

FSA contributions 15: Piperaceae

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Herbs, shrubs or rarely small trees, evergreen, often succulent when herbaceous, often epiphytic or lithophytic, sometimes aromatic, erect or scandent; nodes often swollen or jointed; stems with vascular strands distinct and somewhat scattered as in monocots. *Leaves* usually alternate, rarely opposite or verticillate, simple, entire; stipules absent or adnate to petiole. *Inflorescence* a dense cylindrical fleshy spike; spikes may be arranged in an umbel. *Flowers* minute, bisexual or unisexual, without perianth, each flower subtended by a peltate bract. *Stamens* 1–10, hypogynous; filaments usually free; anthers often articulated on the filaments; thecae 2, distinct or confluent. *Ovary* superior, unilocular, with a single basal, erect ovule; stigmas 1–5, short, often brush-like and lateral in *Peperomia*. *Fruit* baccate, with a succulent, thin or dry pericarp, often sunken into succulent rachis. *Seeds* globose, ovoid or oblong in outline, testa membranous or rather fleshy, embryo minute.

A family of about eight genera and over 3 000 species; widespread in warm areas but especially common in South and Central America and in central Asia. There are two genera represented in the FSA area, *Piper* and *Peperomia*.

Various species are the source of pepper, cubeb and various narcotics, and species of both genera are grown as houseplants for their decorative foliage.

Shrubs; anther thecae usually distinct; stigmas 2 *Piper*
Herbs; anther thecae usually confluent; stigma 1 *Peperomia*

1862000 PIPER

Piper L., Species plantarum, edn 1: 28 (1753); L.: 18 (1754); C.DC.: 240 (1869); Benth. & Hook.f.: 129 (1880); Baker & C.H.Wright: 144 (1902–1913); C.H.Wright: 488 (1912); Keay: 84 (1954); Emboden: 91, 129 (1972); R.A.Dyer: 29 (1975); Tebbs: 518 (1993); Verdc.: 1 (1996); Diniz: 25 (1997); Mabb.: 560 (1997).
Type: *P. nigrum* L.

Erect or scandent herbs, shrubs or rarely trees; branches terete, jointed at nodes. *Leaves* alternate, entire, sometimes asymmetrical at base, penninerved; stipules adnate to petiole or connate into a leaf-opposed sheath. *Inflorescence* a dense, cylindrical spike, terminal on ends of stems or on leaf-opposed short shoots; bracts sessile, peltate. *Flowers* bisexual, sessile, without perianth. *Stamens* 2; filaments very short; thecae distinct. *Ovary* sessile; stigmas 2, distinct, recurved; ovule solitary, basal. *Fruit* globose, compressed, sessile; pericarp thin and dry.

Characters not applicable in South Africa: *Flowers* unisexual, may be pedicellate. *Stamens* 3 or 4, rarely 5–many; filaments occasionally longer than bracts. *Ovary* rarely stipitate; stigmas up to 5, may be erect. *Fruit* rarely stipitate; pericarp may be succulent.

A large genus of over 2 000 species; in Asia as far east as Japan, in tropical America, with a few species in Africa. A single species, *P. capense*, occurs in southern Africa.

As well as *P. capense*, a second species, *P. borbonense* (Miq.) C.DC., was recorded from the FSA area by Wright (1912). He cited specimens of Verraux and Gueinzus, both without precise locality. Killick (1970) considered that the Gueinzus specimen was probably destroyed during World War II, while the Verraux specimen proved to be a true *P. borbonense*. Killick suggested that the wrong label was placed on this specimen, and certainly no other specimen of this species has been seen from southern Africa by me. Possibly the Gueinzus specimen was either mislabelled or misidentified, but this is now impossible to determine. *P. borbonense* is quite different from *P. capense*, as it is parasitic and dioecious.

Various species of *Piper* are the source of spices and narcotics. *P. nigrum*, originally from India and brought from there to Java, is the source of commercial pepper. The ripened fruit with the pericarp removed gives white pepper, while the more pungent black pepper comes from the unripened fruit milled whole.

In S Asia and the islands of the Indian and Pacific oceans, *Piper betle* leaves are rolled with a piece of betel palm (*Areca catechu*) and lime, and chewed as a mild stimulant. *P. methysticum*, which is closely related to pepper, is cultivated in the Pacific Islands. The roots and lower stem are chewed and used to make a beverage called kava-kava, which has a relaxing effect (Emboden 1972).

Piper capense L.f., Supplementum plantarum 90 (1781); Thunb.: 443 (1823); C.DC.: 339 (1869); C.DC.: 224 (1894); Engl.: 146 (1913); Baker & C.H.Wright: 146 (1902–1913); C.H.Wright: 488 (1912); Eyles: 337 (1915); Keay: 84 (1954); Killick: t. 1583 (1970); Agnew: 88 (1974); Coates Palgrave: 90 (1977).

var. **capense** Verdc.: 5 (1996); Diniz: 27 (1997).
Type: Western Cape, growing in forest in Outeniquas and Grootvadersbos, near river, *Thunberg s.n.* (UPS, holo.; microfiche in PRE, No. 713!).

Herb or soft-wooded shrub, rarely a small tree, sometimes scrambling, 0.5–2.5(–3.5) m high; stems swollen at nodes. *Leaves* ovate to very broadly ovate, 70–130 ×

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FIGURE 1.—*Piper capense*: A, habit, $\times 0.87$; B, fruiting inflorescence, $\times 1.75$; C, part of fruiting inflorescence, $\times 5$; D, flower with bract and two stamens, $\times 13$. A, D, Werger 1443; B, Story 4207; C, Strey 9014. Artist: G. Condy.

26–95(–115) mm, palmately 5–7-nerved, apex attenuate, base truncate or cordate, occasionally cuneate, may be symmetrical or asymmetrical, dark glossy green above, paler below, with hairs when young, later only on under-surface along veins, glabrescent above; petiole channeled above, 10–50 mm long; stipules present. *Inflorescence* a slender cylindrical spike, terminating either the main shoot or the short leaf-opposed side shoots, \pm 30–50 mm long (in flower), up to 80 mm long (in fruit). *Flowers* subtended by peltate bracts; stamens 2 or 3; ovary ovoid; style short, with 2 stigmas. *Fruits* compressed-ovoid, with a membranous reddish pericarp. Figure 1.

Occurs in central, western, eastern and southern Africa; in South Africa is found from Northern Province to Eastern Cape, and then disjunctly from the Knysna-Tsitsikamma area as far west as Western Cape: Swellendam, Grootvadersbos (Figure 2). It grows in the understorey of densely shady, moist forests.

Vouchers: Botha & Van Wyk 1017 (PRE); Galpin 10084 (PRE); Meeuse 10005 (PRE); Strey 9340 (NH, PRE); Watt & Brandwyk 1767 (PRE).

The main shoot often ends in an inflorescence or a leaf and growth then continues from a shoot further back. These side shoots may continue to grow but more usual-

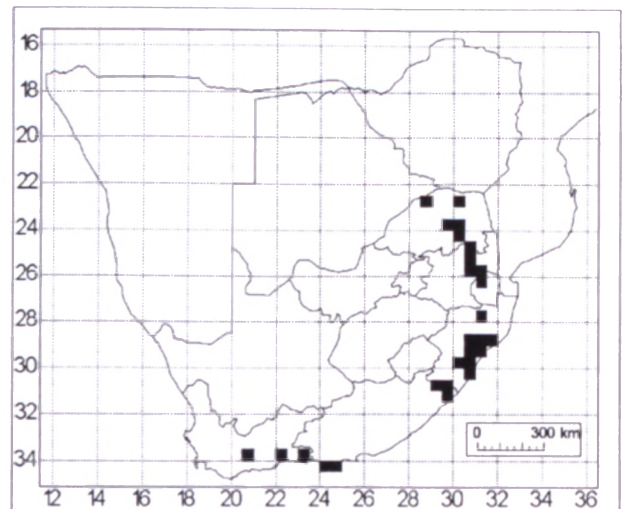


FIGURE 2.—Distribution of *Piper capense* var. *capense* in southern Africa.

ly end in a leaf or sometimes in an inflorescence. When they do end in a leaf, the leaves of the plant may appear superficially to be opposite rather than alternate, but careful examination will show the presence of the stipule or of the scar left where the stipule has abscised. The stipules may either be deciduous or else clasp the petiole.

The fruits have a pleasant spicy smell rather like that of cloves; this intensifies when they are boiled. They have been recorded as having been used as a spice in the past but, as far as is known, are no longer so used.

1866000 PEPEROMIA

Peperomia Ruiz & Pav., Flore peruviana et chilensis prodromus: 8 (1794); C.DC.: 391 (1869); Benth. & Hook.f.: 132 (1880); Baker & C.H.Wright: 147 (1902–1913); C.H.Wright: 489 (1912); Metcalf & Chalk: 1120 (1950); Keay: 81 (1954); Düll: 56 (1973); R.A.Dyer: 30 (1975); Van Jaarsv.: 67 (1992); Tebbs: 519 (1993); Verdc.: 9 (1996); Diniz: 29 (1997); Mabb.: 540 (1997). Type: *P. secunda* Ruiz. & Pav.

Annual or perennial succulent herbs, ascending or prostrate; branches jointed at nodes. *Leaves* alternate, opposite or verticillate, entire, palmately or penninerved; stipules absent. *Inflorescence* a cylindrical spike, terminal or axillary, solitary or aggregated. *Flowers* bisexual, sessile on thickened rachis, without perianth, with short-stalked peltate bracts. *Stamens* 2; filaments short; anther thecae 2, confluent. *Ovary* sessile; stigma undivided, usually penicellate; ovule solitary, basal. *Fruit* minute, globose or ellipsoid; pericarp thin and dry.

Characters not applicable in South Africa: species may be a subshrub or climber.

A genus of about 1 000 species, cosmopolitan in warm areas, especially America. In Africa there are 18 species. Five species are recorded from the FSA area by Düll, but only four are accepted in this treatment.

The species excluded from this treatment is *P. pellucida* (L.) Humb., Bonpl. & Kunth. Düll (1973) cited only one specimen from our area, *Beyrich 99* (B; Beleg durch Bomben vernichtet), from Pondoland, which was probably destroyed in Berlin. The same specimen was quoted by Wright (1909) under the name *P. nana* (a synonym of *P. pellucida*), but he did not indicate that he saw the specimen, as was his practice with all other specimens seen. The description is a direct translation from De Candolle (1869), where *P. nana* was originally described. Baker & Wright (1909) did not record *P. pellucida* from further south than the Zambesi in Mozambique, and it is possible that *Beyrich 99* was misidentified. No specimens of *P. pellucida* from within the FSA area have been seen by me, and it has therefore been decided to exclude it from this treatment. The species is annual, with the leaves alternate, glabrous, cordate at the base, about as wide as long, and widest below the middle.

Key to species

- 1a Leaves ± ovate in whorls of 3 or 4 at nodes; stems succulent; flowers densely crowded on rachis 1. *P. tetraphylla*
 1b Leaves 1 or 2 at nodes; flowers usually loosely arranged along the axis or, if dense, then leaves orbicular and stems not succulent:
 2a Leaves opposite, pilose 4. *P. blanda*
 2b Leaves mostly alternate, may be opposite below an inflorescence, glabrous or pilose:
 3a Leaves orbicular, occasionally broadly ovate, 4–10 mm long; stems prostrate and non-succulent; fertile portion of inflorescence 2–6 mm long 2. *P. rotundifolia*
 3b Leaves elliptic, ovate or obovate, 8–50 mm long; stems succulent, usually ascending; fertile portion of inflorescence 10–45 mm long 3. *P. retusa*

1. *Peperomia tetraphylla* (G.Forst.) Hook. & Arn.,

The botany of Captain Beechey's Voyage: 97 (1841); Yuncker: 188 (1962); Düll: 72 (1973); Bond & Goldblatt: 355 (1984); Van Jaarsv.: 68 (1992); Verdc.: 12 (1996); Diniz: 29 (1997). Type: Society Islands, *Forster s.n.* (GOET, holo.; K, iso.).

Piper tetraphyllum G.Forst.: 5 (1786).

Piper reflexum L.f.: 91 (1781); Thunb.: 443 (1823). *Peperomia reflexa* (L.f.) A.Dietr.: 180 (1831) non Humb., Bonpl. & Kunth (1816); C.DC.: 451 (1869); Hook.f.: 99 (1890); Baker & C.H.Wright: 155 (1902–1913); C.H.Wright: 490 (1912); Compton: 171 (1976). Type: Western Cape, Outeniqua Mountains, in woods, among mosses on tree trunks, *Thunberg s.n.* (UPS, holo.; microfiche in PRE No. 752!).

Peperomia reflexa forma *capense* Miq.: 169 (1843). *P. reflexa* var. *capense* (Miq.) C.DC.: 451 (1869); C.H.Wright: 490 (1912); Batten & Bokelmann: 57, t. 50.1 (1966). Syntypes: Western Cape, Cape Peninsula, *Drège s.n.* (not found); Eastern Cape, near Uitenhage, *Verraux 1831* in hb. Delessert (G!); Western Cape, Hangklip, *Mund & Maire s.n.* (not found); Bourbon Island, *Richard in Paris Mus. hb. 707* (P!); Mauritius, Aub. du Petit Thours (not found).

Micropiper pusillum Miq.: 62, t. 5, fig. B (1839). Type: Java, Tjirebon Province, Tjerimai Mountain, upper slopes on tree trunks, *Blume s.n.* (not found).

Succulent herb; stems ascending to suberect (Figure 3E), rooting at nodes and forming a mat. *Leaves* in whorls of 3 or 4, succulent, broadly rhomboid-ovate to ovate, glabrous, 7–15(–25) × 5–11(–14) mm, base and apex rounded, faintly 3-veined from base, may have 3 pale stripes along veins, dark green above and paler to grey-green below, may be punctate below; petiole 1.5–4.0 mm long. *Inflorescence* terminal only, fertile portion 7–11 mm long (in flower), 13–20(–25) mm long (in fruit). *Flowers* with bracts ± 0.3 mm diam. *Fruit* ± 1 mm long, glanduliferous, long-ellipsoid, with pseudocupule at base.

Pantropical; in southern Africa is found in a number of localities in Northern Province, North-West, Mpumalanga, Gauteng, Swaziland, KwaZulu-Natal, Lesotho and in Eastern and Western Cape, from East Griqualand to Bredasdorp (Figure 4). Epiphytic or lithophytic, often growing among mosses.

Vouchers: *Compton 26918* (PRE); *Gibbs Russell 3824* (PRE); *Meeuse 10355* (PRE); *Scheepers 69* (PRE); *Van Wyk & Theron 4534* (PRE).

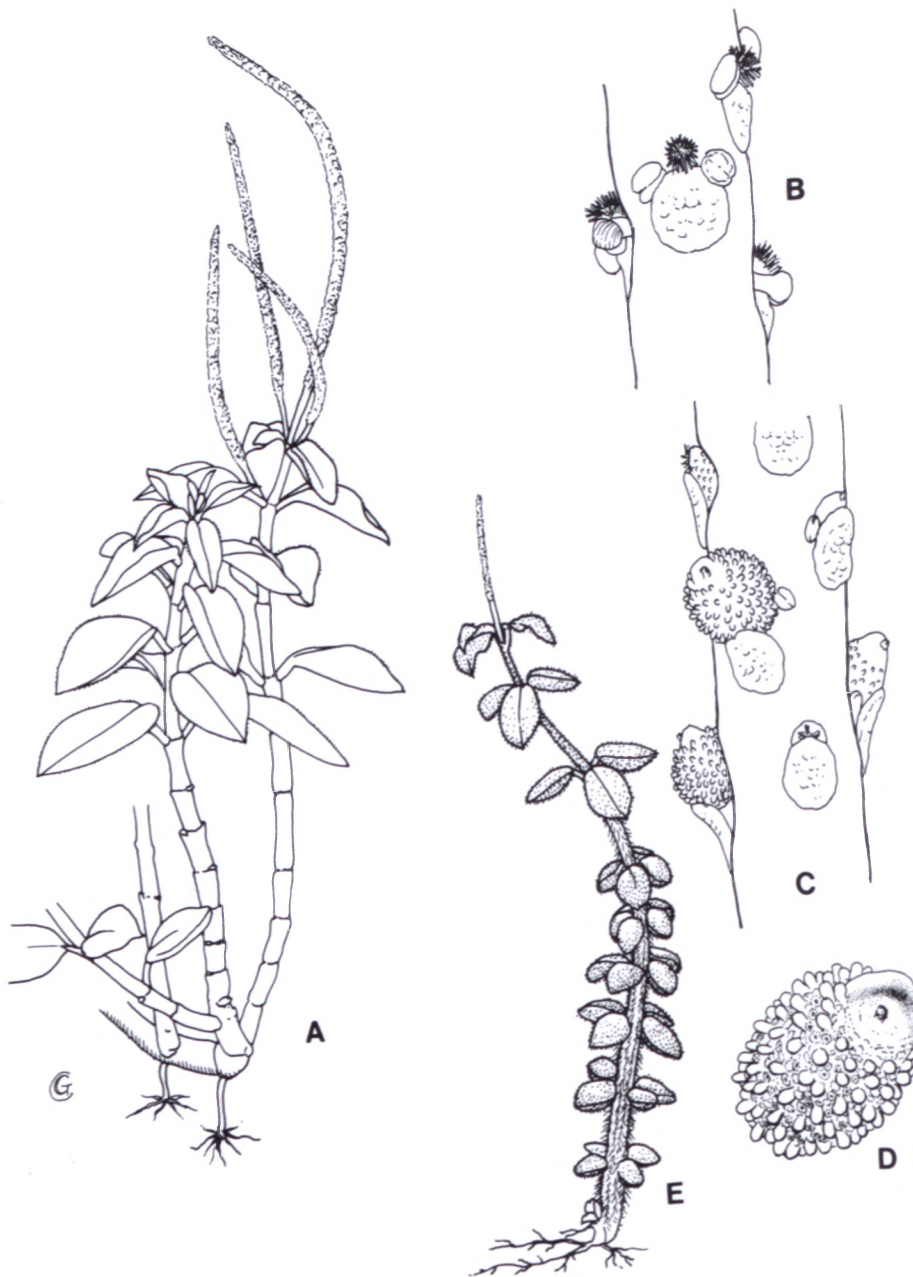


FIGURE 3.—A–D, *Peperomia blanda*, Hardy 3991: A, habit, $\times 0.88$; B, flowering inflorescence, $\times 13$; C, fruiting inflorescence, $\times 13$; D, fruit, $\times 26.6$. E, *Peperomia tetraphylla*, Venter 3786: habit, $\times 0.88$. Artist: G. Condy.

2. *Peperomia rotundifolia* (L.) Humb., *Bonpl. & Kunth, Nova genera et species plantarum* 1: 65 (1816); Key: 83 (1954); Düll: 85 (1973); Van Jaarsv.: 68 (1992); Verdc.: 12 (1996); Diniz: 33 (1997). Iconotype: America Calidiore (Martinique), Plumier, *Traités des Fougères de l'Amérique* 52, t. 69 (1693).

Piper rotundifolium L.: 30 (1753).

Herb; stems slender, trailing, not succulent, rooting at nodes. Leaves alternate, succulent, orbicular or sometimes broadly obovate, glabrous or pilose, 4–10 \times 3–7(–10) mm, apex rounded to emarginate, base rounded to broadly cuneate; petiole 1–3 mm long. Inflorescence axillary, short and dense, 2–6 mm long (in flower). Fruit not seen.

Found in South America and the southern USA., in Africa, the Comores and Madagascar; within South Africa it is rare and restricted in distribution to southern KwaZulu-Natal and Eastern Cape (Figure 5). It is epiphytic or lithophytic.

Vouchers: Flanagan 1821 (PRE); Pegler 763 (PRE); Strey 5823, 6648 (PRE); Venter 883 (PRE).

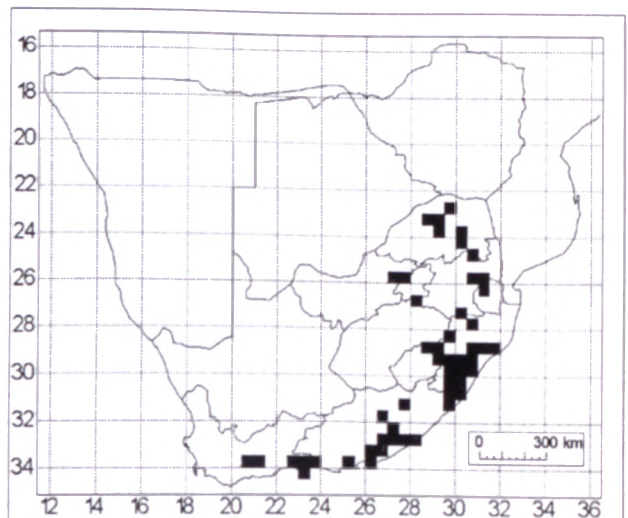


FIGURE 4.—Distribution of *Peperomia tetraphylla* in southern Africa.

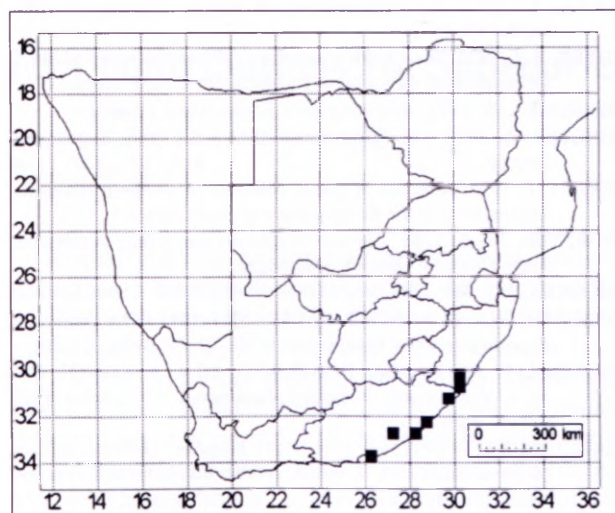


FIGURE 5.—Distribution of *Peperomia rotundifolia* in southern Africa.

3. *Peperomia retusa* (L.f.) A.Dietr., *Species plantarum* 1: 155 (1831); C.DC.: 446 (1869); C.H.Wright: 491 (1912); Marloth: 128 (1913); Keay: 82 (1954); Düll: 89 (1973); Compton: 171 (1976); Goldblatt in Bond & Goldblatt: 355 (1984); Van Jaarsv.: 68 (1992); Verdc.: 13 (1996); Diniz: 33 (1997). Type: Cape Province, in woods, among mosses on tree branches and on rocks, *Thunberg s.n.* (UPS, holo.; microfiche in PRE no. 754!).

Piper retusum L.f.: 91 (1781); Willd.: 165 (1797); Thunb.: 443 (1813).

Peperomia retusa var. *ciliolata* C.DC.: 447 (1869); C.H.Wright: 491 (1912). Type: Diaboli Mountain, *Fischer s.n.* (not seen, LE vide Düll). It is uncertain whether this locality is American or South African. There is a Mount Diablo in California, on the mainland opposite San Francisco, or it may refer to Devils Peak, Cape Town. No collector by the name of Fischer is known to have been in South Africa, according to Dr L.E.W. Codd (pers. comm.).

Peperomia retusa var. *alternifolia* C.DC.: 446 (1869). Type: Cape Province, *Ecklon & Zeyher s.n.* (B, holo.!).

Peperomia bachmannii C.DC.: 227 (1894); C.H.Wright: 491 (1912). *P. retusa* var. *bachmannii* (C.DC.) Düll: 90 (1973). Type: KwaZulu-Natal, Pondoland, *Bachmann 419* (B, holo.!).

Peperomia rehmannii C.DC.: 227 (1894). Syntypes: Northern Province, Houtbosch, *Rehmann 5969* (not found), Western Cape, Knysna, *Rehmann 489* (Z, holo.!).

Peperomia wilmsii C.DC.: 282 (1898). Type: Mpumalanga, Lydenburg, Spitzkop Mountain, *Wilms 1354* (BM!; G!; K!).

Mat-forming herb; stems rooting at nodes, succulent. *Leaves* alternate, obovate or sometimes elliptic, 8–32 × 6–16 mm, succulent, glabrous, apex usually rounded to emarginate, base broadly cuneate to cuneate, dark green, may be slightly discolorous; petiole 3–7(–13) mm long. *Inflorescence* slender with flowers widely spaced, terminal and axillary, 10–25 mm long (in flower), 25–45 mm long (in fruit). *Fruit* ± 1 mm long.

Occurs in tropical and subtropical Africa and Madagascar; in southern Africa it is the most widespread species of the genus, being found from Northern Province, Mpumalanga, Swaziland, KwaZulu-Natal, Eastern and Western Cape in moist areas as far west as

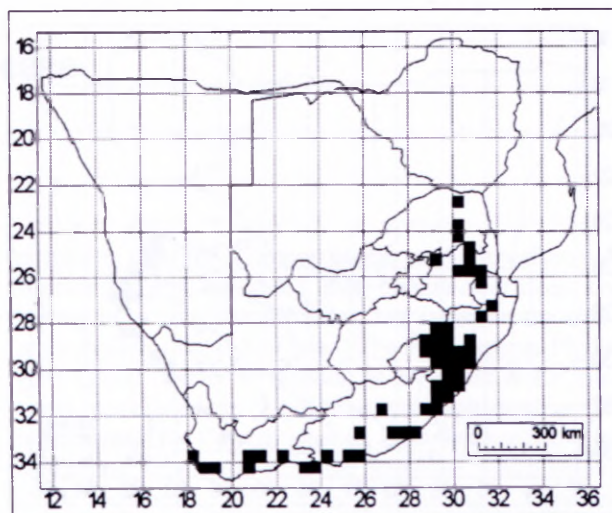


FIGURE 6.—Distribution of *Peperomia retusa* in southern Africa.

the Cape Peninsula, and from sea level to the Drakensberg in Lesotho (Figure 6). Epiphytic or lithophytic.

Vouchers: *Bos 1052* (PRE); *Mohle 262* (PRE); *Venter & Vorster 139* (PRE); *Wager s.n.* (PRE30235); *Zeyde 131* (PRE).

Düll divides the species into three varieties, two of which, var. *retusa* and var. *bachmannii*, occur within the FSA region. The characters he gives as differing, however, show considerable intergradation, and it has therefore been decided here not to keep the two varieties separate.

4. *Peperomia blanda* (Jacq.) Humb., *Bonpl. & Kunth, Nova genera et species plantarum* 1: 67, t. 3 (1816); Verdc.: 18 (1996). Type: specimen grown at Schoenbrunn, Vienna, from seed collected at Caracas, Venezuela, *Jacquin s.n.* (W, holo.; K, photo.!).

Piper blandum Jacq.: 211 (1791).

Peperomia leptostachya Hook. & Arn.: 70 (1839–1841).

Peperomia arabica Decne. in Miq.: 121 (1843); C.DC.: 442 (1869); Baker & C.H.Wright: 154 (1902–1913); C.H.Wright: 490 (1912); Compton: 171 (1976). Syntypes: *Arabie felice*, *P.A. Botta s.n.* (P!); KwaZulu-Natal, Port Natal, *Drège s.n.* (G!).

Peperomia blanda var. *leptostachya* (Hook. & Arn.) Düll: 110, Abb. 16 (1973); Van Jaarsv.: 69 (1992). Type: Hawaii, Oahu Island, *Beechey s.n.* (G, holo.!).

Semi-erect herb; stems succulent, rooting at lower nodes. *Leaves* opposite, succulent, pilose, ovate, ovate-rhomboid or slightly obovate, 28–50 × 12–31 mm, apex acute to rounded, base cuneate, lower leaves smaller and more rounded; petiole pilose, 6–11 mm long. *Inflorescence* terminal or axillary, slender, with widely-spaced flowers, 20–45 mm (in flower), 22–145 mm (in fruit). *Bracts* ± 0.6 mm diam. *Fruit* ± 1 mm long. Figure 3A–D.

Pantropical; is the most common *Peperomia* species in Central and South America, but less common in Africa. In southern Africa it occurs from Northern Province, Mpumalanga, Swaziland, KwaZulu-Natal to Eastern Cape (Figure 7). It is lithophytic, rarely epiphytic, growing on cliffs and in pockets of soil among rocks.

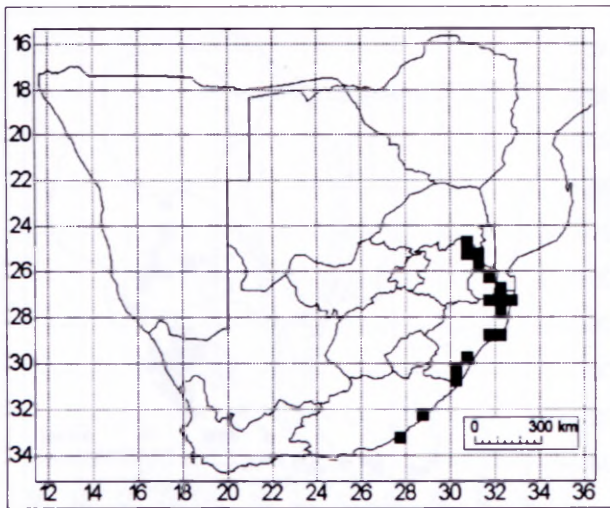


FIGURE 7.—Distribution of *Peperomia blanda* in southern Africa.

Vouchers: Buitendag 470 (PRE); Codd 7029 (PRE); Hemm 539 (PRE); Schweickerdt 1425 (PRE); Venter 4577 (PRE); Ward 4110 (PRE).

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