

Flora of Singapore precursors, 35: New records of Vitaceae in Singapore

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ABSTRACT. Three species of Vitaceae are newly recorded for Singapore. One of them, *Causonis maritima* (Jackes) Jackes, is treated here as native, while two of them, *Cissus discolor* Blume and *Cissus repanda* Vahl, are presumed to be introduced.

Keywords. *Causonis*, *Cissus*

Introduction

The family Vitaceae comprises approximately 950 species in 18 genera distributed mostly in the tropical and sub-tropical regions of the world, with some species extending to temperate areas (Parmar et al., 2021; POWO, 2022). The family has been revised for the *Flora of Thailand* (Trias-Blasi et al., 2020) but nowhere else in Southeast Asia. The account for the *Flora of Singapore* is still underway but currently it is thought to contain 32 species in 8 genera distributed throughout the country.

During the preparation of the account of the Vitaceae for the *Flora of Singapore*, three species were identified from material collected in Singapore and housed in SING (Thiers, continuously updated) that were previously not recorded for the country (Lindsay et al., 2022). These collections had been previously misidentified or identified only to generic level. All three of these species are widespread in areas adjacent or close to Singapore, so it might be presumed they are all native. However, one of them, *Cissus discolor* Blume, has only been recorded within the cultivated areas of the Singapore Botanic Gardens and, therefore, it is presumed to be introduced. This species, however, occurs in Malaysia and other surrounding countries, so there is a chance it might, in fact, be cryptogenic or possibly even native if found in the wild. Another species, *Cissus repanda* Vahl, has only been recorded in managed areas of Mandai (one location close to the Night Safari) and is also presumed to be introduced. The nearest region to Singapore where this species is known to be native is Kanchanaburi and Chon Buri in Thailand. As it is absent from both Peninsular Thailand and Peninsular Malaysia and has not been collected in wild areas of Singapore, it is unlikely to be native.

Due to the low number of specimens available of the species below, the descriptions are based on the information from the examined specimens together with the descriptions in Trias-Blasi et al. (2020).

New record of a native species

Causonis maritima (Jackes) Jackes, *Telopea* 23: 70 (2020). – *Cayratia maritima* Jackes, *Austrobaileya* 2(4): 366 (1987). – TYPE: [Australia], Queensland, Cook, Lakefield National Park, 9.3 km north of Ranger's Cottage, 15°06'57.6"S 144°18'57.6"E, 26 June 1982, *Jackes s.n.* (holotype BRI [BRI-AQ0441384]; isotypes A [A00051579], CANB [CANB375543.1, CANB375543.3, CANB375544.2, CANB375544.4], DNA [DNA-D0056167], K [K000072595], L [L0763085, L0763086], MEL [MEL1582485A], NSW [NSW830674, NSW171693]).

Herbaceous climber. Stem angular, 2–4 mm diam., very branched, usually glabrous with simple hairs at nodes when young; **tendrils** trifurcate (occasionally bifurcate), slender, wiry, leaf-opposed, cylindrical, with a non-coiling section followed by coiling section, 1.5–14 cm long, glabrous, lacking adhesive discs at the tips. **Leaves** compound, 3-foliolate, alternate; petiole 1–8 cm long, hairy as on stem, central petiolule 0.5–2.5 cm long, lateral petiolules 1–8 mm long, hooked hairs sometimes present; central leaflet blade ovate to rhomboid, 1–10 × 1–7 cm, base cuneate to rounded; lateral leaflet blade 2–8 × 2–6 cm, base oblique; margin dentate to crenulose, apex acute; adaxial surface almost glabrous at maturity except for the presence of uniseriate 3- to 14-celled hooked hairs on the midrib, abaxial side usually glabrous, occasionally with hooked hairs at the junction of the petiole and the lamina; veins inconspicuous. **Inflorescence** a ramified, axillary, mostly dividing dichotomously, corymbose, compound dichasium, 2–12 cm long; peduncle 1.5–16 cm long, hairy as on leaf to glabrous; pedicel 1–3 mm long, papillose. Buds ovoid, 1.25–2 × 1–2 mm. Calyx cupuliform, entire, margin sinuate, 0.5–0.75 × 1.5–2 mm, papillose. Petals 4, ovate, 1.25–2.25 × 1–2 mm, apex cucullate, papillose. Stamens 4; filaments flattened, broadening at the base, 0.5–1 mm long; anthers orbicular, medifixed, 0.4–0.75 mm long. Ovary adnate to the disc; disc with 4 lobes, glabrous. Style conical, slender, 0.5–1 mm long; stigma inconspicuous. **Fruit** a berry, subglobose, 0.5–1.25 × 0.5–1.25 mm, glabrous, smooth, base attenuate. **Seeds** 2–4, triangular-obovoid, 5–7 × 4–7 mm, ventral infolds side conspicuous with 2 keels to cup-shaped cavities, dorsal side convex with a linear chalazal knot, endosperm nearly T-shaped in cross-section.

Distribution. India, China, Vietnam, throughout Malesia except Philippines, Australia and the Solomon Islands.

Ecology. Secondary coastal forest, primary forest, and mangrove forest in Singapore. Elsewhere also found in swamps, forest edge, and regrowth (Trias-Blasi et al., 2020).

Specimens examined. SINGAPORE: **Bukit Timah NR:** Near the viewing area at Hindhede quarry, 01°21'17"N 103°46'42.6"E, 10 Feb 2015, *Leong et al.* SING2015-054 (L [L.4303528], SING [SING0213798]). **Geylang:** 01°18'50.5"N 103°53'01.4"E, 8 Jul 1934, *Teruya* 2470 (SING [SING0036282, SING0230755]). **Kallang Pudding Road:** 01°19'45.1"N

103°52'40.8"E, 1911, *Ridley s.n.* (SING [SING0019098]). **Khatib Bongsu:** Mangrove fringe, 01°26'21.4"N 103°51'08.8"E, 30 Sep 1996, *Li & Sidek 59* (SING [SING0019097]). **Labrador NR:** Fringe of reserve through stairway near public toilet to edge of coastal cliff, 01°16'00.4"N 103°48'08.1"E, 19 May 2011, *Hassan SING2011-215* (SING [SING0162388]). **Pulau Hantu Besar:** 01°13'30.6"N 103°44'56.9"E, 5 Nov 2019, *Lua et al. SING2019-1109* (SING [SING0295720]). **Pulau Merambong:** 29 Sep 1935, *Corner s.n.* (SING [SING0019100]). **Pulau Sudong:** 01°12'20.1"N 103°43'45.8"E, 8 Jul 2012, *Hassan et al. SING2012-302* (SING [SING0179574]). **Pulau Tekong:** Coastline north of Eastern Pier, Coastal secondary forest and shore vegetation, 21 Feb 2013, *Lua SING2013-038* (SING [SING0200306]). **Race Course:** 01°18'57.3"N 103°51'28.6"E, Dec 1885, *Hullett 302* (SING [SING0019101]). **Singapore Botanic Garden:** Director's House, 01°18'43.8"N 103°48'55.1"E, 24 Aug 1920, *Burkill s.n.* (SING [SING0042552]). **Teluk Blangah:** 25 May 1997, *Chen LCMJ 153* (SING [SING0042823]).

Notes. This species is very similar to *Causonis trifolia* (L.) Mabb. & J.Wen and they are often confused. *Causonis trifolia* also occurs in Singapore but its exact distribution in the country has not been determined yet. However, *Causonis maritima* has 3-fid (rarely 2-fid) tendrils (vs 4–5-fid), adhesive discs absent at the tendril tips (vs discs present) and hooked hairs restricted to the midrib on adaxial surface of the leaf (vs hairs not restricted) (Jackes, 1987). In Parmar et al. (2021) it is suggested that these two species are genetically closely related but that their morphological characters and almost discrete distribution are enough to keep them as separate species. However, it is also mentioned that as the species limits are still inconclusive, it would be beneficial to conduct further molecular and morphological work to help elucidate them.

New records of introduced species

Cissus repanda Vahl, *Symb. Bot.* 3: 18 (1794); Planchon in De Candolle & De Candolle, *Monogr. Phan.* 5(2): 474 (1887); Gagnepain, *Not. Syst. (Paris)* 1(11): 355 (1911); Craib, *Fl. Siam.* 1: 308 (1926); Gagnepain in Humbert, *Suppl. Fl. Indo-Chine* 1: 885 (1950); Long & Rae, *Fl. Bhutan* 2(1): 159 (1991); Li, *Fl. Reipubl. Popularis Sin.* 48(2): 61 (1998), p.p.; Shetty & Singh, *Fl. Ind.* 5: 290 (2000); Chen & Wen, *Fl. China* 12: 186 (2007), p.p. – *Vitis repanda* (Vahl) Wight & Arn., *Prodr. Fl. Ind. Orient.* 125 (1834); Lawson in Hooker *Fl. Brit. India* 1: 648 (1875). – *Rinoxostylis repanda* (Vahl) Raf., *Sylva Tellur.* 87 (1838). – TYPE: Ex India Orientali, HB Vahl, *Lamarck s.n.* (holotype C).

Vitis rosea Royle, *Ill. Bot. Himal. Mts.* 1: 149, 2: t. 26, f. 1 (1835). – *Cissus rosea* (Royle) Walp., *Repert. Bot. Syst.* 1: 437 (1842); Planchon in De Candolle & De Candolle, *Monogr. Phan.* 5(2): 475 (1887); Gagnepain, *Not. Syst. (Paris)* 1(11): 354 (1911); Gagnepain in Lecomte, *Fl. Indo-Chine* 1: 967 (1912); Craib, *Fl. Siam.* 1: 309 (1926). – TYPE: [India?], Kheree pass, May, *Royle s.n.* (holotype LIV (LIV 1952. 121. 3481)).

Robust climber. Stem robust when mature, lignified, sometimes cracking, to 2 cm diam., greyish, glabrous; young stem suberect, cylindrical, to 6 mm diam., branched, hairy with T-shaped ferruginous hairs 1–1.5 mm long, arms of hairs twisting; *tendrils* racemosely bi- to trifurcate, robust, leaf-opposed, cylindrical, to 3 mm diam., 10–12 cm long, glabrous; stipules ovoid, 2.5–4 × 1.5–3.5 mm, densely hairy. **Leaves** simple; petiole to 40 × 1.5 mm, densely hairy with hairs as in young stem; leaf blade cordate, to 12 × 10 cm, base cordate, margin denticulate with mucronate teeth to 1.25 mm long, directed towards apex, apex acute, adaxial side hairy with hairs as in young stem, denser on veins and margin, abaxial side hairy with hairs as on young stem, veins slightly protruding, 5 main basal veins, 5 pairs of secondary veins. **Inflorescence** ramified, leaf-opposed or terminal, umbelliform, to 10 cm long, elongate; peduncle to 6 cm long, secondary peduncle to 2 cm long, tertiary peduncle to 1.5 cm long; pedicel 2–5 mm long, hairy with ferruginous hairs 0.3–0.5 mm long. Buds ovoid, 2–3 × c. 1.5 mm, apex rounded. Calyx cupuliform, c. 1 × 1.5–1.9 mm, entire, hairy. Petals ovate, 1.5–2 × 1–1.25 mm, interior of apex cucullate, exterior with T-shaped hairs to 1.5 mm long. Filaments 0.75–1.25 mm long; anthers orbicular, medifixed, 0.4–0.6 mm long. Disc with very distinct 4 rounded lobes, 0.75–1 × 1.25–1.75 mm, each lobe 0.5–0.7 mm broad, glabrous. Style conical, 0.5–0.6 × 0.2–0.3 mm; stigma inconspicuous. **Fruit** ellipsoid-pyriform, 8–10 × c. 6 mm, base attenuate, glabrous, smooth. **Seed** 1, pyriform, c. 7 × 5 mm, rather smooth except for encircling raphe.

Distribution. India, Sri Lanka, Bangladesh, Nepal, Bhutan, China, Myanmar, Thailand, Laos, Vietnam, Cambodia and Singapore. The species has not yet been recorded in Peninsular Malaysia but it is likely to occur there as it can be found in neighbouring countries.

Ecology. Outside of Singapore it is found in deciduous forest, dipterocarp forest, bamboo areas, degraded areas and on limestone (Trias-Blasi et al., 2020).

Specimens examined. SINGAPORE: **Mandai Lake Road:** 28 Jan 2019, *Yeoh et al.* SING2019-078 (SING [SING0285699, SING0285700]). **Night Safari Park:** 01°24'14.8"N 103°47'26.9"E, 19 Jan 2017, *Lua et al.* SING2017-016 (SING [SING0253469, SING0253470]).

Cissus discolor Blume, Cat. Gew. Buitenzorg 39 (1823); Blume, Bijdr. Fl. Ned. Ind. 4: 181 (1825); Planchon in De Candolle & De Candolle, Monogr. Phan. 5(2): 496 (1887), p.p.; Craib, Bull. Misc. Inform. Kew 1911: 31 (1911); Gagnepain, Not. Syst. (Paris) 1(11): 354 (1911); Gagnepain in Lecomte, Fl. Indo-Chine 1: 969 (1912); Craib, Fl. Siam. 1: 306 (1926); Gagnepain in Humbert, Suppl. Fl. Indo-Chine 1: 886 (1950); Backer & Bakh.f., Fl. Java (Spermatoph.) 2: 91 (1965); Shetty & Singh, Fl. Ind. 5: 282 (2000). – *Vitis discolor* (Blume) Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 39 (1830); Lawson in Hooker, Fl. Brit. India 1: 647 (1875); King, J. Asiat. Soc. Bengal pt. 2, 65: 399 (1896). – TYPE: [Indonesia], Java, December 1822, *Herb. Reinwardt s.n.* (lectotype L [L0013626], designated by Trias-Blasi et al. (2017: 722)). (Fig. 1)



Fig. 1. Leaves of *Cissus discolor* Blume. From the Singapore Botanic Gardens. (Photo: P.K.F. Leong)

Cissus javana DC., Prodr. 1: 628 (1824); Suessenguth, Nat. Pflanzenfam. 20d: 264 (1953); Momiyama in Hara, Fl. E. Himalaya 1: 199 (1966); Momiyama in Hara, Fl. E. Himalaya 2: 78 (1971); Momiyama in Hara, Fl. E. Himalaya 3: 81 (1975); Momiyama in Hara & Williams, Enum. Fl. Pl. Nepal 2: 94 (1979); Long & Rae in Grierson & Long, Fl. Bhutan 2(1): 158 (1991); Li, Fl. Reipubl. Popularis Sin. 48(2): 64 (1998); Chen & Wen, Fl. China 12: 187 (2007). – TYPE: [Indonesia], Java, s.d., *Unknown s.n.* (lectotype G-DC [G00205284], designated by Trias-Blasi et al. (2017: 723)).

Herbaceous climber. Stem erect, cylindrical to slightly 4-ridged, 2–3 mm diam., branched, glabrous to puberulent with minute hairs 0.05–0.1 mm long, hairs denser and longer on petiole-stem insertion, purplish, striate; *tendrils* bifurcate, slender and wiry, leaf-opposed, cylindrical, 0.5–0.75 mm diam., stalk straight to 2–4 cm long, then tightly coiling 3–7 cm, then bifurcating and coiling 2–4 cm, glabrous; stipules ovate, 3–4 × 2.5–4 mm, papyraceous, with whitish dot at base, slightly hairy or glabrous. **Leaves** simple; petiole 5–30 × 0.25–0.75 mm, finely puberulent with minute hairs; leaf blade ovate, 7–18 × 3–8 cm, base cordate to subtruncate, margin denticulate with minute mucronate teeth (0.5–0.8 mm long) directed towards apex, apex apiculate, adaxial side glabrous to sparsely puberulent on venation with white patches or markings all over, abaxial side glabrous, veins protruding, 5 main basal veins, 4 or 5 pairs of secondary veins. **Inflorescence** ramified, leaf-opposed, umbelliform, to 3 cm long; peduncle 0.75–1.5 cm long, secondary peduncle 0.5–1.25 cm long, sparsely puberulent; pedicel 2–4 mm long, sparsely hairy (hairs to 0.2–0.3 mm long) to glabrous. Buds ovoid,

1.5–2 × 1–1.5 mm, apex rounded, glabrous. Calyx cupuliform, gibbous, entire, 0.6–0.8 × 0.8–1.5 mm, glabrous. Petals ovate, c. 1.5 × 0.75 mm, apex cucullate, glabrous. Filaments 0.6–0.75 × c. 0.1 mm; anthers ovoid, medifixed, 0.4–0.7 mm long. Disc with very distinct 4 rounded lobes, 0.4–0.6 × 0.8–1 mm, each lobe c. 0.4 mm broad, glabrous. Style cylindrical, broadening at base, 0.4–0.8 × c. 0.2 mm; stigma slightly expanded but mostly inconspicuous. **Fruit** globose with minute tip, 4–6 × 4–6 mm, base attenuate, glabrous, smooth. **Seeds** 1, pyriform, 4–5 × c. 4 mm, rather smooth with ridges.

Distribution. India, Nepal, Bangladesh, China, Myanmar, Thailand, Laos, Cambodia, Vietnam, Philippines, Malaysia and Indonesia. This species has not been recorded in the wild in Singapore, but it occurs in neighbouring Peninsular Malaysia, therefore it is quite likely that it also occurs in Singapore.

Ecology. Outside of Singapore it is found in evergreen forest, disturbed dipterocarp forest, disturbed thickets, roadsides, and open areas along rivers.

Specimens examined. SINGAPORE: **Cult. Hort Bot. Sing.:** *Unknown s.n.* (SING [SING0036306]). **SBG, Plant House:** 10 Aug 1921, *Deshmukh s.n.* (SING [SING0244609]).

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