

SOUTH AFRICAN MILKWORTS, *POLYGALA* SPP., IN SOUTHERN AUSTRALIAR.J.Carter<sup>1</sup>, D.A.Cooke<sup>1</sup>, G.Chapman<sup>2</sup> & P. Sheridan<sup>3</sup><sup>1</sup>Animal & Plant Control Commission, GPO Box 1671, Adelaide S.Aust. 5001<sup>2</sup>SA National Parks and Wildlife Service, Adelaide S.Aust. 5000<sup>3</sup>Eyre Animal & Plant Control Board, Box 130 Port Lincoln S.Aust. 5606

*Summary.* Two South African species of *Polygala* are naturalised in southern Australia. Myrtleleaf milkwort, *Polygala myrtifolia*, is a weed of coastal bushland in S.Aust. and Vic, and is established in WA, NSW and Tas. Purple broom, *P. virgata*, is naturalised in S.Aust., NSW and WA. Co-ordinated control including restrictions on new plantings and sale of myrtleleaf milkwort, removal of naturalised plants in and near conservation areas, and research into spread, population dynamics and impact on native vegetation should start.

## INTRODUCTION

The South African plant myrtleleaf milkwort or parrot bush, *Polygala myrtifolia* L., was recognised as a weed of bushland south-west of Port Lincoln S.Aust. in 1970 (Alcock, unpublished report). At Cape Jaffa, it is competing with coastal wattle, *Acacia longifolia* var. *sophorae* (9).

Co-ordinated control programs can efficiently reduce the damage caused by invading weeds (21,31) but frequently result in a costly misdirection of resources (4,10,18,19,26,29). Plants should be subject to control programs while their distributions are still limited, not after reaching their final distributions (3). Co-ordinated control programs have been implemented to protect bushland from the South African weeds African boxthorn, *Lycium ferocissimum* (23), boneseed, *Chrysanthemoides monilifera* subsp. *monilifera* (28,30) and bridal creeper, *Myrsiphyllum asparagoides* (24,28).

The co-ordinated control of myrtleleaf milkwort and related species is being considered in S.Aust.(2). Criteria for deciding the need for co-ordinated control of plants have been suggested(1,26,31).

History. Myrtleleaf milkwort was in S. Aust. nursery catalogues in 1845 (7). It was naturalised in Vic. in 1887, near Perth from 1911 (11), and in 1926 in S.Aust. (15). In Vic. it is considered a weed of coastal areas (6) and covers large areas at Discovery Bay and Port Phillip Bay, although it is less invasive than boneseed (6). It is established in the Albany region and near Toodyay (Hogstrom, pers. comm.) and in NSW (28). It is also naturalised in Tas. (17). Another South African species, purple broom, *P. virgata* Thunb., was grown in an Adelaide nursery in 1845 as *P. speciosa* (15) and is now naturalised at two sites in WA (Hogstrom, pers. comm.), and in coastal areas of NSW (Symon, pers. comm.).

## SOUTH AUSTRALIAN SURVEY

Two South African milkworts are naturalised in S.Aust. Myrtleleaf milkwort is recorded from 11 localities in S.Aust. (fig. 1.); all populations appear to have spread from garden plantings.

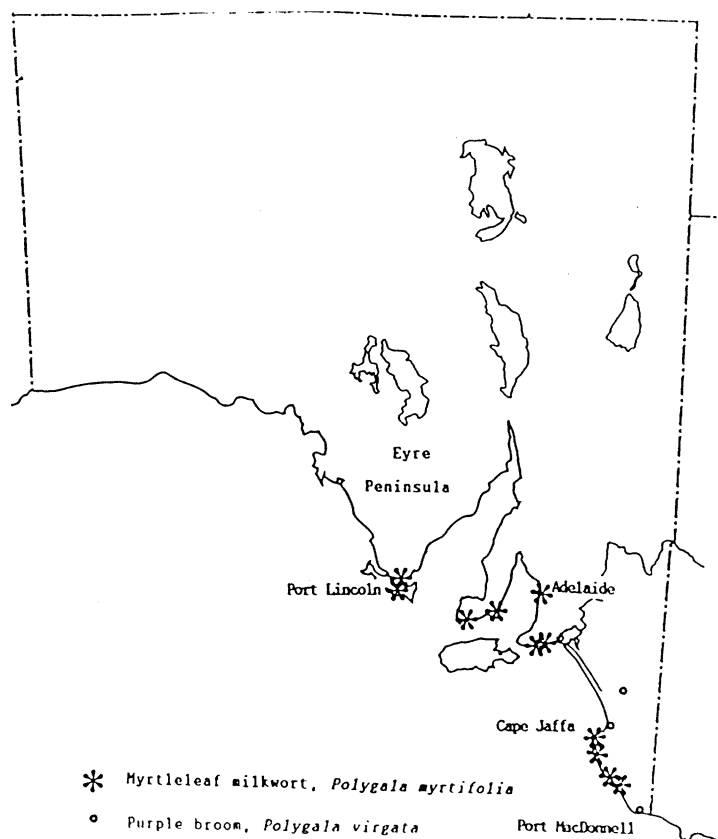


Figure 1 Distribution of South African milkworts, *Polygala* spp., in South Australia, 1990.

The largest area near Port Lincoln started as garden plantings in the early 1900s (Theakstone, pers. comm.). By 1970, after sheep were removed, it had spread to form a continuous infestation over 100 ha, with odd plants and clumps up to 2.4 km away (Alcock, unpublished report). Nearby a second infestation covered a smaller area. The infestations have now spread to form satellite infestations up to 20 km from the areas recorded in 1970. The density and area of each infestation has increased. The larger infestation is now continuous over 500 ha, with other patches up to 40 ha and extending as widely spaced isolated plants and small patches over 40000 ha.

Purple broom was first recorded in S.Aust. in 1983, and is now naturalised at three sites and present as a garden escape elsewhere.

#### GROWTH, HABITAT, AND DISPERSAL

*P. myrtifolia*. Myrtleleaf milkwort is a leafy perennial shrub up to 3 m high described by Stove (28). In South Africa several varieties occur in coastal and elevated environments to 1200m between Capetown and Natal (14,25). In South Australia it flowers throughout the year, but mainly from September to October (28). All S.Aust. infestations are coastal, on shallow soils over calcrete or deep calcareous sands. All sites receive 500 to 700 mm annual rainfall predominantly in winter.

Hot fires kill mature plants, but seedling regeneration is rapid. It does not tolerate grazing, only establishing in areas from which livestock have been excluded (Cassanova, pers. comm.).

Seeds survive in the soil for 2 to 3 years (9), germinating in the open or under dense vegetation in May to June. Small plants of 450 mm height are able to set seed (9).

*Ornamental plantings.* A distinct variety, *P. myrtifolia* var. *grandiflora* Lodd. (syn. *Polygala grandiflora* Hort. non Walt.) is now commonly grown in S.Aust., especially at coastal sites (17) but is not naturalised. Leaves of the naturalised *P. myrtifolia* are 1-4 cm long, shortly petiolate and elliptic to broad-elliptic with an obtuse apex; the variety *grandiflora* is readily distinguished by its narrower, acute leaves. The flowers of var. *grandiflora* are larger and more exposed than those of the naturalised variety. The informal names *P. myrtifolia* var. *dalmatiana* and *P. grandis* have been applied to very similar plants with white at the base of the keel of the flower (17).

*Competition.* Myrtleleaf milkwort competes with native shrubs and shades out native ground flora reducing the integrity of bushland. It is unclear whether it invades intact native vegetation, or requires disturbed sites where it occupies gaps in the shrub stratum ahead of natural regeneration. Isolated satellite infestations occur in disturbed areas, extending into relatively undisturbed vegetation as a front. This pattern is typical of invasive species (8).

*P. virgata* Purple broom is a perennial shrub to 3 m high which may be almost leafless. There are many varieties in South Africa from eastern Cape Province to Natal (14). Two S.Aust. populations are coastal, while a third occurs 45 km inland on remnant coastal dunes. These localities receive an annual rainfall of 500 to 700 mm predominantly in winter. It is competing with native vegetation at Port MacDonnell (Hincks, 1985 unpublished report).

*Spread.* Despite the early introduction of South African milkworts to southern Australia, they have spread slowly, causing only local problems. This is typical of weeds that disperse from garden escapes. They usually remain unimportant and restricted (12).

Long-distance dispersal by man is unpredictable (4). Seed dispersal from satellite infestations causes the fastest spread (20). Increased popularity as garden plants would increase their rate of dispersal to new areas. The habitats susceptible to invasion are typically ungrazed sites on calcareous sands or shallow calcrete. This includes most coastal areas of S.Aust. The characteristics which make milkworts suitable for gardens in coastal localities enable them to volunteer readily in those localities.

The susceptibility of invaded areas to colonisation and the population growth at primary invasion sites may change as a response to the control of rabbits and the removal of livestock.

Comparison with other weeds of bushland. Characteristics of South African milkwort infestation sites appear similar to those favoured by boneseed (30). Like boneseed, it can grow in the open or in full shade.

Special adaptations and the combined efforts of man and birds has caused the relatively rapid spread of other South African weeds of bushland. African daisy has achenes with a pappus which aids in wind dispersal (16). Birds are important in the dispersal of African boxthorn, bridal creeper (13), and boneseed (30). The limited area infested by South African milkworts in S.Aust. may reflect the lack of an efficient vector.

It would be easy to conclude that milkworts pose less threat in southern Australia than other plants which spread rapidly. Myrtleleaf milkwort grows in a similar environment to African daisy. Both plants germinate rapidly after a fire. African daisy does not establish under a dense canopy, and therefore creates an environment unsuitable for its own seedlings (22). Myrtleleaf milkwort, by contrast, germinates and readily establishes under established vegetation as well as open areas. Like boneseed, it can regenerate under relatively dense cover.

As myrtleleaf milkwort is attractive and adapted to coastal areas it will continue to be planted, increasing the risk of further naturalisation.

## CONTROL

Control techniques. Limited experience with control suggests that hand-pulling or herbicides including amitrole, dicamba, glyphosate (9), picloram (Cassanova, pers. comm.) and triclopyr can kill mature myrtleleaf milkwort. No herbicides are registered for its control in S.Aust..

Proposed control program. The objective of the proposed program would be to prevent South African milkworts from displacing native vegetation in significant conservation areas where it is not established.

Domestic plantings are a source of seed and should be given priority, especially near sensitive native vegetation. The second priority would be to reduce the amount of seed dispersing on the borders of large established infestations. As large infestations would be most expensive to remove, the third priority would be to control population growth within established infested areas, to protect the remaining vegetation and to reduce the rate of dispersal of seeds from the area. A fourth priority would be to restore the native vegetation already invaded.

Is enforcement necessary? Land managers may continue their programs of removal of milkworts from reserves under their control without any enforcement.

Where protected areas adjoin sources of milkwort seed it may be more efficient to impose restrictions on other landholders to reduce seed dispersal. If domestic plantings are maintained, regular patrols of protected areas to remove volunteer seedlings may be used.

The removal of existing plantings and naturalised milkworts near remnant bushland would reduce invasion. This would require community support or the implementation of the control provisions of the SA Animal and Plant Control(Agricultural Protection and Other Purposes) Act 1986.

Without information on the rate of local spread, and the distance seed is carried by various vectors, a safe distance between domestic plantings and conserved remnant vegetation can only be guessed.

Community Attitudes. The few concerns about the plants in S.Aust. have come from the most heavily infested areas of Lower Eyre Peninsula. This may reflect a lack of recognition of milkworts, lack of publicity and the distance of the large infestations from major population centres.

## CONCLUSION

Evaluation of alternative enforced control programs for South African milkworts requires further biological data. The population dynamics and potential are unclear. The mechanism for spread has not been studied. Preliminary surveys have improved our knowledge of the plants distribution, but further awareness about the plant in the community is needed to locate other infestations.

Informed action will keep plant invasions from becoming permanent weed problems (31) but quick decisions are necessary. There is an urgent need for basic research. With the available information, control work should begin in and near areas of significant conservation value where South African milkworts are not yet well established.

Further planting of the variety of myrtleleaf milkwort known to be invasive, should be stopped in coastal areas and its potential publicised.

We should act now, with the limited knowledge we have, and review the control program regularly rather than wait another 20 years.

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