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Revision of Catharanthus G. Don

Series of Revisions of Apocynaceae XLI

by

M.A. van Bergen

Catharanthus roseus, the Madagascar Periwinkle, a review of its cultivars

by

W. Snoeijer

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FOREWORD

Since 1976 a project of revisions of the African Apocynaceae is being carried out at the Wageningen Department of Plant Taxonomy/ Herbarium Vadense. More than forty papers have been published. One of my students, Marieke van Bergen, monographed the genus *Catharanthus* containing the well–known Madagascar periwinkle.

When she worked on the subject, Wim Snoeijer, employed at the Division of Pharmacognosy at the Gorlaeus Laboratory in Leiden, who is a very able gardener, contacted me being specialist of the Apocynaceae family. He showed me the research collection of *Catharanthus roseus* including several cultivars with beautiful flowers, and plants grown from seeds collected in the wild of *C. pusillus* and *C. trichophyllus.* Wim even produced new cultivars by selection and hybridization, some of *C. roseus* and others from hybrids between *C. roseus* and *C. trichophyllus.* This living collection was especially so interesting, because the plants were in such a perfect condition as I never saw before in cultivation. He also kept elaborate information on the accessions. Therefore I proposed him to join efforts to produce this book. The first part is a scientific monograph of a genus, of which Marieke and I had the opportunity to see all species except one as living plants, five of which even in the wild. The second part reports on the high–level professional work carried out by this gifted gardener sharing practical information on cultivation, breeding, and existing cultivars.

The book brings together the information for plant taxonomists and gardeners alike, both professionals and amateurs, a combination which is rare in literature.

The editor,

Antony J.M. Leeuwenberg

Revision of Catharanthus G. Don

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by M.A. van Bergen

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Abstract

The genus *Catharanthus* G. Don, a genus in the subtribe *Catharanthinae* of the *Apocynaceae*, comprises eight species. Seven species are endemic to Madagascar, one is found in India. Widespread as ornamental is the well–known *C. roseus* (L.) G. Don, the Madagascar periwinkle, of which the roots produce various valuable alkaloids, used against several forms of cancer. The genus is closely allied to the genera *Amsonia* and *Vinca*. Distribution maps and drawings by the author illustrate the species.

Introduction

The present publication is a monographic revision of the genus *Catharanthus* G. Don. The genus comprises eight species of which the type species, *Catharanthus roseus* (L.) G. Don, indigenous to Madagascar, was introduced as ornamental throughout the tropics. It is well–known as a naturalized herb in the tropics and subtropics, and selected cultivars are for sale in the temperate zone as potplants. Furthermore, the roots of *C. roseus*, or the Madagascar periwinkle, produce various valuable alkaloids, which are used against several forms of cancer.

This study is mainly based on herbarium material, which in most cases was, fortunately, richly provided with flowers and/or fruits. Where possible, spirit collections have been studied. The author was able to study and collect several species in Madagascar. All the type

specimens of the names and synonyms discussed in this revision have been traced.

Geographical distribution

Seven of the eight species in the genus *Catharanthus* are endemic to Madagascar, and one is endemic to India. The best–known species of the genus, *C. roseus*, has been cultivated as ornamental all over the tropics and subtropics and is now naturalized in many countries. Within Madagascar several species grow more or less in the same areas but core areas can be distinghuished. *C. trichophyllus* is to be found mainly in the north–western part of Madagascar. Within the central part *C. lanceus* has its core area around Antananarivo, *C. coriaceus* around Itremo Mts., *C. ovalis* around Parc Isalo and *C. longifolius* around Ambalavao. *C. scitulus* can be collected in the south–central part of Madagascar and *C. roseus* is thought to have its origin around Fort Dauphin, the most south–eastern part of Madagascar, although it has been cultivated and escaped in many areas of Madagascar.

Relationships with other genera

Within the *Apocynaceae* the genus *Catharanthus* belongs to the subtribe *Catharanthinae* Pichon in the tribe *Plumerieae*, subfamily *Plumeroideae*. De Candolle (1844) distinguished three sections in the genus *Vinca* (=*Catharanthus* pro parte). The section *Pervinca* (=*Vinca*), containing several species now regarded as true *Vinca's*, the section *Lochnera* containing the species *C. roseus*, *C. ovalis*, *C. trichophyllus*, *C. coriaceus*, *C. longifolius* and *C. lanceus* and the section *Cupa–Veela* which has only one species, *C. pusillus*. The two latter sections are now placed in the genus *Catharanthus*. Pichon (1949) added a new section to the genus (then called *Lochnera*), section *Androyella*, which contents the species *C. scitulus*. Several authors have followed this sectional view but the present author is of opinion that the characters used for distinguishing the sections are of better use in the identification key to separate the species. Secondly, the species are too closely allied and the genus is too small to justify a sectional division.

Catharanthus is allied to the genus *Vinca* and the genus *Amsonia*.

Most differences can be found in floral structures. Part of the data for *Vinca* come from Lawrence (1959), those for *Amsonia* from Woodson (1928). Differences in characters between the three genera, and their similarities, are listed in Table 1.

(1844) *Vinca* section *Cupa–Veela*
Vinca section *Lochnera*

(1949) *Lochnera* section *Androyella*
Lochnera section *Cupa–Veela*
Lochnera section *Lochnera*

(1949) *Catharanthus* section *Androyella*
Catharanthus section *Cupa–Veela*
Catharanthus section *Lochnera*

History of the genus

In 1753 Linnaeus described the genus *Vinca*, in which he distinguished two species, *V. major* and *V. minor*. Four years later he added *V. rosea* to this group. His brief diagnosis was sufficient to distinct *V. rosea* specifically, but not generically from the other species. Reichenbach (1828) was the first who separated *V. rosea* from the other species in the genus *Vinca* and he proposed the generic name *Lochnera* for the species. Unfortunately he provided neither a description or any statement to support the separation, nor any reference to a previously published description of the genus; his proposal has therefore no nomenclatural validity and has to be regarded as a nomen nudum. Later, in August 1838, Endlicher published a description in his Genera Plantarum (page 583). He made a clear distiction between the genus *Vinca* and the genus *Lochnera*, both provided with correct descriptions. The year before George Don had published the first part of his General System of Gardening and Botany volume IV. He also made a separation between the species in the genus *Vinca*, maintaining the name *Vinca* for the genus containing *V. major*, *V. minor* and *V. herbacea* and giving the new name *Catharanthus* for a new genus with *V. rosea* as type species. Therefore *Catharanthus* got priority over *Lochnera*, which was validly published only about a year later.

Table 1. The genera *Vinca*, *Catharanthus* and *Amsonia*, differences and similarities

	Vinca	Catharanthus	Amsonia
Type of plant	perennial herb ascending or with flowering erect and creeping vegetative branches	annual or perennial herb or undershrub erect or procumbent	perennial herb erect
Leaves	opposite	opposite or decussate	alternate or subverticillate
	subcoriaceous or herbaceous	herbaceous	herbaceous
Flowers inflorescence	solitary	solitary or paired	many–flowered
Corolla	funnelform mouth glabrous or with scale–like appendages	salverform mouth densely pubescent	salverform mouth villose
Stamens	filaments much longer than anthers	anthers subsessile	filaments short
	connective with appendage	connective without appendage	connective without appendage
Disk	glands shorter than ovary	glands shorter to longer than ovary	no disk
Style	narrowly obconical	filiform	filiform
Pistil head	no basal veil	basal veil	with or without basal veil
	apex woolly	apex bilobed, surrounded by ring of hairs	apex bilobed or depressed–capitate
Fruit	follicles forming a V to T with peduncle (angle 60–180°)	follicles forming a V or parallel (angle 0–60°)	follicles forming a narrow V or parallel (angle 0–45°)
	cylindrical	cylindrical	cylindrical to moniliform

Systematic part

Catharanthus G. Don, Gen. Syst. 4: 95 (1837); Pichon in Mém. Mus. Nat. Hist. Nat. Paris, N.S. 27: 237 (1949)

Homotypic synonyms:
Lochnera Reichenbach, Consp. Regn. Veg. 1: 134 (1828), nomen nudum; ex Endlicher, Gen. Pl. 583 (1938); K. Schumann in Engler & Prantl, Nat. Pflanzenfam. IV, 2: 145 (1895); Stapf in Fl. Cap. 4, 1: 504 (1907)
Vinca sect. *Lochnera* A. DC., Prodr. 8: 380 (1844)
Ammocallis Small, Fl. S.E. U.S. 935 (1903)
Type species: *C. roseus* (L.) G. Don

Heterotypic synonyms:
Vinca sect. *Cupa–Veela* A. DC., Prodr. 8: 380, 676 (1844)
Type species: *Vinca pusilla* Murray (= *Catharanthus pusillus* (Murray) Pichon)
Lochnera sect. *Androyella* Pichon, in Notul. Syst. (Paris) 13: 207 (1948)
Type species: *Lochnera scitula* Pichon (= *Catharanthus scitulus* (Pichon) Pichon

Annual or perennial herbs or undershrubs which are often woody at the base, often with white latex. *Leaves* herbaceous to fleshy-coriaceous, opposite or decussate, with a fringe of intra- and interpetiolar colleters and with 2–5 membraneous, filiform stipules at each side of the base which are glabrous or pilose. *Inflorescences* terminal or axillary, 1-2-flowered. *Flowers* 5-merous, actinomorphic. *Sepals* narrowly to very narrowly triangular, subulate, connate at the base, colleters none. *Corolla* purple, red, pink, or white, salver-form; tube with a strigose ring inside just below the mouth and a second strigose ring just below the insertion of the stamens; tube glabrous or pilose outside, cylindrical, widened around the stamens distinctly above the middle (except in *C. scitulus*); throat densely pubescent; lobes elliptic to obliquely obovate or narrowly so, apiculate, often velutinous at the base, spreading. *Stamens* inserted at the widest part of the tube; anthers subsessile, free, oblong or triangular or narrowly so, obtuse or slightly retuse at the apex, cordate at the base, glabrous. *Pistil* with the apex near the base of the

anthers; ovary of two separate carpels; style filiform, straight, glabrous; pistil head composed of three parts: a basal veil, which is recurved, diaphanous and entire, a woolly ring and a cylinder (in *C. pusillus* a cone) which is pubescent and has a bilobed stigmoid apex surrounded by a ring of hairs; disk consisting of two glands, narrowly oblong or triangular, obtuse, alternate with the carpels, sometimes united at the extreme base. *Fruit* of two free, cylindrical follicles, mostly erect, acuminate at the apex, with longitudinal ridges from the apex to the base. *Seeds* oblong or narrowly so, granular, with a deep longitudinal groove at the hilar side; embryo straight, spathulate; cotyledons elliptic, slightly shorter than the rootlet; endosperm mealy, surrounding the embryo.

Etymology: from καθαροσ, katharos, pure, and ανθοσ, anthos, a flower; in reference to the neatness and beauty of the flowers (G. Don, 1837).

Key to the species

1. Annual herb; corolla tube up to 11 mm long, lobes 2–5 x 1–2.3 mm 2
   Undershrub or perennial herb; corolla tube at least 11 mm long, lobes 6–26 x 4–20 mm 3
2. Widest portion of the tube at the middle; corolla lobes pink or blue–violet; Madagascar ..... **7. C. scitulus**
   Widest portion of the tube distinctly above the middle; corolla white; India ..... **5. C. pusillus**
3. Perennial herb, stems usually decumbent; several stems from a carrot–like taproot which is much thicker than the stems; dry stems still present when new stems develop 4
   Undershrub, stems usually erect; with a single, branched stem which has a base not thinner than the taproot 6
4. Leaves (sub–)sessile (petiole less than 1 mm long); blade ovate, cordate at the base ..... **4. C. ovalis**
   Leaves petiolate (petiole at least 1 mm long); blade oblong to linear, rounded or attenuate at the base 5
5. Leaves mostly much shorter than the internodes, attenuate at the base; flowers solitary ..... **2. C. lanceus**
   Leaves mostly twice as long as the internodes, rounded at the base; flowers paired ..... **1. C. coriaceus**
6. Leaves linear to oblong; margin often revolute, not ciliate; corolla

tube 11–22 mm long..... **3. C. longifolius**
Leaves ovate to oblong; margin entire, not revolute, often ciliate; corolla tube 22–26(–30) mm long..... 7

7. Stems quadrangular, winged; leaves (sub–)sessile (petiole less than 1 mm long); peduncle 4–11 mm long ..... **8. C. trichophyllus**
Stems terete; leaves petiolate, petiole 3–11 mm long; peduncle 1–4 mm long ..... **6. C. roseus**

1. Catharanthus coriaceus Markgraf in Adansonia II, 2, 10: 23 (1970). – Type: Madagascar, West of Itremo (West Betsileo), *Humbert* 28285 (holotype P).
Fig. 1, p. 16; map 1, p. 17

Perennial herb, up to 40 cm high, erect. Stems (very) narrowly winged, glabrous, internodes mostly about twice as short as the leaves. *Leaves* shortly petiolate; petiole 1–1.5 mm long, glabrous; stipules 1–2, glabrous; blade fleshy–coriaceous, oblong to linear, 3.2–7 x as long as wide, 15–35 x 2–11 mm, obtuse at the apex, rounded at the base, apiculate, entire, glabrous. *Flowers* axillary, mostly paired, pedunculate; peduncle 7–11 mm long, narrowly winged, glabrous. *Sepals* connate at the base for 0–1 mm, 3.3–9 x as long as wide, 5.7–9.5 x 1–2 mm, glabrous. *Corolla* lobes pink or purple, throat yellow; tube glabrous, with a 1–1.5 mm wide strigose ring inside, just below the mouth and a second 1–1.5 mm wide strigose ring just below the insertion of the stamens, throat shortly pubescent; tube 1.6–3 x as long as the calyx, 1.4–2.1 x as long as the lobes, 15–19 mm long, about 1 mm wide at the base, widened to 2–2.5 mm wide at about 0.75 of the length of the tube, throat 0.9–1.1 mm wide; lobes obovate, 1.3–1.7 x as long as wide, 7–12 x 4.5–9 mm, velutinous above, glabrous below. *Stamens* with apex 0.2–0.8 mm below the mouth of the corolla tube, inserted 0.81–0.83 of the length of the corolla tube (at 12.3–15 mm from the base of the tube); anthers 4.2–5.6 x as long as wide, 2.1–2.8 x 0.5–0.6 mm. *Pistil* 12.5–14.8 mm long; ovary narrowly ovoid, 1.5–2 x 0.4 x 0.5–0.7 mm, glabrous; style 9.5–12.5 mm long; pistil head 1.3–1.5 x 0.5–0.8 mm; basal veil 0.3–0.5 x 0.5 mm, cylinder inclusive of broad woolly ring and stigmoid apex, 1 x 0.5–0.8 mm. Disk 1–1.9 x 0.3–0.4 mm, glabrous. *Fruit* pendulous on recurved peduncle; follicles green, 13–21.3 x as long as wide, 26–32 x 1.5–2 mm, glabrous. *Seeds* 2–2.2 x 1–1.5 mm; embryo 1.5–1.8 x 0.3–0.5 mm.

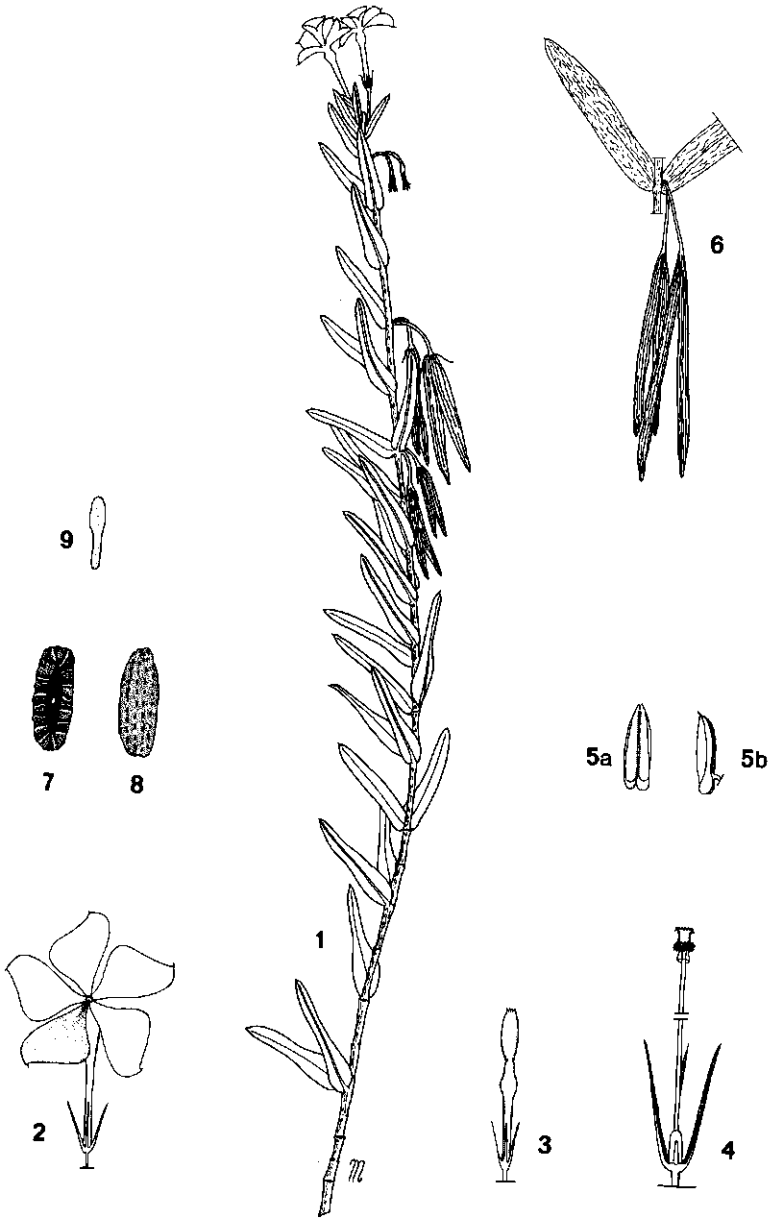
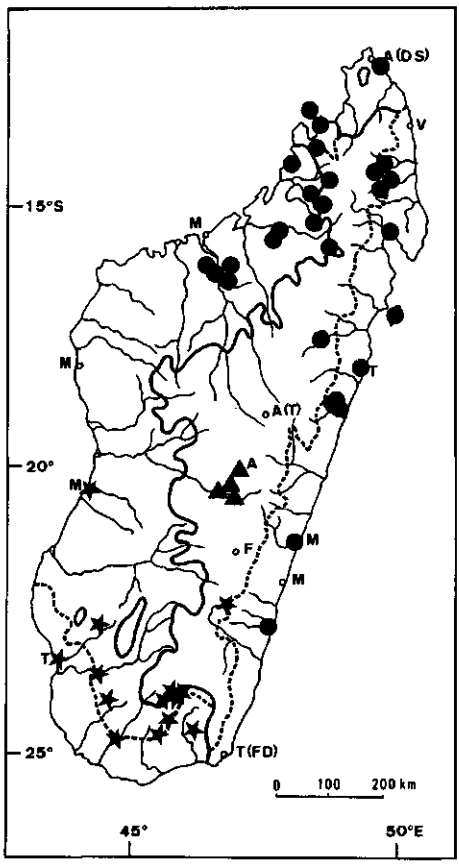
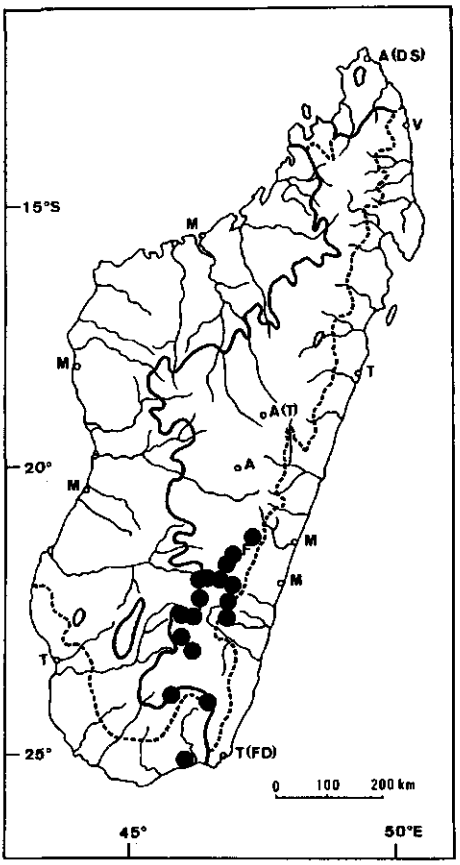


Fig. 1. *Catharanthus coriaceus*. **1**, habit (x2/3); **2**, flower (x4/3); **3**, bud (x4/3); **4**, pistil (x3 1/3); **5a**, **5b**, anthers (x6 2/3); **6**, fruit (x2/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, embryo (x6 2/3); 1 from Boiteau s.n; 2–5 from Homolle 1884; 6 from Croat 29801; 7–9 from Humbert 28285.



Map 1. ▲ *Catharanthus coriaceus*; ✶ *C. scitulus*; ● *C. trichophyllus*.



Map 2. *Catharanthus longifolius*.

Distribution: Endemic to Madagascar. Core area around Itremo Mts. (Central Madagascar).

Ecology: Bare hillsides covered with rocks, at the foot of granite rocks, sunny places. Alt. 1500–1750 m. Flowering and fruiting October–April.

Specimens examined:

Madagascar. Itremo Mts., *Croat* 29801 (MO); ibid., *Baum* 26A (MO), 39 (MO, TAN), 57 (MO, TAN), 58 (MO); Mountains West of Itremo (West Betsileo), *Humbert* 28285 (holotype P); ibid., Keraudren & Aymonin 25797 (P); Along road between Finandrahana and Itremo, 27–40 km W of Finandrahana, *Croat* 29805 (MO) Ambatofinandrahana, *Homolle* 1828 (P); Havre Plains, 8.4 km W after Itremo turnoff, *Hammer* 2 (K); 1 km S of village of Isaha, 5 km W of Mandrirana, on road from Ambalavao to Tulear, *Baum* 61 (MO); sin. loc., *Homolle* 1884 (P).

Cult.: Tsimbazaza, Antananarivo, *Boiteau* s.n. (P), grown in garden from seeds collected by Rajemisa Richard near Itremo, *TAN*-93-486 (WAG).

2. **Catharanthus lanceus** (Bojer ex A. DC.) Pichon in Mém. Mus. Nat. Hist. Nat. Paris, II, 27: 237 (1949). – Type: Madagascar, prov. Emerina, *(Hils &) Bojer* s.n. (lectotype G–DC, not seen (microfiche WAG) designated here; isolectotypes BM, K, M, P, W).
Fig. 2, p. 19; map 3, p. 20

Basionym and homotypic synonym:
Vinca lancea Bojer ex A. DC., Prodr. 8: 382 (1844).
Lochnera lancea (Bojer ex A. DC.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2: 145 (1895).

Heterotypic synonym:
Tachiadenus parviflorus Baker in Kew Bull. 1897: 274 (1897). – Type: Madagascar, Tanala, between Itandroka and Ambohimitombo, *Forsyth Major* 403 (holotype K; isotypes BM, G, Z).

Perennial herb, up to 1 m high, decumbent, glabrous, with carrot–like central taproot, 5–20 mm in diameter, whitish or dark brown to black outside, cream or bright light green in section. Stems and branches reddish, subquadrangular; each internode with a longitudinal groove below the interpetiolar ridge, internodes mostly much longer than the leaves. *Leaves* shortly petiolate; petiole 1–3 mm long; stipules 1–3, glabrous; blade herbaceous to somewhat fleshy–coriaceous, medium green, shiny on both sides, oblong or ovate or narrowly so, 2–8 x as long as wide, 10–45 x 3–13 mm, attenuate at the base, acuminate or rounded at the apex, apiculate, entire. *Flowers* fragant, axillary, solitary, pedunculate; peduncle 5–26(–32) mm long. *Sepals* dark to medium green, connate at the base for 0–0.5 mm, 3–10 x as long as wide, 5–10 x 1–2 mm. *Corolla* lobes pink, reddish violet, or light pink–magenta, often paler outside, white to cream at the base, tube pale to dark green, pinkish to reddish at the base, throat pale (greenish) yellow; tube with a 1 mm wide strigose ring inside, just below the mouth of the corolla tube, and a second 1–2 mm wide strigose ring just below the insertion of the stamens, throat densely pubescent; tube 1.7–4.5 x as long as the calyx, 0.9–2 x as long as the lobes, 15–22 mm long, 1–1.5 mm wide

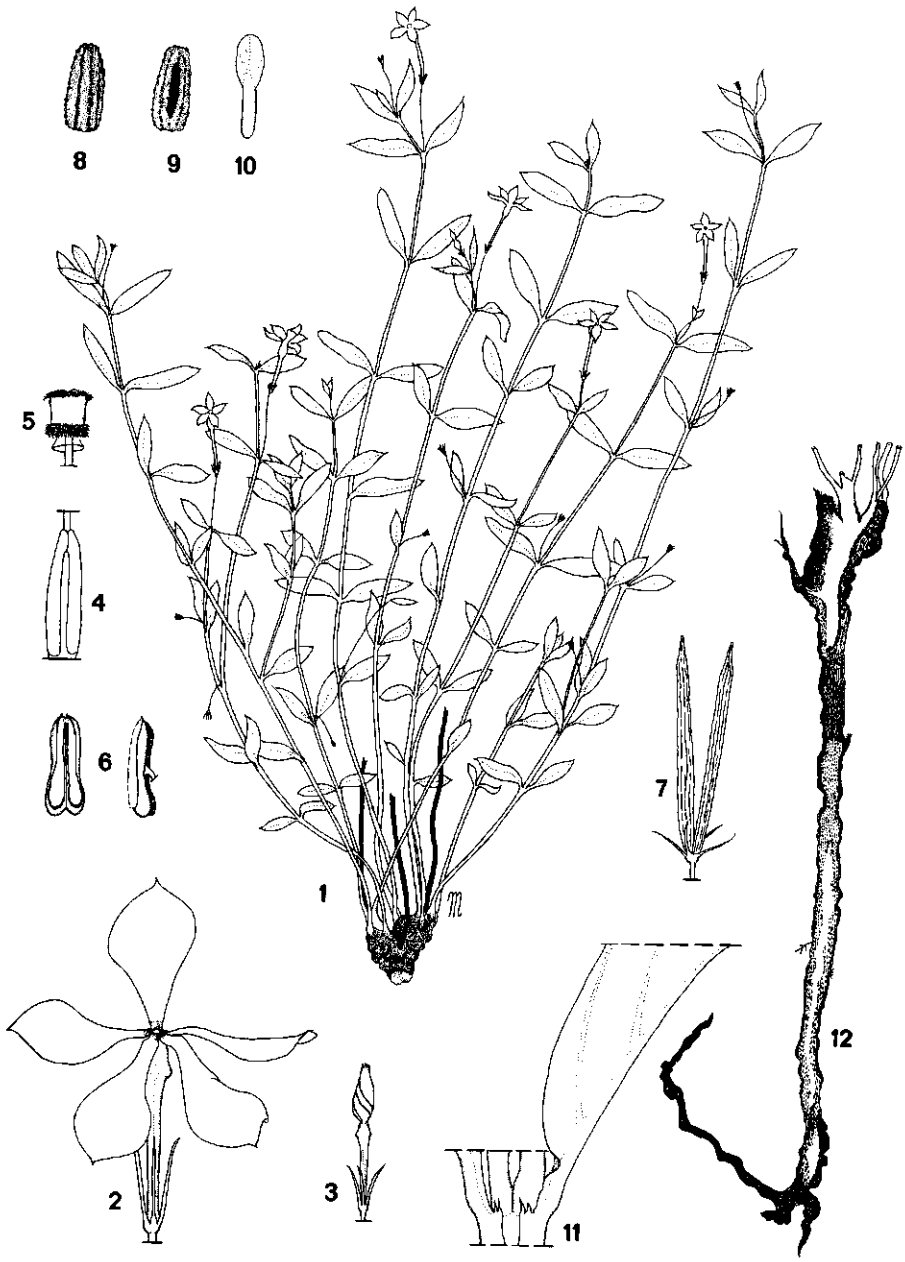
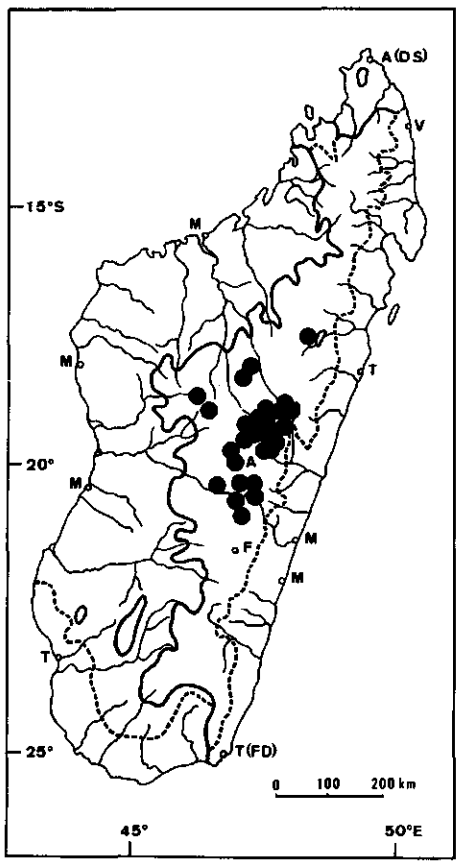
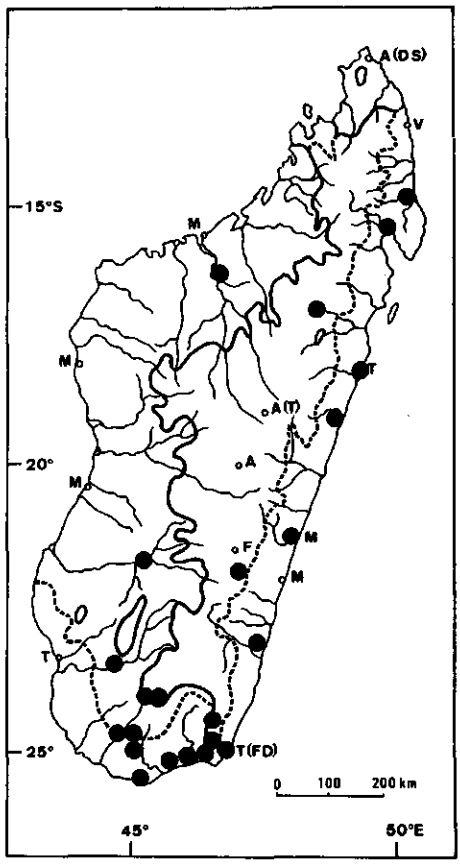


Fig. 2. *Catharanthus lanceus*. **1**, habit (x1/2); **2**, flower (x4/3); **3**, bud (x2/3); **4**, pistil head (x6 2/3); **5**, ovary (x6 2/3); **6**, anthers (x6 2/3); **7**, fruit (x2/3); **8**, seed, back side (x6 2/3); **9**, seed, hilar side (x6 2/3); **10**, embryo (x6 2/3); **11**, root (x2/3); **12**, node with groove and stipules (x6 2/3). 1 from Forsyth Major 403; 2–6, 12 from Leeuwenberg 14462; 7 from Bosser 9612; 8–10 from Leeuwenberg 14463; 11 from Perrier de la Bâthie 8913.



Map 3. *Catharanthus lanceus.*



Map 4. *Catharanthus roseus.*

at the base, widened above to 2–3 mm wide around the anthers, throat constricted, 0.8–1.5 mm wide; lobes ovate to obovate, 0.6–1.3 x as long as the tube, 1.2–2.3 x as long as wide, 11–22 x 6–14 mm, velutinous inside. *Stamens* with apex 0.1–10 mm from the mouth of the corolla tube, inserted 0.83–0.87 of the length of the corolla tube (at 12.5–19 mm from the base); anthers 4–7.5 x as long as wide, 2–3 x 0.4–0.6 mm. *Pistil* 12.8–19 mm long; ovary oblong ovoid, 1.5–5.5 x 0.3–1 x 0.3–1 mm, glabrous; style 10–16 mm long; pistil head 1–1.5 x 0.4–0.9 mm; basal veil 0.2–0.4 x 0.4–0.9 mm, cylinder inclusive of broad woolly ring and stigmoid apex, 0.8–1.1 x 0.4–0.8 mm. Disk 1–2.5 x 0.2–0.3 mm, glabrous. *Fruit*: follicles 7.5–43 x as long as wide, 15–50 x 1–3 mm, glabrous. *Seeds* 1–3 x 1–2 mm; embryo 0.8–2.6 x 0.3–1 mm.

Distribution: Endemic to Madagascar. Core area around city of Antananarivo (Central Madagascar).

Ecology: On volcanic soil, laterite covering quartzite and granitic rocks. In areas periodically burnt, in open woodland on ridges, among rocks and boulders on hillsides, ruderal grassland and along roadsides. In sunny places. Flowering and fruiting Sept–May. Alt.: 750–2000 m.

Vernacular name: Vonenina (Merina), Tsipelana (Betsileo).

Uses: The root is used against tooth pain. The leaves are bitter and astringent. The roots are used as purgative and vermifuge.

Geographical selection of the 92 specimens examined:

Madagascar. Zahamena Res., *Randrianjanaka* 22 (WAG); Antananarivo, *Bosser* 9612 (P, TAN); North of Antananarivo, *Goudot* s.n. (M); Ambodivoanjo, *Beentje* 4557 (K, P); ibid., *van Bergen* 7 (WAG); Ankatso, *Decary* 724 (P); between Miarinarivo–Ijeli, *van Bergen* 8 (WAG); Manjakatompo, *Benoist* 1306 (P); Manjakandriana, *Boiteau* 312–b (BM, P); near Ambohibary, *Croat* 29104 (MO); Amparafaravola (Lake Alaotra), *Cours* 254 (K, P); Lake Itasy, sin. coll. 1364 (P); Sarobaratra Mts., *Catat* 448 (P); Ankaratra Mts., East–side, *Catat* 241 (P); Ankaratra Mts., W of Forest Station, *Leeuwenberg* 14216 (TAN, WAG), 14217 (MO, WAG); Betafo, *Decary* 13850 (K, P, TAN); Ambatolaona, *Decary* s.n. (BM, P); Iaranandriana, N of Behenjy, *Dorr* et al. 3268 (C, K, MO, P, S, US, WAG); 1 km N of R.N. 1, *Du Puy* et al. MB 434 (P, TAN); Ambatolampy, *Decary* s.n. (P); 20 km W & N of Ambatolampy, 'Lac Froid', *Uible* s.n. (US); near Andraisoro, *Decary* s.n. (P); Angavo near Ankazobe, *Decary* 7281 (P); near Arivonimamo, *Haine* 241 (K); Tsiromandidy, *Huré* s.n. (P); Mt. Angavokely, *Keraudren* 32 (P); Ambanitsena, 31 km E of Antananarivo, *van Bergen* 26 (WAG); near Mantasoa, *Le Myre de Viters* s.n. (P); km 31, R.N. 7, Ambositra–Antananarivo, S of Ilaka Afovoany, N of Mania R., *Leeuwenberg* 14129 (TAN, WAG); km 31 Ambatolampy– Antananarivo, N of Behenjy, *Leeuwenberg* 14215 (WAG); km 13 Ankazobe–Majunga = km 107 Antananarivo–Majunga, *Leeuwenberg* 13715 (K, MO, P, TAN, WAG); Antangona, 40 km W of Antananarivo, *Leandri* 2576 (P); Amboasary (Behenjy), *Peltier* 4525 (P); near Tsinjoarivo, *Perrier de la Bâthie* 8913 (P); Road to Majunga, km 116–117, *Debray* 1224–D (P); Ibity, *Keraudren & Aymonin* 24592 (P); between Ambositra–Ambatofinandrahana, R.N. 35, 5 km W of Ivato, *Phillipson* et al. 3831 (WAG); km 200 on road Antsirabe to Ambositra, *Keraudren* 143 (P); 21 km S of Ambositra, along R.N. 7, 5 km S of Ivato, *Leeuwenberg* 14155 (K, MO, P, TAN, WAG), 14156 (P, TAN, WAG); along R.N. 7, 44 km S of Antsirabe and 46 km N of Ambositra, *Schatz* et al. 1684 (MO, TAN, WAG); Antsirabe, *Waterlot* s.n. (K, P); Ambositra, *Perrier de la Bâthie* 8911 (P); Antsirabe, Betafo, *Schlieben* 8157 (B, BM, G, HBG, K, M, TAN, Z); km 25 Ivato–Itremo, *Leeuwenberg & G.R. Rafamantananantsoa* 14440 (TAN, WAG); Mts W of Itremo (W Betsileo), *Humbert* 29942 (BM, P); Itremo, about 25 km S of Manandona, *Fosberg* 52374 (US); 2 km S of Ambalavao, *Leeuwenberg & G.R. Rafamantananantsoa* 14451 (WAG); Imerina Imady, *Hildebrandt* 4111 (BM, G, HBG, K, M, P, US, WAG, Z); Tanala, between Itandroka and Ambohimitombo, *Forsyth Major* 403 (holotype K; isotypes BM, G, Z); near Ambatofinandrahana, *Humbert* 28103 (K, P); W of Ambatofinandrahana, *Decary* 15145 (L, MO, P); sin.

loc., *Baron* s.n. (K, P); ibid., *(Hils &) Bojer* s.n. (lectotype G–DC; isolectotypes BM, K, M, P, W); ibid., *Perrier de la Bâthie* 8886 (P), 8923 (P).

Cult.: Itaosy, propietary Ratsimamanga, *Boiteau* s.n. (P); Tsimbazaza, Antananarivo, *Croat* 28810 (MO).

3. Catharanthus longifolius (Pichon) Pichon in Mém. Mus. Nat. Hist. Nat. Paris, II, 27: 237 (1949). – Type: Madagascar, Mangoky Basin, *Perrier de la Bâthie* 8917 (holotype P).

Fig. 3, p. 23; map 2, p. 17

Basionym:
Lochnera longifolia Pichon in Notul. Syst. ed. Humbert 13: 207 (1948).

Undershrub, 40–150 cm high, woody at the base, erect. Stems and branches straw-coloured, ridged and very narrowly winged, glabrous or pilose. *Leaves* petiolate; petiole 1–6 mm long, glabrous or (laxly) pilose, winged; stipules 2–4, glabrous or pilose; blade oblong or linear or narrowly so, 4.3–12.5 x as long as wide, 28–130 x 4–14 mm, acuminate at the apex, attenuate at the base, pilose (especially beneath), entire. *Flowers* axillary, paired, pedunculate; peduncle 3–13 mm long, glabrous or (laxly) pilose. *Sepals* green, connate at the base for 0–1 mm, 1.7–4 x as long as wide, 2.5–5 x 1–1.8 mm, glabrous inside, (laxly) pilose outside. *Corolla* lobes pink (often much paler outside) or white outside and lilac inside, the base of the lobes whitish, tube green yellow with an orange or yellow throat; tube pilose outside for the upper third part, with a 1 mm wide strigose ring inside, just below the mouth and a second 1–1.5 mm wide strigose ring just below the insertion of the stamens, throat densely pubescent; tube 4–8 x as long as the calyx, 1.2–2.8 x as long as the lobes, 11–22 mm long, 1–1.5 mm wide at the base, widened to 2–3 mm at about 0.75 of the length of the tube, throat 0.8–1 mm wide; lobes obovate or narrowly so, 1–2.8 x as long as wide, 6–15 x 4–11 mm, velutinous above, laxly pilose below (especially at the apex). *Stamens* with apex 0.2–0.4 mm below the mouth of the corolla tube, inserted 0.73–0.88 of the length of the corolla tube (at 8–19.3 mm from the base of the tube); anthers 4.2–7.8 x as long as wide, 2.5–3.2 x 0.4–0.6 mm. *Pistil* 8–19.3 mm long; ovary oblong or narrowly ovoid, 2–3.2 x 0.4–1 x 00.4–0.5 mm, glabrous or (laxly pilose at the apex; style 4.4–15 mm long; pistil head 1.1–1.5 x 0.4–0.6 mm; basal veil, 0.2–0.5 x 0.3–0.6 mm, cylinder inclusive of

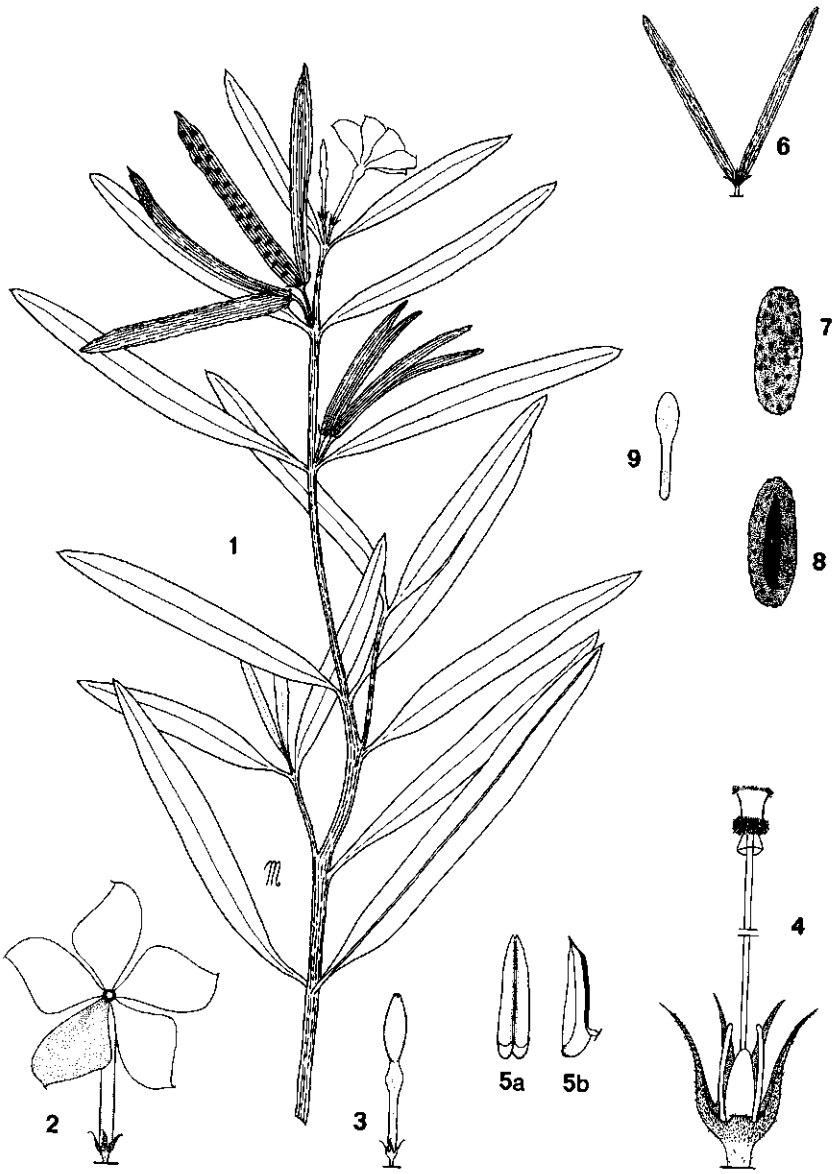


Fig. 3. *Catharanthus longifolius.* **1**, habit (x2/3); **2**, flower (x4/3); **3**, bud (x4/3); **4**, pistil (x6 2/3); **5a, 5b,** anthers (x6 2/3); **6**, fruit (x2/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, embryo (x6 2/3); 1, 2, 4–5 from RN 3532; 3 from Hildebrandt 3964; 6–9 from Boiteau 2076.

broad woolly ring and short stigmoid apex, 0.8–1 x 0.4–0.6 mm. Disk 1.9–3 x 0.3–0.5 mm, glabrous. *Fruit*: follicles 9–65 x as long as wide, 28–65 x 1–4 mm, glabrous or (laxly) pilose outside. *Seeds* 2–3 x 1–1.5 mm; embryo 1.7–2.7 x 0.5–1 mm.

Distribution: Species endemic to Madagascar. Core area around Ambalavoa–Ihosy–Ivohibe.

Ecology: On sand and gneiss. Between rocks in periodically burnt areas, on rocky and grassy hillsides and riverbanks. Flowering and fruiting March–June and Sept–Dec. Alt.: 100–1750 m.

Vernacular names: Kita, Tonga, Benjamina.

Specimens examined:

Madagascar. Iakanga, Ambalavao District, *Boiteau* 2128 (P); Vohitsaoka, Ambalavao District, *Rakoto* RN 4849 (P); Sendrisoa, *Rakoto* RN 6498 (P); ibid., *Razafindrakoto* RN 3969 (P); Between the Sahambana and the Ihosy, *Perrier de la Bâthie* 12673 (P); Ihosy valley (Mangoky Basin), *Humbert* 3002 (G, P); Mangoky Basin, *Perrier de la Bâthie* 8917 (holotype P); road to the upper valley of the Ihosy, near km 25, *Cours* 5117 (P); near Ihosy, *Bosser* 15838 (P, TAN); Antsimilohobe, Ivohibe, *Rakoto* RN 9036 (P, TAN); forest E of Ivohibe, *Humbert* 3378 (P); lower Ivohibe R., *Boiteau* 2109 (BM, G, K, P); Antambohobe, Ivohibe, *Razafindrakoto* RN 3532 (P); Sahatena R. valley, near Ambodiriana, *Boiteau* 2076 (P), 2084 (P); Ambovombe, *Decary* 9190 (P, TAN); Bekinoly Mt near Zazafotsy, *Perrier de la Bâthie* 8917 (P); Kalambatitra Mts, *Humbert* 11745 (P); Ampandrandrava, between Bekily and Tsivory, *Seyrig* 277 (P); between Tsivory and Anadabolava, *Humbert* 12293 (P); Manambolo R. valley, near Esomono, *Humbert* 13216 (P); Ankafina Forest, *Hildebrandt* 3964 (BM, G, K, M, P, Z); ibid., *Deans Cowan* s.n. (BM, P); Fianarantsoa, *Scott Elliot* 2108 (E); sin. loc., *Baron* s.n. (K); *Boiteau* 496 (P); *Deans Cowan* s.n. (BM, P), *Shufeldt* 84 (US).

Cult.: Tsimbazaza Park, Antananarivo, *Bosser* 9613 (P).

4. Catharanthus ovalis Markgraf in Adansonia II, 2, 10: 23 (1970). – Type: Madagascar. SW of Betsileo, *Perrier de la Bâthie* 16538 (holotype P).

Fig. 4, p. 26; map 5, p. 27

Heterotypic synonym:

Catharanthus ovalis ssp. grandiflorus Markgraf, l.c., **syn. nov.** – Type: Madagascar, Parc Isalo, W of Ranohira, *Humbert* 19585 (holotype P; isotype Z).

Perennial herb, up to 1 m high, decumbent with many spreading stems from a taproot, with latex. Stems reddish, subquadrangular, each internode with longitudinal groove below the interpetiolar

ridge, glabrous or pilose. *Leaves* sessile or shortly petiolate; petiole up to 1 mm long, glabrous or pilose; stipules 1–2, glabrous or pilose; blade herbaceous, ovate or narrowly so, 1.3–8.8 x as long as wide, 14–44 x 4–29 mm, acuminate at the apex, cordate at the base, entire, glabrous or pilose. *Flowers* axillary, paired, pedunculate; peduncle 1–10 mm long, glabrous or pilose. *Sepals* connate at the base for 0–1 mm, 1.7–4.2 x as long as wide, 1.8–8.5 x 1–3 mm, glabrous inside and outside or pilose inside (apical part)and outside. *Corolla* lobes white, red, pink, purple, red above and white beneath or pink above and red beneath, the base of the lobes white, throat yellow; tube glabrous or pilose outside, sometimes pilose at the upper part and glabrous at the lower part of the tube, with a 0.5–2 mm wide strigose ring inside, just below the mouth and a second 1–3 mm wide strigose ring just below the insertion of the stamens, throat densely pubescent; tube 2.5–12.8 x as long as the calyx, 1–3.2 x as long as the lobes, 16–30 mm long, 1–2 mm wide at the base, slightly narrowed above to 0.5–1.8 mm wide, widened to 1.5–3.5 mm wide around the insertion of the stamens, throat 0.5–2 mm wide; lobes obovate or narrowly so, 0.3–1 x as long as the tube, 0.8–2.4 x as long as wide, velutinous above, glabrous or (laxly) pilose beneath. *Stamens* with apex 0.1–1.5 mm below the mouth of the corolla tube, inserted 0.79–0.94 of the length of the corolla tube (at 13.5–37 mm from the base of the tube); anthers 3.3–6.3 x as long as wide, 1.8–3.1 x 0.4–0.7 mm. *Pistil* 13.6–38.6 mm long; ovary narrowly ovoid, 1.5–3.8 x 0.4–1 x 0.2–1 mm, glabrous or (laxly) pilose (mostly at the apex); style 10.3–34 mm long; pistil head 1.0–1.6 x 0.4–0.9 mm: basal veil, 0.2–0.7 x 0.4–0.9 mm, and cylinder inclusive of broad woolly ring and short stigmoid apex, 0.6–1 x 0.5–0.8 mm. Disk 1–3 x 0.2–0.5 mm, glabrous or pilose (especially at the lateral sides). *Fruit*: follicles, 5–27.5(–42) x as long as wide, 12–55 x 1–3 mm, glabrous or pilose outside. *Seeds* 1.8–3 x 1–2 mm; embryo 1.5–2.5 x 0.5–1 mm.

Distribution: Endemic to Madagascar. Core area around Parc Isalo.

Ecology: On sand, laterite, gneiss and quartzite. In exposed conditions on sandstone plateaux, between rock outcrops, in low savannah or pseudosteppe, and in disturbed areas along roadsides. Flowering and fruiting throughout the year. Alt.: 400–1700 m.

Vernacular names: Ilaimena, Limena (Betsileo), Tonga, Kilia.

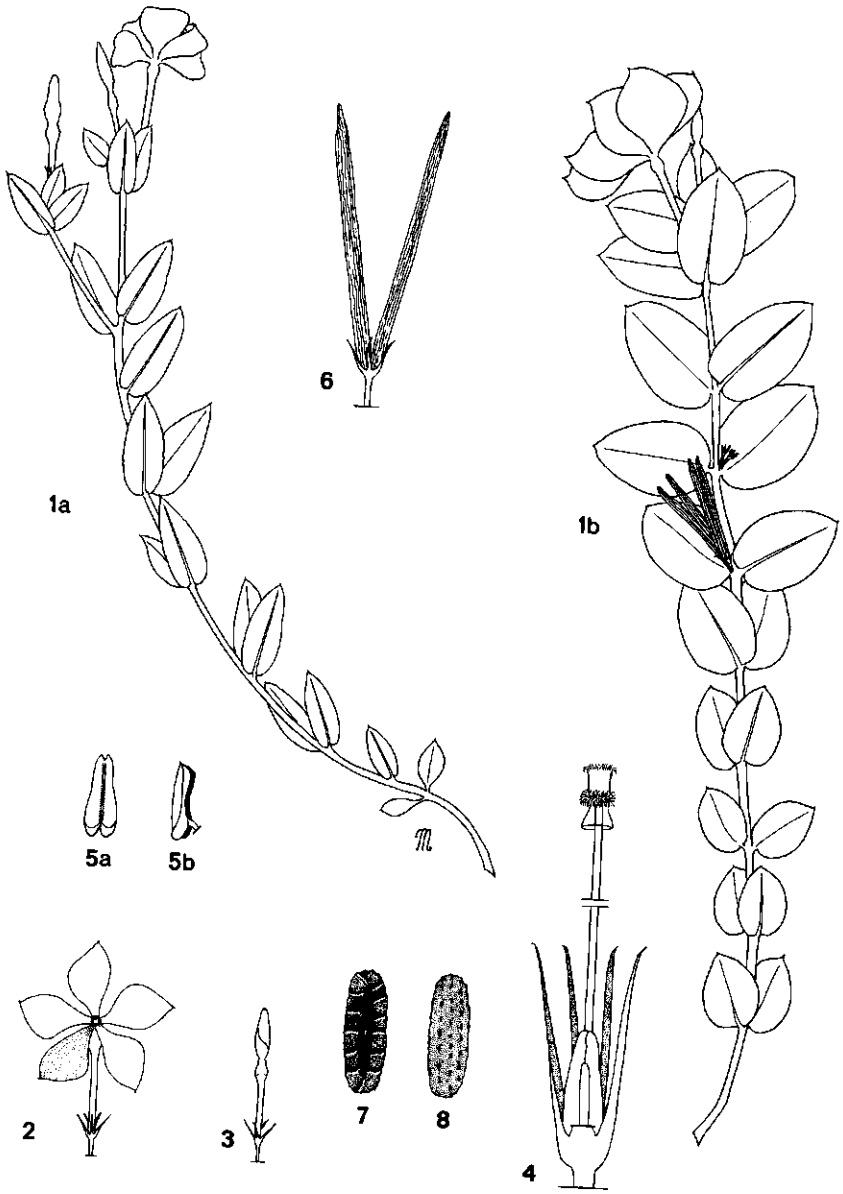
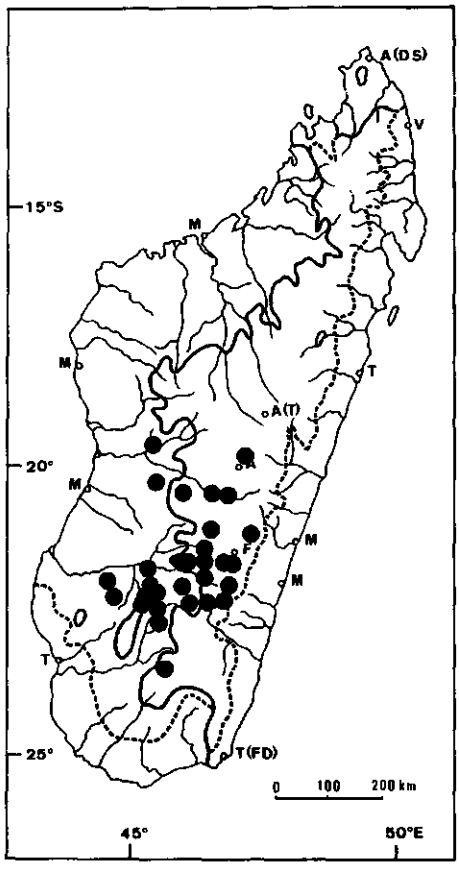


Fig. 4. *Catharanthus ovalis*. **1a, 1b,** habit (x2/3); **2**, flower (x2/3); **3**, bud (x2/3); **4**, pistil (x6 2/3); **5a, 5b,** anthers (x6 2/3); **6**, fruit (x4/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, embryo (x6 2/3); 1a, 6 from Bosser 9124; 1b, 4 from Du Puy et al. MB 463; 2–3, 5a, 5b from Leeuwenberg 14251; 7–8 from Miller et al. 6252.



Map 5. *Catharanthus ovalis*.

Geographical selection of the 97 specimens examined:

Madagascar. Isalo, *Debray* H–852–D (B, P); ibid., *Du Puy* et al. MB 463 (P); ibid., *Dorr* et al. 4147 (K, MO, P, WAG); ibid., *Humbert* 11226 (G, K, P, US), 19585 (holotype P; isotype Z), 28669 (BM, G, K, P), 29879 (BM, K, P); ibid., *Labat* et al., 2143 (K, MO, P, TAN); ibid., *Miller & Randrianasolo* 6096 (G, K, MO, P, WAG); ibid., *Poisson* 576 (P), 694bis (P); ibid., *Schlieben* 8234 (B, BM, G, HBG, K, M, TAN, Z); Ranohira, *Razafindrakoto* RN 11221 (P); 11 km SW of Ranohira, R.N. 7, *Lorence* 2071 (K, MO, P); 25 km W of Ranohira on Tulear road, *Willing* 76 (MO, P, WAG); 10 km SW of Ranohira, along road between Ihosy and Sakaraha, *Miller & Miller* 3780 (K, P, TAN, WAG); between Ambalavao and Ihosy, PK 543, *Bosser* 9125 (P); near Ambalavao, 67 S of Fianarantsoa, *Haine* 203 (K); Sendrisoa, Ambalavao District, *Rakotovao* RN 9295 (P); along the road between Ambalavao and Ihosy, km 25 W of Ambalavao, *Miller & Miller* 3778 (K, MO, P, TAN, WAG); Vohitsoaka, Ambalavao District, *RN* 4801 (P); Tapia Pass, 59 km E of Sakaraha (192 km W of Tulear), *Croat* 30609 (MO, TAN, WAG); 55 km N of Ihosy on R.N. 7, *Miller & Randrianasolo* 6252 (K, MO, P, WAG); road to Ihosy, PK 577, *Morat* 257495 (P, TAN);

Ambatohatoazo (Ihosy District), *Peltier* 1244 (P); Horombe Plains, *Humbert* 11192 (G, P); 14 km by road SW of Ihosy, Horombe Plains, *Goldblatt & Schatz* 8990 (P, TAN, WAG); Horombe Plains, Sakavatony river, *Poisson* 694 (P); between Ankaramena and Fenoarivo, *Veyret* 1081 (P); along Zamandao river, near Ankaramena, *Boiteau* 2027 (G, K, P); R.N.7, PK 541, near La Brioche and 23 km S of the crossing with the Zamandao R., *Dorr* et al. 3924 (K, MO, P, WAG); along R.N. 7, S of Ankazohitroka, between Ihosy and Zazafotsy, *Boiteau* 2085 (A,BM,P); Antambohobe, Farafangana District, *Rakotovao* RN 9842 (P); Ambatomenaloha, *Grandidier* s.n. (P); W of Ambositra, ca 7 km S of Ambatofinandrahana, near village of Mahavanino, Analalehibe, *Du Puy* et al. M623 (K); Ingato, *Morat* 3322 (P); road between Bezaha and Benenitra, middle Ohilahy R. valley, *Morat* 3873 (P); Berilambo Mt, between the Maharivo and Mangoky Rs, *Perrier de la Bâthie* 8912 (P); Malaimbandy, *Rakotozafy* 1088 (B); Ambalabe, Malio R. Basin, *Humbert* 19371 (BM, P); Ankazoaba, *Decary* 16239 (A, P); W of Ankilizato, *Keraudren & Aymonin* 25967 (P); Sakeny (Tsiribihina), *Perrier de la Bâthie* 8870 (P); Beloha, near Ampanihy, *Peltier* 2577 (P); Ikalamavony, Ambohimasoa District, *Humbert* 30229 (P); W of Itremo Mts (Betsileo W), *Humbert* 29982 (P); sin. loc., *Baron* s.n. (K); ibid., *Debray* 1901 (P); ibid., *Montagnac* 82 (P); ibid., *Perrier de la Bâthie* 13148 (P), 16538 (holotype P).

Note: Markgraf distinguished two subspecies within *C. ovalis*, *C. ovalis* subsp. *ovalis* and *C. ovalis* subsp. *grandiflorus*, on the basis of tube length, leaf length/width ratio and lobe length x width. After examining many specimens, the present author is of opinion that no characters can be found to corroborate this distinction. The variation in tube length is too slight, and the leaf length/width ratio and lobe length x width fall more or less within the same limits.

5. Catharanthus pusillus (Murray) G. Don, Gen. Syst. 4: 95 (1837). – Type: plate published by Murray.
Fig. 5, p. 30; map 6, p. 31

Basionym and homotypic synonym:
Vinca pusilla Murray in Nov. Comment. Soc. Reg. Sci. Götting. 3: 66, t.2 f.1 (1773).
Lochnera pusilla (Murray) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4, 2: 145 (1895).

Heterotypic synonym:
Vinca parviflora Retzius in Obs. Bot. 2: 14 (1781). – Type: India, sin. loc., Koenig s.n. (holotype C–VAHL).

Annual herb, 5–45 cm high, erect, with white latex. Stems and branches winged, glabrous. *Leaves* petiolate; petiole 2–9 mm long,

winged, glabrous; stipules 2, glabrous; blade elliptic or ovate or narrowly so, 1.7–6.5 x as long as wide, 2.5–7.7 x 0.6–2.4 mm, acuminate at the apex, cuneate at the base, minutely serrate. *Flowers* axillary, solitary or paired, pedunculate; peduncle 1–5 mm long, glabrous. *Sepals* green, connate at the base for 0–1 mm, 2.9–5.5 x as long as wide, 3.5–5 x 0.9–1.3 mm, glabrous on both sides. *Corolla* white, glabrous outside, pilose inside from 6.5–8.6 mm above base to the mouth, which is 0.8–1.6 mm below the base of the anthers; densely pubescent in the throat; tube 1.8–3.1 x as long as the calyx, 2.6–4.3 x as long as the lobes, 9–11 mm long, 0.9–1.3 mm wide at the base, slightly narrowed above to 0.5–0.8 mm wide, again widened to 1–1.3 mm wide just below the insertion of the stamens which is 7.5–9 mm above the base, then again narrowed to 0.5–1 mm wide at the throat; lobes obovate, 1.2–2 x as long as wide, 2.2–4 x 1.5–2.3 mm, glabrous. *Stamens* with apex 0.2–1 mm below mouth of corolla tube, inserted 0.78–0.81 of the length of the corolla tube (at 7.5–9.6 mm from the base); anthers 3.3–5.5 x as long as wide, 1–1.1 x 0.2–0.3 mm. *Pistil* 8.1–9.9 mm long; ovary ovoid, 1.2–2 x 0.5–0.8 x 0.3–0.6 mm, glabrous; style 6–7.5 mm long; pistil head 0.6–1 x 0.4 mm; basal veil, 0.2–0.31 x 0.4 mm, and cylinder inclusive of woolly ring and conus with stigmoid apex, 0.4–0.6 x 0.4 mm. Disk 0.5–1 x 0.2–0.6 mm, glabrous. *Fruit*: follicles, 14.4–44 x as long as wide, 10–61 x 1–2 mm, glabrous. *Seeds* black, 1.7–3.1 x 1–1.4 mm; embryo 1.5–2.6 x 0.5–1.1 mm.

Distribution: Endemic to India and Sri Lanka.

Ecology: On sand. In pastures, wasteland and on low hillsides. Sunny places. Flowering and fruiting throughout the year. Alt.: 600–1600 m.

Vernacular name: Daisti Sanah.

Etymology: *pusillus* (adjective) means 'very small'.

Uses: Against fever.

Geograpical selection of the 98 specimens examined:

India. Himachal Pradesh: Simla, *Drummond* 2778 (E), *de Hügel* s.n. (M). Delhi: Najafgarh, *M.G., K.D.* 267 (BR). Haryana: Karnal, *Drummond* 23579 (E, K), 25508 (E, K). Punjab: Chandigarh, Sukhna Lake, *Handa* s.n. (F). Rajasthan: Haji–Ki–Kothi, Niwai, Tonk District, *Shetty* 1247 (L). Uttar Pradesh: Saharanpur, *Duthie* s.n. (K); ibid., *Jaquemont* s.n. (P). Orissa: Padampur, District D2A3, *Panigrahi* 20513 (L); District Puri, *n.n.* 678 (E). Andhra Pradesh: Anantapur, *Gamble* 21344 (K); ICRISAT Farm, NE corner, Patancheru, near Hyderabad, *van der Maesen* 2241 (K, WAG), 3877 (K, WAG). Kerala: Cannanore, *Campbell* s.n. (E); Malabar, Concan *Stocks, Law & Co* s.n. (BM, C, L, M, P, TCD); Thenmali,

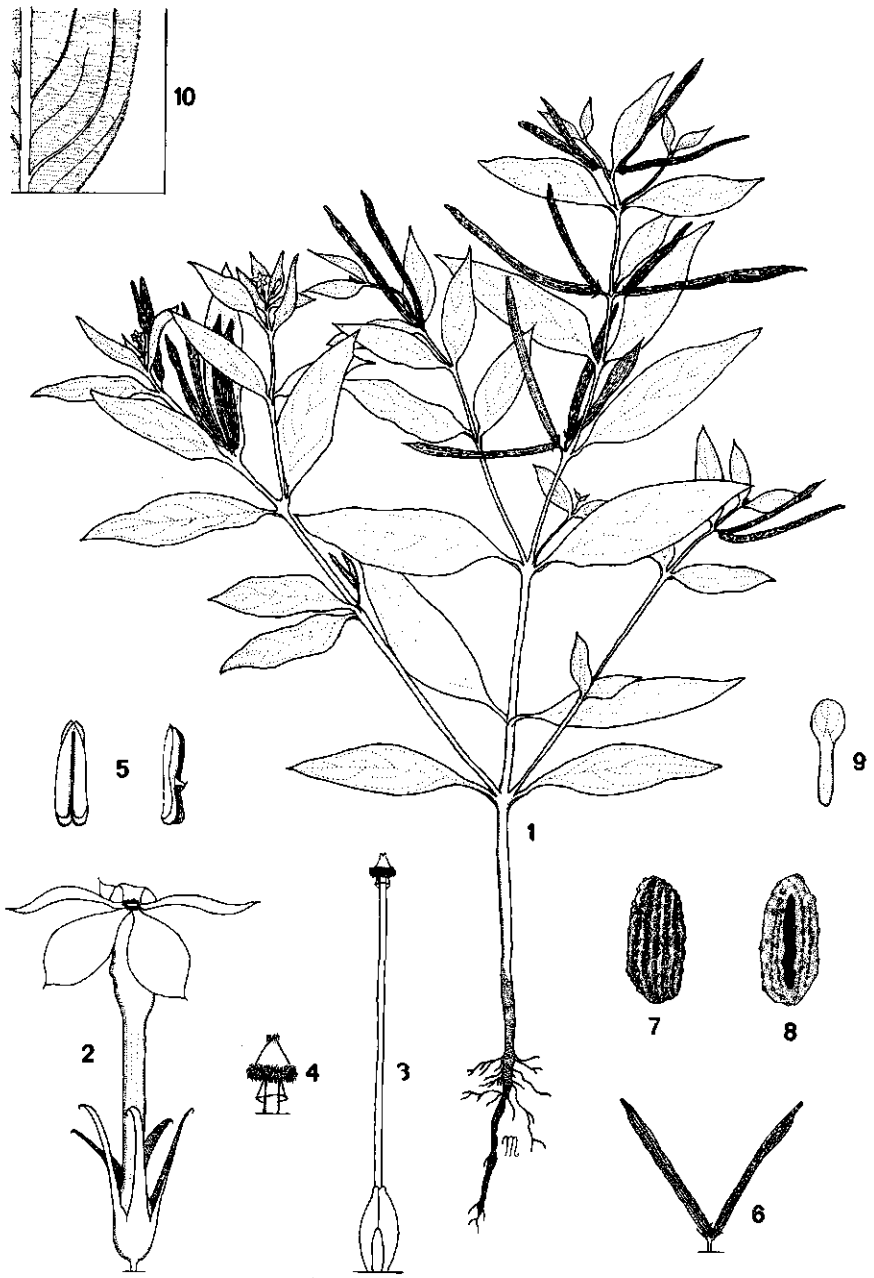
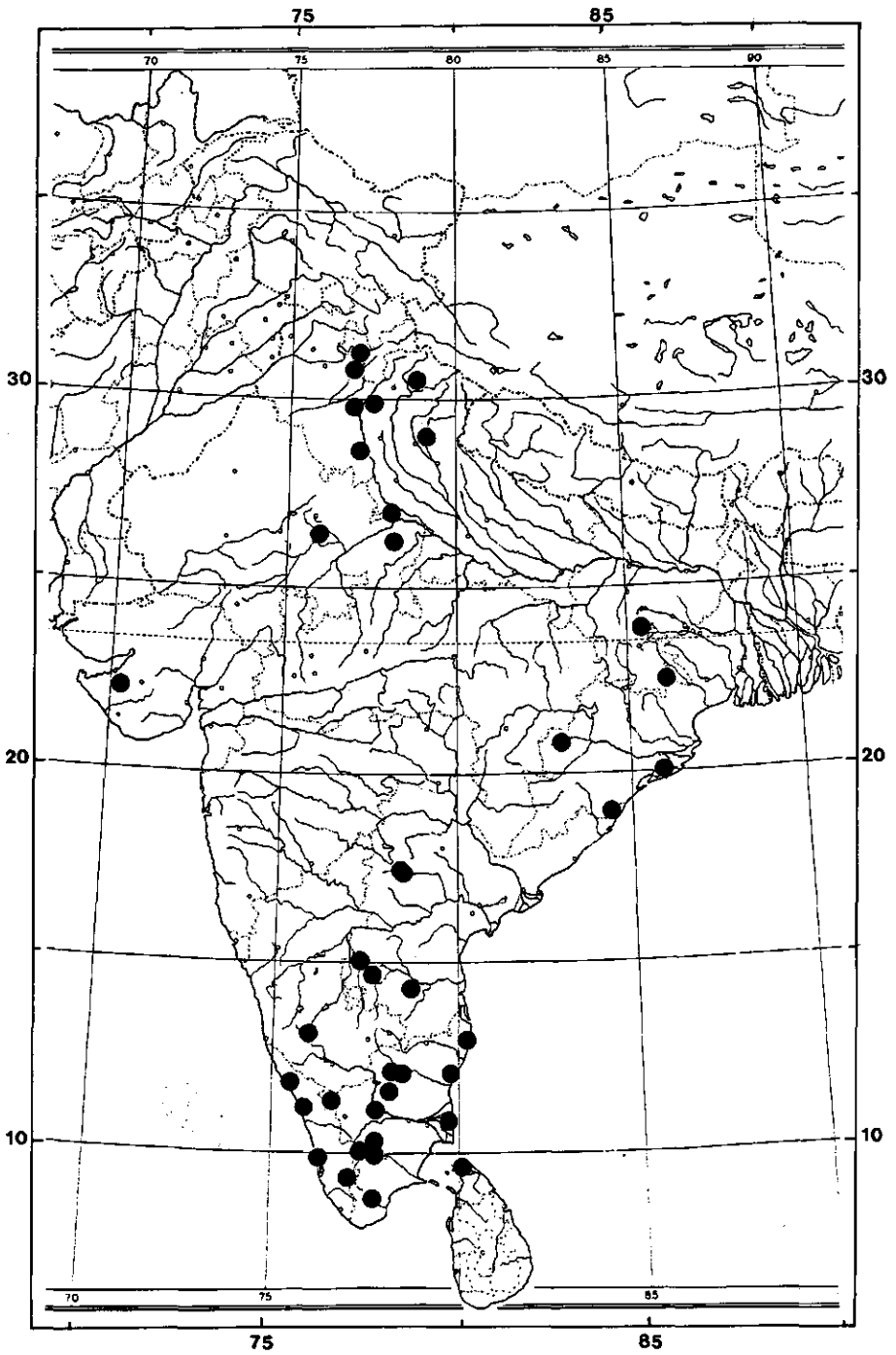


Fig. 5. *Catharanthus pusillus*. **1**, habit (x1/2); **2**, flower (x5 1/2); **3**, pistil (x6 2/3); **4**, pistil head (x13 1/2); **5**, anthers (x13 1/2); **6**, fruit (x2/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, embryo (x6 2/3); **10**, detail leaf (x6 2/3); 1–5, 10 from Shetty 1247; 6–9 from Handa s.n.



Map 6. *Catharanthus pusillus.*

Subramanyan 63070 (E). Karnataka: Hassan District, Mysore, *Gandhi* HFP 2084 (MO, US); Belvathally, Hassan District, Mysore, *Ramamoorthy* HFP 1961 (MO, US). Tamil Nadu: Periya Kalam, *A.G. & Lady Bourne* 1595 (K); Wajra–Karour, Bellary District, *Chaper* s.n. (P); Coromandel, *Commerson* s.n. (P), *Kamphövener* 353 (C); Madras, *n.n.* s.n. (E), *Lindley* s.n. (K), *Campbell* s.n. (E); Dharmapuri, Harur District, Kottapatti, *Diraviadass* 27850 (L), *Venugopal* 21066 (K); Salem, Attur District, *Arockiasamy* 3720(A); Pondicherry, *Perrottet* s.n. (E, K, P), 320 (L, M), 328 (B); Erode, *Flügel* 5003 (B); Calicut, *Drew* s.n. (E); Nilghiri Mts., *Rev. Johnson* s.n. (TCD), *Schmid* 334 (B); Palamcottah, *Herb. Wight* 2530 (E), 2278 (E).

Sri Lanka. Jaffna, *K.J.* s.n. (K).

Cult.: Sierra Leone, Kent, *Deighton* 2669 (K).

6. Catharanthus roseus (L.) G. Don, Gen. Syst. 4: 95 (1837). – Type: Miller, Fig. Beaut. Pl. 2: t. 186 (1757). Typotype: Miller 1849 (BM), cf. Stearn, W.T., in Taylor, W.T. & N.R. Farnsworth, The Catharanthus alkaloids 9–44 (1975).

Fig. 6, p. 33; map 4, p. 20

Basionym and homotypic synonyms:

Vinca rosea L., Syst. Nat. 10th ed. 2: 944 (1759).

Pervinca rosea (L.) Moench, Meth. 463 (1794).

Lochnera rosea (L.) Reichenbach ex Endl. in Gen. Pl. 583 (1838); Stapf in Fl. Cap. 4, 1: 504 (1907); Spach, Hist. Nat. Vég. Phan. 8: 526 (1839).

Ammocallis rosea Small in Fl. S.E. U.S. 935 (1903).

Vinca speciosa Salisb. in Prodr. 147 (1796), nom. illegit.

Heterotypic synonym:

Vinca guilelmi–waldemarii Klotzsch in Klotzsch & Garcke, Bot. Reise Prinzen Ergebn. Waldem. 89, t. 70 (1862). – Type: Nepal (?), Himalaya, *Hoffmeister* (holotype probably B†).

Undershrub, 30–100 cm high, erect or decumbent, with white latex and a somewhat unpleasant smell. Trunk up to 1 cm in diameter, pale grey. Stems terete, narrowly winged, green or dark red, pilose or glabrous. *Leaves* decussate, petiolate; petiole 3–11 mm long, green or wine–red, pilose or glabrous, narrowly winged; stipules 2–4, glabrous or pilose; blade dark green with paler main veins on both sides, oblong or obovate or narrowly so, 1.6–3.9 x as long as wide, 25–84 x 8–40 mm, acute or rounded or slightly retuse at the apex, cuneate at the base, apiculate, margin entire, ciliate or not so, glabrous or pilose at both sides. *Flowers* axillary, solitary or

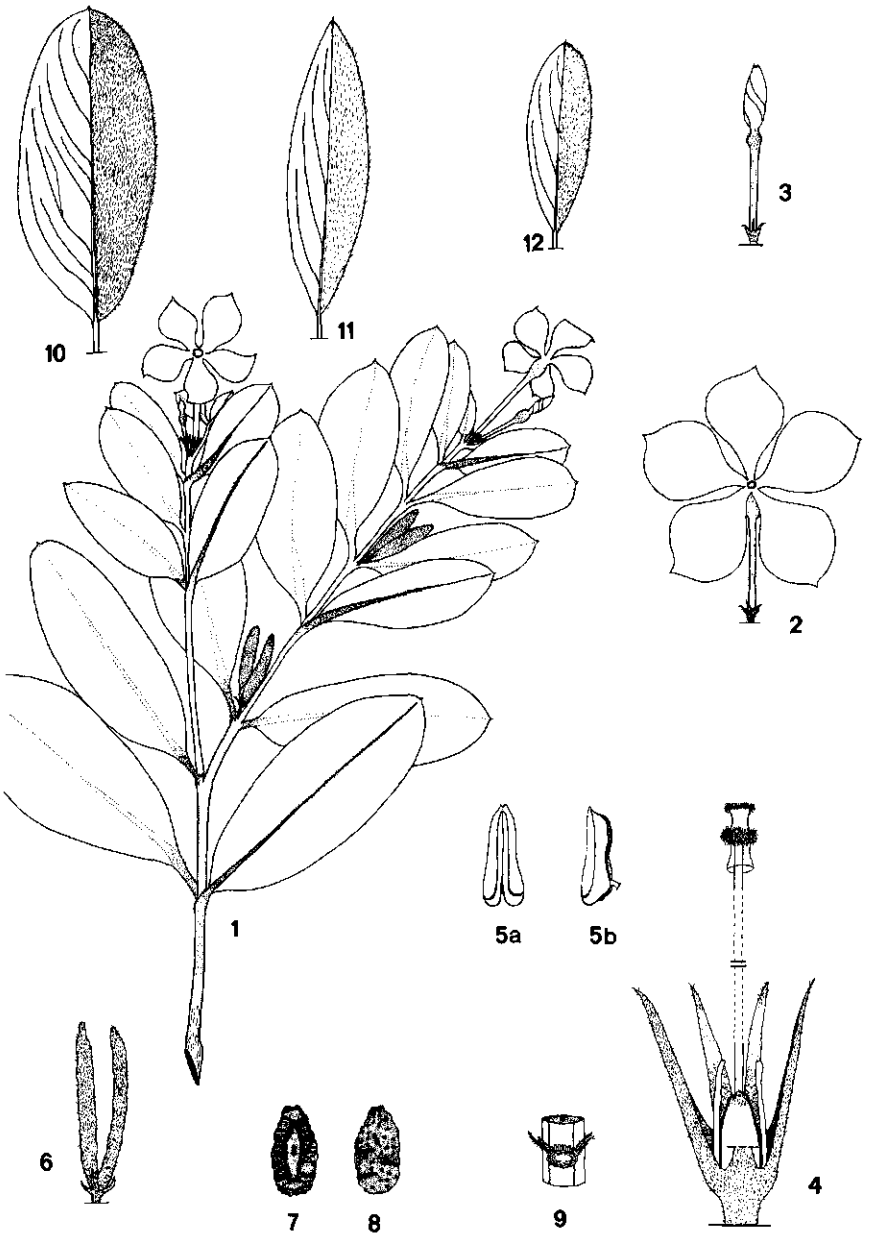


Fig. 6. *Catharanthus roseus*. **1**, habit (x2/3); **2**, flower (x2/3); **3**, bud (x2/3); **4**, pistil (x6 2/3); **5**, anthers (x6 2/3); **6**, fruit (x2/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, detail stem (x3 1/3); **10**, **11**, **12**, leaves (x2/3); 1, 9 from sin. coll. 94; 2 from Leeuwenberg 11602; 3, 4 from Leeuwenberg 11601; 5 from Leeuwenberg 12125; 6–8 from Leeuwenberg 14162; 10 from sin. coll. 914; 11 from Leeuwenberg 10433; 12 from Johnston s.n.

paired, pedunculate; peduncle 1–4 mm long, narrowly winged, glabrous or pilose. *Sepals* medium green, connate at the base for 0–1 mm, 2–3 x as long as wide, 2–6 x 1–2 mm, glabrous or pilose outside, glabrous or sometimes laxly pilose inside. *Corolla* lobes pink, magenta or white with a darker centre, paler or whitish outside; tube pale green, glabrous or pilose outside, with a 1 mm wide strigose ring inside, just below the mouth and a second strigose ring just below the insertion of the stamens, throat densely pubescent; tube 5.5–9 x as long as the calyx, 1.1–2.5 x a long as the lobes, 22–30 mm long, 1.3–2 mm wide at the base, slightly narrowed above to 0.7–1.5 mm wide, widened to 2–3 mm wide at about 3/4 of the length of the tube, throat 1–2 mm wide; lobes broadly obovate, almost rounded, with a 1–1.5 mm long tip, 1–3 x as long as wide, 10–26 x 5–20 mm, velutinous at the base for 0–1 mm, entire or ciliate at the left side of the lobe; in bud overlapping to the left, glabrous or laxly pilose. *Stamens* with apex 0.1–0.5 mm below the mouth of the corolla tube, inserted 0.8–0.9 of the length of the corolla tube (at 19–27 mm from the base of the tube); anthers 3.5–6.2 x as long as wide, 2.5–2.9 x 0.4–0.7 mm. *Pistil* 18–27 mm long; ovary narrowly ovoid, 1.5–3 x 0.4–0.8 x 0.5–1 mm, glabrous or pilose; style 15–23 mm long; pistil head 1.2–1.7 x 0.5–0.8 mm; basal veil, 0.4–0.7 x 0.6–0.8 mm, and cylinder inclusive of woolly ring and short stigmoid apex, 0.8–1 x 0.5–0.8 mm. Disk 2–4 x 0.4–0.8 mm, glabrous. *Fruit* green or pale green; follicles 10–25 x as long as wide, 22–47 x 2–3 mm, glabrous or pilose. *Seeds* black, 2–3 x 1.1–1.5 mm; embryo 1.5–2.5 x 0.5–1.2 mm.

Distribution: Endemic to Madagascar, but cultivated and naturalized all over the tropics and subtropics. Many cultivars have been selected and are for sale as indoor and/or garden plants.

Ecology: On (coral) sand, beaches, limestone rocks. In open forests, ruderal places, along roadsides, in dry shrub woodland or grassland. Flowering and fruiting throughout the year. Alt: 0–900 m.

Vernacular names: Madagascar periwinkle (English); pervenche de Madagascar (French); soldatenbloem, roze maagdenpalm (Dutch); somping kratas, jambangan, taki ayam (Malay); kakapoule (Creole); nithya kalyani (India); ram–goat rose, old mail, periwinkle (Jamaica); arivotambelona, sarita (Betsileo, Madagascar); tonga (Androy, Madagascar); vonenina (Merina, Madagascar); heladolo (Betsimeraka, Madagascar); guiana (Mozambique); kuinini (Tonga Isl.); pervenche du Jays (New Caledonia); palawel (Ifugao, Philippines); kihapai (Hawaii).

Uses: Used in treatment of diabetes (Jamaica), against stomache ache, fever, indigestion and dyspepsy (Madagascar). Roots used in mixture against veneral diseases. Many valuable alkaloids have been found in the roots of *C. roseus*. Several of them are used against some forms of cancer (e.g. leukaemia) (Svoboda, 1964).

Seed dispersal: The seeds of *Catharanthus roseus* have been recorded to be dispersed by ants (van Steenis, 1934).

Specimens, collected in the wild, examined:

Madagascar. Mahajanga, near Ampijoroa Forest Station, *Phillipson* 2065 (K, P, TAN, WAG); Maroantsetra, Antongil Bay, *Mocquerys* 101 (G, Z); Ambila–Lemaitso, *Benoist* 842 (P); between Ambila–Lemaitso and Tampina, *Boiteau* 674 (P); Tamatave, *Boiteau* 1291 (P); ibid., *Decary* s.n. (P); ibid., *Keller* s.n. (Z); near Tamatave, *Humbert & Viguier* 210 (B, G, P); Tamatave, Analalava Forest, near Foulpointe, *Leeuwenberg & G.R. Rafamantanantsoa* 14482 (TAN, WAG); 3 km N of Antalaha, *Imbert* 92 (P); Andilamena, *Safy* RN 2126 (P); Ampaniaherana, Fianarantsoa, *SF* 14467 (P); Kotoala, Ambovombe District, *Decary* 2723 (P); Ambovombe, *Decary* 9134 (K, P); Manambaro, *Seligson* 553 (A); Mananjary, *Decary* 13679 (P); N of Imonty, upper Mananara R., *Leandri* 4567 (P); Mananara N (village), *SF* 26106 (P); Vohitany (Bekily), *Bosser* 15857 (P); Berorotra, Mangoky R., *Decary* 18858 (P, US); 10 km S of Tranoroa, *Bosser* 14049 (P, TAN); between Tranoroa and Beloha, *Leandri* 4176b (P), 4174 (P); road between Ampanihy and Beloha, 6 km after Tranoroa, *Keraudren* 918 (BM, P); near Ampanihy, *Croat* 31360(K, MO); Manambolo Valley, near Esomony, *Humbert* 12988 (P); Mandrare Valley, near Anadabolava, *Humbert* 12603 (P); Fort Dauphin, *Catat* 4301 (P); ibid., *Decary* 4252 (BM, P), 9812 (K, P), 14122 (P); ibid., *Humbert* 5972 (A, P, US), 20391 (BM, K, P),; ibid., *Scott Elliot* 2445 (P); ibid., *Greybine* s.n. (P); near Analamotsaky, about 45 km W of Fort Dauphin, *Fosberg* 52528 (US); Fort Dauphin–Mandena Road, *Dorr* et al. 3974 (K, MO, P, WAG); near Soanierano, Fort Dauphin, *Geay* 6726 (G), 6727 (P), 6728 (P); Andohahela Res., Parcelle II, NW corner, near Ihazofotsy=Anzofotsy, *Leeuwenberg* et al. 14162 (K, P, TAN, WAG); Andohahela Res., Parcelle II, *Leeuwenberg* et al. 14033 (WAG); Cape of St. Marie, *Friedmann* 204 (B).

Naturalized and cultivated:

Africa. Aldabra Isl., Annobon Isl. (= Pagalu), Ascension Isl., Benin, Botswana, Cameroun, Gloriosa Isl., Ivory Coast, Kenya, Liberia, Mafia Isl. (Tanzania), Mauritius, Mozambique, Reunion, Rodrigues Isl., Sao Tomé, Seychelles, Sierra Leone, South Africa, Tanzania, Togo, Zaire, Zanzibar.

America. Brazil, Cayman Isl., Cuba, Dominican Rep., French Guyana, Honduras, Jamaica, Navassa Isl., Nicaragua, U.S.A. (Florida).

Asia. Bangladesh, Bonin Isl. (= Ogasawara–shoto), Borneo, Burma, China, Guam Isl., Hong Kong, India, Indonesia (Java, Sabah, Sumatra), Malaysia, Marquesas Isl., Nepal, New Caledonia, Papua New Guinea, Philippines, Saudi Arabia, Soela Isl., Taiwan, Thailand, Tonga Isl., Vietnam.

Australia. Queensland.

Note: The excellent drawing which appeared in Klotzsch's publication of *V. guilelmi-waldemarii* leaves no doubt that he had a specimen of *C. roseus*.

7. Catharanthus scitulus (Pichon) Pichon in Mém. Mus. Nat. Hist. Nat. Paris, II, 27: 237 (1949). – Type: Madagascar, between Tsivory and Anadabolava, middle Mandrare R., Anivorano, *Humbert* 12312 (holotype P; isotype G).

Fig. 7, p. 37; map 1, p. 17

Basionym:
Lochnera scitula Pichon in Notul. Syst. ed. Humbert 13: 207 (1948).

Annual herb, 4–18 cm high, tender. Roots finely ramified, thin. Stems and branches decumbent, winged, glabrous. *Leaves* petiolate; petiole 2–8 mm long, winged, glabrous; stipules 2, glabrous; blade ovate or elliptic or narrowly so, 2–5 x as long as wide, 10–25 x 2–9 mm, acuminate at the apex, cuneate at the base, entire, glabrous on both sides. *Flowers* solitary, axillary or terminal, pedunculate; peduncle 1–2 mm long. *Sepals* green, connate at the base for 0–0.5 mm, 2.7–3.2 x as long as wide, 0.6–0.8 x 2–2.5 mm; glabrous on both sides. *Corolla* pink or blue-violet, throat (pale) yellow, glabrous outside, pilose inside from 2–2.7 mm above base to the mouth, which is 0.5–1 mm below the base of the anthers; throat densely pubescent; tube 2–3 x as long as the calyx, 1.2–1.7 x as long as the lobes, 5.5–6 mm long, 0.6–1 mm wide at the base, narrowed above to 0.5 mm wide, again widened to 0.7–1 mm wide just below the insertion of the stamens which is 2.3–2.7 mm above the base, then again narrowed to 0.6 mm wide at the throat; lobes narrowly elliptic, 2–4.3 x as long as wide, 3.5–5 x 1–2 mm, glabrous. *Stamens* with apex 1.6–2 mm below mouth of corolla tube; inserted 0.5–0.51 of the length of the corolla tube, (at 2.9–3.5 mm from base); anthers 3.5–5 x as long as wide, 0.7–1 x 0.2 mm. *Pistil* 2.7–4 mm long; ovary ovoid, 0.7–1 x 0.5–0.7 x 0.3–0.4 mm, glabrous; style 1.5–2.5 mm long; pistil head 0.3–0.5 x 0.3–0.4 mm; basal veil, 0.1–0.2 x 0.4 mm, cylinder inclusive of woolly ring and stigmoid apex, 0.2–0.3 x 0.3–0.4 mm. Disk 0.5 x 0.1 mm. *Fruit*: follicles 5–12 x as long as wide, 6–15 x 1–3 mm. *Seeds* black, 1.5–2 x 0.5–1.2 mm; embryo 1.2–1.7 x 0.4–0.8 mm.

Distribution: Endemic to South and Southeast Madagascar.

Ecology: Xerophyllous bushes on limestone, in open savanna on laterite, sand and river banks. Dry and sunny places. Alt: 10–750 m. Flowering and fruiting November–May.

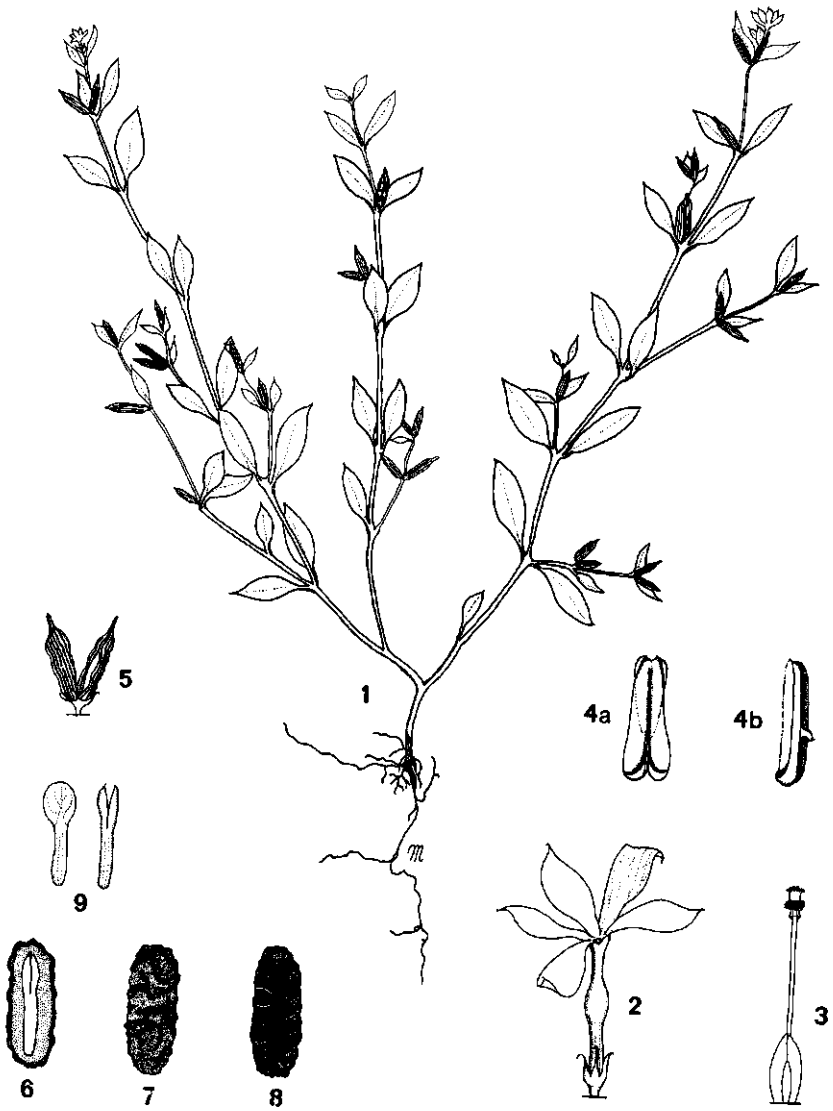


Fig. 7. *Catharanthus scitulus*. **1**, habit (x2/3); **2**, flower (x3 1/3); **3**, pistil (x10); **4a**, **4b** anthers (x6 2/3); **5**, fruit (x6 2/3); **6**, seed, section (x6 2/3); **7**, seed, back side (x6 2/3); **8**, seed, hilar side (x6 2/3); **9**, embryo (x6 2/3); 1–4 from Debray 1722; 5–9 from R–16 394.

Vernacular name: Tsinainkiro (Antandroy).
Etymology: *scitulus* (adjective) means 'pretty, neat, trim, elegant'.

Specimens examined:
Madagascar. Antomilohobe, Ivohibe, *Rakotomiama* RN 11718 (P); Antanimora, Ambovombe District, *Decary* 3822 (P); Mandrare Valley, Ambovombe District, *Decary* 2626 (P, TAN); Ambovombe, *Decary* 3493 (BM, P, US); near Ankaleiano, *Keraudren* 864 (P); near Tulear, *Humbert* 14395 (P), 19846 (P); Fiharenana R., near Manera, *Perrier de la Bâthie* 19208 (P); Manombe at Morondava, *Grandidier* s.n. (P); SE of Betioky, near Evoatana, *Keraudren* 1435 (P); Near Beza Mahafaly Reserve, near Betioky, *Phillipson* 2799 (MO); Along route between Andranovory and S of Andranovory, *Croat* 31089 (MO); 32 km South of Beraketa, *Debray* 1722 (P); Ejeda P1, Ampanihy District, R–16 394 (P); 40 km S of Ampanihy, Menarandia R. mouth, *Humbert* 29344 (P); between Tsivory and Anadabolava, middle Mandrare R., Anivorano, *Humbert* 12312 (holotype P; isotype G); Imanombo, *Bosser* 167 (P); Ampandrandava, between Bekily and Tsivory, *Seyrig* 313 (P); Aven Vintany, near Androka (S, W), *Bosser* 47 (P); Andohahela Res., Parcelle 2, *Randriamampionona* 142 (TAN, WAG).

8. Catharanthus trichophyllus (Bak.) Pichon in Mém. Mus. Nat. Hist. Nat. Paris, II, 27: 237 (1949). – Type: Madagascar, sin. loc., Baron 1591 (K).
Fig. 8, p. 39; map 1, p. 17

Basionym and homotypic synonym:
Vinca trichophylla Bak. in Journ. Linn. Soc. Bot. 20: 204 (1883).
Lochnera trichophylla (Baker) Pichon in Notul. Syst. ed. Humbert 13: 207 (1948).

Undershrub, up to 100 cm high, erect, with white latex and a somewhat unpleasant smell. Stems quadrangular, winged, reddish or purple. *Leaves* (sub–)sessile; stipules 2–5, glabrous or laxly pilose; blade herbaceous, oblong or ovate or narrowly so, 2.3–5.2 x as long as wide, 2.7–8.5 x 0.9–3.8 cm, acuminate at the apex, rounded or slightly cuneate at the base, margin ciliate, more or less hairy on both sides, especially beneath. *Flowers* axillary, solitary or paired, pedunculate; peduncle 4–11 mm long, quadrangular, glabrous or laxly pilose. *Sepals* 5(–6), pale green, sometimes slightly purple, connate at the base for 0–0.5 mm, 4–6.3 x as long as wide, 6–9.5 x 1.3–1.9 mm, glabrous inside, glabrous or pilose outside. *Corolla* lobes white, pink, red, purple or pinkish–red, tube often pale green with a green–yellow or yellow throat; tube glabrous or laxly pilose outside, with a 1–1.5 mm wide strigose ring inside, just below the

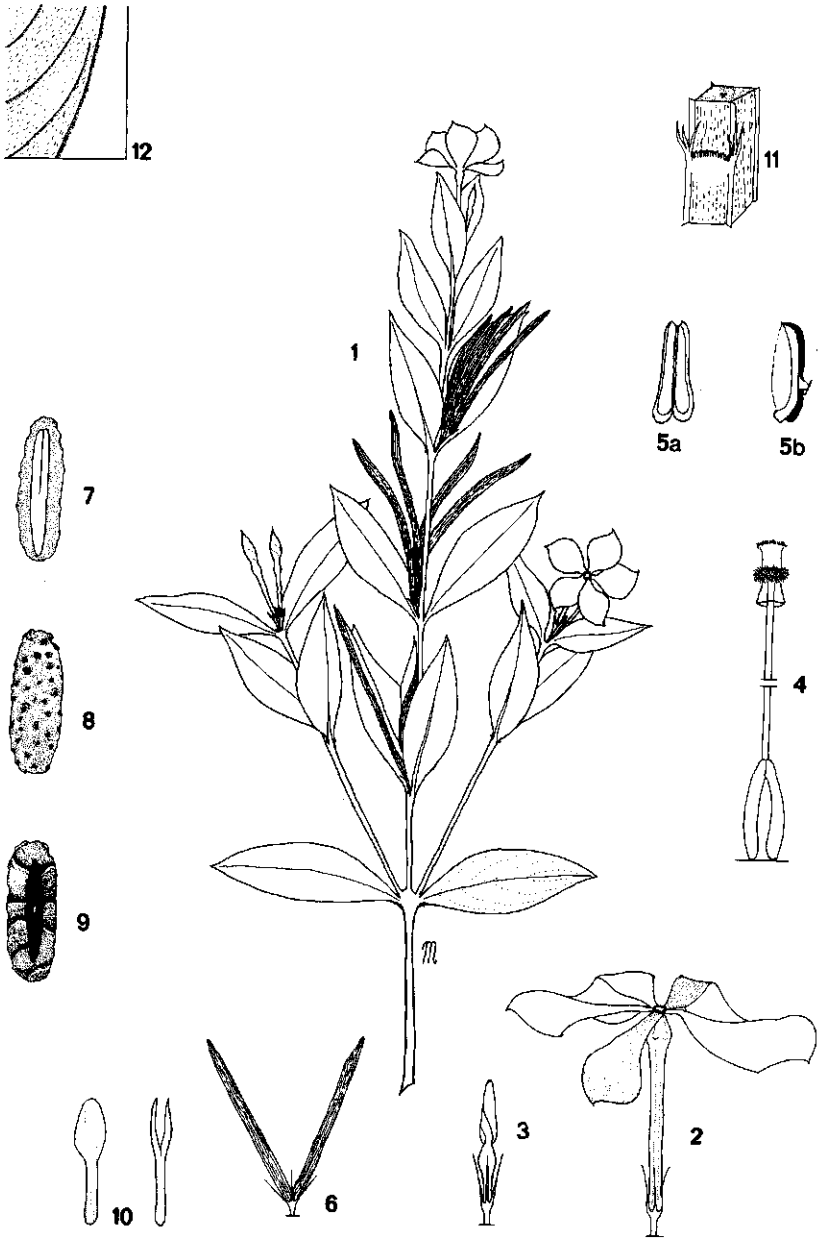


Fig. 8. *Catharanthus trichophyllus*. **1**, habit (x2/3); **2**, flower (x4/3); **3**, bud (x6 2/3); **4**, pistil (x6 2/3); **5a**, **5b** anthers (x6 2/3); **6**, fruit (x2/3); **7**, seed, section (x6 2/3); **8**, seed, back side (x6 2/3); **9**, seed, hilar side (x6 2/3); **10**, embryo (x6 2/3); **11**, stem (x3 1/3); **12**, leaf margin (x6 2/3). 1, 12 from Hildebrandt 3148; 2–11 from Leeuwenberg 13855.

mouth and a second 2–3 mm wide strigose ring just below the insertion of the stamens, throat densely pubescent; tube 2.4–3.7 x as long as the calyx, 1.3–2.8 x as long as the lobes, 22–26 mm long, 1–2.5 mm wide at the base, slightly narrowed above to 0.7–1.3 mm wide, widened to 1.8–3 mm wide at about 3/4 of the length of the tube, throat 1–2 mm wide; lobes 5(–6), narrowly obovate, 1–2.8 x as long as wide, 8–18 x 4–14.5 mm, velutinous at the base for 0–2.5 mm. *Stamens* 5(–6), yellow, with apex 0.1–1.4 mm below the mouth of the corolla tube, inserted 0.81–0.89 of the length of the corolla tube (at 17.1–23 mm from the base of the tube); anthers 4.3–7 x as long as wide, 2.3–3.2 x 0.4–0.7 mm. *Pistil* 16.8–22.5 mm long; ovary narrowly ovoid, 1.5–3.9 x 0.5–1 x 0.5–1 mm, glabrous; style 14–18.5 mm long; pistil head 1.2–1.6 x 0.4–1 mm; basal veil, 0.3–0.6 x 0.4–1 mm and cylinder inclusive of woolly ring and short stigmoid apex, 0.7–1 x 0.5–0.7 mm. Disk 1.4–2.7 x 0.4–0.7 mm, glabrous. *Fruit* green to purplish–green, pale green to pale brown when mature; follicles 15–36.7 x as long as wide, 29–70 x 1.5–3 mm, glabrous to laxly pilose outside. *Seeds* dark brown, 2.3–3.1 x 0.8–1 mm; embryo 2–2.8 x 0.5–0.7 mm.

Distribution: Endemic to Madagascar, especially in the northern region.

Ecology: On sand, riverbanks, gneiss and laterite, mainly in open (grassy) places in forest, along forest edges and roadsides. Flowering and fruiting July–May. Alt: 0–1400 m.

Vernacular names: Befala, Razoma.

Uses: The root is boiled in water and the resulting tea is drunk to cure backaches.

Specimens examined:

Madagascar. Maromokotra, *Veyret* 1142 (P); Ankarafantsika Mts, *Debray* 1698 (P), 12814 (A, P), 14528 (P); Ampijoroa, *Boiteau* 1022 (MO, P); Ampijoroa F.R. = Res. Nat. 7, near Tsaramandrosa For. Stat., *Leeuwenberg* 13855 (MO, WAG); ibid., *Dorr* 3784 (K, MO, P, S, TAN, US, WAG); Ambato Peninsula, *Veyret* 1146 (P); Bongolava, Port Bergé, *Morat* 4447 (P); 50 km near Antsohihy, road to Befandriana N, *Bosser* 16723 (P, TAN); Ambanja–Andilamboay Road, *Debray* 1590–D (B, P); Nosy Bé, *Boivin* 2077 (P); ibid., *Hildebrandt* 3148 (BM, G, K, L, M, P, W); ibid., *Perrier de la Bâthie* 18718 (BM, P); Mahabo, Nosy Bé, *Lebosaka* RN 7819 (A, K, P); Nosy Komba, *Keraudren* 1609 (P); upper Sandrakoto R., to Bealeanana, *Humbert* 25448 (G, P); road from Antsohihy to Bealeanana, 13–15 km E of Antsahabe, *Gentry* 11768 (P); Ankaigina Mts, along road to Bealeanana, *Bosser* 2585 (P); Manditsara, *Decary* 14490 (P); Anjobony, *Perrier de la Bâthie* 8959 (P); Maromandia, Sandrakoto, *Decary* 1006 (WAG), 1082 (P), 1239 (P); Borilambo Mt, between the Mahariva and Mangoky Rs, *Perrier de la Bâthie* 8912

(P); Analava District, *Waterlot* 228 (P); between Doany and Anketsahely, *Humbert* 23180 (BM, K, P): near Antongodrina, *Humbert* 23992 (BM, P); W of the Manatenina R., tributary of the Lokoho R., *Humbert* 22407 (P); near Andapa, Lokoho R. Basin, *Humbert* 21990 (BM, K, P); upper Sofia R. valley, near Antsakabary, *Humbert* 18097 (P); Maroantsetra, *van Nek* 2156 (WAG); St. Marie Island, *Boivin* 1784 (G, K, P), 1853 (G); Lake Alaotra, *MEN–3* (P); Menaloha, Ambatondrazaka District, *Cours* 619 (P); Tamatave, *Vigreux* s.n. (P); near Maromamy–Brickaville, R.N. 2, *Rakotobe* 120 (P); Andevoranto, Tamatave, *Scott–Elliot* 1787 (BM, K); Manajary, *Geay* 7346 (P), 7530 (P), 7531 (P), 7625 (P), 7743 (P); near Farafangana, *Debray* 1257 (B, P); Befotaka, Farafangana, *Decary* 4761 (P), 4762 (P); Anivorano, *Schlieben* 8035 (B, BM, G, HBG, K, M, TAN, Z); sin. loc., *Baron* s.n. (K), *Perrillé* 323 (P, paratype), 522 (P, paratype).

Cult.: Madagascar: Antanarivo, *Boiteau* 1003 (P). The Netherlands: Wageningen, Dept. of Plant Taxonomy, greenhouse 88PTMC 059, *van Setten* 989 (WAG); ibid., *van Veldhuizen* 1293 (WAG).

Nomen nudum

Lochnera Reichenbach, Consp. Regn. Veg. 1: 134 (1828) = *Catharanthus* G. Don.

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Schmid, B., 334 (pu).

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Catharanthus roseus, the Madagascar Periwinkle, a review of its cultivars

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Introduction

> "Vinca rosea: These are amongst the most easily managed of all stove plants; they are continuous bloomers all through the summer and autumn, producing their cheerful–looking, Phlox-like flowers from the points of the shoots in unbroken succession from June to October. They are easily propagated, not much subject to the attacks of insects, and deserve to be much more generally grown for ordinary decorative purposes than they at present are, for, save where cultivated as exhibition specimens, they are seldom met with except in a halfstarved condition."

This was written down in 1885 by Baines, and, unfortunately, it is still valid more than a century later. But for the 21st century, *Catharanthus* or Madagascar Periwinkle is bound to become popular, as the 'large' seed companies around the world have increased their efforts to breed new cultivars.

In their 1992 catalogue Thompson & Morgan wrote: "Every few years or so T&M acclaim the virtues of significant progress or 'breakthroughs' in the development for the garden of new plants. In the early seventies it was with seed–raised geraniums. In the eighties, *Impatiens* recorded a similar rise in popularity. And now for the nineties, T&M would draw your attention to this decade's likely front runner *Catharanthus*." To complete this image, Park Seed wrote in their 1995 catalogue: "Annual *Vinca* is surging ahead to become one of America's favorite annuals for summer bedding and landscape use."

Since I became gardener for the Division of Pharmacognosy, of the Leiden/Amsterdam Center for Drug Research at Leiden University in The Netherlands, I have grown *Catharanthus* plants for research, although it was not really necessary to grow many plants and/or many different cultivars. Every year, I have been allowed to join in the annual seed exchanges by the Hortus Botanicus Leiden. Many botanical gardens around the world exchange seeds. In 1989 I received a sample of *Catharanthus* seeds from Boedakalesk, Hungary. The plants produced three different flower colours, and, accordingly, I became more interested in the plant.

This resulted in an extensive study of *Catharanthus* cultivars from literature, seed catalogues and incorporating my own experimental

work. The data referred to in this paper will hopefully be a contribution to further popularization of *Catharanthus*.

Catharanthus and the Apocynaceae family

The genus *Catharanthus* belongs to the family Apocynaceae. This family name was given by A.L. de Jussieu in 1789. It is a large family; it contains about 150 genera with about 1700 species. It is of mainly tropical distribution with only a few species in the temperate zone. Ranging from annual and perennial herbs to shrubs, lianas and small to large trees, almost all species are characterized by having a milky white latex and entire leaves. The flower consists of a tubular corolla with 5 lobes which are twisted in bud, and the seeds have a large straight embryo. For references see Leeuwenberg 1994.

The more popular and better–known plants of this family belong to the genera *Allamanda, Amsonia, Mandevilla, Nerium, Plumeria, Rauvolfia, Tabernaemontana, Tabernanthe, Thevetia, Trachelospermum* and of course *Vinca*.

Catharanthus is a small genus with 8 species. In India a single species occurs; *C. pusillus*. The other 7 species are endemic to Madagascar; *C. coriaceus, C. lanceus, C. longifolius, C. ovalis, C. roseus, C. scitulus* and *C. trichophyllus* (see van Bergen, this volume). In Botanic Gardens only *C. pusillus* (phot. 1), *C. roseus* and *C. trichophyllus* (phot. 2) are grown, the other species are (as far as we know) not in cultivation. Of these three, only *Catharanthus roseus* is commercially grown. With my own plants I managed to grow hybrids of *Catharanthus trichophyllus X C. roseus*. I have also seen plants of the same cross in the Palm House of the Royal Botanic Gardens, Kew, near London, England. Plaizier (1981) mentions several natural hybrids such as: *C. coriaceus X C. trichophyllus* and *C. roseus X C. trichophyllus*. Descriptions of *C. trichophyllus* and a named hybrid are also included at the end of the cultivar list.

History

In the 10th Edition of his Systema Naturae of 1759 Linnaeus named the Madagascar Periwinkle as *Vinca rosea*. In 1837 G. Don moved it to the new separate genus *Catharanthus* because he observed many botanical differences (about 34 character states) between *Vinca*

and the Madagascar Periwinkle.

The plant has been in cultivation in Europe for quite a long time. Its history began when seeds from Madagascar were sent to the Royal Gardens in Versailles near Paris. These seeds were grown by Mr. Richard, the gardener of King Louis XV, at (one of) the Trianon pavillions. Mr. Richard sent seeds of his own plants to the Chelsea Botanic Garden in London in 1757. These seeds were grown by the famous botanist Philip Miller. At this time only flowers were known in the colours purple and white with a red eye. David van Royen, prefect of the Hortus Botanicus Leiden, had also received some seeds from 'a French Diplomat' and showed his plants to Linnaeus in 1758. So it seems that plants grown in England and Holland came originally from the same French source. G. Don mentioned plants with white flowers in 1837, and in 1850 a plant with variegated leaves was known. I am not aware if there is still a variegated leaved form grown somewhere, but undoubtedly there is.

Medicinal uses

(by Robert van der Heijden, Division of Pharmacognosy, Leiden)

The traditional medicinal use of *Catharanthus roseus* was responsible for the widespread occurrence of the plant at present. By chewing the leaves, feelings of fatigue and hunger were suppressed, effects which were very much appreciated by sailors. Also in their new habitats, *Catharanthus* was used in traditional medicine and the number of applications increased. Already in 1661, the hypotensive effects of the root extract were reported (Markgraf, 1976). Around 1930, the traditional use against diabetes (in Madagascar, but also in SE Asia and probably also in Australia) attracted the attention of the pharmacologists. After repeating the experiments in the 1950s, it appeared that the test animals became seriously ill. This observation resulted in 1957 in the isolation of the dimeric alkaloid vinblastine, which is still one of the most powerful anti–cancer drugs discovered.

Catharanthus roseus is now one of the most thoroughly investigated medical plants. More than 100 alkaloids have been isolated, some of them are also of pharmaceutical importance, e.g. vincristine as anti–cancer drug; and ajmalicine is used in the treatment of cardio-vascular disorders. *C. roseus* has developed into a model organism in studies on plant physiology, biochemistry and secondary

metabolism. Every year about 60 publications on these topics that include research on the Madagascar Periwinkle appear in scientific journals.

At the Division of Pharmacognosy (Prof.dr. R. Verpoorte) of the Leiden/Amsterdam Center for Drug Research, *Catharanthus roseus* is subject of research for two major reasons:
- the production of secondary metabolites (alkaloids) in a large–scale process, i.e. by fermentation of *C. roseus* cells in bioreactors,
- the regulation of secondary metabolism, i.e. the characterization of intermediates, enzymes, genes, stress reactions and environmental aspects, all in relation to alkaloid accumulation.

This research is performed in a collaboration with the Department of Biochemical Engineering (Delft University of Technology) and the Institute of Molecular Plant Sciences (Leiden University). Some recent publications of this group, reviewing the studies on *Catharanthus roseus* are included in the follwing short literature list (Van der Heijden et al. 1989, 1992; Verpoorte et al. 1991, 1996; Moreno et al. 1995). For more references see p. 99-100.

Moreno, P.R.H., van der Heijden, R. & Verpoorte, R. (1996). Catharanthus roseus (L.) G.Don cell suspension cultures: a literature survey. Updating from 1988-1993. Plant Cell Tissue Organ Culture 42: 1–25.

Van der Heijden, R., Verpoorte R. & ten Hoopen, J.J.G. 1989. Cell and tissue cultures of Catharanthus roseus (L.) G.Don: a literature survey. Plant Cell, Tissue and Organ Culture 18:231-280.

Van der Heijden, R., Snoeijer W. & Verpoorte, R. 1992. Catharanthus roseus (L.) G.Don, inhoudstoffen en gebruik. Pharmaceutisch Weekblad 127: 1283-1290.

Verpoorte, R., R. van der Heijden, W.J. van Gulik & H.J.G. ten Hoopen, H.J.G. 1991. Plant Biotechnology for the production of alkaloids: present status and prospects. In: The Alkaloids, Vol. 40, (ed. A. Brossi). Academic Press, San Diego, pp. 1–187.

Verpoorte, R., van der Heijden, R., and Moreno, P.R.H. 1996. Biosynthesis of terpenoid indole alkaloids from *Catharanthus roseus* cells. In: G.A. Cordell (ed.), The Alkaloids Vol. 49, Academic Press, San Diego, in press.

Cultivation

Catharanthus plants are very easy to grow. Just sow the seed, provide it with a little water, and the plant will grow and flower for months. Madagascar periwinkle grows in any soil; sand, rockeries, clay or peat, it really does not matter. A mixture of those soils will be preferred. And for those who live along the coast, *Catharanthus* is very salt–tolerant.

When the seedling has one main stem, the top can be cut off. This will encourage side branching, more shoots develop, and flowering is enhanced. After topping, the developing side branches are always opposite. When the main stem of a seedling is not topped, it will continue to grow and eventually will branch by itself. This usually starts at a height of about 20–30 cm, and strangely enough only one side branch will develop, and so on with subsequent branching.

Cultivation as a potplant

For plants which are grown indoors, such as in a greenhouse, or as a container plant on the patio or in the garden, a peat-, compost- or coconut-based soil is adequate. Any extra liquid feeding throughout the growing season will be advantageous but 2 or 3 times is quite sufficient.

Catharanthus plants do not support overwatering. In a greenhouse watering is needed about 2-3 times a week, mainly depending on the size of the pot. Too much moisture causes yellowing of the leaves while these remain in the same more or less normal horizontal position. When the soil is too dry, the leaves will curl and droop somewhat, but they will stay green. It is preferable to water the plants during the early morning, never during the late afternoon or in the evening.

In more temperate zones the plants need to hibernate indoors, at a temperature of about 12–15 °C. A conservatory is perfect, and with enough light and heat, the plants flower in winter as well. If the temperature is low the plant will stop flowering and most of its leaves are falling off. When it is too cold (5–8°C) some branches or even the complete plant will die. In winter the soil has to be kept just slightly moist. In early spring the plant will regrow again from axillary buds. This is the time to repot and prune. Prune the plant at both ends, meaning roots and shoots can be pruned hard (phot. 3). Cut off all stems to 2, 3 or 4 nodes. With no pruning, the plant grows mainly from the top again, producing a floppy plant later in the season. The rootball can be pruned to half of its original size with the benefit that the same pot can be used again. If it is impossible to hibernate large plants, or this is too laborious, it is also possible to maintain the plant by cuttings. These can be taken in autumn and require less space and attention.

Cultivation for outdoor use

When growing Madagascar periwinkle in the garden, the soil has to be prepared by deep digging. When the soil contains either a lot of sand or clay, add some compost during digging. For sandy soils this will ensure retention of water during the growth season, for clay the compost provides air for easier rooting. Plant spacing is about 30-40 cm apart, either for edge or border plantings. In the tropics or subtropics, plants will flower about the whole year round. Water requirements depend on soil and rainfall and should be checked during growth. When the taller cultivars become too high, pruning is necessary. The easiest way is by using shears. Trim the plants at an appropriate level. Regrowth is fast and the plants will soon flower again. It should be kept in mind that the cultivars offered as dwarf or low growing will usually grow just as fast after hard pruning as the tall cultivars.

Applications

The use of *Catharanthus* cultivars as ornamentals is more or less location-dependent. In the more temperate zones, the plant can only be used as an annual or as a potplant either out- or indoors. In summer the pot can be placed outside on the patio, preferably in full sun. Also mixed planting in containers or hanging baskets is possible and in gardens with a sheltered border they can be used as annual bedding plant. Many cultivars will have flowers which stain in wet weather, and those cultivars of which the old flowers will stick around the new flower bud should be avoided outdoors. *Catharanthus* will suffer when the weather becomes colder in autumn, and dies at the first frost. Also in these colder climates, plants grown outside will set seed freely. The seeds can be harvested and stored until the next year. A conservatory or greenhouse is preferable and the plants will flower continuously.

In the tropics and subtropics, *Catharanthus* can be planted in the garden. The plant can be used as edging along paths or along the front of a border. Personally, I do not like flower colour mixtures, I prefer grouping plants by flower colour. For edging a row in the garden may, for instance, lead to the front door or a statue. Single colours will also facilitate the choice of the best companion plants. On a lawn that is large enough, island bedding can be applied. After removal of the grass and soil preparation, in the centre a tall plant can be surrounded by *Catharanthus*. Plants with dark-coloured leaves

give a striking effect, e.g. red-leaved cultivars of *Phormium*, dark-leaved *Dracaena*, or if an entirely annual bedding is preferred, large and/or coloured-leafed annuals such as *Amaranthus, Canna, Coleus* or *Ricinus* are suitable companions.

In the tropics the plants will seed freely through the garden, but seedlings can be easily picked out where they are not wanted. During a cooler or drier period plants may well become a bit spindly, but they will survive and recover.

Cut-flowers

The application as cut-flower is not well-known. A flowering Catharanthus branch will last for weeks if not months on water. Of course the lower leaves will fall off, the new flowers will be paler of colour and smaller in size, but the branch continues to grow and produces new buds. A thorough investigation at one of the experimental stations for cut–flowers would be interesting. As a tropical addition in flower arrangements, that is needed for only a couple of days, *Catharanthus* can be tried for a change.

Diseases and pests

It seems that the species of *Catharanthus* are rarely attacked by disease. The dying of a branch is caused by low temperatures and is actually not a disease, but well worth to be aware of.

In the Leiden collection in the glasshouse red spider mite (*Tetranychus urticae*) is very common. Its natural predator (*Phytoseiulus persimilis*) is suitable for control if chemical insecticides are to be avoided. The plant may be sensitive to white fly, but so far we do not have this pest in the glasshouse. Pests which attack other plants, such as greenfly and mealy bugs, are never found in *Catharanthus*.

In outdoor plantings in the (sub)tropics, leaf rollers and blight might be a problem.

I have never had problems with pest or diseases on germinating seeds and seedlings. As some seeds will germinate later, and when damping off has already been taken care of, the newly germinated seeds might get stuck in the seed skin because of lack of humidity. It is better to prick out those which are large enough to handle and cover the seed pot or tray again with the plastic. This will allow germination of all the remaining seeds.

When plants are grown too long in the same soil this will result in

yellowing of the leaves with pale green coloured veining. A liquid feeding will help but this must be repeated several times before the leaves will return to their normal green colour again. Pot-bound specimens will benefit from repotting with fresh soil. The yellowing might also be the result of overwatering that reduces nutrient uptake by the roots.

Propagation

By seed: in commercial plant trade *Catharanthus* is normally propagated by seed. Also for the amateur gardener propagation by seed is easy (phots. 4 and 5). All cultivars are offered as seed, I have not yet come across any plants that were propagated by cuttings.

The seeds will germinate on almost anything wet. In standard potting soil with added sand, germination will be no problem. It is not necessary to cover the seeds. Optimum temperature is about 20–25°C. Cover the pot or tray with transparant plastic to provide humidity. This is in contrast to the advice of seed companies favouring germination in the dark. In the light, germination has always been successful. In 2-3 days the seeds will germinate but keep the pot for at least 20 days to allow all seedlings to emerge. Germination in general is very high, over 95%. A lower percentage may be caused by too dry storage of the seeds, but at room temperature they normally stay viable for at least 3 years. After germination, the seedlings have to be hardened off by making a small hole in the plastic cover. This hole has to be enlarged every day until there are no humidity drops on the plastic any more. Seedlings which are not hardened off will lose their cotyledons and will grow very slowly. During this period it is not necessary to maintain the high temperatures, a lower temperature will be no problem for the seedlings. Seedlings can be potted up as soon as they are large enough to handle. This is about 20 days after germination. They can be transplanted directly into the final pot, but when preferred, seedlings can be potted up in a smaller pot first.

Sowing on a wet tissue in a closed dish is also possible. Seeds will germinate easier and quicker on a wet tissue than when sown on soil. It is better to choose a tall glass jar of about 6-7 cm. The roots will grow into the tissue and the seedling itself straight upwards. The pricked-out seedlings must be covered with transparant plastic for the first few days before hardening off.

When seeds are wanted, hand-pollination is required, especially

when the plants are grown indoors. Plants grown outdoors will be pollinated by butterflies and moths. This may, however, lead to uncontrolled cross-pollination. Some cultivars will develop seeds by self-pollination but most will not.

The flowers are ready for pollination when the eye (the throat) is open, usually the second day of flowering. In the eye the top of the pistil head will be visible. Use a hard but thin hair from a brush or so. Clean this hair first by pulling it between two fingers or between a tissue. Prick the hair gently in the throat next to the pistil head. Move the hair up and down for about 1 cm and pollen will stick to the hair. When moving the hair up and down curl it also between the fingers resulting in complete pollination of the stigma. Go round from flower to flower leaving the pollen on the hair, but clean the hair again when too much pollen remains, as too thick a hair may damage the stigma. It is best to pollinate the flowers twice and use flowers of other plants of the same cultivar. This will encourage fertilization. It is not necessary to pollinate again the next day, most corollas will drop off the next day anyway. The amount of seed per fruit will differ from one cultivar to the other but generally it will be between 10 and 20 seeds. The fruit has to be harvested when it turns from green to pale brown showing the black seeds inside rather distinctly. When waiting too long, the fruit will split open and scatter its seeds which will be lost. Dry the fruits indoors on a small basket with a tissue at the bottom or a in paper tray to avoid rotting. The fruit will open quickly and the seeds can be harvested easily. Store the seeds in a small paper bag and seal it when possible. When kept at room temperatures, most seeds will stay viable for at least 5 years.

By cuttings: For the amateur gardener an easy way of propagation is by cuttings and this can be done the whole year round.

Choose a non-flowering stem and take off the tip, leaving a shoot with 2 pairs of leaves. Remove the lower pair and cut the upper pair to half of their size. Use a very sharp knife to make the final cut about 1 cm below the lower node. It is not necessary to make an extra injury along the stem, the roots will emerge from the cut. After this preparation, dip the cutting in a rooting hormone powder and prick them directly into a pot or tray with normal potting soil. Cover with a transparant plastic bag and put the tray on a warm spot, either on a window sill or in a greenhouse. In two weeks time, the cuttings will start to root and after 4-5 weeks they can be potted up

separately in their own pot. Meanwhile, start to harden off in the same way as described for seedlings. Within 6-8 weeks the first flowers can be expected.

Putting a stem in a glass with water will also induce rooting but takes longer. The soil medium gives better results.

Grafting

I have tried to graft some cultivars but to no avail. However, van Eeden (1868) wrote that grafting should be possible.

Cross-breeding

Hybridization with *Catharanthus* is exciting, but results cannot be predicted (phots. 6, 7 and 8). For emasculation a flower bud has to be chosen that will open the next day. This can be seen when the apex of the bud has opened and the flower tube is at the same length as the open flowers. As the plant usually has two flowers at one level, one has to be removed. A very sharp knife has to be used. The pistil in the corolla tube is situated just below the anthers. The place of the anthers can be seen from outside as five distinct lumps at the top of the tube were this is wider. When cut just through the highest part of this lump, the anthers are removed and the stigma at the top of the pistil remains unharmed. White latex is produced by the cut. When the knife is sharp this sap will remain at the ring of the tube, otherwise the sap will stick on the pistil head and this might influence the pollination. Normally the anthers are still closed at this stage, if pollen is released the flower has to be discarded.

After removing the upper part of the flower bud it is best to wait for a moment to let the sap dry. As the stigma is now below the level of the cut, it is necessary to remove another small ring of the tube. After this, the pistil head is ready for pollination.

Pollination

To ensure that the pollen is at its best, choose a flower which starts to wilt (phot. 9). In such a flower the anthers are open and have released the pollen. Cut the corolla lobes off at the top of the tube. Wait for a moment to let the sap dry when produced. Then cut down the tube lengthwise, just between two anther lumps. Open this part of the tube by using your thumb nail to push at the base of the

cut. The tube will open and produce its pollen. This pollen can be put directly on a stigmatic surface. Be sure that the complete stigma is covered with pollen. Pollinating only on the top of the pistil head will not result in any seed as this surface is non-receptive. The pollen must be added at the side of the pistil head.

The seed parent is now pollinated. Label the flower by using a small label and note the name of the seed parent followed by the name of the pollen parent.

After a couple of days the remaining part of the tube will fall off, leaving just the 5 sepals with a very short young fruit in the middle. Usually a small drop of nectar is left as well. After two weeks fruit growth is visible. In most cases fewer seeds are formed than after self-pollination. When the fruit remains small and unequal, it does not mean that no seeds are formed, there might be just one or only a few. The seed is ripe for picking when it is visible through the fruit wall which will turn from green to pale brown. The fruit will still be closed and this is the best time to pick, otherwise the fruit opens by itself and scatters the seeds. With proper attention, cross-breeding is easy, also for the amateur.

Advantages and disadvantages of cross-breeding

- The purple colour of the corolla lobes seems to be dominant. When a seed plant belonging to the Ocellata Group is pollinated by a plant belonging to the Albus Group, you might get a flowering plant belonging to the Roseus Group.
- The dark eye of the flower seems to be a dominant factor.
- The tall and open habit seems dominant.
- Cultivars with a short habit will have, in general, smaller flowers. When the plants are grown on for several years instead of the normal annual season, the flowers might get even smaller.
- Cultivars with a tall habit and large flowers will keep these large flowers, it does not matter how old the plants are.
- If a plant produces fruit by self-pollination it does not mean that the plant will produce fruit by crossing.
- If a plant does not produce fruit by self-pollination it does not mean that the plant will not produce fruit by crossing.
- Many cultivars belonging to the Subgroup Unicolor have very small spots on their corolla lobes. By further cross-breeding this can be eliminated quite easily.
- After flowering the flower can either drop off or stick to the young

fruit. Best is to breed plants of which the flowers drop, because when it sticks to the young fruit it usually also sticks to the new bud which, subsequently, can not develop well.
- In this sense, also very large flowers may stick to the young bud as they overlap the new bud.

Availability

During spring and summer, *Catharanthus* plants are available at flowershops and garden centres. Plants are usually not offered by name but only by colour or as a mixture. Seed might be offered either as a mixture or by cultivar name. Seed companies have started to promote *Catharanthus* on a worldwide scale and most will offer *Catharanthus* by its cultivar name. Some of the companies mentioned only deliver wholesale. *Catharanthus roseus* is usually still offered for sale under its well–known synonym *Vinca rosea.*

Seed companies

Ball Seed - Ball Seed Co., A Division of Geo. J. Ball, Inc., 622 Town Road, West Chicago, Illinois, 60185 - 2698, U.S.A. tel.: (1) 630–231 –3500, fax: (1) 630–231–7248.

Chiltern Seeds - Chiltern Seeds, Bortree Stile, Ulverston, Cumbria LA12 7PB, England. tel.: (44) 1229–581137, fax: (44) 1229–584549.

Kieft - Kieft Bloemzaden B.V., P.O. Box 63, 1606 ZH Venhuizen, The Netherlands. tel.: (31) 228 541844, fax: (31) 228 543440 (wholesale only).

Muller - Gerrit Muller & Zoon B.V., P.O. Box 182, 2160 AD Lisse, The Netherlands. tel.: (31) 252 410744, fax: (31) 252 416578 (whole sale only).

PanAmerican Seed - PanAmerican Seed Co., P.O. Box 438, West Chicago, Illinois 60186-0438, U.S.A. tel.: (1) 708–231–1400, fax: (1) 708–231–1419. Also: P.O.Box 404, 1600 AK Enkhuizen, The Netherlands. tel. (31) 228 310455, fax (31) 228 314884.

Park Seed - Geo. W. Park Seed Co., Inc., Cokesbury Road, Green-

wood, S.C. 29647-0001, South Carolina, USA. tel.: (1) 803-223-8555, fax (1) 803-941-4239.

Sakata - Sakata Seed Corporation, P.O. Box Yokohama Minami No. 20, 1-7 Nagata Higashi 3-chome, Minami-ku, Yokohama, Japan 232. tel.: (81) 45–715–2111, fax: (81) 45–715–2112.

Thompson & Morgan - Thompson & Morgan (UK) Ltd., Poplar Lane, Ipswich, Suffolk IP8 3BU, England. tel.: (44) 1473–690869, fax: (44) 1473–680199.

Nomenclature

The nomenclature of *Catharanthus* cultivars is quite confusing as can be seen from the list. Many names consist of two parts in which one refers to a colour and the other to a Series name. Because the colours are rather close to each other, the same colour name is used for different cultivars.

The naming of cultivars is described in the International Code of Nomenclature for Cultivated Plants - 1995 (ICNCP or simply called 'Code'). These rules contain, apart from several taxonomic categories, most helpful recommendations on how to choose a new cultivar name. Although this new edition of the Code is easy to obtain, some of the main rules are included here. A few examples are given for *Catharanthus*.

ICNCP - 1995

Article 17.9. To be established, a new cultivar epithet published on or after 1 January 1959 must be a word or words in a modern language (except as otherwise required under Art. 17.3); Latin words or words which may be considered to be Latin, and thus are liable to cause confusion, may not be used unless they are the classical name of an ancient Roman person, or of a place. (Example: New cultivars introduced on or after 1 January 1959 must not be given a name in Latin form such as 'Nana').

Article 17.3. A Latin epithet at the rank of a species or below which is validly published (established) and otherwise legitimate (acceptable) in conformity with the *ICBN* for a taxon subsequently reclassified as a cultivar (and which is considered, upon reclassification, to be coextensive with that taxon as described in Art.

6.2). is to be retained as a cultivar epithet. (Example: *Catharanthus roseus* var. *ocellatus* becomes *C.* 'Ocellatus').

Art. 14.3. When there are two or more epithets in use for the same cultivar, the epithet that best preserves existing usage is to be chosen and sanctioned by the appropriate International Registration Authority without regard to any rank in which those epithets might have been established or to the principle of precedence. Such an epithet becomes conserved as the accepted epithet by application to, and action of, the Commission.

Art. 17.10. To be established on or after 1 January 1996, new cultivar epithets must consist of no more than 10 syllables and no more than 30 letters or characters overall, excluding spaces and demarcating marks. (Remark: cultivar names of more than three words are now allowed).

Art. 17.18. To be established on or after 1 January 1996, words exaggerating the merits of a cultivar, or which may become inaccurate through the introduction of new cultivars or other circumstances, may not be used in new cultivar epithets. (Example: *C.* 'Best Red' or *C.* 'Earliest of All').

Art. 17.12. To be established on or after 1 January 1996, epithets may not be so similar to an existing epithet in the denomination class that they might be confusing (parahomonyms). (Example: Not *C.* 'Rose' but 'Rose Cooler', or, not *C.* 'Pink' but 'Pretty in Pink').

Art. 21.1. Publication is effected inder this *Code* only by distribution of printed or similarly duplicated matter (through sale, exchange, or gift) to the general public or at least to botanical, agricultural, forestry or horticultural institutions with libraries accessible to botanists, agriculturists, foresters ro horticulturists generallly. It is not effected by communication of new "names" at a public meeting, by the placing of "names" on labels in collections or gardens open to the public, by the issue of microfilm made from manuscripts, typescripts or other unpublished material, publication via electronic media, or by publication in confidential trade lists which are not made generally available.

Art. 23.1. On or after 1 January 1959, publication is deemed to be effected only if the publication containing the new cultivar or cultivar–group epithet is clearly dated at least to the year.

Recommendation 22A.1. The description or diagnosis of any new taxon of cultivated plants should mention the features by which the taxon differs from its allies.

Recommendation 22D.1. For new cultivar epithets, wherever

possible, an illustration should be provided as part of the protologue.

Art. 22.6. A new cultivar epithet is not established if its publication is against the expressed wish of its originator or his assignee, unless the originator or his assignee had knowingly distributed that cultivar without a proposed cultivar epithet.

Principle 4. The nomenclature of cultivars is based upon precedence of publication except in specified cases.

These are but a few of the rules and recommendations of the Code, allowing the choice of correct names for new cultivars. It will be clear that just a name in a catalogue is not enough to accept a new introduction. Practically it means the following: e.g. Company A introduces a new epithet without description in their 1995 catalogue. When Company B would use the same name, and publish the name correctly (with a description) in their catalogue in 1996, the Company B name has priority over the Company A epithet.

It will also be clear that colours are not very suitable to use in a new name as so many cultivars have a name referring to a colour. A real fancy name, for instance the new name 'Passion' is much more suitable. Such names in a catalogue will sell better anyway. If a gardener tried 'Little Bright Eye', and did not like it, why should he try 'Sahara Bright Eye' or 'Tropicana Bright Eye' the following year?

Classification

In order to group the cultivars, a classification is necessary but has so far not been published. Seed companies arrange their plants in 'Series', but cultivars belonging to the same Series may belong to different groups. This is also the case with seed mixtures. In order to give a complete overview of all Series and mixtures mentioned in catalogues, they are also included here, at the end of this review.

I propose the following cultivar–group classification which will make it easier to get an overview of all cultivars grown. The chosen group name is also mentioned in the description of the cultivar. This classification is strictly for cultivars of *Catharanthus roseus*, not for interspecific hybrids.

Flower with a coloured eye

* corolla lobes coloured (**Roseus Group**)
'Apricot Delight'
'Blush Cooler'
'Dawn Carpet'
'Grape Cooler'
'Little Linda'
'Little Pinkie'
'Little Rosie'
'Madagascar Pink'
'Madagascar Rose'
'Pacifica Punch'
'Pacifica Red'
'Pink Carpet'
'Pink Panther'
'Pink Turkey'
'Pretty in Rose'
'Rose Carpet'
'Rose Cooler'
'Roseus'
'Sahara Pink'
'Sweet Elizabeth'
'Tall Crimson'
'Tropicana Blush'
'Tropicana Bright Eye'

** corolla lobes white (**Ocellatus Group**)
'Birdie Yancy'
'Little Bright Eyes'
'Little Delicata'
'Morning Mist'
'Ocellatus'
'Parasol'
'Peppermint Cooler'
'Polka Dot'
'Sahara Bright Eye'

Flower with a green/white eye (**Albus Group**)

* corolla lobes white (**Albus Subgroup**)

'Albus'
'Little Blanche'
'Snowflake'
'Tropicana White'
'White Turkey'

** corolla lobes in 1 colour (**Unicolor Subgroup**)
'Orchid Cooler'
'Passion'
'Pink Cooler'
'Tropicana Pink'
'Tropicana Rose'

*** corolla lobes in 2 colours (**Bicolor Subgroup**)
'Icy Pink Cooler'
'Pretty in Pink'
'Pretty in Soft Pink'
'Pretty in White'

The future of Catharanthus breeding

In the near future, new colours will be introduced. For instance, Park Seed seems very close to having obtained a good red flower colour. Better cold-resistant cultivars are necessary for the more temperate zones of the U.S.A. and western Europe. Thompson & Morgan is likely to be fortunate in this breeding and will market new cold–resistant cultivars. In short: for the gardener the future will become very exciting.

It will be necessary to maintain all cultivars known today to save their genetic diversity for the future. A National Collection as known in England for various species should be founded for *Catharanthus*, otherwise several cultivars will be lost very soon, and some have already been lost.

Also a study into cut–flower use should be considered.

An international registration authority is needed to deal with the naming of new cultivars. This will avoid misunderstandings and arguments between the big seed companies on priority of names.

General description of Catharanthus roseus

A subshrubby evergreen plant with stems up to 1 meter tall but usually shorter. Depending on the cultivar the habitus is upright to somewhat spreading, strongly or hardly branching. The leaves are dark green, elliptic, usually glossy and on growing stems opposite. In some cultivars the leaves can be solitary on the flowering tips. The flowers are produced at the end of the growing stem, but always in the axil of the leaf and usually in pairs. No fragrance. The corolla is 2-5 cm across with 5 lobes, overlapping or not, in the colours purple, white with red eye, white or any colour intermediate. They last 3-4 days, and, depending on the cultivar, they drop or stick to the young fruit. The fruit consists of two follicles which contain up to 20 black seeds each.

The habit of each cultivar could not be included in the following list. They look so similar that it was impossible to make a distinction. Of course the habit is mentioned in the referred seedlists as a short, free–branching plant. This is still the ideal plant for seed companies. Unfortunately, the short and branching habit sometimes disappears after hard pruning of the plant. It grows on with leaves and length of stems about the same size like a normal Catharanthus.

Plants named '.... Carpet' are supposed to grow more wide than upright, but I have no practical experience with these plants yet.

Plants named '.... Cooler' will grow more compact, also after a hard pruning, except for 'Peppermint Cooler' which is not compact. They grow as fast as the others and reach the same height. They also have rather large leaves which can be a problem for new buds and shoots which can be caught under it.

Plants named 'Pretty in ....' form round bushes by themselves but grow as fast as the others. They have rather small leaves.

Plants named 'Little ....' are not little in habitus, they grow as fast as the other cultivars.

Explanation of the cultivar descriptions

- The correct name first, otherwise the name refers to its correct name by the use of the word 'see'.
- Synonym: referring to names which are regarded as a synonym.
- Quoted references (with year of publication) and their description.
- Origin of the plant, only known from my own introductions. The

origin of other cultivars is almost impossible to recover.
- Leaf description in general.
- Flower: amount of flowers open on the same stem at the same time; size of the flowers; general shape of the flowers; overlapping of the corolla lobes (erroneously named petals in most catalogues).
- inside: colour of the lobe which faces the observer. The number refers to the R.H.S. Colour Chart, issued by The Royal Horticultural Society in association with the Flower Council of Holland. The colour is given for the separate corolla lobes (not for the entire flower), the colour for the eye is for the entire centre.
– apex is the short tip of the lobe: eye is the centre of the flower; sometimes the eye colour extends to the lobes forming a star-like shape; and finally the colour of the tube which can be seen through the eye and is named throat.
- outside: colour of the lower side of the lobe; colour of the flower bud before opening.
- fruiting indicates whether the plant develops fruits by self-pollination or not. It is also mentioned if the corolla drops after flowering or whether it sticks to the young fruit. The characteristic of the fruit is strictly for plants grown indoors without any possibility of pollination by insects or by hand-pollination.
- Any further information is listed under info.

All the characteristics listed here are from my own observations. The plants are all grown under the same conditions in a glasshouse at 25°C. These characteristics will change only a little when the conditions are different, while the colour of both bud and flower will be much deeper for outside–grown plants.

Tentative checklist of Catharanthus cultivars

Catharanthus roseus

'Alba' see 'Albus'

'Alba Pura' see 'Albus'

'Albo Oculata' see 'Ocellatus'
Baines (1885): Flowers white with a red eye.

'**Albus**' (cultivar–group Albus, subgroup Albus), phot. 10.

synonyms: *C. roseus* var. *albus, C. roseus* forma *albus,* 'Alba' 'Alba Pura', 'Madagascar White', 'Tall Alba Pura', 'Tall Pure White'.
Baines (1885): Flowers pure white.
Boom (1968): kroon geheel wit: cult. 1827-E. (corolla completely white).
Leaf dark green, glossy. Flower 2-3-4 open at a time, up to 5 cm across, flat but sometimes one lobe rather wavy, corolla lobe overlapping or gappy, inside pure white, apex white to very pale green, eye pale green, throat pale green-yellow, outside white, apex white to very pale green, bud white, Fruit: makes very short to short fruits by self–pollination, the flowers will drop. Info: received an Award of Garden Merit in England.

'**Apricot Delight**' (cultivar–group Roseus)

Park Seed (1995): Beautiful Ivory with unique apricot blush! This Vinca has real flower power! Apricot Delight is a new, unique color to expand your Vinca selections - with flowers a warm, soft ivory beautifully brushed with apricot buff, then electrified by a deep raspberry eye. Blossoms are 1 1/2-inches across with nicely overlapping petals, and are produced in huge quantities on plants that are even more compact and basal-branched than the Tropicanas, making them incredibly floriforous and showy in the garden. Because of their especially compact habit with full, solid

color, plants are ideal as edging, or in containers, as well as low-growing beds. Height is approximately 12 to 14 inches, with a similar spread. Blooms 60 days from seed (illustrated in the catalogue).

'Bicolor' see 'Little Bright Eye'
Info: Illegitimate name according to the ICNCP, article 17.9.

'Birdie Yancy' (cultivar–group Ocellatus)

De Marie III (1984): The name 'Birdie Yancy' is here proposed for a new cultivar of Catharanthus roseus. 'Birdie Yancy' is an apparently sterile form, discovered among a group of *C. roseus* seedlings being offered for sale by a nursery in Yonkers, New York, in the spring of 1979. 'Birdie Yancy' has been maintained by tip-cutting propagation, and recently samples have been accepted by a commercial firm for trial and probable marketing.
'Birdie Yancy' has linear leaves typically 1/4 in. (5 mm) in width and 2-3 in. (5-7.5 cm) in length. The nodes are closely spaced, rarely more than 1/4 in. (5 mm) apart. Branching is more dense than in typical *C. roseus*, and sterile, bicoloured flowers are borne at the tips of the branches. The corolla of 'Birdie Yancy' differs from typical *C. roseus* in that the corolla segments are more acute and narrower, and are slightly irregular in shape. The colour of the corolla is white with a red eye. 'Birdie Yancy' has never set seed, despite repeated pollination attemps, and can only be propagated asexually.
Living material and herbarium specimens have been deposited at Cornell University and The Brooklyn Botanic Garden (New York). Standard specimen W.J. Dress & E.T. De Marie III, 11574, aug. 3, 1981 (BH) (in the article a line drawing is provided). Info: The standard specimen at the Brooklyn Botanic Garden is not in cultivation any more. During the rebuilding of the glasshouse it was decided which plants should be maintained and which had to go. 'Birdie Yancy' was one of those which had to go.

'Blush Cooler' (cultivar–group Roseus), phot. 11.

PanAmerican Seed (1993): Light clear pink with a large, deep pink eye that shades to white at the edge of the flower. The overall effect is a pastel true pink without a hint of lavender.

Hamer (1995): Helder rose met een groot donkerrose oog dat vervaagt tot wit aan de rand van de bloem (Clear pink with large dark pink eye which faded to white along the edge of the flower).

Leaf dark green, not so glossy. Flower 2-3 open, 4 cm across, rather flat but later drooping somewhat, corolla lobe overlapping, inside very pale purple-white with red-purple (68A) towards base, apex green, eye dark red-purple, throat very pale green, outside white, apex green, bud greenish-white, fruit makes short fruits by self–pollination, the corolla will drop. Info: The red-purple towards the base is larger than in 'Peppermint Cooler', paler and larger than in 'Parasol', and paler than and as large as in 'Sweet Elizabeth'. The dark red-purple eye is similar to the one in 'Peppermint Cooler'.

'Bright Eye' see 'Little Bright Eye'

Clausen (1989): White flowers with a carmine eye. Dwarf.

'Bright Eyes' see 'Little Bright Eye'

Hamer (1971 & 1972): wit met rood oog. Laag. 25 cm (white with red eye. Dwarf).

Pannevis (1994): 25 cm, wit met rood oog (white with red eye).

De Mos (1975 & 1979): wit met rood hartje, 15 cm (white with red eye).

Muller (1995): (15) wit met rood oog (white with red eye).

Carpet Hybrids see Carpet Series

'Carpet Pink' see 'Pink Carpet'

Clausen (1989) no description, only illustrated.

Cooler Hybrids see Cooler Series

'Coquette' see 'Little Pinkie'
Hamer (1971 & 1972): rose, zeer laag en gedrongen. 25 cm (pink, very dwarf).
Pannevis (1974): 25 cm, helderrose, rijkbloeiend, gedrongen groei (clear pink, abundant flowering, short growth).
de Mos (1975 & 1979): helderrose met donker hartje, 15 cm (clear pink with dark eye).

'Crimson'

Muller (1995): (15) rood (red). Info: Illegitimate name according to the ICNCP, article 17.11, example 12. Probably a synonym of 'Madagascar Crimson' (see 'Roseus').

'Dawn Carpet' (cultivar–group Roseus)

Ball Seed (1992): Pink with a rose eye.

'Grape Cooler' (cultivar–group Roseus), phot. 12.

Thompson & Morgan (1991): 6-8x6-8in. NEW INTRODUCTION! Glorious rosy-pink overlapping blooms with deeper red eye (illustrated in the catalogue).
Ball Seed (1992): Rosy pink with a darker eye (illustrated in the catalogue).
Kieft (1992): rose.
PanAmerican Seed (1993): lavender pink.
Park Seed (1995): Rosy pink.
Hamer (1995) Rose met donkerrose oog (Pink with dark pink eye).
Leaf dark green, glossy. Flower 2-3 open, 4.5 (-5) cm across, flat but irregularly wavy and propellor-shaped, corolla lobe overlapping but also with a bit gappy base, when ageing the margin at the apex bends downwards, inside purple-violet (82C) but darker towards base especially in the middle, usually with white spots unequally scattered, fading, apex pale greenish, eye dark red-purple (74A), throat pale green, outside white but the red-purple from the inside is visible, apex pale green, bud white with green tip, fruit makes short fruits by self-pollination, the flowers will stick to the young fruit.

Hot Streak Hybrids see Hot Streak Series

'Icy Pink Cooler' (cultivar–group Albus, subgroup Bicolor)

PanAmerican Seed (1993): no description.
Park Seed (1995): New (no further description, but illustrated).
Leaf dark green, rather large and not smooth, flower (1-) 2-3 open, 4 cm across, more or less propellor–shaped, corolla lobe overlapping, inside very pale purple-white, much darker towards the base (68B), apex green, eye lemon, throat lemon, outside white, apex pale green, bud white with green apex, fruit makes short fruits by self-pollination, the flowers will stick to the young fruit.

'Kokette' see 'Little Pinkie'

'Little Blanche' (cultivar–group Albus, subgroup Albus), phot. 13.

synonym: 'Snow White' ('Sneeuwwitje')
Sakata (1971): Like other Little Vincas of our origination, this has the same dwarf and compact habit. Its snow white flowers are clean and fascinating. A valuable addition to our group of dwarf Vincas. Suitable for pot as well as for garden (illustrated in the catalogue).
Hamer (1971 & 1972): zuiver wit. 25 cm (pure white. 25 cm).
De Mos (1975, 1979 & 1989) wit, 15 cm (white. 25 cm).
Kieft (1980): pure white.
Denholm (1981): Pure white.
Ball Seed (1992): Pure white.
Kieft (1992): pure white
Sakata (1982 & 1994): Snow white flowers contrast extremely well with the dark green glossy foliage. Clean and fascinating variety (illustrated in the catalogue).
Leaf dark green, glossy, flower 2-3 open, 4-4.5 cm across, flat but a few margins bent downwards, corolla lobes overlapping but sometimes with gappy base, inside pure white, apex green, eyepale green, throat green, outside white, apex greenish, bud greenish, fruit almost normal fruits by self–pollination, the flowers will drop.

'Little Bright Eye' (cultivar–group Ocellatus)

synonyms: 'Bicolor', 'Bright Eye', 'Bright Eyes', 'Little Bright Eyes', 'Nana Bright Eyes'.

Sakata (1971): The same dwarf and compact habit as our 'Little Pinkie', but a pure white color with rose eye. This goes extremely well with rose colored 'Little Pinkie' (illustrated in the catalogue).

Kieft (1980): white with rose eye.

Denholm (1981): Sparkling white flower with pink eye (illustrated in the catalogue).

Butcher (1989): white with red eye.

De Mos (1989): wit met rood hartje (white with red eye).

Ball Seed (1992): White with a red eye.

Kieft (1992): white with rose eye.

Sakata (1982 & 1994): Pure white with a very distinct deep rosy-red eye. A very popular variety (illustrated in the catalogue).

Leaf dark green, glossy, flower 1-4 open, 4-5 cm across, flat but margin usually bent downwards, corolla lobe overlapping or not overlapping, inside white, apex pale green, eye red-purple (57B), throat pale yellowish-green, outside white, apex green, bud greenish-white with green tip, fruit makes short fruits by self–pollination, the flowers will drop. Info: The eye is as big as in 'Peppermint Cooler'. The illustrations of the older catalogues show flowers which are quite gappy, plants grown today have flowers of which the corolla lobes are mostly overlapping.

'Little Coquette' see 'Little Pinkie'

De Mos (1989): helderrose met donker hartje (clear pink with dark eye).

'Little Delicata' (cultivar–group Ocellatus), phot. 14.

Sakata (1971): This is a counterpart of our 'Little Pinkie' and 'Little Bright Eye' in height and growing habit but with a pleasing, delicate pink color (illustrated in the catalogue).

Hamer (1971 & 1972): zalmrose. 25 cm (salmon pink).

De Mos (1975, 1979 & 1989): lichtzalmrose met donkerrood hartje. 15 cm (pale salmon pink with dark red eye).

Kieft (1980 & 1992): soft pink with rose eye.
Denholm (1981): Pink with rose eye.
Ball Seed (1992): White with a pink eye.
Sakata (1982 & 1994): White with rosy-red center. Very uniform markings. A highly showy variety.
Leaf dark green, glossy. Flower 2-4 open, 4-5 cm across, flat but margin strongly bent downwards, corolla lobe not overlapping or overlapping with gappy base or overlapping, inside white with pale purple base (68C), apex green, eye red-purple (57A), throat pale yellowish-green, outside white, apex green, bud greenish-white with green tip, fruit makes very short fruits by self–polli nation, the flowers will drop, Info: The eye is similar to 'Sweet Elizabeth' but paler, and larger than in 'Parasol'. Illegitimate name according to the ICNCP, article 17.9 because of the Latin word delicata. However, as the name is still used worldwide, and because the name is so close to the English word delicate, the name is accepted here.

Little Hybrids see Little Series

'Little Linda' (cultivar–group Roseus)

De Mos (1979): zeer donkerrose, naar het hart tot karmijnrood verlopend. De allerbeste. 15 cm (very deep pink, towards the centre carmine-reddish. The best of all. 15 cm)
De Mos (1989): dieprose, zeer rijke bloei (deep pink, very free flowering).
Butcher (1989): new introduction with deep pink flowers throughout the entire growing season.
Ball Seed (1992): Violet rose.
Kieft (1992) deep rose, very floriferous.
Sakata (1982 & 1994): The fifth in the series of Little Dwarf Vincas. Deep rose color. Very floriferous throughout the entire growing season (illustrated in the catalogue).
Leaf dark green, glossy. Flower usually 2 open, 4-4.5 cm across, flat but margin usually bent downwards, corolla lobe overlapping or not, inside purple (78C) but towards the base with red-purple (74B), usually with unequally scattered white spots, apex greenish-white, eye dark red-purple (74A), throat greenish,

outside white, apex pale green, bud greenish-white with green tip, fruit makes short fruits by self-pollination, the flowers will drop.

'Little Pinkie' (cultivar–group Roseus), phot.15.

Synonyms: 'Coquette', 'Kokette', 'Little Coquette', 'Nana Coquette', 'Pinkie'.
Sakata (1971): Similar to the common rose-colored Vinca except the growing habit is dwarf and compact. It takes half the space of the old variety to make a compact bushy plant (illustrated in the catalogue).
Kieft (1980): (Coquette) rosy pink.
Denholm (1981): Rosy pink.
Butcher (1989): rose-pink.
Ball Seed (1992): Rosy pink.
Kieft (1992): rose-pink.
Sakata (1982 & 1994): (Coquette) Rose pink with a deeper center. The first and still the most popular selling variety (illustrated in the catalogue).
Leaf dark green, glossy. Flower 1-3 open, 4 cm across, flat, corolla lobe overlapping, inside red-purple (77C) but darker towards eye especially in the middle, apex greenish, eye dark red-purple (74A), throat pale green, outside white, apex very pale green, bud white, fruit makes short fruits by self–pollination, the flowers will drop. Info: Very similar to 'Roseus' and probably a synonym.

'Little Princess'

Van der Heijden (1992): no description.

'Little Rosie' (cultivar–group Roseus)

Kieft (1980): deep rose fl., very uniform and compact.
Denholm seeds (1981): Very free flowering with deep rose flowers. Very uniform and compact. Adds an attractive new color to the series (illustrated in the catalogue).

'Madagascar Bicolor' see 'Ocellatus'
Van Zanten (1986): lichtrose met vlek.
Info: Illegitimate name according to the ICNCP, article 17.9.

'Madagascar Crimson' ('Madagascar Violetrood') see 'Roseus'
Van Zanten (1986) violetrood, extra grootbloemig (violet red, extra large flowering).

'Madagascar Pink'

Synonym: 'Tall Delicata'
Van Zanten (1986): lichtrose met vlek.

'Madagascar Rose'

Synonym: 'Tall Rose'
Van Zanten (1986) helderrose (bright pink).

'Madagascar White' see 'Albus'
Van Zanten (1986) zuiver wit.

Magic Carpet see Carpet Series

Magic Carpet Hybrids see Carpet Series

'Morning Mist' (cultivar–group Ocellatus), phot. 16.

Kieft (1992): Upright growing varieties, plants are covered with clusters of white flowers with pink eye. Multiflora type, 30 cm.
Leaf dark green, glossy. Flower solitary, but because of the many branches many flowers open, up to 4.5 (-5) cm across, opening flat but typically quickly ascending, corolla lobe overlapping but usually with gappy base, sometimes completely overlapping, wavy, inside pure white, apex pale green, eye red-purple (66B-C), similar to 'Parasol' but smaller, throat green, outside white, apex pale green, bud greenish-white, Fruit: none by self–

pollination, the flowers will drop, Info: Sepals at the base of the tube are rather unequal in size and shape and sometimes one of the five can be leaflike and large. It seems that they continue to grow when the corolla has fallen off and sometimes one of the five develops a white centre. Perhaps this feature might be of some help to breed a double flower.

The plant habit differs from all other cultivars. The plant is a strong growing shrub making a straight stem of about 25 cm, branching profusely giving it a somewhat 'umbrella' shape. This habitus also returns after hard pruning.

Although the addition by Kieft of Multiflora type is quite clear, it does not refer to the habitus. Compared with the other cultivars 'Morning Mist' does not flower more freely and therefore this group name should not be used. When more cultivars are introduced in the future showing a similar habitus, then a new group name can be given.

***Catharanthus roseus* mutant**, phot. 17.

Info: discovered by Snoeijer in 1990 in a batch of over 150 seedlings of 'Roseus' raised for research. The plant still florishes. The habitus and leaves are similar to 'Roseus' but the flowers are incomplete, having only a few corolla lobes which are smaller, irregular in shape and purple with white stripes. The usually undeveloped anthers do not produce pollen. In only a few flowers a normal pistil is developed. I have pollinated these pistils and th descendants are similar to 'Roseus' again. They proved to be very cold–resistant and for this reason Thompson & Morgan took over the plant for further hybridization.

In some cultivars similarly shaped flowers appear, especially the first flowers on new shoots from hard pruned plants such flowers can develop. But the second or third flower will usually be normal.

'Nana Bright Eyes' see 'Little Bright Eye'

Tubergen (1969): Groeit zeer gedrongen en bloeit overvloedig met witte bloemen, die een rood oog hebben (growth very dwarf and abundant flowering with white flowers, with a red eye).

Info: 'Nana' is an illegitimate name according to the ICNCP, article 17.9.

'Nana Coquette' see 'Little Pinkie'

Tubergen (1969): rose. Een verbetering van de Vinca rosea, die opvalt door gedrongen groei en rijkbloeiendheid. Bij uitstek geschikt voor potkultuur (An improvement of Vinca rosea which attact attention for its dwarf habitus and free flowering. Very useful for potculture).

Info: Illegitimate name according to the ICNCP, article 17.9.

'Ocellata' see 'Ocellatus'

'Ocellatus' (cultivar–group Ocellatus), phot. 18.

Synonyms: *C. roseus* var. *ocellata,* 'Albo Oculata', 'Madagascar Bicolor', 'Ocellata', 'Tall Albo Oculata', 'Tall White with Rose Eye'.

Baines (1885): Flowers white with a red eye.

Boom (1968): kroon wit met rose oog cult. 1827-E. (corona white with red eye)

Bailey (1977): Fls. white with rose-pink to carmine-red eye.

Leaf normal green, glossy. Flower 2-4(-5) open, up to 5 cm across, flat but later a bit ascending, sometimes one lobe a bit wavy, corolla lobe usually gappy but sometimes overlapping, inside pure white, apex very pale green, eye dark red-purple (57A), throat pale green, outside white, apex very pale green-white, bud white with green apex. Fruit short fruits are produced by self–pollination, the flowers will drop.

'Orchid Cooler' (cultivar–group Albus, subgroup Unicolor), phot. 19.

PanAmerican Seed (1993): New. A very bright garden color, 'Orchid Cooler' is a rosy orchid with a clean white center. Each flower, including the first, is fully rounded. Habit, garden performance and germination are all consistent with the Cooler series.

Park Seed (1995): New (no further description).

Hamer (1995): Rose-orchid met een zuiver wit midden. Kan het best omschreven worden als een lichtere versie van Grape Cooler.

Geheel rondbloemig. (Rose-orchid with pure white eye. Best described as a paler version of Grape Cooler. Completely round flowers).

Leaf dark green, very large and not smooth. Flower 2-3 open, 4.5 cm across, rather flat, corolla lobe overlapping, irregularly wavy, inside equally purple (78B) but opening darker (78A), towards the base with a very pale violet blush, at the base in the middle dull white forming a distinct 5–pointed star, apex very pale green, eye lemon, throat lemon, outside very pale purple (78C) along the margin to white in the middle and base, apex very pale green, bud pale purple. Fruit: hardly fruits by self–pollination, the flower will stick to the young fruit.

'Pacifica Polka Dot' see 'Polka Dot'

Park Seed (1995): white with small red eye.

'Pacifica Punch' (cultivar–group Roseus)

Park Seed (1995): Intense rose-pink with darker center.

'Pacifica Red' (cultivar–group Roseus)

Park Seed (1995): The long-awaited, raspberry red Vinca! (illustrated in the catalogue).

Info: The illustration shows a dwarf and free–flowering plant. The flower shape is similar to that of 'Pretty in Soft Pink'. The corolla lobes are overlapping, red but slightly darker towards the base, the eye is also dark red. The leaves are distinctly narrow. Although the colour of the catalogue looks realistic at first sight, it seems a bit overdone as the throat is also coloured which I have never seen before.

In Dutch garden centres a plant is offered which looks similar to 'Pretty in Soft Pink' but with reddish flowers. It differs from 'Pacifica Red' mainly by the yellow eye. As I have no practical experience yet with 'Pacifica Red', I cannot conclude that this name belongs to that consignment. The description is as follows:

Cultivar A (cultivar–group Albus, subgroup Bicolor)

Leaf narrow, dark green, glossy. Flower 1-2 open, 4-4.5 cm across, flat but propellor–shaped, corolla lobe overlapping, inside opening red (52B) with apex slightly paler and darker towards base (52A), base itself paler with white, later bit fading (52D-54D), apex white, eye yellow, throat yellowish, outside very pale red to white-green at base, apex green, bud pale-red-purple with small green apex. Fruits short by self–pollination, the corolla will drop.

'Parasol' (cultivar–group Ocellatus), phot. 20.

Thompson & Morgan (1991): 15in. NEW INTRODUCTION! The largest flowers of any periwinkle of purest white with deep red eye and significantly more flowers than regular varieties (illustrated in the catalogue).

Ball Seed (1992): Along with some of the largest blooms around - 1 1/2 to 2 in. (4 to 5 cm) across - this variety features an overlapping petal form. The free-flowering plants bloom all summer long, with a colorful display of white flowers highlighted by prominent rose eyes. With its mounded habit and 18 to 20-in. (46 4-in. (10-cm) pots (illustrated in the catalogue).

PanAmerican Seed (1993): Parasol is highly recommended for commercial landscape use and home gardens where a height of 18 to 20 in. (46 to 51 cm) in a sunny location is desired. This striking Vinca offers the largest flowers in its class-1.5 to 2 in. (5 to 6 cm) across. The pure white petals are accented by large red eyes. Upright and vigorous, Parasol is a double 1991 All-America Selections Winner for its exceptional performance in the park and the garden. When pinched, Parasol is well-adapted to 4-in. (10-cm.) pot productions.

Park Seed (1995): 1991 AAS Winner. The largest flowered Vinca available! Pure white blooms with a red eye actually measure a full 2 1/2 inches across and are borne in tremendous profusion on bushy, uniform, 12-inch plants.

Leaf normal green, flower 1-4 open, 5-5.5 (-6) cm across, flat but somewhat propellor-shaped, later just a bit ascending, corolla overlapping, inside pure white with red-purple base, apex pale green, eye red-purple (66B-C), throat pale green, outside white,

apex pale green, bud greenish-white, fruit makes short fruits by self–pollination, the flowers will drop. Info: The red-purple eye is larger than in 'Ocellatus' and 'Peppermint Cooler', but smaller than in 'Sweet Elizabeth' and 'Little Delicata'.

'Passion' (cultivar–group Albus, subgroup Unicolor)

Park Seed (1995): Annual. This Passionate Purple Bicolor is a Park Exclusive! Catharanthus. A bold, new standout color for Vinca - deep orchid purple, with a yellow center for striking contrast! Large flowers produced early and in great abundance, and sturdy, neat form also make this one of the best new selections. Flowers are two inches and more across, with overlapping petals for maximum color effect, and they bloom earlier than Tropicanas. Form is upright, 16-18 inches, andbranching for full color, profuse bloom, and neat appearance. The result so much outstanding color, you can hardly see the foliage! (illustrated in the catalogue).

Info: The illustration shows a single flower. The flower is round in shape. The corolla lobes are overlapping, red-purple with at the base a white 2-3 mm long margin, and unequally scattered with small white spots, the eye is yellow.

'Peppermint Cooler' (cultivar–group Ocellatus), phot. 21

Thompson & Morgan (1991): 6-8x6-8in. NEW INTRODUCTIONS! Purest snowy-white overlapping petals and distinct deep red eye (illustrated in the catalogue).

Ball Seed (1992): White with a rose eye (illustrated in the catalogue).

Kieft (1992): red eyed white.

PanAmerican Seed (1993): white with a contrasting red eye.

Park Seed (1995): White with red eye.

Hamer (1995): Wit met rose oog (White with pink eye).

Leaf dark green, glossy. Flower 2-3 (-4) open, 4-5 cm across, flat but later somewhat ascending, corolla lobe overlapping, inside pure white, apex pale green, eye red-purple (66B-C), throat pale green, outside white, apex pale green, bud white with green tip. Makes very short fruits by self–pollination, the flowers will drop. Info: The red-purple eye is smaller than in 'Parasol' but larger than in 'Ocellatus'.

'Pink Carpet' (cultivar–group Roseus)

synonym: 'Carpet Pink'
De Mos (1989): donkerrose (dark pink).
Ball Seed (1992): no description.
Info: the illustration in Clausen shows a bushy plant, not very free flowering, the flowers are purple with a dark eye, and seem to fade. The corolla lobes are not overlapping.

'Pink Cooler' (cultivar–group Albus, subgroup Unicolor)

PanAmerican Seed (1993): no description.
Park Seed (1995): New (no further description).
Leaf dark green. Flowers 2-3 open, 3.5 cm across, propellor–shaped, corolla lobe overlapping, inside equally red-purple (68B) and near base greenish-white, with white spots unequally scattered, apex pale green, eye lemon, throat lemon, outside white but the left side of the lobe very pale red-purple, apex pale green, bud white with greenish apex. Makes short fruits by self–pollination, the flowers will stick to the young fruit.

'Pinkie' see 'Little Pinkie'
Van der Heijden (1992): no description.

'Pink Panther' (cultivar–group Roseus)

Clausen (1989): has clear rose red flowers, with a darker eye. 10"-12" tall.

'Pink Turkey' (cultivar–group Roseus), phot. 22.

Snoeijer (1995): Habitus als soort. Bloemen 5(-6) cm doorsnede. Kroonslippen meestal overlappend met vrije basis, purper (77C-D) met meer rood-purper nabij de basis, oog donker rood-purper (74A). Eigen cultivar, meegebracht door Prof.dr. R. Verpoorte uit Turkije. (Habit as the type. Flowers 5 (-6) cm across. Corolla lobes usually overlapping with free base, purple (77C-D) with more red-purple towards the base, eye dark red-purple (74A).

Self-selected cultivar, introduced by Prof.dr. R. Verpoorte from cultivated source in Turkey.
Leaf dark green, glossy. Flower 2-3-4 open, 5(-6) cm across, flat but later somewhat ascending, corolla lobes overlapping with gappy base, rarely completely overlapping, inside purple (77C-D) but more red-purple towards the eye especially in the middle, rarely with a few white spots unequally scattered, apex greenish-white, eye dark red-purple (74A), throat pale green, outside white, apex pale green, bud white. Very short fruits after self–pollination, the flowers will drop. Info: The red-purple is a bit paler than in 'Roseus' but the eye is equally dark red-purple. Cuttings will root as easily as others but take rather a long time before they are established and start to grow. Standard specimen in L (Rijksherbarium, Leiden).

'Polka Dot' (cultivar–group Ocellatus)

synonym: 'Pacifica Polka Dot'.
Hamer (1971): zuiver wit met klein rose oog. 25 cm. Winnaar All America Selections 1969 (clear white with small pink eye).
Denholm (1981): White flower with pink eye.
Ball Seed (1992) no description.
Park Seed (1995): White with a small red eye.

Pretty Hybrids see Pretty in .... Series

'Pretty in Pink' (cultivar–group Albus, subgroup Bicolor)

Thompson & Morgan (1991): 12in. NEW INTRODUCTION! A true pure pinkflowered periwinkle - the first ever. Several days earlier than 'Little Pinkie' (illustrated in the catalogue).
Ball Seed (1992): no description.
Info: the illustrations show a free flowering plant. The flowers are similar to 'Pretty in Soft Pink'. The corolla lobes are overlapping, pale red-purple and somewhat darker towards the base, at the base itself with a white 2-3 mm long margin forming a tiny white star, eye yellow. Flower buds pale red-purple. The leaves appear quite narrow.

'Pretty in Rose' (cultivar–group Roseus), phot. 23.

Synonym: 'Pretty in Velvet Rose'
Ball Seed (1992): no description.
Thompson & Morgan (1992): New! (no further description, but illustrated in the catalogue).
PanAmerican Seed (1993): Full and bushy, Pretty in Rose produces flowers in an unusual shade of deep rosy purple. One plant in a 4-in. (10-cm) pot creates a full, attractive display. A 1991 All-America Selections Winner.
Habit a much branching low shrub making a thick bush. Leaf normal green, glossy, flower 2-3 open, 4.5-5 cm across, rather flat but some lobes are wavy, corolla lobe overlapping or overlapping with gappy base, inside dark purple (78A) with red-purple (74A) tint near the base, apex white, eye very dark red-purple, throat pale green-purple, outside white with a thin pale red-purple margin and the red-purple from the inside is visible, apex very pale green, bud white, fruit makes short fruits by self–pollination, the flowers will drop, Info: The red-purple eye is darker than in 'Roseus'.

'Pretty in Soft Pink' (cultivar–group Albus, subgroup Bicolor), phot. 24.

Thompson & Morgan (1994): no description but illustrated together with other cultivars.
Leaf normal green, not so glossy. Flowers 2-3 open, 4-4.5 cm across, more or less propellor–shaped, corolla lobe overlapping, inside equally pale purple (65B-C) but darker (68B) near the base, white between the darker colour and the eye, apex pale greenish-purple, eye yellowish, throat yellowish, outside very pale purple-white, apex pale greenish-purple, bud very pale purple with greenish apex. Self–pollination produces short fruits, the flowers will drop.
Info: The illustration in the T&M 1994 catalogue is the same photograph (but a mirror–image) as in the T&M 1992 catalogue. Strangely enough, in 1992 'Pretty in Soft Pink' was not offered for sale.

'Pretty in Velvet Rose' see 'Pretty in Rose'
Thompson & Morgan (1994 & 1995): no description, but illustrated.
Info: The plant is similar to 'Pretty in Rose' making it only distinct in the colour of the opening flower which is paler than in 'Pretty in Rose'. As cultivars are grown only by seed, this variation must be accepted as being normal and insufficient to separate the plant as a new cultivar.

'Pretty in White' (cultivar–group Albus, subgroup Bicolor), phot. 25.

Ball Seed (1992): New (no further description).
Thompson & Morgan (1994): New! (no further description, but illustrated in the catalogue).
Leaf normal green, not so glossy. Flowers 2-3 open, 4 cm across, more or less propellor–shaped, corolla lobes overlapping, inside pure white with a small and very pale purple spot near the eye, apex very pale greenish-white, eye yellowish, throat yellowish, outside white, apex very pale greenish-white, bud white. Fruits short after self–pollination, the corolla will drop.

'Rose'
Muller (1995): (15) donkerrose (dark pink)
Info: Illegitimate name according to the ICNCP, article 17.11 Example 12. Probably synonym of 'Madagascar Rose'.

'Rosea' see 'Roseus'

'Rose Carpet' (cultivar–group Roseus)

Hamer (1972): zuiver rose, kruipende Vinca. 15 cm (clear pink, creeping Vinca).

'Rose Cooler' (cultivar–group Roseus)

PanAmerican Seed (1993): no description.

Park Seed (1995): New (no further description).
Leaf dark green, glossy, rather large. Flowers 2-3 open, 3.5 cm across, more or less propellor-shaped, corolla lobe overlapping, a bit bent downwards, inside red-purple (74A) but darker towards eye, usually with white spots unequally scattered, apex greenish-white, eye very dark red-purple, throat dull green, outside white, apex pale green, bud white with green apex. Fruits short after self-pollination, the corolla will stick to the young fruits.

'Roseus' (cultivar–group Roseus), phot. 26

Synonyms: *C. roseus* var. *roseus*, 'Madagascar Crimson', 'Rosea', 'Tall Crimson', 'Tall Kermesina'.
Leaf dark green, glossy. Flowers 2-3 open, up to 5 cm across, rather flat, corolla lobe sometimes overlapping with gappy base or gappy, inside red-purple (77C) but darker towards eye especially in the middle, apex greenish-white, rather large, eye dark red-purple (74A), throat pale green, outside white but the red-purple from the inside is visible, apex very pale green, bud white with greenish apex, fruit makes very short fruits by self-pollination, the flowers will either drop or stick to the young fruits. Info: This name is used here for plants which are closest to the standard specimen. 'Roseus' is typical for the cultivars of the group. Received an Award of Merit in England as C. roseus.

Sahara Madness Hybrids see Sahara Madness Series

'Sahara Madness Bright Eye' (cultivar–group Ocellatus)

Ball Seed (1992): White with a rose eye.

'Sahara Madness Pink' (cultivar–group Roseus)

Ball Seed (1992): Rose pink with a deep rose eye.

'Sahara White with Red Eye'

Info: Listed by Isaacson (see references).

'Snow Carpet'

Ball Seed (1992): no description.

'Snowflake' (cultivar–group Albus, subgroup Albus)

Denholm (1981) Pure white.

'Snow White' ('Sneeuwwitje') see 'Little Blanche'
Pannevis (1974): 25 cm, zuiver wit (clear white).
Info: In the Pannevis 1974 catalogue a photograph is shown with 4 different plants but without any separate names. This photograph is the same as in the Sakata 1971 catalogue in which the 4 plants were named. I therefore conclude that Pannevis obtained seeds of this plant from Sakata, which makes 'Snow White' a synonym of 'Little Blanche'. Also remarkable is the fact that in the description of Sakata, 'Little Blanche' is described by having snow-white flowers.

'Sweet Elizabeth' (cultivar–group Roseus), phot. 27.

Snoeijer (1995): Habitus als soort. Bloemen 4.5 cm doorsnede. Kroonslip overlappend, zeer licht rood-purper (62C) tot wit nabij de top en met donkerder rood-purper (68A) nabij de basis, oog helder rood-purper (66A). Eigen kruising van C. r. 'Parasol' X C. r. 'Pretty in Soft Pink'. De naam is van mijn collega Els (Elizabeth) Schlatmann, die ook altijd erg aardig is (Sweet), terwijl dit 'Sweet' tevens slaat op de zoete kleur van de bloem.
Origin: Catharanthus roseus 'Parasol' X 'Pretty in Soft Pink'. Raised by Wim Snoeijer. Name in honour of Els Schlatmann, head gardener at the Institute for Evolutionary and Ecological Sciences, Leiden University, The Netherlands.
Leaf normal green, glossy. Flowers 2-3 (-5) open, 4.5(-5) cm across, rather flat but somewhat propellor–shaped, corolla lobes overlapping, inside very pale purple (62C) to white but more red-purple (68A) near the base, apex very pale green, eye bright red-purple (66A), throat green, outside white, apex very pale green, bud very pale pinkish-white with greenish tip. Makes very short

fruits by self–pollination, the corolla will drop, Info: The bright red eye is smaller than in 'Peppermint Cooler'. The habitus is similar to 'Parasol'.

'Tall Alba Oculata' see 'Ocellatus'
Sakata (1971): no description.
Info: Illegitimate name according to ICNCP, article 17.9.

'Tall Alba Pura' see 'Albus'
Sakata (1971): no description.
Info: Illegitimate name according to ICNCP, article 17.9.

'Tall Crimson' see 'Roseus'
Kieft (1992): no description

'Tall Delicata' see 'Madagascar Pink'
Sakata (1971): no description.

'Tall Kermesina' see 'Roseus'
Sakata (1971): no description.

'Tall Pure White' see 'Albus'
Kieft (1992): no description

'Tall Rose' see 'Madagascar Rose'
Kieft (1992): no description

'Tall White with Rose Eye' see 'Ocellatus'
Kieft (1980): no description
Kieft (1992): unusual colour (no further description).

Tropicana see Tropicana Series

'Tropicana Blush' (cultivar–group Roseus), phot. 28.

Park Seed (1995): Light rose, deep eye.
Leaf dark green, glossy. Flowers 1-2-3 open, 4-4.5 cm across, flat but slightly propellor–shaped, corolla lobes overlapping, inside very pale red-purple (62CD) with some darker stripes, near the base much darker (66B), apex green, eye dark red-purple (66A), throat yellowish, outside white, apex greenish, bud white with greenish apex. Self–pollination producing very short fruits, the corolla will drop.

'Tropicana Bright Eye' (cultivar–group Roseus)

Park Seed (1995): pale pink, deep eye (illustrated in the catalogue).
Info: The illustration shows a dwarf and free–flowering plant. The flowers seem round in shape and similar to 'Pretty in Soft Pink'. The corolla lobes are overlapping, very pale pink to white at the tip but darker at the base, eye red-purple.

'Tropicana Pink' (cultivar–group Albus, subgroup Unicolor), phot. 29.

Park Seed (1995): no description, but illustrated.
Leaf dark green, glossy. Flowers 1-3 open, 4-4.5 cm across, flat but slightly propellor–shaped and later somewhat descending, corolla lobe overlapping, inside equally red-purple (768B/73A) with small white base, apex pale green, eye yellow, throat greenish-yellow, outside very pale red-purple to white at base, apex very pale green, bud pale red-purple with green apex. Self–pollination produces short fruits, the corolla will drop.

'Tropicana Rose' (cultivar–group Albus, subgroup Unicolor), phot. 30.

Park Seed (1995): Most unique of all (no further description but illustrated in the catalogue).
Leaf dark green, glossy. Flowers 1-2-3 open, 4-4.5 cm across, flat but propellor-shaped, corolla lobe overlapping, inside equally red-purple (74C) with white spots unequally scattered, base

greenish-white, apex pale green, eye yellow, throat greenish-yellow, outside very pale red-purple to white at base, apex green, bud pale red-purple. Fruits short after self–pollination, the corolla will drop. Info: The white eye is larger than in 'Tropicana Pink'.

'Tropicana White'

Park Seed (1995): New (no further description).

'Variegatus'

Synonym: Catharanthus roseus foliis variegatis

Loudon (1850): *Vinca rosea* fol. *variegatis* Hort. English Name Variegated–leaved Periwinkle Habit Deciduous undershrub. Duration and Habitation Bark, or moist, stove Popular Character ornamental Height 1 (feet) Time of Flowering: March to October. Color of the Flower R.w (R. = Red, the w stands probably for the white on the leaf) Native Country gardens Year of Introduction ..... Propagation: cuttings. Soil: rich mould.

'White Turkey' (cultivar–group Albus, subgroup Albus), phot. 31.

New introduction, origin from a cultivated source in Turkey, taken by Prof.dr. R. Verpoorte, supervisor of Division Pharmacognosy. Leaf dark green, glossy, flower 2-4 open, 5(-6) cm across, flat but later just a bit ascending, corolla lobe overlapping with large gappy base, margin distinctly very short wavy, inside pure white, apex very pale green, eye very pale green, throat lemon coloured, outside white, apex very pale green, bud white with green tip. Self–pollination produces very short fruits, the flowers will drop.

Info: As the flower is larger compared with 'Albus', the gappy base is also larger. Cuttings will root as easily as in other cvs but take rather a long time before they are established and starting to grow. Standard specimen: in L (Rijksherbarium, Leiden).

Catharanthus trichophyllus, phot. 2.

Habit: strongly growing open shrub, the stems upright, hardly branching. Leaf medium green and dull, flower solitary, rarely 2 open, 3.5 cm across, flat but later the margins bend downwards, corolla lobes gappy with rather wide spaces, inside evenly red-purple (58C) and near the base with a bit violet and white, apex red-purple, eye pale yellow, throat yellowish, narrower than *C. roseus*, outside pale red-purple, near the base white with thin pale red-purple stripes, apex red-purple, tube pale green with some red-purple at the anther lumps, bud pale red-purple. Fruits after self–pollination normal, the corolla will drop.

Info: Germination of seeds is erratic, a few emerge within a couple of days but most seeds germinate after 20-40 days.

'Twinkling Anja', phot. 32.

Snoeijer (1995): Habitus erg open en sterk rechtop groeiende struik, gelijk aan *C. trichophyllus*. Bloemen 4-4.5 cm doorsnede. Kroonslip meestal overlappend met basis vrij, gelijkkleurig rood-purper (72D), oog donker rood-purper (74A). Eigen kruising van *C. trichophyllus* X *C. roseus* 'Parasol'. De naam is van mijn collega Anja Peltenburg, verzonnen door haar man. (Habitus very open and rather upright growing shrub, similar to C. trichophyllus. Flowers 4-4.5 cm across. Corolla lobes usually overlapping with free base, equally coloured red-purple (72D), eye dark red-purple (74A). Product of cross C. trichophyllus X C. roseus 'Parasol'. The name refers to my colleague Anja Peltenburg, and was suggested by her husband).

Origin: *Catharanthus trichophyllus* X *C. roseus* 'Parasol' Raised by Wim Snoeijer. name In honour of Anja Peltenburg-Looman, analyst at the Division of Pharmacognosy. Habitus strong growing and somewhat branching shrub, similar as the seed parent *C. trichophyllus*. Leaf green colour and appearance similar as in *C. trichophyllus* but much larger, not glossy but not as dull as in *C. trichophyllus*. Flowers (1-)2-3 open, 4-4.5 cm across, flat but soon a bit ascending with also the margins bent downwards, corolla lobe usually overlapping with gappy base, but also either overlapping or not, inside very evenly red-purple coloured(72D), apex red-purple, eye dark red-purple (74A), which is darker

than in *C. roseus.* 'Parasol' and a bit paler than *C. roseus* 'Roseus', throat as narrow as in *C. trichophyllus* and pale yellow, outside pale red-purple to white near base, apex pale red-purple, bud pale red-purple. Flower makes short to normal fruits by self–pollination, the corolla will drop, Info: Germination is as quick as of *C. roseus*, within 2-3 days most seeds of the original cross–breeding had germinated. Info: The plant recovers slowly after hard pruning. Info: Plants raised from seeds of 'Twinkling Anja' are not true to type. Standard specimen in L (= Rijksherbarium, Leiden).

Series

All names of the series are quoted here from the references without any further classification. Therefore these names are not referred to with a cultivar name. In contrast, these Series names are usually mentioned in the seed catalogues.

Bright Eyes Series see Little Series

Carpet Series
Info: Cultivars offered under this series are named '.... Carpet'.
Sakata (1971): Similar to the ordinary rose-colored Periwinkle, except for its creeping habit. Under favorable conditions, it practically covers the ground for two feet or so in diameter. An occasional tall type may appear. Makes a desirable plant for a border and for rock gardens, etc. We feel it is a most useful plant, especially in warmer locations or in the tropics.
De Mos (1989): Compactere en breder uitstoelende planten dan de Little-serie (dwarf growing and more spreading than the Little Series).
Thompson & Morgan (1987): 6-9in. GA/HHA. Very good dwarf, prostrate habit, ideal for containers indoors or out where it is very heat tolerant.
Clausen (1989): has flowers in white and shades of pink and rose. Very heat tolerant. 6"-9" in height.
Kieft (1992): Creeping varieties. Carpet Series, dwarf growing with spreading habit. Excellent as borderplant, for hanging baskets and tubs.

Ball Seed (1992): no description.

Cooler Series

Info: Cultivars offered under this series are named '.... Cooler'.

Thompson & Morgan (1991): For many of us this will be the first time periwinkles can be grown outside. Bred for cooler, temperate climates they carry many 2 in. flowers of charm and beauty and deep green foliage to add contrast. A further attraction is a vastly improved flower form of overlapping, rounded petals. They bloom early, are drought tolerant and flower well even in the hottest weather and paradoxically their petals are extremely waterproof.

Ball Seed (1992): Full and lush, the upright, 5 to 7-in. (13 to 18 cm) plants produce vivid blooms with large, overlapping petals that give this series an especially brilliant appearance. These vincas are good in the pack, and put on a great outdoor show in pots and garden displays.

Kieft (1992) Dwarf varieties, compact growing types, round flowers, (improved Little), 20 cm.

PanAmerican Seed (1993) (as Cooler tm Series) This series gives a new look to the class, more resembling an impatiens for sun than an old-fashioned periwinkle. The look comes from a difference in flower form-previously showing gaps, the triangular petals are now fatter and overlapping, creating a complete disk that makes the flowers appear much larger. The series also has a truly uniform habit, flat after flat and pot after pot, offering better production, shipping, sales and performance. The plants branch heavily and early, low and evenly, and have proven themselves to be more tolerant of cool, wet growing conditions than other vinca. Germination is also consistently reliable. The Cooler series sets the standard for Vinca, providing a distinctly cool and refreshing look in the hottest garden of landscape settings. And Coolers are the choice for 4-in. (10-cm) pot production, requiring no pinching.

Thompson & Morgan (1994): 6-8 x 6-8in. T&M INTRODUCTION. Bred especially for cooler, temperate climates. Early flowering, uniform, good colour mixture for a wonderful cool and pastel summer show.

Park Seed (1995): Huge blooms (actually measuring a full 2 1/4 inches across) have overlapping petals which give them a

beautiful, rounded, very formal appearance. Choice colors. Grows to 15 inches.

Hamer (1995): De 13-18 cm hoge planten zijn goed vertakt en overdekt met grote ronde bloemen. Mooie zomerpotplant. (The 13-18 cm high plants are well branched and covered with large round flowers. Beautiful summer potplant).

Creeping Rose Carpet see Carpet Series

Dwarf Little Series see Little Series

Hot Streak Series
Info: Listed by Isaacson (1993).

Catharanthus roseus Little Series
Info: Cultivars offered under this series are named 'Little ....'.

Sakata (1971): A well-balanced formula mixture. Very popular since its introduction.

Denholm Seeds (1981) (as Dwarf type) 10 inches (25 cm) Very uniform compact plants. Good for bedding. Does well in hot, dry summers.

De Mos (1989): (als rosea lage potsoorten) Zeer geschikt als potplant. Stervormige bloemen, glanzend blad. Zaaitijd januari-half juli bij 18-21°C. Verspenen en niet te warm afkweken. Eventueel remmen met Cycocel, 1 cc per liter water. Indien men topt zullen de planten beter vertakken. Oppotten in een 8 of 9 cm pot of 3 planten in en 11-12 cm pot. 4 gram voor 1000 planten. Bloeitijd april-oktober. Hoogte 15 cm (Very valuable potplants. Star-shaped flowers, glossy leaves. Sowing time January-mid July at 18-21°C. Prick out and grow on not too warm. When necessary use Cycocel, 1 cc per liter water, for shorter plants. If the growing tip is pinched out the plant will branch easier. Potting up in a 8 or 9 cm pot or 3 plants in a 11-12 cm pot. 4 gram for 1000 plants. Flowering time April-October. Height 15 cm).

Ball Seed (1992): This 10-in. (25.5-cm.) varieties produce uniform, 1 3/4-in. (4-5-cm.) blooms on upright plants.

Kieft (1992): Dwarf varieties, uniform, compact plants with glossy leaves. Ideal for hot and dry climates, 20-25 cm.

Chiltern (1994) (as 'Little mixed') Madagascar Periwinkle. This is a charming little plant that flowers profusely for months on end in a greenhouse or conservatory. It is also worth trying outside in a sheltered position. We offer a mixture of separate, dwarf varieties including such delight as 'Little Pinkie' (rose-coloured flowers) and 'Little Bright Eye' (pure white with rose eye) and others. 12 ins. GA. symbol for attractive to butterflies.

Sakata (1994): Since the introduction of the Dwarf Little Series of Vincas years ago, the demand and useage of Vincas has changed completely throughout the world. All are dwarf and compact with base branches, uniform habit, floriferous and will thrive under hot summers. Will flower in packs when plants are 4 inches (10 cm) tall. Recommended for early pack sales.

Catharanthus roseus Madagascar Series

Info: Cultivars offered under this series are named 'Madagascar .... '.

Van Zanten (1986): Dit type vinca produceert stevige, compacte struikachtige potplanten, ca 25 cm hoog. Een verbeterd ras met mooie stervormige bloemen op fris donkergroen blad. De vele bloemen staan mooi boven het blad. (This type of vinca produces strong, compact shrubby potplants, ca 25 cm high. An improved cultivar with beautifull star–shaped flowers with fresh dark green leaf. The many flowers are arranged above the leaf.)

Catharanthus roseus Magic Carpet Series zie Carpet Series

Catharanthus roseus Pacifica Series

Info: Cultivars offered under this series are named 'Pacifica .... '.

Park Seed (1995): Catharanthus. Annual Vinca is surging ahead to become one of America's favorite annuals for summer bedding and landscape use. You just can't beat its massive color display, even under adverse conditions - for this is a plant that takes the worst heat and poor dry soils without complaint. And the breeder's art has been bringing us exciting new varieties with better and better colors every year. Now, we bring you the

sensational new Pacifica Series with unique colors (including the closest thing to a true red Vinca ever), huge 2-inch flowers with nicely overlapping petals, and extra early flower production, blooming only 60 days from seed. 10 to 12 inches tall, the plants are more basal branching than older varieties, which means easier culture, stronger garden performance, and solid color in your borders and beds. Without doubt, Pacifica is destined to be the nation's top Vinca series for 1995!

Catharanthus roseus Pretty in ..... Series
Info: Cultivars offered under this series are named 'Pretty in ....'.
Ball Seed (1992) A new member - Pretty in White - appears this year, showing off the same 1 to 2 in. (2.5 to 5-cm.) blooms as the other series colors, as well as the overlapping petals which give the appearance of more flower color per plant. Highlighted by glossy green foliage, the vincas reach 14 to 16 in. (35.5 to 41 cm) tall, with a 14 in. (35.5 cm) spread. Count on these heat and drought-tolorant plants to put on a colorful, season-long display in 4-in. (10-cm.) pots, gardens and landscapes.
Thompson & Morgan (1992) Exciting new luscious colours for long summer climates, available in soft pink, swans-down white and rich velvet rose. Producing a never ending show of blooms from early summer to first frosts, you could only but achieve one of the very best in garden displays. (1991 AAS winner). 12-14in.

Catharanthus roseus Sahara Madness Series
Info: Cultivars offered under this series are named 'Sahara ....'.
Ball Seed (1992): Boasting more flowers per plant than any other vinca, each 5 to 6-in. (13 to 15 cm) vinca is covered with 1 1/2-in. (4-cm.) blossoms. This well-branched series spreads 10 to 12 in. across in sensational displays. An excellent full-sun landscape variety, the heat and drought-tolorant series is an ideal way to add instant, beautiful color.

Catharanthus roseus The Cooler Series see Cooler Series

Catharanthus roseus Tropicana see Tropicana Series

Catharanthus roseus Tropicana Series
Info: Cultivars offered under this series are named 'Tropicana ....'.
Chiltern (1994) A fine new early flowering strain of the Madagascar Periwinkle bred for bedding purposes, producing bushy plants bearing a profusion of large flowers, each two inches or so in diameter, and which contrast nicely with the dark green foliage. The colours are blush (light rose deepening towards the centre), pale pink with a deep eye, pink and rose. (They prefer a temperature of 80°F for germination but at this, require only 5-8 days to emerge.) 14-15 ins. HHA.
Park Seed (1995): A Park Introduction. Luscious colors (especially the rose!) and free-flowering habit. Extra early to bloom, Tropicana flowers just 60 days from sowing, which is 10 days earlier than the Coolers, and grows to a height of 14 to 15 inches, with a spread of 15 to 16 inches. This eye-catcher is sure to win your favor!
Thompson & Morgan (1995) Vinca - Catharanthus. Poisonous. HHA. 14x16in. Not just hot, but really hot!! In fact they can't get enough heat. Four sizzling colours, rose, blush, bright eye and pink with lots of large flowers which cover the plant. Fantastic container and basket plants and they make good pot plants too. As their name implies, they perform best when enjoying hot conditions.

Seed Mixtures

Catharanthus roseus Dwarf Mixed: mixture of cultivars named 'Little .....'

Catharanthus roseus Formula Mixed: mixture of cultivars named 'Little .....'

Catharanthus roseus Ice Cool Mixed: mixture of cultivars which are not named separately, belonging to all 3 cultivar Groups.

Catharanthus roseus Little Formula Mixed: mixture of cultivars named 'Little .....'

Catharanthus roseus Little Gem Mixed: mixture of cultivars named 'Little .....'

Catharanthus roseus Little Mixed: mixture of cultivars named 'Little .....'

Catharanthus roseus Madagascar Mixed: mixture of cultivars named 'Madagascar .....'

Catharanthus roseus Magic Carpet Mixed: mixture of cultivars named'..... Carpet'

Catharanthus roseus Nana compacta Dwarf Varieties: mixture of cultivars named 'Little .....'

Catharanthus roseus Pretty in Mixed: mixture of cultivars named 'Pretty in .....'

Catharanthus roseus Tall Choice Mixed: mixture of cultivars named 'Madagascar .....'

Catharanthus roseus Tall Rosea Mixed: mixture of cultivars named 'Madagascar .....'

Catharanthus roseus Tall Varieties Choice Mixed: mixture of cultivars named 'Madagascar .....'

Catharanthus roseus Tropicana Formula Mixed: mixture of cultivars named 'Tropicana .....'

Catharanthus roseus Tropicana Mixed: mixture of cultivars named 'Tropicana .....'

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collected over the past 10 years, I also visited the libraries of the Experimental Station for Cutflowers in Aalsmeer and the National Herbarium in Leiden. I would like to thank the library staff of both institutes for their help and attention. The Landbouw Export Bureau, Wageningen provided funds towards the publication of the colour photographs and this support is thankfully acknowledged.

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Kieft Bloemzaden, The Netherlands. 1980. 1992.
Leen de Mos, The Netherlands. 1975. 1979. 1989.
Muller, The Netherlands. 1995.
PanAmerican Seed, U.S.A. 1993.
Pannevis Bloemzaden, The Netherlands. 1974.
Park Seed, U.S.A. 1995.
Sakata, Japan. 1971. 1982. 1994.
Suttons, England. 1989.
Thompson & Morgan, England. 1987. 1991. 1994. 1995.
van Tubergen, The Netherlands. 1969.
van Zanten & Co B.V., The Netherlands. 1986.

Catharanthus plant collection Division of Pharmacognosy

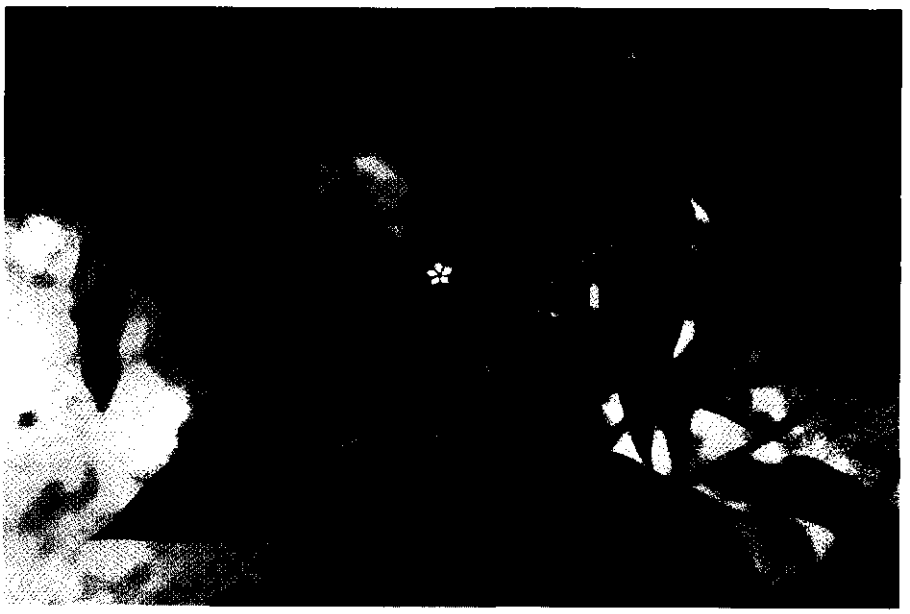
Leiden/Amsterdam Center for Drug Research, Gorlaeus Laboratories, Division of Pharmacognosy, P.O. Box 9502, 2300 RA Leiden, the Netherlands. Phone (31) 71 527 4510; fax (31) 71 527 4511.

Supervisor Prof.dr. Rob Verpoorte, head gardener Wim Snoeijer

Catharanthus pusillus ex HB Auroville, India.

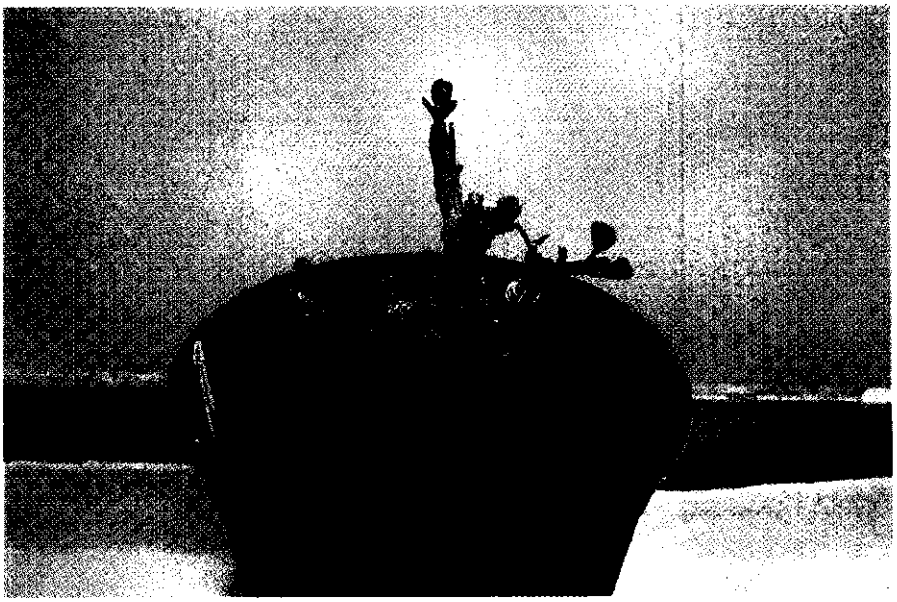
Catharanthus roseus 'Albus' ex Ank Hermans-Lokkerbol, analyst of Division Pharmacognosy. LN Thailand, Sukothai.
'Albus' ex HB Hamburg, Germany, no 78. LN Legion Beach Hotel, Kuta, Bali.
'Albus' ex HB Boedakalesk, Hungary. Seed received as *Catharanthus roseus* var. *ocellatus*.
'Blush Cooler' ex PanAmerican Seed
'Grape Cooler' ex PanAmerican Seed
'Grape Cooler' ex Thompson & Morgan
'Icy Pink Cooler' ex PanAmerican Seed
'Little Blanche' ex Sakata Seed
'Little Bright Eyes' ex Muller & Zn. BV.
'Little Delicata' ex Muller & Zn. BV.
'Little Linda' ex Muller & Zn. BV.
'Little Pinkie' ex Sakata Seed
'Morning Mist' ex Kieft.
mutant
'Ocellatus' ex HB Boedakalesk, Hungary. Seed received as *Catharanthus roseus* var. *ocellatus*.
'Orchid Cooler' ex PanAmerican Seed
'Parasol' ex PanAmerican Seed
'Parasol' ex Thompson & Morgan
'Peppermint Cooler' ex PanAmerican Seed
'Peppermint Cooler' ex Thompson & Morgan
'Pink Cooler' ex PanAmerican Seed
'Pink Turkey' ex Turkey
'Pretty in Rose' ex PanAmerican Seed
'Pretty in Rose' ex Thompson & Morgan
'Pretty in Soft Pink' ex Thompson & Morgan

'Pretty in Velvet Rose' ex Thompson & Morgan
'Pretty in White' ex Thompson & Morgan
'Rose Cooler' ex PanAmerican Seed
'Roseus' ex Ank Hermans-Lokkerbol, Division Pharmacognosy. LN Thailand, Chiang Mai.
'Roseus' ex Ank Hermans-Lokkerbol Division Pharmacognosy. LN Thailand, Damnernsaduok, Rajchaburi.
'Roseus' ex HB Boedakalesk, Hungary. Seed received as *Catharanthus roseus* var. *ocellatus*.
'Sweet Elizabeth' own cross-breeding.
'Tall Crimson' ex Kieft
'Tall Pure White' ex Kieft
'Tropicana Blush' ex Thompson & Morgan
'Tropicana Pink' ex Thompson & Morgan
'Tropicana Rose' ex Thompson & Morgan
'White Turkey' ex Turkey Turkey'
Catharanthus roseus unnamed cultivar see 'Pacifica Red'
Catharanthus trichophyllus ex Huntington BG., Cal., USA. Seed received as *Catharanthus lanceus*. Originally LN Madagascar.
Catharanthus trichophyllus ex Han Blankert, Etten-Leur, The Netherlands. LN Madagascar, Ampijoroa Forest Station, Ankarafantsika Reserve, Mahajanga Province, north-west Madagascar, dry mixed forest.
'Twinkling Anja' own cross-breeding.

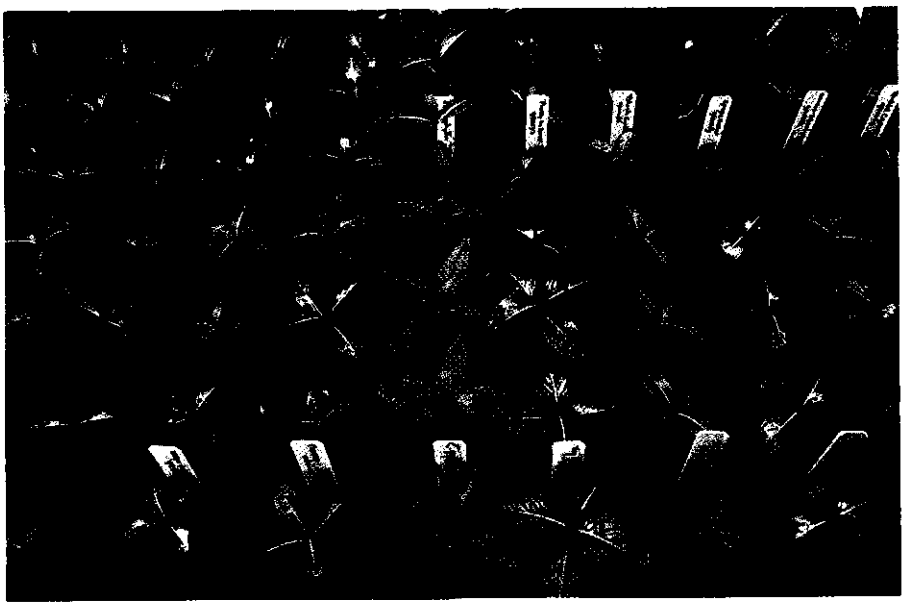


Phot. 1. *Catharanthus pusillus.*

Phot. 2. *Catharanthus trichophyllus.*



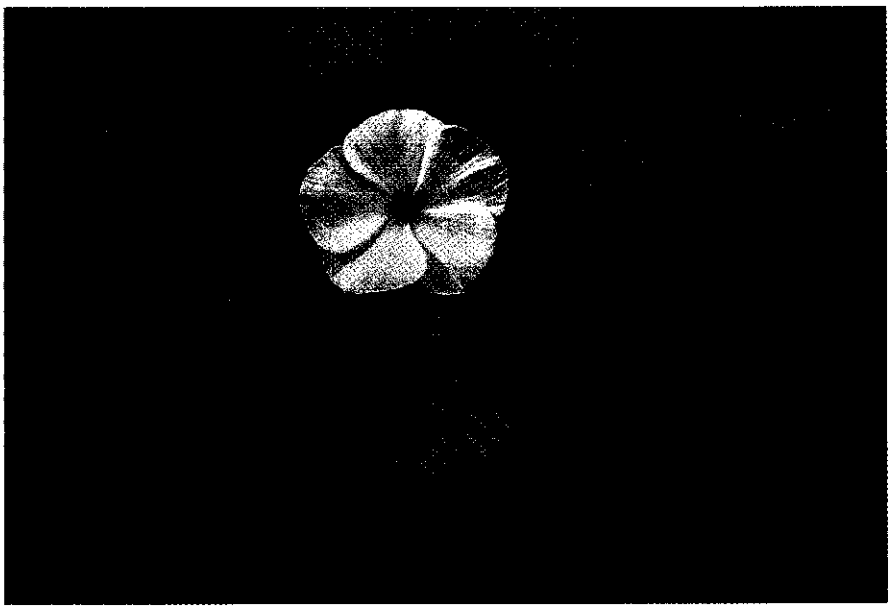
Phot. 3. *Catharanthus roseus* after hard pruning.



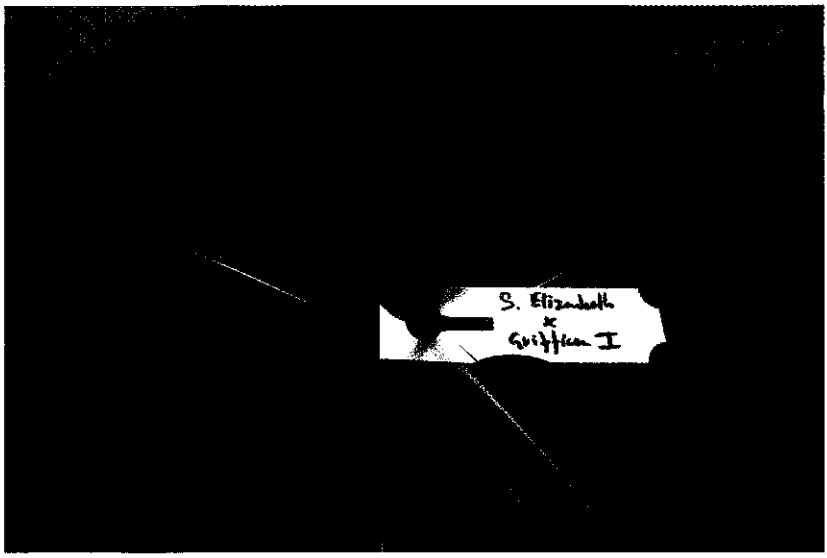
Phot. 4. *Catharanthus roseus*, young seedlings after two weeks of pricking out.

Phot. 5. Seedlings from the left to the right: *Catharanthus trichophyllus*, *C. roseus* 'Rose Cooler', *C. pusillus*.

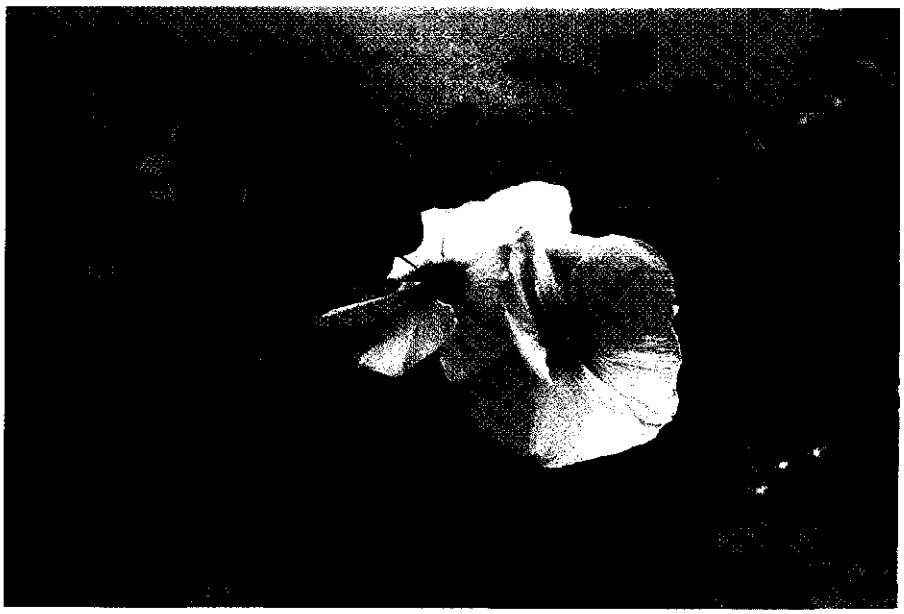
Phot. 6. Cross breeding: from the left to the right: *Catharanthus roseus* 'Parasol' x 'Pretty in Soft Pink' and 'Sweet Elisabeth'.



Phot. 7. Top from the left to the right *Catharanthus trichophyllus*, *C. roseus* 'Parasol' and hybrid 'Twinkling Anja'.



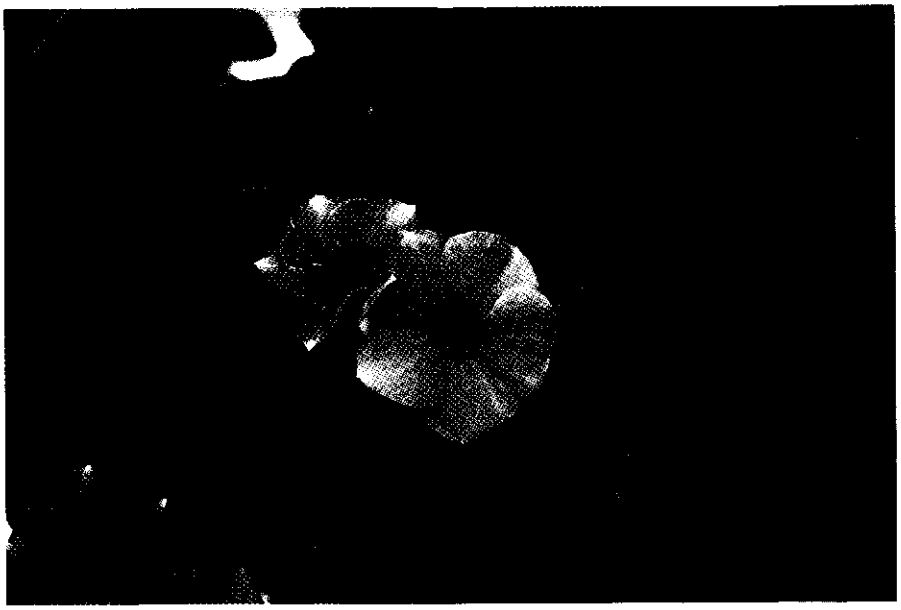
Phot. 8. Young fruit after cross breeding of *Catharanthus roseus* and *C. trichophyllus*.



Phot. 9. Hand pollination of *Catharanthus roseus* 'Sweet Elisabeth'.

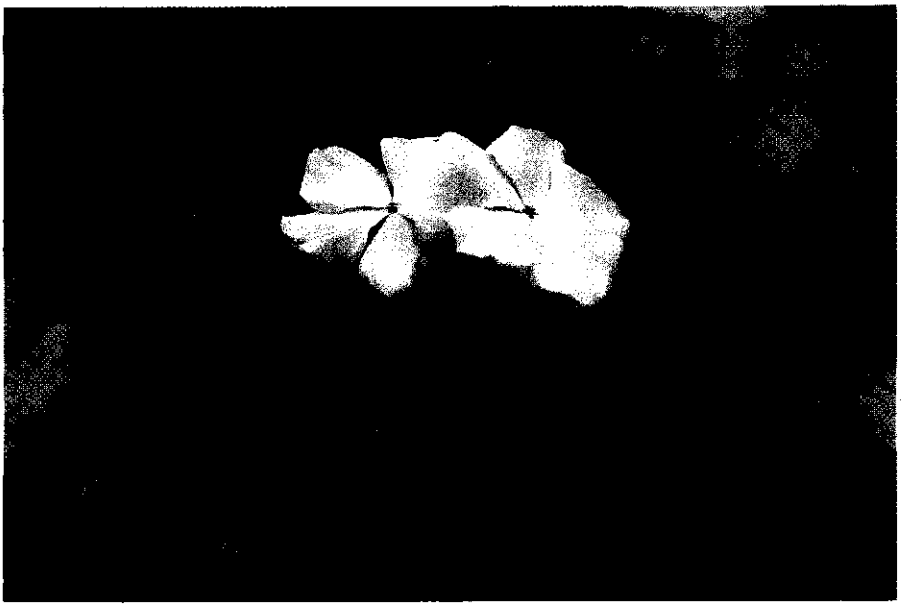
Phot. 10. *Catharanthus roseus* 'Albus', 3 forms.

Phot. 11. *Catharanthus roseus* 'Blush Cooler'.

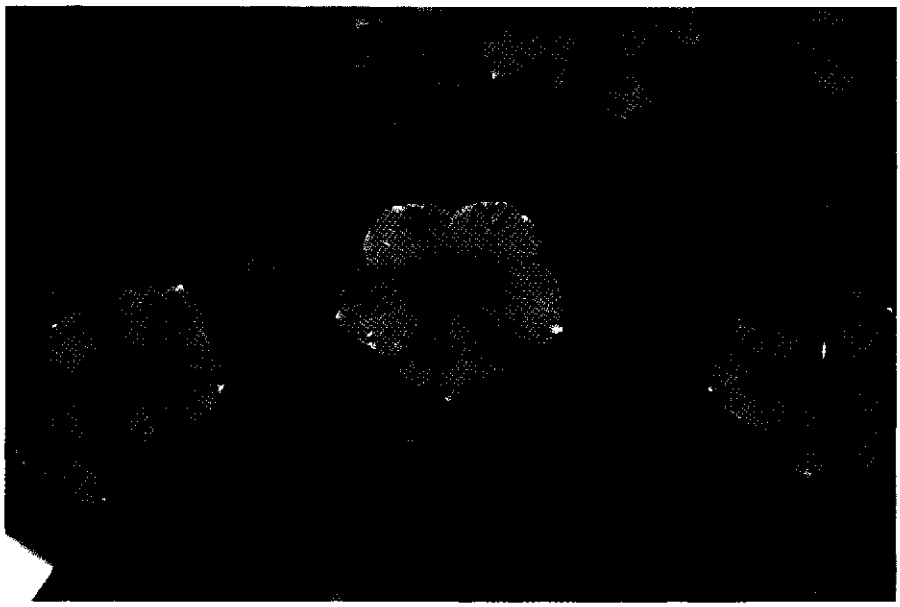


Phot. 12. *Catharanthus roseus* 'Grape Cooler'.

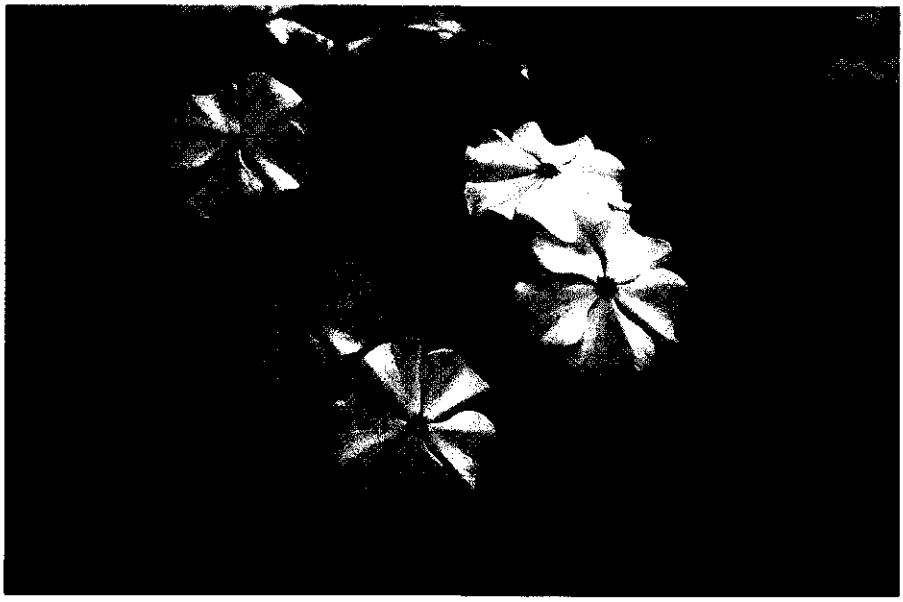
Phot. 13. *Catharanthus roseus* 'Little Blanche'.



Phot. 14. *Catharanthus roseus* 'Little Delicata'.

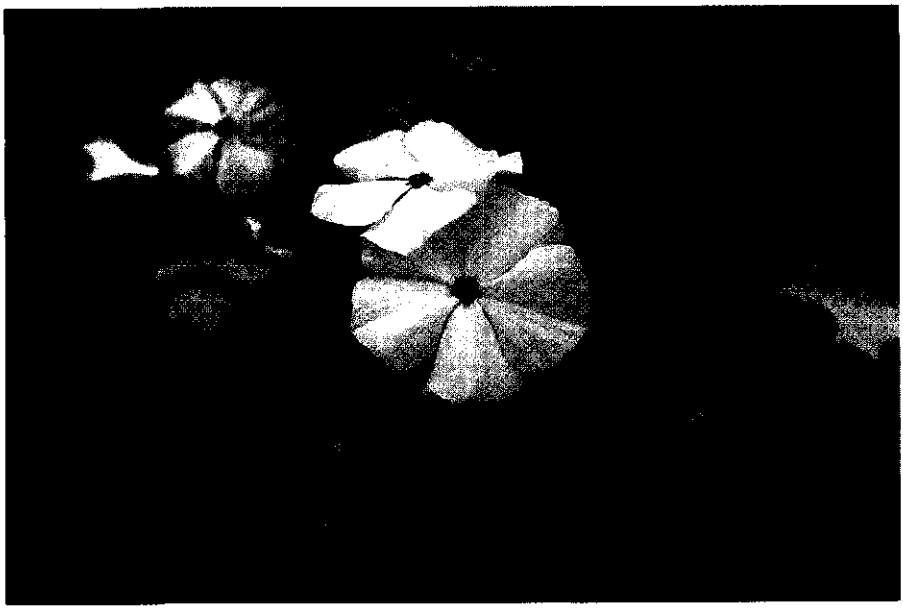


Phot. 15. *Catharanthus roseus* 'Little Pinkie'.



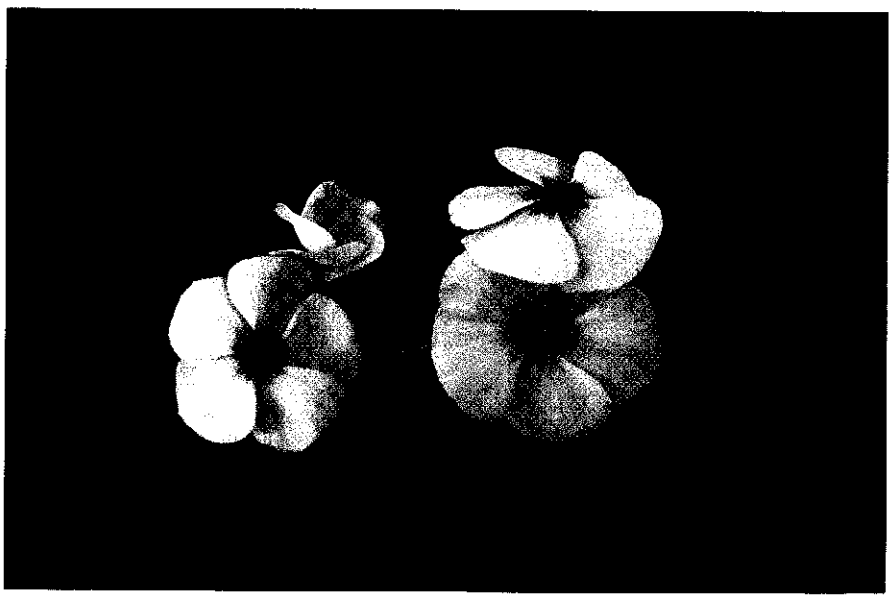
Phot. 16. *Catharanthus roseus* 'Morning Mist'.

Phot. 17. *Catharanthus roseus* mutant.



Phot. 18. *Catharanthus roseus* 'Ocellatus'.

Phot. 19. *Catharanthus roseus* 'Orchid Cooler'.

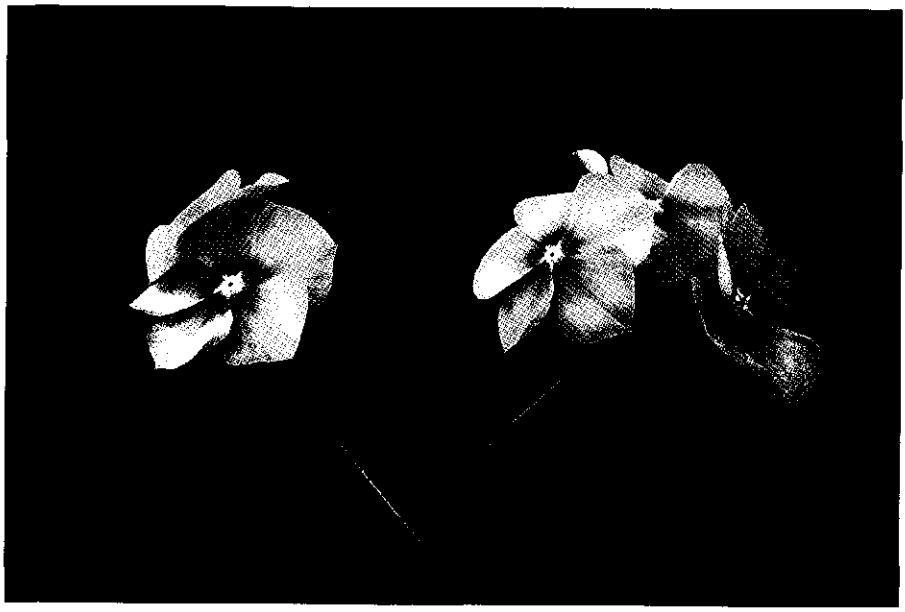


Phot. 20. *Catharanthus roseus* 'Parasol'.

Phot. 21. *Catharanthus roseus* 'Peppermint Cooler'.

Phot. 22. *Catharanthus roseus* 'Pink Turkey'.

Phot. 23. *Catharanthus roseus* 'Pretty in Rose'.

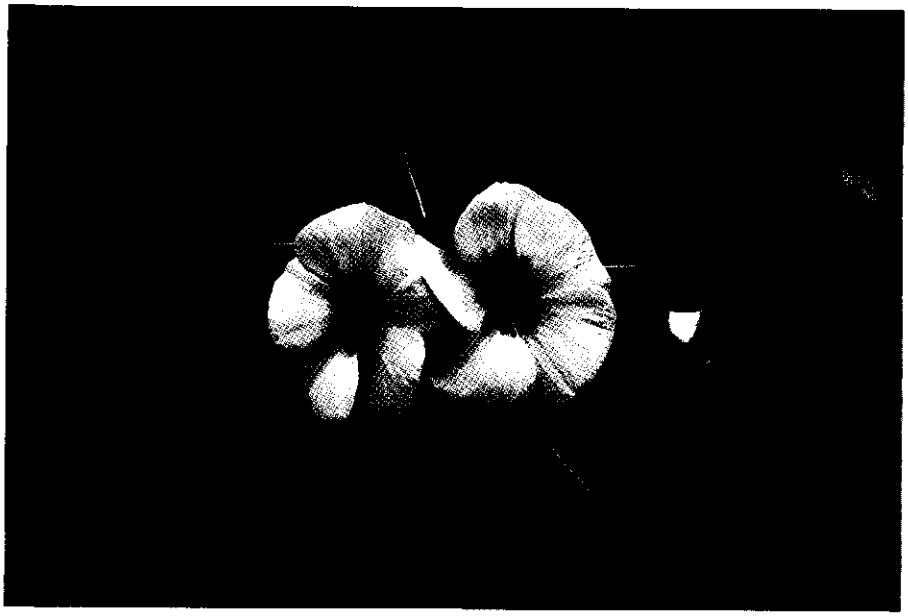


Phot. 24. *Catharanthus roseus* 'Pretty in Soft Pink'.

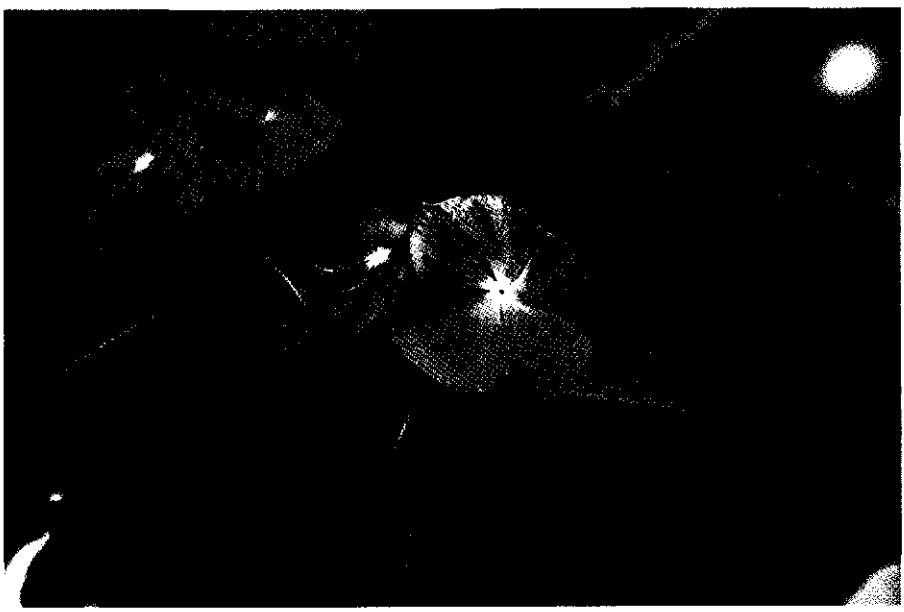
Phot. 25. *Catharanthus roseus* 'Pretty in White'.

Phot. 26. *Catharanthus roseus* 'Roseus'.

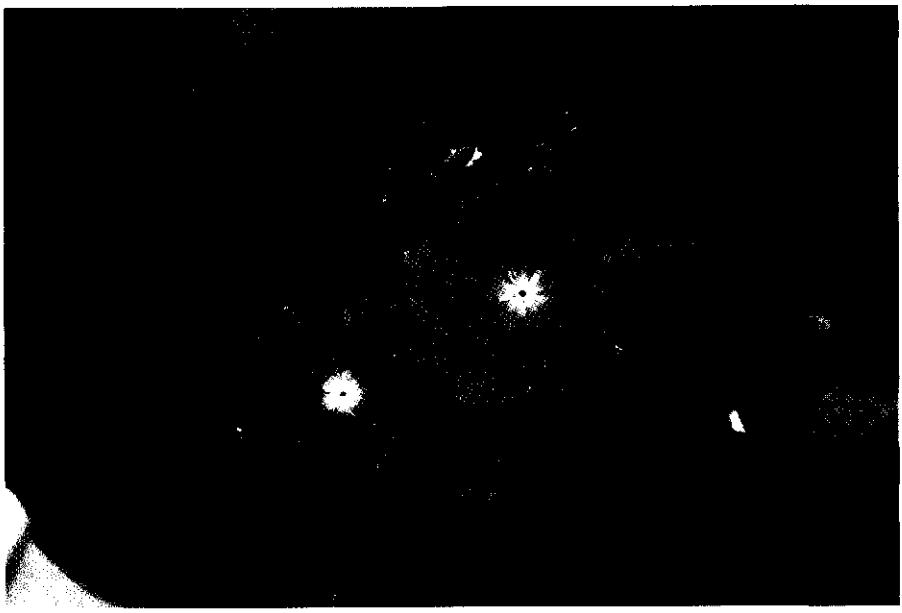
Phot. 27. *Catharanthus roseus* 'Sweet Elisabeth'.



Phot. 28. *Catharanthus roseus* 'Tropicana Blush'.



Phot. 29. *Catharanthus roseus* 'Tropicana Pink'.



Phot. 30. *Catharanthus roseus* 'Tropicana Rose'.

Phot. 31. *Catharanthus roseus* 'White Turkey'.

Phot. 32. *Catharanthus roseus* 'Parasol' x *C. trichophyllus* = *Catharanthus* 'Twinkling Anja'.