

‘Wild’ *Cistus* L. (CISTACEAE) in Victoria—future problem weeds or benign escapes from cultivation?

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Summary

Four species of the largely Mediterranean genus *Cistus* L. (Rock-roses) are reported as occurring in self-sustaining populations at various localities in Victoria: *C. creticus* L. at Clunes and Glenthompson, *C. inflatus* Pourr. ex Demoly (previously known, incorrectly, as *C. psilosepalus* Sweet) at Glenthompson and on the Mornington Peninsula, *C. monspeliensis* L. at Clunes, and *C. salviifolius* L. near Harcourt. The populations are briefly documented with a view to assisting assessment of the species’ weed potential, and to provide a benchmark for further monitoring. At present *C. inflatus* poses the greatest threat to indigenous vegetation. A key and descriptive notes to assist identification are provided. Difficulty with accurate identification of *C. creticus* is noted.

Introduction

The Rock-rose and Sun-rose Family, Cistaceae, contains eight genera and about 175 species of herbs and small shrubs, most of which are native in warmer parts of the northern hemisphere. Generally hardy plants, they have a preference for open, drier, sunny habitats, often on sandy or stony soils. Several genera, including *Halimium*, *Helianthemum* and *Cistus*, are cultivated in many countries including Australia.

The genus *Cistus* (Rock-rose) contains about 20 species of low shrubs with opposite leaves and showy flowers, mostly distributed in the Mediterranean region, particularly north-western Africa. Identification of plants has been complicated by the presence of natural and artificial hybrids, and many named cultivars. Confusion still exists, particularly in horticulture; plants have been seen offered for sale under incorrect names.

Perhaps the best known species is *C. ladanifer* L., a resinous, distinctively aromatic plant with showy white petals, each usually with a distinctive contrasting blotch of darker colour towards the base. In its native range in southern Europe, the species forms thickets on dry hills. Along with several other species, it is the source of the balsam ladanum (labdanum), a complex mixture of different ethereal oils and resins used in perfumery and cosmetics and, at one time, in medicine. The species is involved in numerous hybrids, one of which is the pink-flowered *C. x purpureus* Lam. (*C. ladanifer* x *C. creticus*, Fig. 1). This is one of the more commonly cultivated rock-roses in Melbourne, occasionally seen in ornamental roadside plantings where hardiness and drought tolerance are valued.

Localities of ‘wild’ *Cistus* populations in Victoria, based on herbarium records, were visited several times from 2002 to 2004. Voucher specimens of these occurrences are lodged at the National Herbarium of Victoria (MEL). Identification of *Cistus* specimens has made use of standard texts (e.g., Gardner and Page 1997), as well as the expertise of Mr Robert G. Page, an authority on the genus, who examined photographs and scans of specimens.

The genus in Victoria

Rock-roses have been in cultivation in Victoria for over a hundred years. Several specimens of garden origin collected just after 1900 exist at MEL. The earliest, possibly wild, Victorian collection is of *C. salviifolius* from Coode Island, near the mouth of the Yarra River, in 1908. It is not recorded whether the sample came from a wild or cultivated plant, although a note by botanist Jim Willis in 1950 on this specimen states “apparently an occasional garden escape, not truly naturalised”. In *The Aussie Plant Finder* (Hibbert 2004) seven species and a similar number of hybrids and cultivars are listed as being

available in nurseries. Recent visits to Melbourne nurseries reveal nine taxa readily available, a couple of which are additional to those in the *Plant Finder*. At least a dozen more species and cultivars are known from specialist collections.

Currently, four species are recorded as having escaped from or persisted beyond cultivation to form self-perpetuating populations in Victoria. These known 'wild' populations are documented briefly hereunder.

C. creticus

Plants identified as *Cistus creticus* (Fig. 2) have been located mixed with *C. inflatus* at a site near Glenthompson in western Victoria, and with *C. monspeliensis* at the Clunes Cemetery (see under those species for locality details). At both sites *C. creticus* occurs in smaller numbers than the other species, and appears to be 'holding its own' rather than posing any serious invasive threat.

Specimens from Glenthompson were first received at MEL in 1975, from plants believed to be descendants of an ornamental roadside plantation of various species including wattles and sheoaks established in about 1960. The species was relocated in September 2003 at what is believed to be the original site. Many individuals bore old capsules; a small amount of viable seed was recovered (one seed germinated when soaked for a few days in water after the seed coat was broken). None was then in flower. In late November 2003 numerous plants were observed flowering; some were bushy shrubs, the largest about 1.2 m tall. The pink flowered *C. creticus* plants were easily seen among the more common white flowered *C. inflatus*; they did not appear to be growing beyond the presumed limits of the original plantation.

At Clunes Cemetery, *C. creticus* was first recorded in early October 2003 during a search for *C. monspeliensis*. At the time, *C. creticus* was not in flower but many plants retained capsules from the previous season, from which a small amount of well-formed seed was recovered. A few flowers were observed in late November 2003. Individuals occurred in an area of slashed grasses and herbs (including a number of native species) north of the main entrance gate, down the slope from the graves area. The species obviously tolerates drastic 'pruning'; some individuals consisted of a number of short stems to about 15 cm long arising from an older central stock. Closer to the front fence, away from mowing, a few taller plants attained a height of about 40 cm. The species appeared confined to a small area, and was far less common than *C. monspeliensis*.

One plant of *C. creticus* has been found with a population of *C. inflatus* on a weedy roadside at Hadspen in Tasmania.

C. inflatus

The first Victorian collections of *Cistus inflatus* (Fig. 3) were made in 1975 from a self-perpetuating population near Glenthompson in the Western District. Several other populations have more recently come to attention on the Mornington Peninsula around Arthurs Seat, Dromana, and from Ferrero Reserve, Mount Martha.

Labels on the first herbarium specimens of this species from Glenthompson in 1975 are informative, and assist in evaluating the current status of the population. The locality is given as the "south side of Glenelg Hwy, c. 7 km east of township". Other notes record: "growing in an old roadside plantation (plantation trees were an *Acacia* sp. ...)" and "plants ... were planted in about 1960" as well as "the plant occurs throughout the plantation area (50 yards x 10 yards) and there are a few scattered plants outside the fence now. In the plantation area there would be at least one plant in every square yard. ... The white flowering specimen is the dominant one. There are only a few purple flowered plants." The 'purple flowered plants' are believed to be a form of *C. creticus*, see above. Petals of *C. creticus* when fresh are pink, but fall readily and, on drying, can become darker which could account for the colour being recorded as purple.

In September 2003 a population presumed to be the same as that recorded above was located about 6 km east of Glenthompson. Several dense patches of mature shrubs up to about 60 cm tall were accompanied by numerous individuals scattered throughout the area. Many plants were in bud, a couple had open flowers. Limits of the original plantation were not evident, but numerous planted wattles and sheoaks were surviving although none was particularly healthy. The previous seasons had been exceptionally dry. Two *Cistus* species were noted with *C. creticus* much less frequent than *C. inflatus*. On a subsequent visit to the site in late November 2003, both species were flowering well. It appeared that *C. creticus* was probably still within the presumed boundary of the original plantation, but *C. inflatus* had clearly spread, with plants occurring over an area measuring about 95 m parallel to the road and 15 m out from the fence of the adjacent paddock. Several plants had established within the windbreak planting along the edge of this paddock. A narrow fire break, roughly slashed or ploughed, passed adjacent to the population and may have assisted the species' spread. Small areas of basalt plains grassland with indigenous species of *Austrodanthonia*, *Austrostipa*, *Acaena*, *Chrysocephalum*, *Wahlenbergia* and other species occur along the roadside to the west and east, as well as occupying a narrow strip between the *Cistus* and the road.

On the Mornington Peninsula, *C. inflatus* was first noted in the mid 1990s in bushland below the Northern Lookout at 'Seawinds' (off Purves Road, Dromana). This was one of the original estates on the Peninsula, and is now managed by Parks Victoria. Presumed to have originated from plants believed to have been cultivated in the garden at Seawinds, the population in 1996 extended from the slope immediately below the Northern Lookout south-west about two-thirds of the way to the Western Lookout, and down the slope to the nearby walking track and possibly beyond. It consisted of fairly closely spaced mature shrubs about 1 m tall, invading *Eucalyptus viminalis* ssp. *pryoriana* / *Allocasuarina littoralis* grassy woodland. On 21 January 1997 wildfire burnt the area, killing above-ground plants in the population. Numerous seedlings subsequently germinated both above and below the walking track that roughly follows a contour below the Lookout. The germination is believed by local observers to have represented a very high proportion of the seed bank in the soil. In the autumn and winter of 1998 all seedlings found below the walking track were removed by hand. Plants above the walking track were noted as beginning to flower. Between 2000 and 2003, plants found in the area were sprayed annually with herbicide. In April 2003, only occasional young plants up to about 15 cm tall (presumably germinated in 2002) were evident.

Also from Dromana, specimens of *C. inflatus* were collected and forwarded to MEL in October 1996 from 30 m north of the intersection of LaTrobe Parade and Bunurong Track. The population was stated to occupy an area with a radius of about 200 m centred further north on the 'Heronswood' estate, and had been observed over a ten year period to be seeding and slowly increasing in area. The original collector, at the time employed at Heronswood, reported that the species was not then grown on the estate. At this time, the population had extended south into *Eucalyptus* / *Allocasuarina littoralis* open woodland. In the same year another observer independently recorded plants on the north-west side of LaTrobe Parade opposite Heronswood.

In April 2003 numerous plants 5 to 65 cm tall were noted near the presumed location of the original collection, now apparently with more houses occupying part of the site. The population extended some 140 m along the edge of degraded, weedy indigenous vegetation under power lines running north-east from LaTrobe Parade, adjacent to the boundary with private property. Plants favoured gaps, but tolerated shading from other weeds such as *Chrysanthemoides monilifera* (L.) Norl. subsp. *monilifera* (Boneseed), and competition from *Pennisetum clandestinum* Hochst. ex Chiov. (Kikuyu Grass).

Plants were also observed further north, beyond houses, on the steep south-east bank of the Mornington Peninsula Freeway, immediately north-east of the LaTrobe Parade bridge.

At Mount Martha, *C. inflatus* was collected from Ferrero Reserve, off the end of Seppelt Avenue, in January 1999. Notes on the herbarium label record that thousands of plants occurred at the site. In April 2003 the species was persisting, in reduced numbers, despite sporadic efforts at eradication. Small areas where adult plants had been burnt in previous months supported dense seedling growth. Plants occurred on the south-west side of Seppelt Avenue for some 80 m, and the population extended back about 180 m forming a rough crescent shape on the gentle slope above the sports ground. Most of the Rock-roses at this site occur in an area of roughly mown grassy weeds (with a few herbaceous indigenous remnants) with scattered individuals and clumps of native shrubs including *Acacia mearnsii* De Wild., *A. longifolia* (Andrews) Willd. subsp. *sophorae* (Labill.) Court, and *Leptospermum laevigatum* (Gaertn.) F. Muell. In January 2004 numerous *Cistus* plants were dead, and the great majority of those seen were small (up to about 20 cm tall), presumably a consequence of continuing control measures. A few outlying plants of *C. inflatus* were noted more than 300 m from the south-west end of this main population, and several dead plants were seen between these and the main group. Another small group of plants occurred on the north-east side of Seppelt Avenue, between the road and adjacent houses.

C. inflatus is also known from Hadspen in Tasmania, and reported to be locally naturalised in the Mt Lofty Ranges in South Australia.

C. monspeliensis

In November 1996, *Cistus monspeliensis* (Fig. 4) was reported as naturalised at the Clunes Cemetery (about 2 km west of Clunes off the Maryborough Road). Label data from this first collection noted that the species had been present at the Cemetery for more than 25 years, as well as “young plants prolific this year”, and “attempts to control with herbicide as yet unsuccessful”. In early October 2003 the species was still common despite evidence of continued spraying in the form of numerous deformed or dead plants. Seedlings were not uncommon. Plants were also observed growing on the roadside down the slope beyond the front fence of the Cemetery, although casual inspection revealed none in the adjacent eucalypt open forest on the other three sides. No plants were flowering at this time, but many bore old capsules, some of which still contained well-formed seeds. Numerous flowers were seen in mid November. Several mature shrubs about a metre or more tall were noted on the northern boundary. The species obviously tolerates rough treatment as many severely ‘pruned’ plants were growing in slashed grassy areas away from grave sites. *Cistus creticus* has also been seen at this site (see previous section).

An unconfirmed and undated note on an herbarium specimen records that the species is also common in remnant bushland around a small reservoir in the Ballarat district.

C. salviifolius

A small population of *Cistus salviifolius* (Fig. 5) from the east side of North Harcourt Road about 8 km (direct line) north of Harcourt was reported to MEL in 1999. The collector noted that plants had been observed at the site for some 15 years.

In December 2002 this dense population, including numerous seedlings, extended some 90 m along the eastern bank above the road. Numerous plants also occurred among weedy grasses and thistles along the west side of the road for some 170 m.

In November 2003, the population was flowering prolifically. Residents who have lived nearby for 13 years say that the population was well established when they arrived and has roughly doubled in size during their tenure. They suggested that the origin of this species could lie with rabbit trappers who had established a camp there around the time of the Depression in the 1930s. North Harcourt Road at the time was a main thoroughfare to Bendigo from the south. A previous attempt at control of the population by burning was unsuccessful.

In the ACT, *C. salviifolius* was first collected in 1988 from bushland in Black Mountain Reserve, and in November 1999 about 50 plants were noted there.



Fig. 1 *Cistus x purpureus* (*C. creticus* x *C. ladanifer*) is one of the more commonly cultivated Rock-roses in Melbourne. These pink flowered, resinous shrubs have a characteristic dark patch on each petal, a trait derived from *C. ladanifer*. Five petals are usually visible. [I.C. Clarke 3350]. **Fig. 2** *Cistus creticus* — flowering shoot from the population growing east of Glenthompson. Plants have a greyish-green aspect and mostly pink flowers (with yellow in the centre) about 5 cm diameter. [I.C. Clarke 3289]. **Fig. 3** *Cistus inflatus* — flowering shoot from the population east of Glenthompson. Plants have a dark green aspect and white flowers (with some yellow in the centre) about 4 cm diameter. One petal has fallen from the upper flower. [I.C. Clarke 3264]. **Fig. 4** *Cistus monspeliensis* — flowering stems from plants at the Clunes Cemetery. Flowers are mostly white (with some yellow in the centre) and about 3 cm in diameter. [I.C. Clarke 3286]. **Fig. 5** *Cistus scabifolius* — plants bear white flowers (with yellow centres) about 3 cm diameter, with scarcely crinkled petals. From the population north of Harcourt. [I.C. Clarke 3245]

Descriptions and key to 'wild' *Cistus* in Victoria

The following generic description has been compiled from published sources (e.g., Arrington and Kubitzki 2003, Warburg 1968). Species descriptions are largely based on locally collected material (specimens from fairly tough habitats), augmented by published descriptions (Gardner and Page 1997, Jessop 1986).

Plants shrubby, sparse to dense, sometimes small but up to 2 m or more tall, usually aromatic; some species resinous; often hairy, sometimes with a mixture of stellate, glandular, and simple hairs; *leaves* opposite, exstipulate, sessile or petiolate or in some species the blade narrowing to a petiole-like base (here subsequently termed pseudopetiolate), in some species with 3 main veins from the base; *flowers* showy, usually in cymes, rarely solitary, 2 to 10 cm (or more) in diameter; *sepals* 3 in some species or more often 5 (or variable in hybrids), rather persistent; *petals* 5, often mostly pink or white, with a small area of yellow at the base, often crumpled in bud and in some species remaining crumpled apically in the open flower, falling readily; *stamens* numerous, often conspicuously yellow (including filaments), much shorter than the petals and forming a rather close-knit circle around the ovary; *carpels* 5 (6–12); ovary superior, incompletely divided by narrow intruding placentas (placentation sometimes appearing axile); *fruit* a loculicidal capsule; seed coat of two layers, the outer thin, the inner firm.

Colour of the petals usually changes on drying with white petals turning yellow, and pink petals (at least initially) often darkening appreciably or becoming more reddish. Individual flowers are short-lived, petals usually falling within one day, but plants often flower for an extended period.

Colour photographs of many species and cultivars can be found in Phillips and Rix (1989), and Brickell (1989). In *European Garden Flora* (Gardner and Page 1997) references to photographs are provided for most entries (species, hybrids, cultivars). Excellent photographs of *C. creticus* are available on the Angiosperm Phylogeny Group website: www.mobot.org/MOBOT/Research/APweb (Go to "Malvales", then "Cistaceae", then take the "photos – collection" link).

Cistus differs from all other genera of the family in having 5 (rarely 6–12) carpels, other Cistaceae having 3 (rarely 2).

1. Plants greyish green; flowers mostly pink; style 3–4 mm long*C. creticus*
1. Plants (darkish) green; flowers mostly white; style ≤ 0.5 mm2
2. Leaf blades narrow (c. 5–8– times as long as wide); outer sepals narrowed to or obtuse at the base*C. monspeliensis*
2. Leaf blades broader (c. < 4 times as long as wide); outer sepals cordate at the base 3
3. Most leaves narrowly pseudopetiolate; flowers to c. 3 cm diameter*C. salviifolius*
3. Leaves sessile; flowers c. 4 cm diameter*C. inflatus*

C. creticus L., Sp Pl. edn 2: 738 (1762)

Variable, rather bushy, greyish-green *shrub* up to 1 m or more tall, c. 1 m diameter; indumentum of stellate hairs throughout, with long simple hairs prominent on calyces, and also on inflorescence branches and near leaf axils, and with glandular hairs present on inflorescence; *branchlets* densely hairy, often appearing whitish-shaggy when young; *leaf blades* (narrow-) elliptical to obovate (tending to lanceolate immediately below inflorescence, and grading into \pm sessile bracts above), c. 1.5–3 x 0.5–1 cm (to 5 x 1.5 cm or more on young growth), greyish-green, paler below, apex obtuse or broadly acute, margin often undulate, blade narrowed gradually to quite abruptly to a petiole-like base up to c. 1 cm long; 'petiole' bases sometimes united across the node to a small degree on young growth; *flowers* few to c. 6 in terminal \pm symmetrical cymes, to c. 5 cm diameter;

sepals 5, persistent; *petals* obovate, obtuse and crumpled apically, c. 2.5 x 2 cm, pink with a small area of yellow at the base; *style* 3–4 mm long; *open capsules* c. 9 mm long, brown, silky-villous with semi-appressed hairs; *seeds* irregularly rounded-blocky, 1–1.5 mm long, brown, outer layer of seed coat wrinkled. Figure 2.

Indigenous to the Mediterranean region—southern Europe, northern Africa and western Asia.

Selected specimens examined: VICTORIA: Volcanic Plain, Clunes Cemetery, c. 2 km west of Clunes, 37° 18'S 143° 46'E, 1 Oct 2003, I.C. Clarke 3269 (MEL); 25 Nov 2003, I.C. Clarke 3285 (MEL); Midlands, South side of the Hamilton - Ballarat Highway, approx. 7 km east of Glenthompson, 37° 37'S 142° 37'E, Aug 1975, S. Collins s.n. (MEL 604914A); Volcanic Plain, south side of Glenelg Highway, c. 6 km east of Glenthompson, 37° 39'S 142° 37'E, 27 Nov 2003, I.C. Clarke 3289 (MEL).

Some difficulty has been experienced in identifying Victorian plants. *C. creticus*, itself a variable species, hybridises with *C. albidus* L. to produce *C. x canescens* Sweet. These species do not meet in nature, but in cultivation, “The offspring, *C. x canescens*, are fully fertile and appear to be self-compatible, the second generation showing every possible shade of variation on the spectrum between the two species. They will also back-cross with either grandparent or with any siblings. As a result of this we have in cultivation ... a mongrel race which is impossible to classify in any meaningful way.” (R.G. Page, in litt., 29 January 2004.) The preceding comments relate to the European context and, as there is no way of knowing the origin of the plants first established in the Victorian populations, some version of the European story may apply here.

C. albidus and *C. x canescens* are both known in horticulture in Victoria, albeit to a limited extent at present. Compared to *C. creticus*, *C. albidus* has sessile leaves with plane margins and three (or more) nerves from the base, and more compact inflorescences. Although the leaf blades of ‘wild’ Victorian plants sometimes taper to a rather less than distinct ‘petiole’, adoption of the name *C. creticus* appears the most practical option at present. A scan of a specimen from the population at Glenthompson had “much in common with forms of *C. creticus* from Corsica” (R.G. Page, in litt., March 2004).

C. inflatus Pourr. ex Demoly, Acta Bot. Gallica 144:42 (1998)

Bushy dark green *shrub* to about 1 m tall or often less; indumentum of stellate hairs, longer simple hairs (the latter prominent on branchlets and calyces) and glandular hairs (the last mostly on peduncles and calyces); *leaves* sessile, (lanceolate-) elliptical to oblong (-oblanceolate), c. 2–5 x 0.5–2 cm (possibly larger on vigorous growth), mid to dark green above, sometimes with a purplish cast, paler below, apex broadly acute; *flowers* few to c. 10 or more in terminal ± symmetrical cymes, white with yellow centre, c. 4 cm diameter; *sepals* 5, persistent, becoming brown and papery in fruit, broadly ovate, acuminate, the outer cordate at the base, broader and with recurved margins; *petals* white (drying yellow) with a small area of yellow at the base, obovate; *style* to c. 0.5 mm; *stigma* appearing ± sessile; *open capsules* c. 6–7 mm long, brown; *seeds* rounded-blocky, c. (1–) 1.5 mm long, surface minutely granular, dark reddish-brown; cotyledons ± oblong c. 9 x 1.5 mm, glabrous but for short marginal hairs, green. Figure 3.

Indigenous to Portugal, western Spain, and western France.

This species has been widely known, incorrectly, as *C. psilosepalus* Sweet (see Demoly 1998), and may be offered for sale in nurseries under that name. Conspicuous features are the outer sepals cordate and very broad, with recurved margins, particularly obvious in the fruiting stage.

Selected specimens examined: VICTORIA: Gippsland Plain, Mornington Peninsula, Dromana, 30 m N of the intersection of LaTrobe Parade and Bunurong Track, 38° 21'S 144° 58'E, 12 Oct 1996, W.L. Ashburner 2011 (MEL); Mt Martha, Ferrero Reserve, S side of Balcombe Creek, 38° 15' 51"S 145° 01' 29"E, 19 Jan 1999, G. Walker s.n. (MEL 2057994); Dromana, SE bank of

Mornington Peninsula Freeway, immediately east of LaTrobe Parade overpass, 38° 21' S 144° 57' E, 30 Apr 2003, *I.C. Clarke 3260* (MEL); Volcanic Plain, South side of Glenelg Highway, c. 6 km east of Glenthompson, 37° 39' S 142° 37' E, 12 Sep 2003, *I.C. Clarke 3264* (MEL, CANB). **TASMANIA**: Hadspen, roadside to disused jetty, near Rutherglen Village, 41° 30' 56" S 147° 03' 47" E, 1 Jan 2004, *M.L. Baker 1141 and M.F. Duretto* (AD, CANB, HO, MEL, NSW).

C. monspeliensis L., Sp Pl. 1:524 (1753)

Rather upright, open, resinous, dark green *shrub*, slender when young, to about 1.2 m tall; *branchlets* resinous, sticky; indumentum of very short glandular hairs, with short stellate hairs (the latter mostly on leaf undersides and apex of ovary/capsule), and long simple hairs most prominent on calyces, pedicels and peduncles, but also on young leaves; *leaves* more or less sessile, lanceolate to narrow-elliptical to (narrow-) oblong, c. 2–5 x 0.2–1 cm (but to 7.5 x 1.5 cm on vigorous young growth), dark green above, paler below, apex acute, margin recurved on drying; *flowers* few to c. 10 or more in one-sided terminal cymes, white with yellow centre, to c. 3 cm diameter; *sepals* 5, tapering or rounded-obtuse at the base; *petals* white (drying yellow) with small area of yellow at the base, broadly obovate, truncate to slightly emarginate, c. 1.3 x 1.3 cm when fresh; *style* to c. 0.5 mm or less; *open capsules* c. 4 mm long, glossy dark reddish brown, glabrous but for short dense stellate hairs towards the apex; *seeds* rounded-blocky, c. 1.5–2.6 mm long, rather glossy dark brown, outer layer of seed coat wrinkled. Figure 4.

Indigenous to southern Europe, northern Africa, Canary Is.

The plants are conspicuously resinous, with white flowers in one-sided (\pm scorpioid) terminal cymes.

Selected specimens examined: **VICTORIA**: Volcanic Plain, roadside in front of Clunes Cemetery, c. 2 km west of Clunes, 37° 18' S 143° 46' E, 25 Nov 2003, *I.C. Clarke 3286* (MEL, CANB); Clunes Cemetery, 37° 18' S 143° 46' E, 1 Oct 2003, *I.C. Clarke 3268* (MEL, CANB); Clunes Cemetery, 37° 17' 30" S 143° 46' E, 18 Nov 1996, *I. Macfarlane s.n.* (MEL 2035097).

C. salviifolius L., Sp Pl. 1:524 (1753)

Dense, rather wiry, divaricate, dark greenish variable *small shrub* to perhaps 1 m tall but often smaller; indumentum of rather even, shortish stellate hairs throughout, older parts glabrescent, calyx and 'petioles' also with apparently simple hairs; most *leaves* narrowly pseudopetiolate (but for those immediately below inflorescence which are sessile), blades (broadly-) ovate to oval, c. 1.5–4.5 x 0.6–2.5 cm, dark green above, paler below, apex obtuse (to acute on some cultivated plants), base obtuse to truncate; *flowers* mostly solitary in upper axils on pedicel/peduncles up to 10 cm long, but sometimes up to 5 in a cyme; to c. 3 (–5 or more) cm diameter, reported to be nodding in bud; *sepals* 5, persistent; *petals* white (drying yellow) with a small area of yellow at the base, scarcely crinkled, obovate, truncate to slightly emarginate, c. 1.3 cm wide when fresh; *style* very short; *open capsule* c. 6 mm long, dark reddish-brown, rather glossy below wispy appressed hairs; *seeds* rounded to slightly angular, c. 1.5 mm long, dark brown, outer layer of seed coat markedly wrinkled. Figure 5.

Indigenous to southern Europe and northern Africa.

Conspicuous features are the more or less solitary, long-stalked flowers with scarcely crinkled petals. Features reported as distinctive but not checked on local plants include the nodding buds, and capsules somewhat flattened at the apex, surrounded by semi-spread persistent sepals.

Selected specimens examined: **VICTORIA**: Midlands, c. 8 km (direct line) just E of N of Harcourt, E side of North Harcourt Rd, 36° 56' S 144° 17' E, Nov 1999, *I. Higgins s.n.*, MEL 2156654; c. 8 km (direct line) just E of N of Harcourt, on W side of North Harcourt Rd, 36° 56' S 144° 17' E, 4 Dec 2002, *I.C. Clarke 3245*, (MEL, CANB); **NEW SOUTH WALES**: Southern Tablelands, end of Rani Rd, SW slope of Black Mountain Reserve, Canberra, 35° 16' S 149° 07' E, 11 Nov 1999, *B. J. Lepschi 4236* (AD, HO, K, MEL, MO, NSW).

Discussion

The Mediterranean region is well known as a source of weedy introductions in Victoria. Carr *et al.* (1992) report 299 species from the Mediterranean basin that have become established.

Arrington and Kubitzki (2003) concisely summarise features of the Cistaceae including some points of particular relevance here:

- 1 the Cistaceae have typical pollen flowers and usually do not produce nectar (although some *Cistus* are exceptions)
- 1 numerous species of bees, flies, beetles and ants visit the flowers
- 1 Cistaceae seeds are notable for their hard coat that minimises water loss and water uptake, features that result in seed dormancy and extended viability
- 1 *Cistus* species inhabit “dry scrub or open woodland”, and are “colonists after fire”.

These are characteristics of species that are not specific in their pollinators, each flower being capable of producing a number of hard-coated seeds that will contribute to a growing seed bank. (However, not all *Cistus* seeds are hard-coated—a low percentage, varying with species, lack the hard coat and are not subject to dormancy. R.G. Page, in litt., 2004.) Although individual flowers are short-lived, each plant produces many flowers each year. Overseas experience (R.G. Page, in litt., 2004) as well as observations of local populations suggest that *Cistus* seeds are not usually speedily dispersed far from parent plants. Thus the term ‘colonists’ as used by Arrington and Kubitzki presumably refers to the germination of seeds after fire rather than the capacity of species to move readily into an area not previously occupied. This is supported by prolific *C. inflatus* germination on the Mornington Peninsula following fire, either controlled or uncontrolled. Observations of *C. inflatus* at Ferrero Reserve, *C. monspeliensis* at Clunes Cemetery, and *C. salviifolius* near Harcourt seem to indicate that these populations have increased in size downhill, perhaps aided by gravity and water.

While *Cistus* seeds are possibly dispersed in damp soil adhering to birds or animals, it seems more likely that human activity would be implicated in establishment of new Victorian populations. Seeds of *C. salviifolius* from near Harcourt for example could be moved to new localities through works modifying road alignment, or roadside maintenance such as mowing or drain clearing. Density of *C. salviifolius* on the east side of the road virtually excludes all other species, and its ability to succeed among thistles and other weeds on the western roadside, mark this species as a strong competitor.

Given that four species of *Cistus* have escaped from or persisted beyond cultivation, and at least one (*C. inflatus*) has invaded indigenous vegetation, intentional cultivation of *Cistus* species constitutes a weed risk that increases with proximity to indigenous vegetation.

Randall (2002) compiled records from various sources of at least 8 *Cistus* species (including the 4 here discussed) naturalised or weedy in numerous countries. *C. creticus*, *C. monspeliensis*, and *C. salviifolius* are recorded as weedy in coastal regions of California (Hickman 1993), and *C. creticus*, *C. ladanifer*, and *C. inflatus* (as *C. psilosepalus*) are recorded as naturalised in New Zealand (Sykes 1988).

Observations from overseas (R.G. Page, in litt., 2003 & 2004) and Victoria confirm that *Cistus* species, as well as the hybrid *C. albidus* x *C. creticus* (= *C. x canescens*), and the cultivar ‘Grayswood Pink’ (*C. parviflorus* Lam. x unknown) are fertile and set seed readily. Other hybrids, mostly those between species within the same section of the genus, will produce some fertile seed in some seasons. On the other hand *C. x purpureus* (Fig. 1) and *C. x pulverulentus* Pourr. (*C. albidus* x *C. crispus* L.—usually sold as the cultivar ‘Sunset’) appear consistently sterile. Similarly, *C. x skanbergii* Lojac. (seen for sale in some Melbourne nurseries incorrectly labelled as the cultivar ‘Silver Pink’) does not appear to set fruit. For responsible horticulturists offering *Cistus* plants for sale, and for gardeners who wish to enjoy these attractive floriferous shrubs, being selective as to which forms to grow is warranted. Cultivated plants should be monitored for fertility, and unwanted plant material disposed of with care.

Carefully collected samples of weedy plants are welcomed by the National

Herbarium of Victoria. Where possible specimens should include a leafy branch about 30 cm long, preferably with flowers and or fruits attached, accompanied by notes on the locality of collection, collector's name, and date of collection. The locality should be sufficiently detailed to enable the population to be relocated at a later time. Additional notes, providing information not obvious from the sample are particularly useful, such as flower colour and scent, and population extent, history in the area, and rate of spread. Specimen donations can be forwarded by post (early in the working week if fresh, or any time if pressed and dried) to the Identification Service, National Herbarium of Victoria, Birdwood Ave, South Yarra, 3141.

Acknowledgements

Thanks are due to Bob Page, holder of the former National *Cistus* Collection in Britain, for assistance with identification of plants, nomenclature, and information on the habits of species and cultivars in the northern hemisphere. Sue and Andrew Cairns provided background information on the plants at Harcourt North, to which attention was first drawn by Ian Higgins. Gidja Walker provided information on the populations on the Mornington Peninsula, early samples collected by Will Ashburner. Ian Macfarlane forwarded the first specimens from the Clunes Cemetery. My thanks to John Reid, Neville Walsh and referees for comments on the manuscript. The National Herbarium of Victoria at the Royal Botanic Gardens, Melbourne is gratefully acknowledged for access to facilities.

The assessment of the weed potential of *C. inflatus*, in particular, has been greatly assisted by information recorded with specimens lodged at the National Herbarium of Victoria. The efforts of Herbarium Officers in pursuing such information, following receipt of the initial sample, are applauded and gratefully acknowledged, as are those of the all-too-few collectors who provide it spontaneously.

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