotoneaster* cf. *monopyrenus* Diels”), based on CHR 463186, W.R. Sykes 326/89, 18 June 1989, Eastwoodhill Arboretum. Also cited in Heenan et al. (1999) is CHR 513510, W.R. Sykes 194/97, 8 May 1997, Port Hills. Both are *C. hebephyllus* as *C. monopyrenus* is a synonym of *C. hebephyllus* in Lu & Brach (2003), a decision followed here.

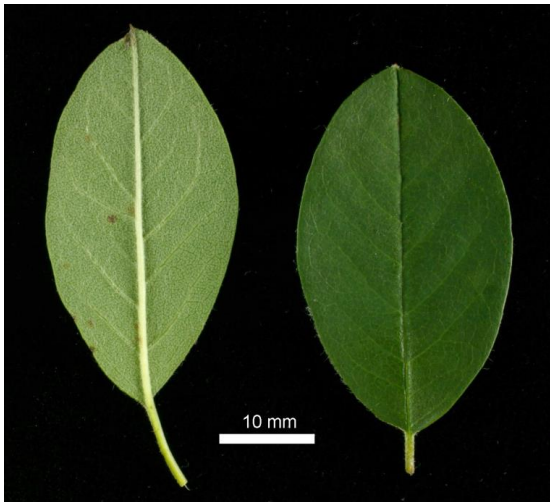
**First record:** CHR 463186, W.R. Sykes 326/89, 18 June 1989, Eastwoodhill Arboretum.

**Recognition:** A deciduous, erect shrub. Leaves 6–40 mm long, elliptic, midvein only impressed. Hairs on lower leaf surface moderately dense and more or less persistent, fine, almost straight. Corymbs of 19–24 flowers. Hypanthium hairs sparse. Petals white, spreading, with a tuft of hairs at the inner petal base. Styles 1 or 2 fused. Fruit red, pyrenes usually 1, rarely 2.

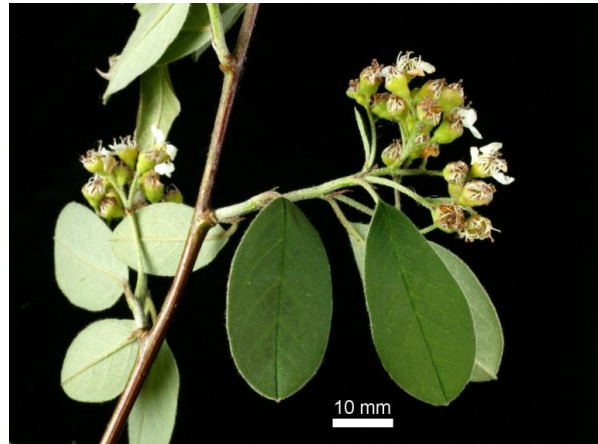
Most similar to *Cotoneaster soongoricus* in the size of the shrub, the sparse branching and leaves, the non-glossy mid green upper leaf surface with few hairs on either surface, flowers in corymbs of 19–24, petals, white and spreading with a tuft of hairs at the petal base. The leaves of *C. hebephyllus* are elliptic rather than orbicular, and the anthers pink, not white. Hypanthium hairs are usually sparse (densely white-tomentose in *C. soongoricus*). The fruit of *C. hebephyllus* contains 1 pyrene, but usually 2 in *C. soongoricus*. Neither species is common in cultivation in New Zealand but of the two, *C. hebephyllus* is more common.

**Phenology:** Flowering: mid-October to early December; Fruiting: mid-February to March

**Cytology:** Triploid using flow cytometry result from CHR 638082. Ploidy not stated in Fryer & Hylmö (2009).



**Fig. 73:** *Cotoneaster hebeophyllus*: Leaves, upper and lower surfaces.



**Fig. 74:** *Cotoneaster hebeophyllus*: Corymb of flowers.



**Fig. 75:** *Cotoneaster hebeophyllus*: Flowers.



**Fig. 76:** *Cotoneaster hebeophyllus*: Flower.



**Fig. 77:** *Cotoneaster hebeophyllus*: Fruit.



**Fig. 78:** *Cotoneaster hebeophyllus*: Single pyrene formed by fusion of 2 pyrenes.

***Cotoneaster horizontalis* Decne., *Ann. Gén. Hort.* 22: 168 (1877 [1878])**

Type: Jardin des Plantes, Paris, G. Nicholson, May 1885, grown from seeds collected in Szechuan Province by A. David, K758588, image seen. Note: The type has leaves with lamina c.13 mm long, apex obtuse but apiculate, branching regular and pinnate but not densely so.

Low shrub with spreading branches, up to 0.6(1.5) m tall, deciduous. Branches in flattened planes; branchlets red-brown to grey-brown, branchlet hairs moderately dense to dense, yellow; stipule 1.8–4.0 mm long, usually red, hairs absent or sparse. Leaves crowded on branches, 16–29 mm long, lamina 14–23 mm long, 10–17 mm wide, elliptic or orbicular, plane or V-shaped in cross-section, or slightly cupped, 160–310 µm thick, petiole 1.5–6 mm long, with sparse to moderately dense, straight, pale yellow hairs, leaf base cuneate, obtuse or rounded; leaf apex round, apiculus cuspidate or apiculate; lateral veins in 2–5 pairs, midvein or midvein and lower lateral veins impressed above and projecting below; upper surface smooth, moderate olive green (RHS 137B), glossy, upper-surface hairs absent or sparse, yellow, straight; margins plane, hairs absent or sparse and yellow; lower surface glossy, hairs sparse, pale yellow, straight (strigose).

Inflorescence a corymb of 1–4 flowers 7–11 mm long, rachis hairs moderately dense, yellow; pedicel 0–1.0 mm long, hairs absent to dense. Flowers 3.3–4.2 mm diameter. Hypanthium green, sepals 1.1–1.5 mm long, 2.0–2.4 mm wide, hairs absent to sparse, yellow. Petals red in bud, erect when flower open, red at outer base, pink inside and at margins, 3.1–3.8 mm long, 2.5–3.2 mm wide, base clawed or not, tuft of hairs absent, margins irregular. Stamens 12–15(17); filaments 1.6–2.0 mm long, dark pink; anthers white, 0.8–1.0 mm long; styles 2–3(4), 1.5–2.0 mm long. Fruit vivid red (RHS 44A), obovoid, 6.0–8.5 mm long, 6.1–9.0 mm diameter, calyx closed or open, hairs very sparse to absent. Pyrenes 2–3(4), 3.6–5.5 mm long, 2.1–4.4 mm wide, hairs sparse to moderately dense at apex, umbonate, style attached 1.2–2.1 mm below pyrene apex.

**Distribution:** Auckland (Mt Hobson, 1994), Southern North Island (Whanganui, 2007), Western Nelson (South Graham R, 1993), Canterbury (Hilltop, 1988; Birdlings Flat, 2007; Rāpaki, 2016; Castle Hill village, 2013), Otago (Lake Hāwea, 2001), Southland (Lake Manapōuri, 1997). Fairly common in cultivation.

**Region of origin:** China (Gansu, Guizhou, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang provinces), Nepal, 1500–3500 m.

**Biostatus:** Exotic; fully naturalised.

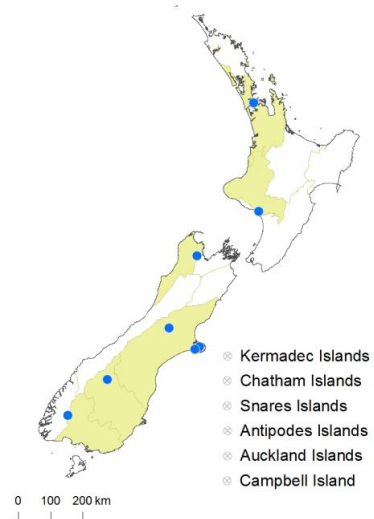
**First record:** CHR 498374, Banks Peninsula, Hilltop on Barrys Bay side, H.D. Wilson BP1392, 3 Dec. 1988, “single plant, wild”.

**Recognition:** Procumbent low-growing shrub with branches forming a herringbone pattern. Deciduous. Leaf lamina 14–23 mm long, elliptical with acute to cuspidate apices, midvein impressed on upper surface, leaf usually slightly but distinctly V-shaped, margins not contorted or recurved, lower surface not glaucous. Flowers 1 or 2. Petals erect, dark red at centre, dark pink at the petal margins. Stamens 12, filaments dark red, anthers white. Fruit with (2)3(4) pyrenes, the style attached below the pyrene apex.

Most similar to *Cotoneaster perpusillus*. Both are low-growing, prostrate, or cascading, both have secondary branches regularly distichous; both have leaves glossy on the upper surface, the lower surface not glaucous, with sparse, straight, thick hairs; the flowers of both have petals erect and red centrally, pink at the margins, stamens are few with filaments red and anthers white. *Cotoneaster horizontalis* has larger leaves (lamina 14–23 mm long rather 10–14 mm); stamens 11–17, not 8–11, and fruit larger, 6–10 mm diameter, not c. 6 mm diameter.

**Phenology:** Flowering: late September to November; Fruiting: December to May, persisting over winter

**Cytology:** Tetraploid (Fryer & Hylmö 2009)



**Fig. 79:** *Cotoneaster horizontalis* distribution map based on databased records at CHR.





**Fig. 80:** *Cotoneaster horizontalis*: Wild plant on Banks Peninsula.



**Fig. 81:** *Cotoneaster horizontalis*: Branch with flowers.



**Fig. 82:** *Cotoneaster horizontalis*: Branches.



**Fig. 83:** *Cotoneaster horizontalis*: Ventral view of branch.



**Fig. 84:** *Cotoneaster horizontalis*: Fruit.



**Fig. 85:** *Cotoneaster horizontalis*: Pyrene.

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***Cotoneaster hylmoei* Flinck & J.Fryer, *Plantsman* 15: 26 (1993)**

Type: China, Western Hubei, Ichang, Oct. 1907, E.H. Wilson 335. Holotype: A, isotype BM 602231, image seen.

= *Cotoneaster salicifolius* var. *rugosus* Rehder & E.H.Wilson in Sargent, *Pl. Wilson.* 1(2), 172–173 (1912) nom. nov.

Erect shrub, c. 1.5 m. Branchlets green-brown, lenticels sparse, branchlet hairs a dense, white tomentum; stipule 3.0 mm long, green, with moderately dense white hairs. Leaves evergreen, crowded on branches, 55 mm long, lamina 51 mm long, 21 mm wide, elliptical, plane, c. 310 µm thick, petiole 4 mm long, with dense white hairs; leaf base cuneate; leaf apex acute with apiculus bent downwards; lateral veins in 7 pairs, midvein and lateral veins impressed above and projecting below; upper surface moderately rugose, mid-green, semi-glossy, upper surface hairs very sparse, becoming glabrous; margins recurved, glabrous; lower surface not visible or glaucous, hairs on lower surface of young leaf dense, white, fine and tangled, woolly and floccose, becoming sparse with age.

Inflorescence a compound corymb of 48–52 flowers, 4 leaves per fascicle, 40–50 mm long, rachis hairs dense, white, woolly; pedicel 0–3.0 mm long, hairs dense, white, woolly. Flowers 7.0–9.0 mm diameter. Hypanthium green, red at margins and on sepals, sepals 0.8–1.3 mm long, 2.0 mm wide, hairs dense, white, woolly, rubbing off from the sepals. Petals dark pink in bud, when open semi-spreading, pink, almost white at the petal base when open, 2.9–3.2 mm long, 3.2–3.5 mm wide, base not clawed, tuft of hairs absent, margins slightly irregular. Stamens 20–23; filaments 3.2 mm long, white; anthers red-purple with almost-black dots in cells of anthers, 0.7–0.8 mm long; styles 2–3, 2.0 mm long. Fruit strong red (RHS 39A), almost spherical, 6.0–6.5 mm long, 6.5–7.5 mm diameter, calyx somewhat open with pyrenes slightly visible, fruit skin hairs sparse to none. Pyrenes 2–3 in equal numbers, 3.7–4.0 mm long, 2.5–3.3 mm wide, hairs sparse at apex, slightly umbonate, style attached at pyrene apex.

**Distribution:** In cultivation at Dunedin Botanic Gardens (2014–2015). Not recorded in any New Zealand horticultural trade catalogue.

**Region of origin:** China (Hubei and Sichuan provinces)

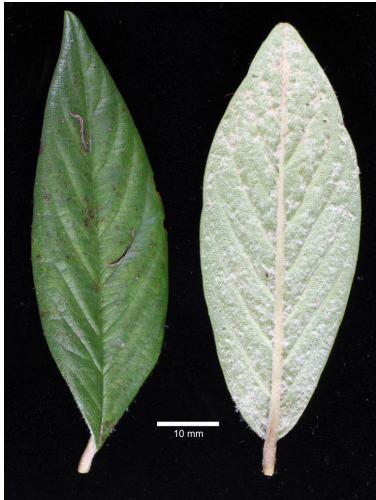
**Biostatus:** Exotic; cultivated.

**Recognition:** Leaves evergreen, leathery, rugose, c. 50 mm long × 20 mm wide, narrowly elliptical. Upper leaf surface dark green, initially sparsely hairy with 7 pairs of deeply impressed veins, leaf margins recurved, lower surface glaucous, initially densely pilose, with age the hairs rub off. Flowers 48–52 per corymb, petals dark pink in bud, when open semi-spreading, pink but almost white at the petal base, glabrous, filaments white, anthers red-purple with black dots. Pyrenes equally 2 or 3 per fruit, style at pyrene apex.

Most similar to *Cotoneaster salicifolius*. The two are probably indistinguishable without flowers. Both have narrowly elliptical leaves that are quite strongly rugose. The petals of *C. hylmoei* are pink and semi-spreading while they are white and fully spreading in *C. salicifolius*.

**Phenology:** Flowering: December; Fruiting: April

**Cytology:** Tetraploid (Fryer & Hylmö 2009)



**Fig. 86:** *Cotoneaster hylmoei*: Leaves, upper and lower surfaces.



**Fig. 87:** *Cotoneaster hylmoei*: Flower.



**Fig. 88:** *Cotoneaster hylmoei*: Fruit and foliage.



**Fig. 89:** *Cotoneaster hylmoei*: Pyrenes.

***Cotoneaster integrifolius* (Roxb.) G.Klotz, *Wiss. Z. Martin-Luther-  
Univ. Halle-Wittenberg, Math.-Naturwiss. Reihe 12: 779 (1963)***

≡ *Crataegus integrifolius* Roxb., *Fl. Ind.* 2, 509 (1832)

Lectotype (chosen by Fryer & Hylmö, 2009, p. 128): Nepal, alpine zone of Gossainkund, herb. Wallich 662 (labelled "662b" on the sheet), August 1821. K. Not seen.

= *Cotoneaster conspicuus* Comber ex C.Marquand, *Bull. Misc. Inform. Kew* 1937: 119 (1937)

Type: cult. England, Sussex, Nymans Handcross, 16 March 1937 J. Comber. Raised from seed collected by F. Kingdon Ward, 18 Nov 1924 (F. Kingdon Ward 6400), SE Tibet, Konbo province, Tsangpo river area, Gyala, K 758608, image seen.

Prostrate shrub 0.8–2.0 m tall, evergreen. Branches flattened planes; branchlets red-brown, peeling cuticle present, branchlet hairs moderately dense to dense; stipule 1.4–2.3 mm long, red or green, stipule hairs sparse to dense, white to yellow. Leaves crowded on branches, 12–25(26) mm long, lamina 10–18(21) mm long, 4.5–10 mm wide, elliptical to obovate, slightly V-shaped, 250–340 µm thick, petiole 1–2.5 mm long, petiole hairs dense, yellow; leaf base cuneate; leaf apex acute to obtuse appearing emarginate, apiculus bent downwards; lateral veins in 1–5 pairs or none visible, midvein only impressed above and projecting below; upper surface smooth, dark green (RHS 136A), semi-glossy, upper surface hairs sparse to moderately dense, white, persistent; margins recurved, hairs moderately dense to dense, yellow or white; lower surface glaucous, hairs moderately dense, white, fine, straight.

Flowers solitary, on a branch 8–10 mm long with 3–6 leaves, pedicel 1.5–3.5 mm long, hairs dense, yellow. Flowers c. 10 mm diameter. Hypanthium green, red at sepal margins and becoming red after flowering, sepals 1.0–1.5 mm long, 2.0–2.2 mm wide, hairs moderately dense, white. Petals pink in



bud, white and spreading when open, 4.2–4.3 mm long, 3.8–4.5 mm wide, base clawed, glabrous, margins entire, minutely papillose. Stamens 15–19; filaments 2.5–2.8 mm long, white; anthers red-purple, 0.6–1.0 mm long; styles 2, 2.0–3.6 mm long. Fruit not glossy, slightly white pruinose, vivid to strong red (RHS 44A–46A), obovoid, 7.0–9.0 mm long, 7.4–10.0 mm diameter, calyx closed, an even spread of white appressed hairs that rub off the fruit. Pyrenes invariably 2, 4.1–5.8 mm long, 3.1–4.0 mm wide, hairs absent to moderately dense at apex, style attached at pyrene apex.

**Taxonomy:** Internationally there is a considerable difference of opinion over *Cotoneaster integrifolius*, *C. microphyllus* and its varieties, and *C. conspicuus*. In addition, both in New Zealand and in other countries they have been misidentified. Lu & Brach (2003) and Dickoré & Kasperek (2010) argue that *C. integrifolius* is a diploid montane to subalpine species in the wild, and that *C. conspicuus* is a synonym of *C. integrifolius*, while *C. microphyllus* is a tetraploid alpine species. Fryer & Hylmö (2009) recognise all three species, and recognise several species within the *C. microphyllus* species complex such as *C. glacialis* and *C. thymifolius*. According to Fryer & Hylmö (2009), *C. microphyllus* is tetraploid, *C. thymifolius* and *C. conspicuus* are diploid, and *C. integrifolius* is tetraploid.

The approach taken here is to recognise three species as being in New Zealand: *C. integrifolius*, *C. microphyllus*, and *C. thymifolius*. *Cotoneaster integrifolius* in New Zealand is diploid, triploid, and tetraploid. This is consistent with the view of Fryer & Hylmö (2009) that there is more than one species within *C. integrifolius* sens. lat., but they do not list any triploid species within the series *Conspicui* G.Klotz. The diploid, triploid, and tetraploid plants do not correspond to recognisable entities within the variation in *C. integrifolius*. A broad species concept for *C. integrifolius* is used here, following Lu & Brach (2003).

**Distribution:** Volcanic Plateau (Lake Rotoiti, 1994), Gisborne (near Eastwoodhill Arboretum, 1989), Nelson (Kaituna R; 1996), Canterbury (Blythe Valley, 2009; Dyers Pass, 1995; Rangitata R, 1985).

**Region of origin:** Nepal, Tibet, India (Himachal Pradesh, Sikkim), Bhutan, China (Guizhou, Sichuan, and Yunnan provinces)

**Biostatus:** Exotic; fully naturalised.

Heenan et al. (1998, p. 157) as *Cotoneaster conspicuus*.

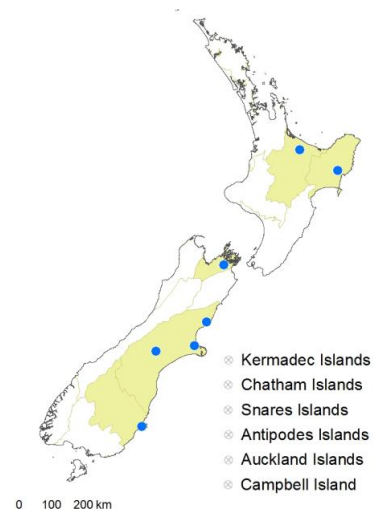
**First record:** CHR 485661, M.J. Newfield 1/95, 19 Oct. 1995, Port Hills, Dyers Pass.

**Recognition:** Sub-erect shrub, leaves small (12–25 mm long, 10–18 mm wide), elliptic to obovate, midvein impressed, leaf slightly V-shaped, apex obtuse with an apiculus appearing emarginate due to the apiculus bending downwards. Flowers solitary, petals white and spreading, styles 2, filaments white, anthers red-purple. Fruit vivid red to dark red, obovoid to almost spherical, with hairs evenly spread over the fruit surface but these rubbing off, pyrenes invariably 2 with style attached at the pyrene apex.

Most similar to *Cotoneaster microphyllus* in prostrate form, narrowly elliptic to obovate leaves with laminae that are somewhat longer than for *C. microphyllus* (lamina 10–18(21) mm long, cf. 5.3–10.0 mm long in *C. microphyllus*), flowers solitary, petals pink in bud, white and spreading when open, stamens 15–19, filaments white, anthers red-purple, pyrenes 2 with style attached at apex. *Cotoneaster microphyllus* differs in having a very glossy upper leaf surface and an apex that appears emarginate due to a strongly recurved apex and strongly grooved midvein. *Cotoneaster integrifolius* has leaves that are semi-glossy, partly due to an even spread of fine, persistent hairs; the apex is acute to obtuse and sometimes appears emarginate, but not with a strongly grooved midvein.

Similar to *Cotoneaster horizontalis* but having slightly arching branches, not distichously branched, petals spreading rather than erect, and fruit dark pink, not scarlet as in *C. horizontalis*. Leaves thicker in texture than *C. horizontalis* but less V-shaped. The leaves have denser, more strigose hairs on the lower surface, and beneath the hairs the leaf undersurface is clearly glaucous, whereas the leaves of *C. horizontalis* are not glaucous.

The largest-leaved forms of *C. integrifolius* have leaves very similar to those of *C. ×suecicus*. Both are more or less prostrate shrubs but when supported can reach 1–2 m; both have sparse non-planar branching; the leaves overlap slightly in size (at their smallest *C. ×suecicus* leaves are 24 x 10 mm),



**Fig. 90:** *Cotoneaster integrifolius* distribution map based on databased records at CHR.

the leaf upper surface is glossy, the leaf slightly folded, the margins slightly recurved, the undersurface of the leaf glaucous and moderately densely hairy with straight appressed hairs. The flowers have no obvious differences: petals in both are white, pink in bud, and spreading; filaments are white and anthers red-purple in both. Fruit hairs are evenly spread and persistent in *C. integrifolius*, while hairs are absent from *C. ×suecicus* fruit. Pyrenes are 2 per fruit in *C. integrifolius*, usually (2)3–4(5) in *C. ×suecicus*. *Cotoneaster integrifolius* has the style attached at the pyrene apex, *C. ×suecicus* has the style attached slightly below the apex. Pyrene/style number provides the surest way of distinguishing the two, and they can be difficult to distinguish when flowers or fruit are absent. *Cotoneaster integrifolius* retains fruit for most of the year.

**Phenology:** Flowering: mid October to early December; Fruiting: February to May

**Cytology:** Tetraploid (Fryer & Hylmö 2009). Flow cytometry of five New Zealand plants in cultivation shows three ploidy levels: diploid, triploid, and tetraploid (CHR 635042, CHR 635028, CHR 635039, CHR 638090, and CHR 638098)



**Fig. 91:** *Cotoneaster integrifolius*: Wild plant on Banks Peninsula.



**Fig. 92:** *Cotoneaster integrifolius*: Leaves, upper and lower surfaces.



**Fig. 93:** *Cotoneaster integrifolius*: Hairs on lower leaf surface.



**Fig. 94:** *Cotoneaster integrifolius*: Flower.



**Fig. 95:** *Cotoneaster integrifolius*: Fruit and foliage.



**Fig. 96:** *Cotoneaster integrifolius*: Pyrenes.

### ***Cotoneaster marquandii* G.Klotz, *Bull. Bot. Surv. India* 5: 209 (1963)**

Type: cult. Wales, Tal-y-cafn, Bodnant, in garden of Lord Aberconway. Holotype K, not seen.

Erect shrub 0.6–2.5 m tall, deciduous. Branches horizontal, in flattened planes with herringbone branching; branchlets grey-brown, papillae present at fallen hair bases, branchlet hairs dense, yellow; stipule persistent, 3.5–4.0 mm long, green or red, hairs sparse and white. Leaves sparse to crowded on branches, 22–29 mm long, lamina 18–23 mm long, 8.5–11.0 mm wide, elliptical, plane or slightly V-shaped, 210–240 µm thick, petiole 46 mm long, sparse, white or yellow; leaf base cuneate; leaf apex acute and cuspidate, apiculus straight; lateral veins in 4–5 pairs, midvein only impressed above and projecting below; upper surface smooth to slightly rugose, dark yellowish-green (RHS 139A), glossy, upper-surface hairs sparse, white or yellow; margins plane, hairs sparse to moderately dense, yellow; lower surface not glaucous, glossy, hairs sparse, white or yellow.

Flowers invariably solitary, inflorescence branch 12–20 mm long, rachis hairs dense; pedicel 2.5–3.0 mm long, hairs sparse, white. Flowers 6.0 mm diameter. Hypanthium green, sepals 1.3–1.5 mm long, 2.6–3.0 mm wide, hairs sparse, white. Petals red in bud, when open erect, red centrally, margins white or mixed red and white, 4.0–4.5 mm long, 3.1–3.5 mm wide, base not clawed, glabrous, margins appearing torn. Stamens 20; filaments 1.6–2.6 mm long, white, pink later; anthers white, 1.0–1.2 mm long; styles 3–4, 2.0–2.5 mm long. Fruit very glossy, strong orange (RHS 26A) to vivid reddish-orange (RHS 34A), strongly obovoid, 7.8–8.3 mm long, 7.0–8.9 mm diameter, calyx very open navel, hairs absent except at calyx margins and petiole. Pyrenes 3–4, 4.2–5.3 mm long, 3.6–4.2 mm wide, hairs sparse or none at apex, style attached 1.1–2.0 mm below pyrene apex.

**Distribution:** Canterbury (Victoria Park 2013–2016). In cultivation at Abberley Park, Christchurch, 2013–2016).

**Region of origin:** China (Yunnan province)

**Biostatus:** Exotic; casual.

First listed in this publication.

**First record:** CHR 635013, D. Glenny 11952, 16 Oct. 2013, Victoria Park, Harry Ell Track. A single plant is on a track margin in an area not now cultivated. It is possible the area was cultivated in the past, but the plant is small (<1 m tall) and so appears to be only about 10–15 years old. There has been no planting in this area for over 30 years.

**Recognition:** A low shrub, c. 1 m tall, with planar, distichous branching, small leaves and branchlets with yellow strigose hairs, leaf lamina 13 × 9 mm, plane, apex acute to acuminate, stipules persistent and particularly obvious. Flowers solitary, hypanthium with only sparse hairs, petals erect, red centrally, white marginally, anthers white, filaments white turning pink. Fruit orange, strongly obovoid, pendent (more obvious below the plane of the branch), navel very wide open because calyx lobes are erect. Pyrenes 3–4.

Most similar to *Cotoneaster simonsii* and *C. divaricatus*. Similar in orange fruit colour and obovoid fruit shape to *C. simonsii*, and in having an open navel, but differs from *C. simonsii* in having horizontal branches with a herringbone pattern and smaller leaves.



Very similar in leaf size, shape, and leaf hairs to *C. divaricatus*, but the leaves of *C. marquandii* are acute and cuspidate, whereas in *C. divaricatus* they are obtuse and often cuspidate. Leaves are often smaller: 8.5–11.0 mm wide (8.5–17 mm wide in *C. divaricatus*). The flowers are very similar: petals erect, red centrally and pink to white marginally, but stamen number is 20, not 11–15 as in *C. divaricatus*. The most obvious difference is in the fruit: *C. marquandii* has an orange fruit that resembles that of *C. simonsii* but has a wider navel. *Cotoneaster divaricatus* has a red fruit with a closed navel. Pyrenes are 3–4 whereas *C. divaricatus* has 2(3) pyrenes.

**Phenology:** Flowering: October to November; Fruiting: March

**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed with flow cytometry using CHR 638083.



**Fig. 97:** *Cotoneaster marquandii*: Branch.



**Fig. 98:** *Cotoneaster marquandii*: Leaves, upper and lower surfaces.



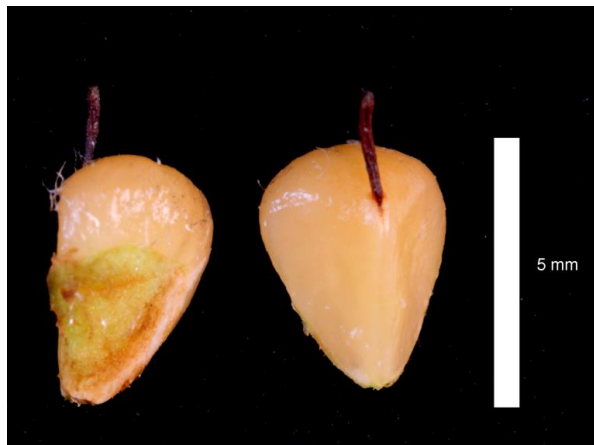
**Fig. 99:** *Cotoneaster marquandii*: View of branch from below, showing solitary fruit.



**Fig. 100:** *Cotoneaster marquandii*: Dorsal view of branch with fruit.



**Fig. 101:** *Cotoneaster marquandii*: Fruit, showing open navel.



**Fig. 102:** *Cotoneaster marquandii*: Pyrenes.

***Cotoneaster microphyllus* Wall. ex Lindl., *Bot. Reg.*, pl. 1114 (1827)**

Type: Nepal, alpine zone of Gossain Than, Aug. 1821, Wallich 662 (labelled "662.a" on the sheet). Holotype K, not seen. Isotype M 213716, image seen.

Prostrate shrub 0.8 m tall, evergreen. Secondary branches not in one plane to somewhat aligned into one plane; branchlets red-brown, epidermis peeling, branchlet hairs moderately dense to dense, white or yellow; stipule 1.4–2.3 mm long, green or red, sparse to moderately dense, white. Leaves crowded on branches, 7.0–13 mm long, lamina 5.3–10.0 mm long, 3.3–6.0 mm wide, obovate, slightly V-shaped, 270–410  $\mu\text{m}$  thick, petiole 1.7–3.0 mm long, dense, white; leaf base cuneate; leaf apex round, appearing emarginate, apiculus bent downwards; lateral veins not visible, midvein only impressed above and projecting below; upper surface smooth, mid to dark green, very glossy, upper surface hairs on young leaves sparse, on old leaves absent or confined to midvein; margins recurved, hairs moderately dense, straight, white; lower surface glaucous, hairs moderately dense, white, straight.

Flowers solitary, on branches 11–14 mm long with 4–8 leaves; pedicel 1.5–3.5 mm long, hairs dense, white. Flowers 8.5–10.5 mm diameter. Hypanthium green, red at sepal margins, sepals 0.9–1.5 mm long, 2.0–2.2 mm wide, hairs moderately dense, white. Petals pink-tipped in bud, spreading and white when open, 3.6–4.3 mm long, 3.7–4.5 mm wide, base slightly clawed, tuft of hairs absent, margins slightly irregular, papillose. Stamens 15–18; filaments 2.3–2.5 mm long, white, turning red after anthesis; anthers red-purple, 0.8–1.0 mm long; styles 2, rarely 3, 2.7–2.8 mm long. Fruit strong red (RHS 46A), oblate, 4.7–9.0 mm long, 6.4–11.0 mm diameter, calyx closed or partly open, hairs sparse. Pyrenes 2, rarely 3, 4.0–4.9 mm long, 2.7–3.6 mm wide, hairs sparse at apex, style attached at pyrene apex.

**Distribution:** Auckland (Mt St John, 1980), Volcanic Plateau (National Park, 1953; Raetihi, 1994), Taranaki (Waitaanga Plateau, 1998; Pūrangi, 1961, 1956; Sentry Hill, 1961), Southern North Island (Whanganui City, 2007; Maraetōtara, 1973; Kiritaki, 1955; Waikanae, 2008; Woodville, 1974; Te Marua, 1950; Mangaroa, 1946; Karori, 1940–1945; Western Nelson (Ngārua Caves, 2004), Sounds–Nelson (Maitai R, 1959, Havelock, 1996), Canterbury (Port Hills, 1989, 2004; Mesopotamia Station, 1978; Māwaro, 2005), Otago (Cromwell, 1975). Common in cultivation throughout New Zealand.

**Region of origin:** China (Sichuan, Yunnan), Tibet, Nepal, Bhutan, Sikkim, India, Kashmir, Burma

**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 28361, R. Mason, 3 Aug. 1940, Karori. Cited in Allan (1940, p. 287) as *C. integerrima* Medic.; in Healy (1948, p. 179) as *Cotoneaster microphylla*; in Given (1982, p. 222).

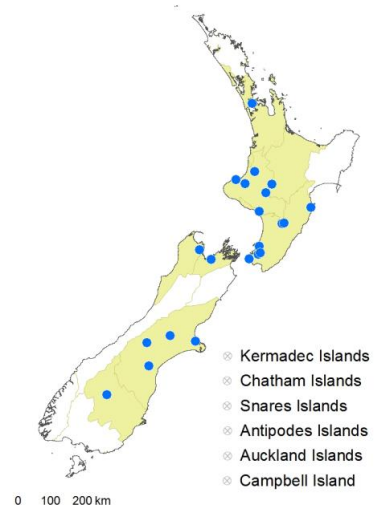
**Recognition:** A prostrate shrub with long, unbranched, terminal branches. Leaves small, obovate, glossy and sparsely hairy or glabrous above (hairs persisting only in the midvein groove), glaucous below with moderately dense, straight white hairs that persist, margins distinctly recurved, base cuneate, apex appearing emarginate due to the apiculus pointing downwards. Fruit wider than long (oblate), vivid red with a slight waxy bloom and so appearing dark pink, with scattered white appressed hairs that disappear over time, fruit persisting over winter. Pyrenes 2–3, style attached at pyrene apex.

Most similar to *Cotoneaster thymifolius* but with larger leaves (lamina 5.3–10.0 mm long, 3.3–6.0 mm wide, not 4.5–5.6 mm long, 2.3–2.9 mm wide). Said to differ in how much pink is evident on the petals, but this seems to be only a matter of slight degree.

Similar to *Cotoneaster integrifolius*. Both have small leaves (5.3–25 mm long, 3.3–10 mm wide) that are obovate, slightly to distinctly V-shaped, thick in texture, margins recurved, moderately dense, straight white hairs on undersurface that persist; flowers solitary, petals white, spreading; fruit strong red but appearing dark pink due to a waxy bloom, pyrenes 2–3, style attached to pyrene at apex. *Cotoneaster microphylla* has a glossier upper leaf surface, has smaller leaves that are less variable in size on one branch, the upper leaf surface hairs are sparse and in older leaves absent or confined to the midvein. The two are very similar and can be difficult to distinguish. The two species are equally common in cultivation but *C. microphylla* is much more common in the wild than *C. integrifolius*.

**Phenology:** Flowering: October to mid December; Fruiting: January to March

**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 635036.



**Fig. 103:** *Cotoneaster microphylla* distribution map based on databased records at CHR.



**Fig. 104:** *Cotoneaster microphylla*: Flowers in male and female phases.



**Fig. 105:** *Cotoneaster microphylla*: Old flower showing change in filament colour after anthesis.





**Fig. 106:** *Cotoneaster microphyllus*: Lower surface of leaves.



**Fig. 107:** *Cotoneaster microphyllus*: Fruit and foliage.



**Fig. 108:** *Cotoneaster microphyllus*: Fruit with open navel.



**Fig. 109:** *Cotoneaster microphyllus*: Pyrenes.

### ***Cotoneaster pannosus* Franch., *Pl. Delavay. 3, 223–224 (1890)***

Lectotype (chosen by Fryer & Hylmö 2009, p. 52): China, Yunnan, Tapin-tze, 1886, J. Delavay 3743, not seen.

Erect shrub to small tree 2–10 m tall, evergreen. Branches arched, spreading; branchlets red-brown to yellow-brown, cuticle peeling, papillae from old hair bases present, branchlet hairs dense in young branchlets, sparse in old branchlets, white to yellow; stipule 2.0–4.0 mm long, red, stipule hairs moderately dense, yellow. Leaves crowded on branches, 27–48 mm long, lamina (14)16–35(48) mm long, (9)12–19(24) mm wide, elliptic to obovate, slightly V-shaped at leaf base, otherwise plane, 200–260 µm thick, petiole 4–12 mm long, hairs on petiole dense and yellow in young leaves, becoming sparse; leaf base cuneate; leaf apex acute to obtuse, apiculus straight or bent downwards; lateral veins in 6–7 pairs, midvein only, or midvein and lateral veins impressed above and projecting below; upper surface smooth, moderate yellowish-green (RHS 139B), glossy, upper-surface hairs sparse to none, white; margins very slightly recurved or plane, hairs on margins dense and white in young leaves, not persisting; lower surface not visible due to dense, white tomentum in young and old leaves, tomentum becoming dirty in old leaves.

Inflorescence a corymb of 1–32 flowers, 12–65 mm long with 3 leaves, rachis hairs dense, off-white; pedicel 1.2–7 mm long, hairs dense, off-white. Flowers 8.0–9.0 mm diameter. Hypanthium green, sepals 1.6–2.0 mm long, 1.9–2.0 mm wide, hairs densely woolly, white. Petals spreading and white when open, 2.8–3.2 mm long, 2.3–3.1 mm wide, base not clawed, tuft of hairs usually present, small, margins slightly irregular, not papillose. Stamens 16–22; filaments 2.4–3.0 mm long, white; anthers red-purple, 0.8–1.0 mm long; styles 2, 2.6–2.9 mm long. Fruit vivid red (RHS 45A), oblong-obovate, 7.8–8.0 mm long, 5.5–8.0 mm diameter, calyx half-open, pyrenes visible, hairs persisting at calyx,

sparse elsewhere on fruit skin, not persisting. Pyrenes invariably 2, 4.9–5.5 mm long, 3.2–3.9 mm wide, hairs moderately dense at apex, apex acute, style attached at pyrene apex.

**Distribution:** Northland (Russell), Auckland (Takapuna, Waikumete Cemetery, 1975–1989; Meremere, 2000), Gisborne (Eastwoodhill Arboretum, 1989), Volcanic Plateau (Wairakei, 2006), Southern North Island (Whanganui City, 2002; Tinui, 2004), Canterbury (Port Hills, 1997; Diamond Harbour, 2015). Uncommon in cultivation throughout New Zealand.

**Region of origin:** China (Sichuan and Yunnan provinces)

**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 310749, S. Bowman & A.E. Esler 5311, 12 Nov. 1975, Waikumete Cemetery, “Naturalised among graves and in scrubby places”. CHR 310749 has no flowers or fruit to confirm its identity, but a number of collections made in the cemetery in 1987–1988 by Alan Esler, Ewen Cameron, and Bill Sykes show that *C. pannosus* had naturalised in the cemetery by 1975.

**Recognition:** An upright shrub to tree with medium-sized evergreen leaves that are densely and persistently tomentose on the lower surface such that the glaucous undersurface is not visible. Flowers have white spreading petals and two styles. Fruit have 2 pyrenes with the style at the pyrene apex.

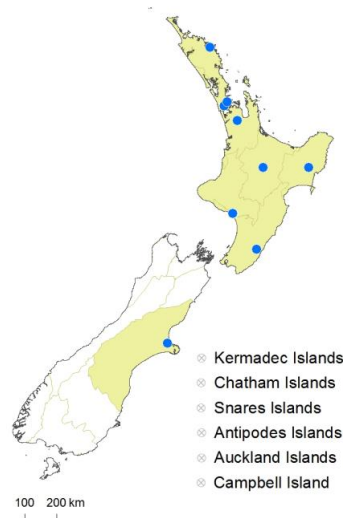
Most similar to *Cotoneaster franchetii*. Both are erect shrubs with medium-sized leaves [*C. pannosus* lamina (14)16–35(48) × (9)12–19(24) mm; *C. franchetii* lamina 19–36(46) × 13–22 mm] that are elliptic or ovate and acute at the apex. Mean lamina length in *C. pannosus* is slightly less, 25.6 mm, than for *C. franchetii* with a mean of 29.4 mm. The difference in length is statistically significant (CI = 95%, 30 samples of each), but the size difference is too small to be useful.

Dickoré & Kasperek (2010) point out that herbarium specimens of this species are difficult to distinguish from those of *C. franchetii* despite the two being placed in different subgenera. Both have a dense felt of woolly hairs on the underside of the leaf, which persist with leaf age. Both have sparse hairs on the upper leaf surface which become more sparse with age, and both have midvein and lateral veins impressed on the upper surface. Ogle & Sykes (2003) provide a table of differences, which include that *C. franchetii* branches are arching while those of *C. pannosus* are erect to spreading, and that *C. franchetii* young leaves are thinly pubescent on the upper leaf surface, and lateral veins are obviously impressed, while *C. pannosus* leaves are hardly or not pubescent on the upper surface when young and lateral veins are obscure and not impressed.

The most reliable differences are in the flowers and fruit. *Cotoneaster pannosus* differs from *C. franchetii* in having spreading white petals rather than erect pink petals. In fruit *C. pannosus* differs in having 2 pyrenes per fruit rather than 3–5 per fruit, and in having the style attached at the pyrene apex or within 0.5 mm of the apex, while in *C. franchetii* the style attachment is c. 1.0–1.5 mm below the pyrene apex. *Cotoneaster pannosus* is much less common in New Zealand than *C. franchetii*.

**Phenology:** Flowering: early November to December; Fruiting: February to May, not persisting

**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 638086.



**Fig. 110:** *Cotoneaster pannosus* distribution map based on databased records at CHR.





**Fig. 111:** *Cotoneaster pannosus*: Multiple trunks on mature tree.



**Fig. 112:** *Cotoneaster pannosus*: Leaves, upper and lower surfaces.



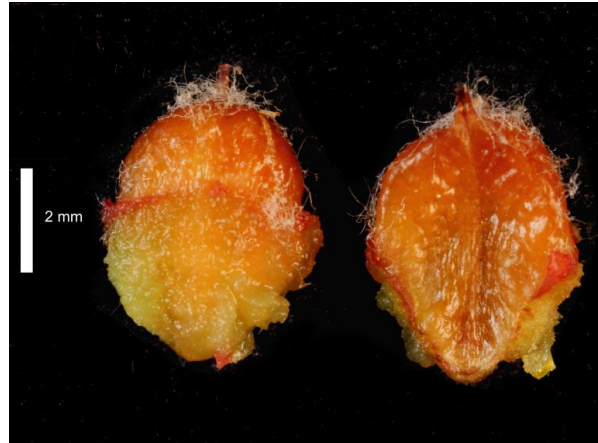
**Fig. 113:** *Cotoneaster pannosus*: Hairs on lower leaf surface.



**Fig. 114:** *Cotoneaster pannosus*: Fruit and foliage.



**Fig. 115:** *Cotoneaster pannosus*: Fruit and foliage.



**Fig. 116:** *Cotoneaster pannosus*: Pyrenes.



***Cotoneaster perpusillus* (C.K.Schneid.) Flinck & Hylmö, Bot. Not. 119: 453 (1966)**

≡ *Cotoneaster horizontalis* var. *perpusillus* C.K.Schneid., *Ill. Handb. Laubholz.* 1, 745, f. 419 e2 (1906)

Type: China, Hubei, A. Henry 712 [protologue]; Sichuan, without locality. K 758545, image seen.

Prostrate shrub, deciduous. Branches in flattened distichous planes (“herringbone” pattern); branchlets red-brown, branchlet hairs moderately dense, yellow; stipule 1.8–3.0 mm long, red-brown and persistent, with sparse hairs. Leaves crowded on branches, 12–16 mm long, lamina 10–14 mm long, 6–8 mm wide, dark green (RHS 136A), elliptic or obovate, distinctly V-shaped, 200–270 µm thick, petiole 1.5–2.9 mm long, sparse to moderately dense, white or yellow; leaf base cuneate to almost obtuse; leaf apex obtuse to acute and cuspidate, apiculus straight; lateral veins in 2–3 pairs or none apparent, midvein only impressed above and projecting below; upper surface smooth, mid to dark green, glossy, upper-surface hairs usually absent, occasionally very sparse; margins plane, hairs sparse; lower surface glossy, not glaucous, hairs sparse, straight, white or yellow.

Inflorescence 1–2 flowers, 8–10 mm long, rachis hairs dense, pale yellow; pedicel 0–0.5 mm long, hairs moderately dense, yellow. Flowers 3.0–4.0 mm diameter. Hypanthium green turning red after flowering, sepals 1.7 mm long, 1.8 mm wide, hairs sparse, white. Petals red in bud, petals remaining almost closed, dark red centrally with red margins, 3.5 mm long, 2.8 mm wide, base not clawed, glabrous, margins torn. Stamens 8–11; filaments 1.5–2.7 mm long; red, anthers white, 0.7–1.0 mm long; styles 3, 1.0–2.1 mm long. Fruit vivid red (RHS 45A), obovoid, 6.0–6.4 mm long, 5.8–6.4 mm diameter, calyx closed, hairs very sparse. Pyrenes invariably 3, 4.2–4.4 mm long, 2.5–3.5 mm wide, hairs sparse at apex, style attached 1.4–2.1 mm below pyrene apex.

**Taxonomy:** Recognised by Lu & Brach (2003) as *C. horizontalis* var. *perpusillus*. A synonym of *C. horizontalis* in Dickoré & Kasperek (2010). Recognised as a species by Fryer & Hylmö (2009). The two are distinct in New Zealand and so are recognised here as two species. It is possible that their distinctiveness in cultivation is because two apomictic forms of the same wild species have been selected.

**Distribution:** Volcanic Plateau (Raurimu, 1994), Taranaki (Rangitikei, 2009), Canterbury (Monument, 2012; Montgomery Scenic Reserve, 1984). Common in cultivation.

**Region of origin:** China (Anhui, Gansu, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xinjiang, Yunnan, Zhejiang provinces), Tibet.

**Biostatus:** Exotic; casual.

New status designated in this publication.

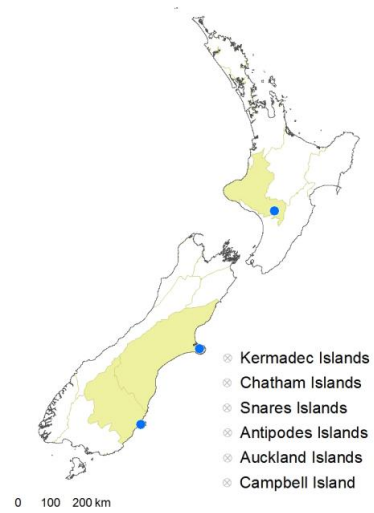
**First record:** CHR 481276, H. D. Wilson BP397, 22 Sept. 1984, Banks Peninsula, north end of Montgomery Reserve near Hilltop.

**Recognition:** A densely branched shrub up to 1.8 m tall. The branching is planar and in a regular herringbone pattern. The leaves are small, distinctly V-shaped, acute at the apex, glossy above, glossy and sparsely hairy below, not glaucous. The flowers have erect petals that are red centrally and pink at the edges, 8–11 filaments that are red, anthers white. Fruit are dense on the branches, solitary and vivid red.

Most similar to *Cotoneaster horizontalis* (q.v.). Both have flowers with erect petals that are red centrally and pink on the margins, red filaments and white anthers. *Cotoneaster perpusillus* has smaller leaves (6–8 mm wide, rather than 10–17 mm wide) that are more distinctly V-shaped in cross-section, and are consistently small in size (leaves near the main stem are usually larger in *C. horizontalis* than those on the branchlets). Flowers have 8–11 stamens (not 11–17). The fruit are smaller (c. 6 mm diameter, not 6.1–9.0 mm diameter).

**Phenology:** Flowering: mid-October to November; Fruiting: January to March, persisting over winter

**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 637373.



**Fig. 117:** *Cotoneaster perpusillus* distribution map based on databased records at CHR.



**Fig. 118:** *Cotoneaster perpusillus*: Herringbone arrangement of branchlets.



**Fig. 119:** *Cotoneaster perpusillus*: Autumn foliage.



**Fig. 120:** *Cotoneaster perpusillus*: Leaves, upper and lower surfaces.



**Fig. 121:** *Cotoneaster perpusillus*: Flower with petal removed.



**Fig. 122:** *Cotoneaster perpusillus*: Fruit and foliage.



**Fig. 123:** *Cotoneaster perpusillus*: Pyrenes.



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***Cotoneaster salicifolius* Franch., *Nouv. Arch. Mus. Hist. Nat. sér. 2*,  
8: 225 (1885)**

Type: A. David, June 1869, China, Sichuan, Moupine. Holotype P 130707, image seen.

Note: Leaves on the type are c. 67 × 20.5 mm and vary between elliptic and narrowly ovate, with c. 15 pairs of deeply impressed veins; the leaf surface is finely rugose between the lateral veins, and the margins are recurved. Flowers are c. 40 per corymb.

Shrub or small tree, 2–4 m tall, evergreen. Branchlets dark purple, glossy, with peeling cuticle and lenticels. Stipules not persisting, 2.3–5.0 mm long, red, hairs dense. Leaves narrowly elliptic, plane, 70–84 mm long, lamina 67–80 mm long, 21–22 mm wide, veins in 10–13 pairs, lamina 300–320 µm thick, petiole 3–6 mm long with dense, fine, yellow, frizzy hairs; midvein and lateral veins impressed above and projecting below, moderately rugose due to lamina being convex between the side veins, upper surface moderately glossy, young leaves not seen, old leaves glabrous on upper surface except along the midvein; margins recurved, glabrous on old leaves; undersurface glaucous, hairs sparse when old except on the midvein, where they remain dense; base of lamina cuneate; apex acute with straight apiculus.

Inflorescence a compound corymb, c. 15–17 fruit per corymb, rachis hairs dense, pale yellow. Pedicels 1.5–2.0 mm long, hairs dense. Flowers not seen. Fruit crimson, spherical, 6.0–6.8 mm long, 6.0–7.0 mm diameter, hairs on mature fruit absent, navel closed; pyrenes (2)3–4, 3.0–5.3 mm long, 2.5–3.5 mm wide, hairs sparse, apex rounded, style attached at apex.

**Distribution:** Known wild from only the Lake Wānaka site. In cultivation in Christchurch (1962) and Port Hills—Victoria Park (1987).

**Region of origin:** China (Sichuan, Guizhou, Hubei, Hunan, Yunnan), Tibet

**Biostatus:** Exotic; casual.

**First record:** CHR 534889, P.N. Johnson 1433, 12 Feb. 2000, Lake Wānaka, Dublin Bay.

**Recognition:** Shrub or small tree 6–8 m tall. Branches arched. Leaves evergreen, leathery, 40–90 × 13–23 mm, narrowly ovate. Petiole often red. Upper leaf surface dark green, initially sparsely hairy, 7–12 pairs of deeply impressed veins, leaf margins recurved, lower surface glaucous, initially densely pilose. Flowers 10–50 per corymb, petals white and spreading, glabrous, filaments white, anthers purple. Pyrenes (2)3–4, style at pyrene apex.

Most similar to *Cotoneaster ×watereri*, the hybrid which has *C. salicifolius* as one of its parents.

*Cotoneaster salicifolius* has a leaf lamina 60–85 mm long, 18–22 mm wide, the leaves are fairly strongly rugose, and have a dry uncompressed fruit diameter 4.2–7.0 mm. Most *C. ×watereri* plants have a leaf lamina 90–135 mm long × 23–40 mm wide, weakly or not rugose, and have a dry uncompressed fruit diameter of 5.7–8.0 mm and a fresh fruit diameter of 10–11 mm.

Plants with a leaf lamina 60–90 mm long may be either *C. salicifolius* or *C. ×watereri*, and the only way of identifying these small-leaved plants in the absence of fruit seems to be the degree of rugosity, which is stronger in *C. salicifolius*.

*Cotoneaster coriaceus* is persistently hairy on the lower leaf surface below while *C. salicifolius* loses its hairs with leaf age. The leaves of *C. salicifolius* are narrowly elliptic, not obovate. Leaves of *C. coriaceus* are 31–50 mm wide, vs. *C. salicifolius* 18–22 mm wide. Flowers do not differ. Pyrene number is 2–3 in *C. salicifolius*, 2 in *C. coriaceus*, but the style in *C. salicifolius* attaches at the pyrene apex, not 0.4–0.8 mm below the apex.

Very similar to *Cotoneaster hylmoei*. The two are probably indistinguishable without flowers. The petals of *C. salicifolius* are white and spreading, while in *C. hylmoei* they are pink and semi-spreading.

**Phenology:** Flowering: not known; Fruit: February to May

**Cytology:** Diploid (Fryer & Hylmö 2009)





**Fig. 124:** *Cotoneaster salicifolius*: Branch with flowers in bud.



**Fig. 125:** *Cotoneaster salicifolius*: Leaves, upper and lower surfaces.

***Cotoneaster sherriffii* G.Klotz, *Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg, Math.-Naturwiss. Reihe 12: 776 (1963)***

Type: Tibet, “Konbo Prov, Molo, Lilung Chu, 10,500 ft”, *F. Ludlow, G. Sherriff and G. Taylor* 5677, 26 June 1938. Holotype BM 550222, image seen. Isotype E 10988, image seen. Holotype label says: “Corolla white, tinged pale pink. On open river banks”.

Erect shrub 1–3 m tall, deciduous (most leaves fallen by August). Branches spirally arranged; branchlets red-brown, slightly angulate, with peeling cuticle, branchlet hairs moderately dense, yellow; stipule 2.0–2.5 mm long, green to dark red, hairs moderately dense, yellow. Leaves sparse on branches, 16–22 mm long, lamina 14–20 mm long, 10.5–11.5 mm wide, elliptic, plane, 210–240  $\mu$ m thick, petiole 2.0 mm long, hairs dense, fine, straight, yellow; leaf base obtuse; leaf apex rounded, apiculus bent downwards; lateral veins in 4 pairs or not visible, midvein only impressed above and projecting below, upper leaf surface smooth, dark green (RHS 136A), glossy, hairs sparse, on midvein only, none on old leaves; margins plane; lower surface glaucous, hairs moderately dense, white, fine but straight.

Inflorescence a corymb of 1–3 flowers, 6–8 mm long with 3–4 leaves, rachis hairs dense, pale yellow; pedicel 1–2 mm long, hairs as for rachis. Flowers 8–10 mm diameter. Hypanthium green, becoming pink after flowering, sepals 2.0 mm long, 1.2 mm wide, hairs moderately dense, pale yellow. Petals pink in bud, when open spreading, white, 3.0–3.3 mm long, 3.0–3.5 mm wide, base clawed, tuft of hairs absent, margins entire. Stamens 19–20; filaments 2.6–3.1 mm long, white, turning pink later; anthers red-purple, 0.9–1.1 mm long; styles 2 (or 2 fused into 1), 2.3–2.9 mm long. Fruit vivid reddish-orange (RHS 34A), or in shaded situations strong orange (RHS 26–31A), obovoid to spherical, 8.0–11.0 mm long, 7.3–11.1 mm diameter, calyx closed, hairs sparse, eventually none. Pyrenes 2, rarely fused into 1, 5.5–6.0 mm long, 3.1–4.5 mm wide, hairs very sparse at apex, umbonate, style attached 0.6–0.8 mm below apex.

**Distribution:** Known in cultivation at one site, Canterbury, Port Hills, Cashmere, Cracroft Reserve—CHR 635007, CHR 637371.

**Region of origin:** Tibet

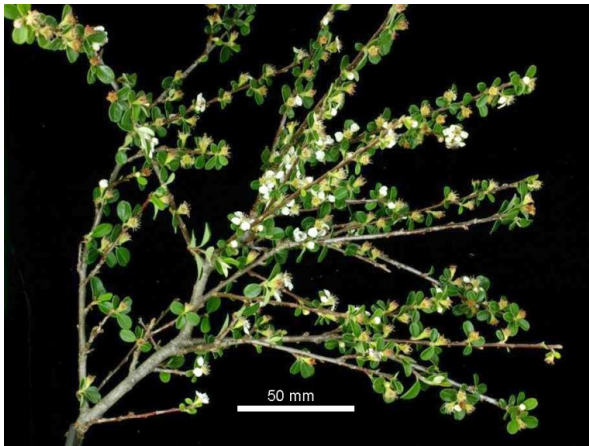
**Biostatus:** Exotic; cultivated.

**Recognition:** An erect shrub 1–3 m tall, leaves small, 16–22 mm long, glaucous below with moderately dense hairs, the leaf apex obtuse. Flowers 1–3, corolla white but slightly pink in bud, without a tuft of hairs, petals spreading, filaments white but turning pink later, anthers red-purple, fruit with 2 pyrenes, pyrenes with style near to but not at apex.

Most similar to *Cotoneaster integrifolius* in leaf size and number of styles/pyrenes, but *C. sherriffii* becomes a large upright shrub or small tree.

**Phenology:** Flowering: mid to late October; Fruiting: late January to June

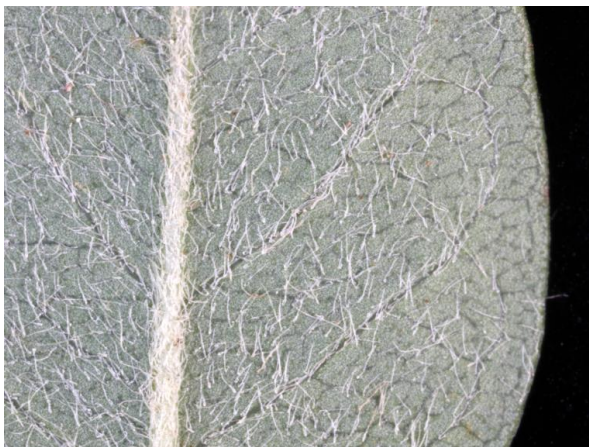
**Cytology:** Diploid (Fryer & Hylmö 2009). Flow cytometry result is triploid using CHR 635038.



**Fig. 126:** *Cotoneaster sherriffii*: Branch.



**Fig. 127:** *Cotoneaster sherriffii*: Leaves, upper and lower surfaces.



**Fig. 128:** *Cotoneaster sherriffii*: Hairs on lower leaf surface.



**Fig. 129:** *Cotoneaster sherriffii*: Flower.



**Fig. 130:** *Cotoneaster sherriffii*: Fruit.



**Fig. 131:** *Cotoneaster sherriffii*: Pyrenes.

***Cotoneaster simonsii* Baker in Baker et al., *Refug. Bot.* 1(3), pl. 55 (1869)**

Type: India, Himchal Pradesh, Lailankote, Khasia, 26 Sept. 1886, C.B. Clarke 45543. K 758590, image seen.

Erect shrub, 1.5–3.5 m tall, semi-deciduous to deciduous in New Zealand. Branches stiffly erect; branchlets glossy red-brown, lenticels and papillae from broken hairs present, branchlet hairs dense, white or yellow; stipule persistent, 4.5–6.5 mm long, red, green, or red-brown. Leaves crowded on

branches, 24–35 mm long, lamina 12–31 mm long, 14.5–19 mm wide, ovate to elliptic, plane to distinctly V-shaped, 250–400 µm thick, petiole 3–5 mm long, hairs moderately dense, yellow; leaf base cuneate to rounded; leaf apex acute, apiculus straight; lateral veins in 3–4 pairs, midvein and base of lateral veins impressed above and projecting below; upper surface smooth to slightly rugose, mid green to dark green, dull to glossy, upper-surface hairs sparse to moderately dense and yellow; margins plane with hairs sparse to moderately dense and yellow; lower surface not glaucous, hairs sparse to moderately dense, straight, yellow.

Flowers solitary or in a simple corymb of 2–3 flowers, 14 mm long, rachis hairs dense, yellow; pedicel 2.0–5.0 mm long, hairs moderately dense, yellow. Flowers 4.5 mm diameter. Hypanthium green, usually glabrous except for fringe of hairs, sepals 1.8–2.1 mm long, 2.3–3.2 mm wide. Petals pink in bud, when open erect, pink centrally with white margins, 3.4–3.6 mm long, 3.3–3.4 mm wide, base clawed, tuft of hairs present or absent, margins appear torn. Stamens 18–20; filaments 2.3–2.5 mm long, white in bud, turning pink; anthers white, 1.1–1.2 mm long; styles 3–4, 2.0–2.2 mm long. Fruit vivid red (RHS 45A), ellipsoidal to obovoid, 6.5–11 mm long, 5.4–8.4 mm diameter, calyx closed or open, hairs sparse or none. Pyrenes 3–4, 4.8–6.0 mm long, 2.5–3.8 mm wide, hairs sparse at apex, slightly umbonate, style attached 1.4–2.5 mm below pyrene apex.

**Taxonomy:** Kumar & Panigrahi (1992) pointed out that *Cotoneaster symondsii* T.Moore is an older name for what might be this species. Moore's name was effectively published but no type matching the details in the protologue can be found. Published work has been divided over the use of the name *C. symondsii* vs. *C. simonsii*. Fryer & Zika (2014) resolved this problem by neotypifying the name *C. symondsii* in such a way that *C. symondsii* is a synonym of *C. marginatus* and the established use of the name *C. simonsii* is undisturbed.

**Distribution:** Gisborne (Eastwoodhill, 1989), Volcanic Plateau (Taihape, 1991, 2001; Raetihi, 2006; Ōhakune, 1964; Whakapapanui R, 1971; Mangaweka, 1994), Southern North Island (Akātārawa, 1953; Wallaceville, 1952), Sounds–Nelson (Torrent Bay, 1996), Westland (Maruia Falls, 2015; Springs Junction, 1991; Taipo Valley, 1979), Canterbury (Hanmer, 1988; Kōwai River, 1962, 2000; Rākaia Gorge, 1994; Alford Forest, 1972; Banks Peninsula, 2014; Castle Hill, 1993; Methven, 1970; Ashburton, 1956; Peel Forest, 2015; Hunters Hills, 2015; Fairlie, 1957; Mt Cook, 1969; Lake Ōhau, 2015), Otago (Dunedin City, 1994, 2004; Otago Peninsula, 1984; Clyde, 1989; Queenstown Hill, 1989), Southland (Tahakopa Bay, 1994; Wyndham, Mossburn, 2001), Fiordland (Lake Manapōuri, 1973; Lake Monowai, 1997), Stewart Island (Half Moon Bay, 1962). The most common naturalised species in New Zealand and one that invades native forest as an understorey species. Common in cultivation throughout New Zealand.

**Region of origin:** India (Sikkim), Bhutan

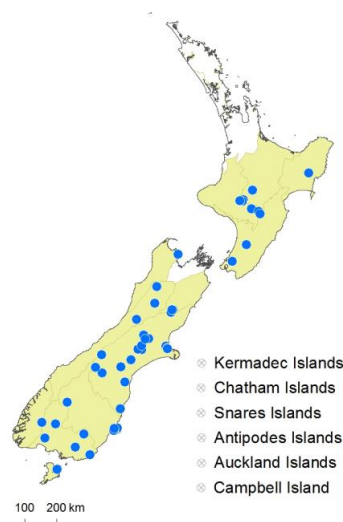
**Biostatus:** Exotic; fully naturalised.

**First record:** CHR 70941, A.J. Healy 50/415, 29 Nov. 1950, Hutt Valley, near Upper Hutt, in Healy (1958, p. 536).

**Recognition:** An erect shrub, with branches that are stiffly erect, not arching. Stipules are persistent and obvious. Leaves are elliptic or ovate with an acute apex, the leaf underside glossy, not glaucous, and moderately densely hairy with white or yellow straight hairs that persist. Flowers with petals pink, dark centrally, erect, filaments white turning pink, anthers white, styles/pyrenes 3(4), fruit orange-red to red, ellipsoidal, longer than wide, the navel slightly open due to projecting calyx lobes.

Most similar to *Cotoneaster divaricatus*. *Cotoneaster simonsii* belongs to the group of species that are not glaucous on the lower leaf surface but have sparse, straight (strigose) leaf hairs. The group includes *C. simonsii*, *C. divaricatus*, *C. horizontalis*, *C. marquandii*, and *C. perpusillus*. Of these, *C. simonsii* attains the greatest height: up to c. 3 m, with erect branches. Smaller plants of c. 1 m height are difficult to distinguish from *C. divaricatus* as the leaves have a similar hair distribution and shape, particularly the acute to cuspidate leaf apex. Pyrene number overlaps in the two species, but *C. simonsii* has 3(4) pyrenes, while *C. divaricatus* has 2(3) per fruit.

*Cotoneaster marquandii* is similar to *C. simonsii* in having orange obovoid fruit with an open navel when ripe, and having obvious persistent stipules. It differs from *C. simonsii* in having horizontal



**Fig. 132:** *Cotoneaster simonsii* distribution map based on databased records at CHR.



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branches with a herringbone pattern, rather than erect branches. It also has smaller leaves, 8.5–11.0 mm wide, not 14–19 mm wide as in *C. simonsii*.

*Cotoneaster horizontalis* and *C. perpusillus* are prostrate or semi-prostrate rather than erect shrubs and have smaller, round leaves.

**Phenology:** Flowering: late October to December; Fruiting: January to March, persisting over winter

**Cytology:** Tetraploid (Fryer & Hylmö 2009), confirmed by flow cytometry of four specimens: CHR 637417, CHR 635258, CHR 637361, CHR 635270; but CHR 635040 was pentaploid.



**Fig. 133:** *Cotoneaster simonsii*: Cultivated shrub showing erect branches.



**Fig. 134:** *Cotoneaster simonsii*: Leaves, upper and lower surfaces.



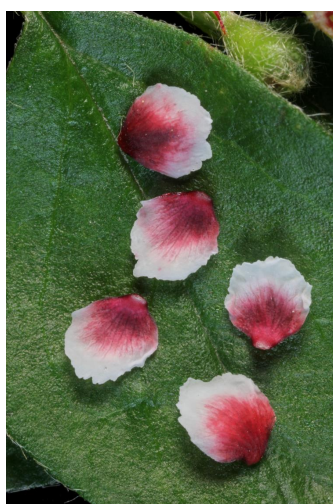
**Fig. 135:** *Cotoneaster simonsii*: Hairs on lower leaf surface.



**Fig. 136:** *Cotoneaster simonsii*: Flower.



**Fig. 137:** *Cotoneaster simonsii*: Flower in late male phase.



**Fig. 138:** *Cotoneaster simonsii*: Petals.



**Fig. 139:** *Cotoneaster simonsii*: Fruit and late season foliage.



**Fig. 140:** *Cotoneaster simonsii*: Pyrenes.

***Cotoneaster soongoricus* (Regel & Herder) Popov, *Byull. Moskovsk. Obshch. Isp. Prir. Otd. Biol.* 44: 128 (1935)**

≡ *Cotoneaster nummularius* var. *soongoricus* Regel & Herder, *Bull. Soc. Imp. Naturalistes Moscou* 39: 59 (1866)

Type: Kazakhstan, Songaria, 15 June 1857, Semenov 381. Holotype LE (St Petersburg), not seen.

Erect shrub 2 m tall, deciduous (a few leaves left by August). Branches angled upwards; branchlets red-brown and glossy; branchlet hairs dense, white, woolly; stipule 2.0–3.0 mm long, red, falling early, hairs dense, white. Leaves sparse on branches, 28–36 mm long, lamina 22–30 mm long, 20–26 mm wide, orbicular, plane, texture thin (160–180 μm), petiole 6 mm long, petiole hairs dense, white, woolly; leaf base obtuse; leaf apex rounded, apiculus apiculate, straight; lateral veins in 5–6 pairs, midvein only impressed above and projecting below; upper surface slightly rugose, moderate olive green (RHS 137B), matt, upper-surface hairs sparse, white, on midvein only; margins plane, hairs dense, white; lower surface glaucous, hairs dense, white.

Inflorescence a corymb of 1–10 flowers, 15 mm long, rachis hairs dense, white, woolly; pedicel 2.0 mm long, hairs moderately dense, white. Flowers 7.0 mm diameter. Hypanthium green, sepals 0.8 mm long, 1.6 mm wide, hairs moderately dense, white, woolly. Petals spreading, white in bud, white when open, 2.6 mm long, 2.5 mm wide, base not clawed, tuft of hairs present, petal margins entire but contorted. Stamens 13–15; filaments 1.9 mm long, white; anthers white, 1.1 mm long; styles 2, 2.0 mm long. Fruit not known.



**Distribution:** Known at a single garden site in Canterbury, Port Hills, Cashmere, Cracroft Reserve, CHR 635009.

**Region of origin:** Kazakhstan, Tibet

**Biostatus:** Exotic; cultivated.

**Recognition:** An erect shrub, with red-brown glossy branchlets. Leaves deciduous, not crowded on branchlets, thin, matt on upper surface, orbicular, base of leaf obtuse, medium-sized. Flowers 1–10, petals white, spreading, a tuft of hairs at petal base, filaments and anthers white, styles 2.

Most similar to *Cotoneaster hebephyllus* and *C. roseus* in having a tuft of hairs at the petal base, and in having deciduous leaves that are soft in texture, matt and only sparsely hairy on the upper surface, glaucous and moderately densely hairy on the lower surface. It differs from *C. roseus* in having white petals that are spreading, not pink and upright. It differs from *C. hebephyllus* in having orbicular, not elliptic, leaves, and anthers white, not pink. *Cotoneaster roseus* is not known to be in cultivation in N.Z. now, but it has been in the past (Christchurch Botanic Gardens, 2008, CHR 610453).

**Phenology:** Flowering: mid to late October; Fruiting: not formed on the only known New Zealand plants

**Cytology:** Tetraploid (Fryer & Hylmö 2009)



**Fig. 141:** *Cotoneaster soongoricus*: Leaves, upper and lower surfaces.



**Fig. 142:** *Cotoneaster soongoricus*: Corymbs of flowers.

### ***Cotoneaster thymifolius* Baker in Baker et al., *Refug. Bot.* 1(3), t. 50 (1869)**

≡ *Cotoneaster microphyllus* var. *thymifolius* (Baker) Koehne, *Deut. Dendrol.*, 227 (1893)

Type: India, Simla, T. Thomson, 11 June 1848, holotype K, isotypes: LD 1488345 (image seen), BM.

Prostrate shrub, evergreen. Branches trailing and with ultimate branchlets at a very narrow angle to the main stem, sometimes dense and regular; branchlets grey-brown with peeling cuticle, branchlet hairs sparse, white; stipule 0.8 mm long, green to pink, sparse, white. Leaves crowded, sometimes sparse on long branchlets on branches, 6.0–6.8 mm long, lamina 4.5–5.6 mm long, 2.3–2.9 mm wide, obovate, distinctly V-shaped, c. 300 µm thick, petiole 0.7–1.8 mm long, glabrous; leaf base cuneate; leaf apex obtuse, emarginate, apiculus downwards; lateral veins not visible, midvein only impressed above and projecting below; upper surface smooth, moderate yellowish-green (RHS 137C), glossy, upper surface hairs none; margins slightly recurved, hairs none; lower surface glaucous, hairs sparse, white, thick (strigose) or none.

Flowers solitary on branch 6–8 mm long with 2–4 leaves, pedicel 1.0–2.0 mm long, hairs dense, white. Flowers 3.4–4.0 mm in diameter. Hypanthium green, sepals 0.7 mm long, 1.2 mm wide, hairs moderately dense, white, straight (strigose). Petals pink in bud, when open spreading, white with pink on outside at apex, 2.0 mm long, 2.3 mm wide, not clawed, glabrous, margins entire, minutely papillose. Stamens 16; filaments 1.8 mm long, white; anthers dark red-purple, 0.7–0.8 mm long; styles 2, 1.6 mm long. Fruit strong red (RHS 46A), oblate-obovate, 5.2–6.5 mm long, 6.1–7.5 mm diameter, calyx somewhat open, hairs a few at apex and base. Pyrenes invariably 2, 2.8–3.2 mm long,



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2.3–2.4 mm wide, hairs sparse on outer face or only at apex, apex rounded with style attached at pyrene apex.

**Distribution:** Known from Southern North Island (Raumati South, 2012), Canterbury (Christchurch Botanic Gardens, 1962–2016, Christchurch City, 1987)

**Region of origin:** India (Himachal Pradesh), Nepal

**Biostatus:** Exotic; cultivated.

**Recognition:** By the low, prostrate form with long leading branches and short side-branches, tiny obovate leaves that are glossy on the upper surface with the midvein in a groove but the lateral veins not visible, the lower surface glaucous with sparse strigose hairs, the leaf apex recurved so as to appear emarginate, the small solitary flowers that are pink in bud, but white when open and spreading, the pink-red oblate fruit.

Most similar to *Cotoneaster microphyllus* but has smaller leaves (4.5–5.6 mm long × 2.3–2.9 mm wide, not 5.3–10.0 mm long × 3.3–6.0 mm wide).

**Phenology:** Flowering: October; Fruiting: February to May

**Cytology:** Diploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 638081.



**Fig. 143:** *Cotoneaster thymifolius*: Leaves, upper and lower surfaces.



**Fig. 144:** *Cotoneaster thymifolius*: Flowers in bud, leaves.



**Fig. 145:** *Cotoneaster thymifolius*: Flower in bud.



**Fig. 146:** *Cotoneaster thymifolius*: Flower.



**Fig. 147:** *Cotoneaster thymifolius*: Fruit and foliage.



**Fig. 148:** *Cotoneaster thymifolius*: Fruit and leaves.

### ***Cotoneaster* ×*suecicus* G.Klotz, *Beitr. Phytotax.* 10, 47-48 (1982)**

Type: cult. Germany, leg. G. Klotz, 10 June 1980, holotype JE. Not seen

Cascading or prostrate shrub, up to 1 m tall, sometimes up to 2 m tall where supported, evergreen or semi-deciduous. Branches distichous, in flattened planes; branchlets red-brown, lenticels present, branchlet hairs sparse to moderately dense, yellow; stipule 2.3–3.3 mm long, green or red with sparse to moderately dense yellow hairs. Leaves crowded on branches, 13–32 mm long, lamina 15–27 mm long, 7.2–16 mm wide, elliptic, slightly V-shaped, 220–350 µm thick, petiole 1.0–6.5 mm long, petiole hairs moderately dense to dense, leaf base cuneate, rarely obtuse, leaf apex obtuse, appearing emarginate, apiculus bent downwards; lateral veins in 4–8 pairs, midvein only or midvein and lateral veins impressed above and projecting below, upper surface smooth to slightly rugose, deep yellowish-green (RHS 141A), moderate olive green to dark green (RHS 136A–137A, moderately glossy, upper surface hairs absent or sparse on the midvein; margins usually recurved, sometimes weakly, marginal hairs sparse to dense on young leaves, absent from old leaves; lower surface glaucous, hairs sparse to moderately dense, straight but fine.

Inflorescence of 1–3 flowers, corymb 15–21 mm long with 2–5 leaves, rachis hairs moderately dense and yellow; pedicel 1.5–10 mm long with hairs moderately dense to dense, yellow. Flowers 9.0–10.5 mm diameter. Hypanthium green, red at the sepal margins, sepals broadly triangular, 1.0–1.3 mm long, 2.0–2.2 mm wide, hairs sparse to moderately dense. Petals pink in bud, white and spreading when open, 2.7–4.3 mm long, 2.5–4.9 mm wide, base clawed, tuft of hairs absent, margins entire, minutely papillose. Stamens 19–24; filaments 2.5–3.5 mm long, white; anthers red–purple, 0.8–1.1 mm long; styles 1–3, 3.0–3.7 mm long. Fruit vivid red (RHS 44A–B), obovoid, 6.7–11.2 mm long, 6.5–10.5 mm diameter, calyx closed or open, glabrous. Pyrenes 2–4(5), 4.4–6.0 mm long, 2.9–4.6 mm wide, hairs sparse at apex, slightly umbonate but style attached at apex.

**Distribution:** Southern North Island (Foxton, 2010–2016). Common in cultivation in Christchurch and probably elsewhere.

**Region of origin:** Produced in cultivation from *Cotoneaster dammeri* and *C. integrifolius* parents.

**Biostatus:** Exotic; casual.

Nominated in this publication.

**First record:** CHR 609365, C.C. Ogle 5734, 9 Mar. 2010, Foxton, “Wall at base of dune—planted but sprawling and rooting below wall. Covering maybe 5–8 m<sup>2</sup> of wall and path”.

**Recognition:** A prostrate shrub with long cascading branches but older plants form a rather stout trunk that raises the branches to about 0.5–1 m, and is sometimes used as a hedge up to 2 m tall. Leaves of small to medium size are glaucous underneath with sparse strigose hairs. The upper leaf surface is glabrous and semi-glossy. Flowers are mostly solitary; petals are pink in bud, white and spreading once the flower opens. Filaments are white and anthers red-purple. The fruit is vivid red to vivid reddish-orange and obovoid, with 2–4 pyrenes, the style attached at the apex of the pyrene. A description of this hybrid can also be found in Fryer et al. (2014, p. 460).

Most similar to *Cotoneaster dammeri*, one of its parents, and in New Zealand is more common in cultivation than *C. dammeri*. Fruit colour is vivid red in both parent and hybrid. The hybrid differs from *C. dammeri* in having 2–4 styles per flower or pyrenes per fruit rather than (4)5. Typically the number of pyrenes is variable on a plant, while in *C. dammeri* the pyrenes are usually consistently 5. The leaves are smaller on average than those of *C. dammeri* but with some overlap (lamina length 15–27 mm vs 23–51 mm). Flower pedicels are short (1.5–10 mm long), whereas they are sometimes very long in *C. dammeri* (3–23 mm long).

Similar to *Cotoneaster integrifolius* in the form of the plant, number of flowers, petals pink in bud but white at maturity, petals spreading and entire, filaments c. 20 and white, anthers dark pink, styles usually c. 3. It differs from that species in having larger leaves (24–37 mm long vs 12–19 mm long) that are mid green, not dark green. Branching is less dense than in *C. integrifolius* and less in one plane, and the branches are weaker so that they cascade or lie flat rather than stiff and are capable of producing a supported shrub up to 3 m tall.

**Phenology:** Flowering: late October to February; Fruiting: March, fruit persisting in first half of winter

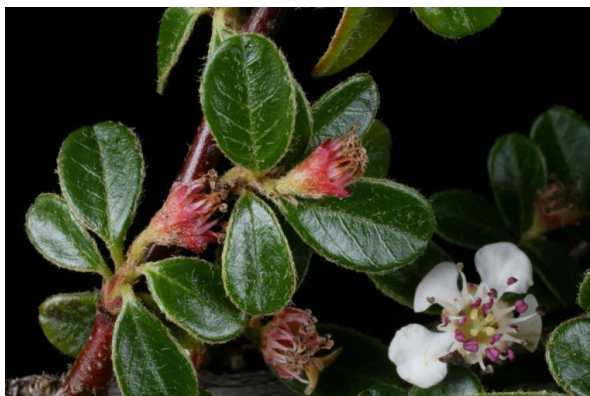
**Cytology:** Diploid (Fryer & Hylmö 2009), confirmed by flow cytometry using CHR 635037 and CHR 637362. However, CHR 638103 was mixaploid (diploid and tetraploid) in both fruit and leaves.



**Fig. 149:** *Cotoneaster x suecicus*: Leaves, upper and lower surfaces.



**Fig. 150:** *Cotoneaster x suecicus*: Leaves, upper and lower surfaces.



**Fig. 151:** *Cotoneaster x suecicus*: Old flowers showing change in filament colour after anthesis.



**Fig. 152:** *Cotoneaster x suecicus*: Flower.





**Fig. 153:** *Cotoneaster x suecicus*: Fruit and foliage.



**Fig. 154:** *Cotoneaster x suecicus*: Pyrenes.

***Cotoneaster x watereri* Exell, *Gard. Chron.*, ser. 3 83: 44, fig. 31 (1928)**

Type: BM 1041888, A.W. Exell, Nov. 1927, ex hort., Waterer and Sons, Bagshot. Image seen. BM 1041887 has the same details but specifies that it is *C. frigid[us]* ♀ × *C. rugos[us]* ♂. Image seen.

Shrub or small tree, 2.5–7 m tall, larger plants with multiple trunks, erect, evergreen (most leaves retained by September), branching tending 2-ranked on reproductive branches. Branchlets dark purple, glossy, with peeling cuticle and lenticels. Stipules 2.7–3.1 mm long, red, hairs dense. Leaves narrowly elliptical or slightly narrowly ovate, plane, (50)90–120(125) mm long, lamina 90–110(125) mm long, 23–40 mm wide, veins in 5–13 pairs, lamina 230–270 µm thick, petiole 8–11(14) mm long with dense, straight, but fine hairs; midvein and lateral veins impressed above, midvein and lateral veins projecting below, slightly rugose due to convexity between the side veins, upper surface moderate yellowish-green (RHS138A), semi-glossy to glossy, hairs on upper surface of young leaves very sparse, mostly in the midvein groove, old leaves glabrous on upper surface; margins slightly recurved or plane when dried, plane when fresh, glabrous or rarely densely hairy; undersurface glaucous, moderately densely hairy when young, hairs sparse when old and usually confined to the midvein and lateral veins; base of lamina cuneate; apex acute with straight apiculus, rarely bent downwards. Inflorescence a compound corymb of 29–50 flowers, c. 35 fruit, rachis hairs dense, pale yellow. Pedicels 0.5–2.0 mm long, hairs dense. Flowers 7.5 mm diameter. Hypanthium with hairs dense; sepals broadly triangular, 0.6–1.0 mm tall, 1.6–2.6 mm wide. Petals spreading, white, 2.6–2.9 mm long, 2.6–2.8 mm wide, clawed, glabrous, margins entire or irregular but not torn. Stamens 17–21, filaments 2.8–3.0 mm long, white, anthers purple, 0.6–0.7 mm long; styles 2–3, 1.4–2.0 mm long. Fruit vivid reddish-orange to vivid red (RHS 33A–45A), obovoid, 10.0–10.7 mm long, 10.0–11.2 mm wide, hairs on mature fruit absent, navel closed; pyrenes 2–3, 3.6–4.0 mm long, 2.8–3.1 mm wide, hairs sparse, apex acute, style nearly always attached at apex, rarely up to 0.5 mm below apex.

**Distribution:** Volcanic Plateau (Raetihi, 2006–2014), Southern North Island (Whanganui 2003; Wairarapa, 2000), Canterbury (Port Hills, 1998–2016; Craigieburn, 1997), Otago (Wānaka, 1999). Also known in cultivation from Auckland City, Whanganui City, Christchurch City, and probably common in cultivation throughout New Zealand.

**Region of origin:** In cultivation in the UK in the 1920s.

**Biostatus:** Exotic; casual.

First reported in New Zealand in Heenan et al. (2004, p. 810) based on AK 281095, P. Enright, 12 Nov. 2000, eastern Wairarapa, Greycliffs.

**First record:** CHR 512756, G. Hall & M. Voyce, 7 Feb. 1997, Craigieburn Range, near Forest Service Hut. “An isolated plant. Adventive”.

**Recognition:** A large-leaved shrub or small tree (leaf lamina [50]90–125 mm long, 23–40 mm wide) with dark purple erect to arching branchlets. The leaves are narrowly elliptical, semi-glossy and dark green and very sparsely hairy on the upper surface. The midvein is impressed and the lateral veins lightly impressed, making the leaf slightly rugose. The underside of the leaf lamina is glaucous, moderately densely tomentose, the tomentum becoming sparse and usually confined to the midvein on old leaves, the underside midvein pink-tinted, the tinting becoming stronger in autumn leaves. The flowers have spreading white, glabrous petals. The fruit have 2–3 pyrenes in about equal numbers, which have the style attached at the apex. In New Zealand, cultivars appear to be all erect shrubs, but prostrate cultivars are grown overseas.

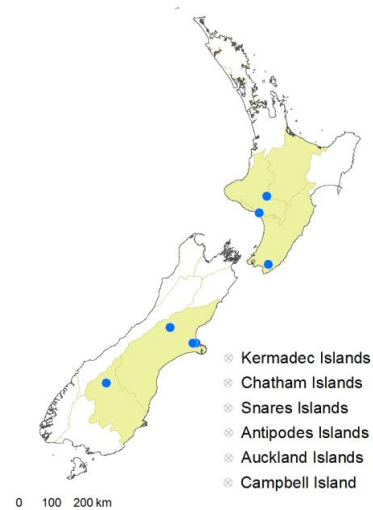
Most similar to the parent *C. salicifolius*, which appears to be rarely grown in N.Z., in contrast to Europe, where the parent appears to be much more common than the hybrid (Dickoré & Kasperek 2010). *Cotoneaster ×watereri* and *C. salicifolius* are distinguished by leaf size, how rugose the leaves are, and fruit diameter. However, the two seem to intergrade with no reliable differences, particularly as the hybrid appears to be very variable in leaf size. Identification needs to be done using the combination of characters mentioned above.

Most *C. ×watereri* have a leaf lamina 90–135 mm long × 23–40 mm wide, are weakly or not rugose, and have a dry but uncompressed fruit diameter of 5.7–8.0 mm. *Cotoneaster salicifolius* has a leaf lamina 60–85 mm long, 18–22 mm wide, the leaves are fairly strongly rugose, and have a dry uncompressed fruit diameter 4.2–7.0 mm and a fresh diameter of 10–11 mm.

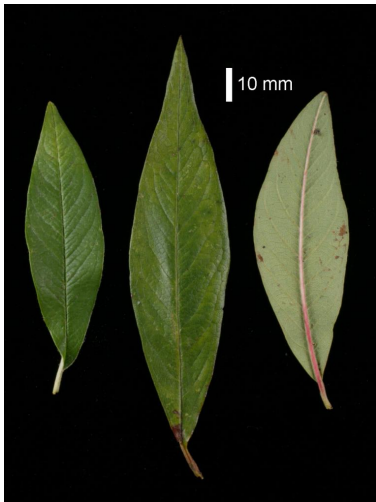
Plants that have a leaf lamina more than 100 mm long are certainly *C. ×watereri*, but *C. ×watereri* can have small leaves in the 60–90 mm range. The only way of deciding the identity of such small-leaved plants seems to be the degree of rugosity of the leaf (stronger in *C. salicifolius*).

**Phenology:** Flowering: December to February; Fruiting: March to May, not persisting over winter

**Cytology:** Diploid, based on flow cytometry of CHR 637369.



**Fig. 155:** *Cotoneaster ×watereri* distribution map based on databased records at CHR.



**Fig. 156:** *Cotoneaster ×watereri*: Leaves, upper and lower surfaces.



**Fig. 157:** *Cotoneaster ×watereri*: Hairs on lower surface of late season leaf.



**Fig. 158:** *Cotoneaster ×watereri*: Flowers and foliage.



**Fig. 159:** *Cotoneaster ×watereri*: Flowers.



**Fig. 160:** *Cotoneaster ×watereri*: Petals, showing hair tuft at base.



**Fig. 161:** *Cotoneaster ×watereri*: Fruit and leaf undersurfaces.

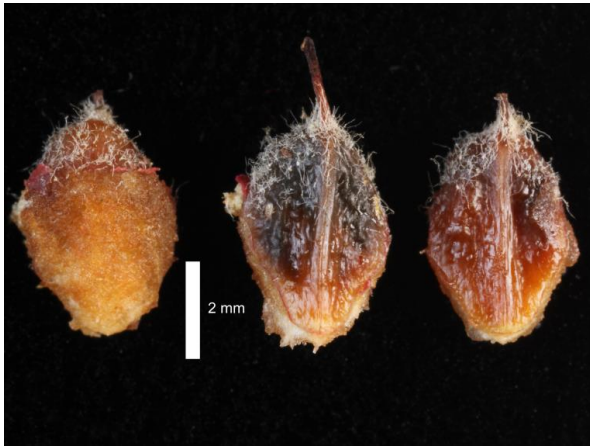




**Fig. 162:** *Cotoneaster ×watereri*: Fruit.



**Fig. 163:** *Cotoneaster ×watereri*: Fruit in longitudinal section showing pyrenes.



**Fig. 164:** *Cotoneaster ×watereri*: Pyrenes.



**Fig. 165:** *Cotoneaster ×watereri*: Pyrene.

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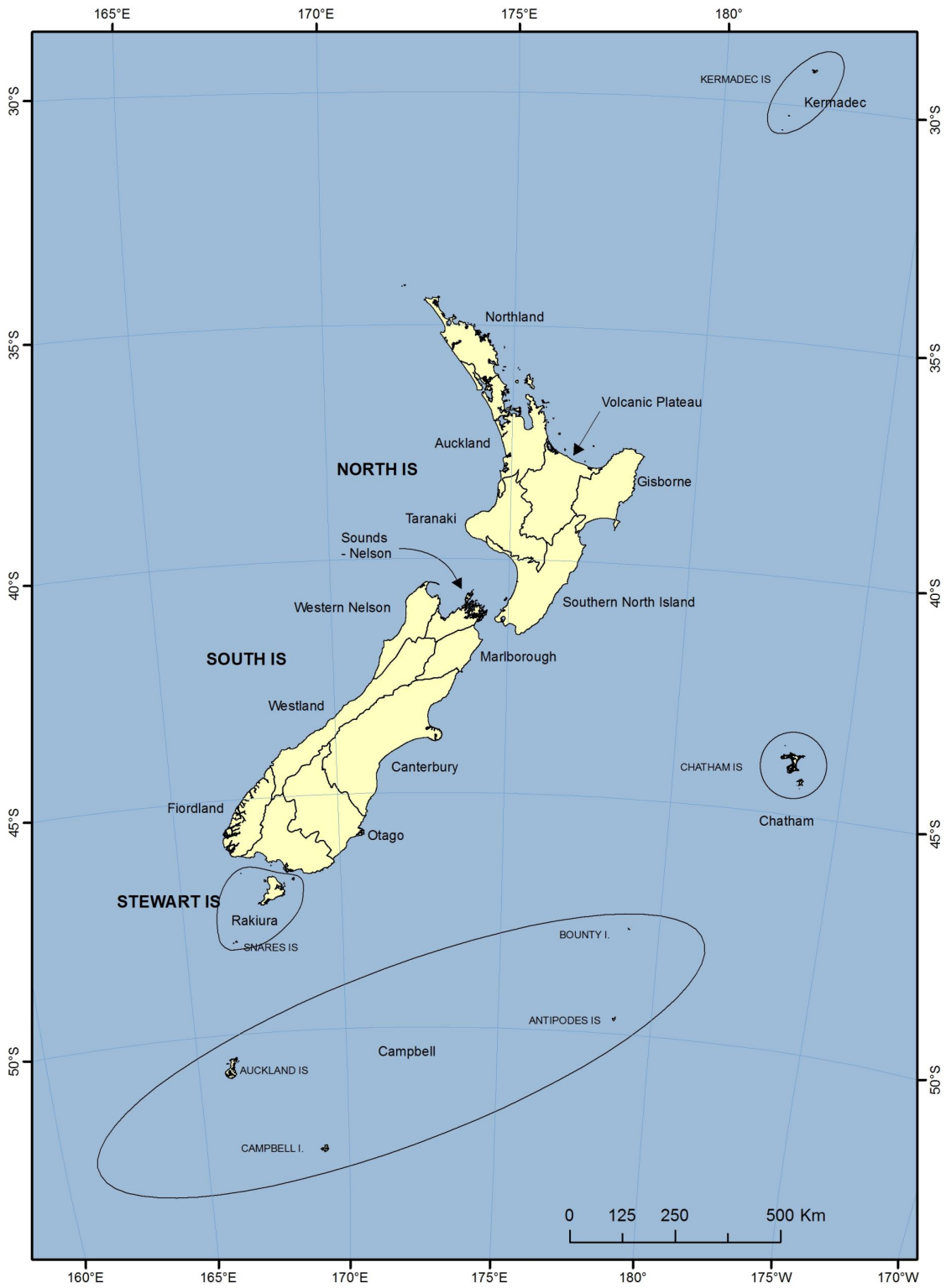
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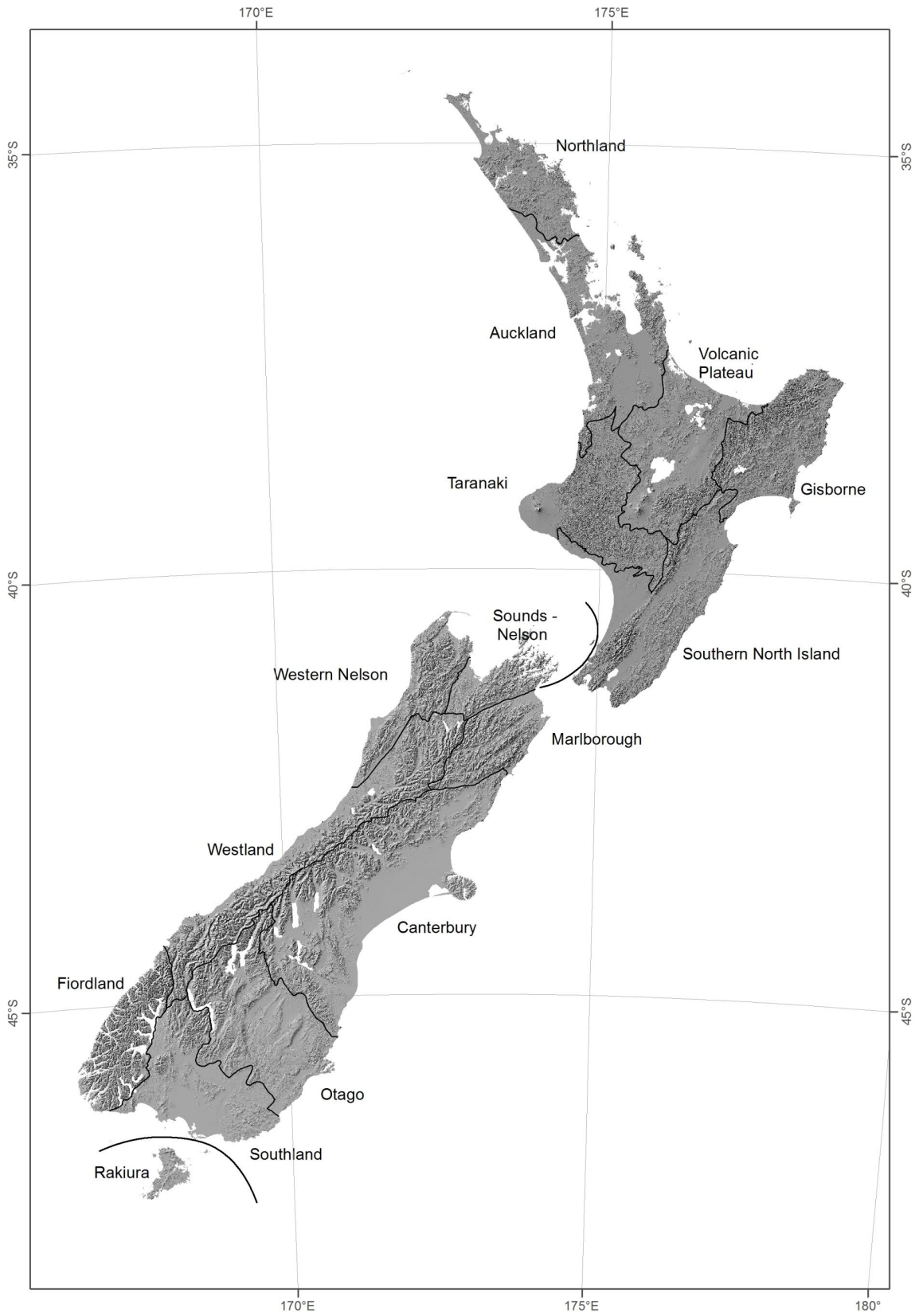
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**Map 1:** Map of New Zealand and offshore islands showing Ecological Provinces



**Map 2:** Map of New Zealand showing Ecological Provinces



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