

## A challenge for our values: Australian plants as weeds

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### Summary

**Australian plants can become weedy when they travel outside their original range as seeds transported accidentally or as cultivated plants. Few accidentally translocated plants become serious weeds but many cultivated plants have, especially garden plants. Many species also become highly invasive within their original range.**

Garden writers have been advocating Australian plants since the 1830s. Very few native plants were popular in gardens until recently, but those that were include several of today's worst weeds. These plants had a long head start over species entering cultivation more recently. We can thus expect many more serious weeds in future, for example possibly *Pittosporum ferrugineum*. Victoria has the most weedy Australian garden plants. Several species have established south of their original range, and others have spread from eastern to western Australia, and vice versa.

In Australia today an 'exotic' plant to most people is one from overseas, and a 'native' plant a plant from Australia. But 'exotic' should apply to any plant established outside its normal distribution. Gardens of Australian plants should not be called 'native gardens' but 'national gardens'. Whether gardeners grow Australian or foreign plants matters less than whether they grow invasive or benign plants.

### Overview of the problem

Australian plants as weeds have not received adequate attention, even though they cause the same range of problems as foreign weeds, albeit on a smaller scale. Australian plants invade gardens, farms, natural habitats, and pose threats to rare fauna.

Australian plants can become weedy either within or outside their original range. Plants are taken outside their original range either accidentally or deliberately. They travel accidentally on vehicles as seeds carried in soil (Wace 1977), hay, dung or attached to animals or clothes. Seeds often travel from inland pastures to coastal ports with movements of stock (Macdonald 1887, Gray and Michael 1986, Kloot 1985). In other examples, plants native to mainland eastern Australia have established new populations in Tasmania (Rozeffelds *et al.* 1999) and Western Australia (Hussey *et al.* 1997).

In only a few instances have accidentally translocated plants become serious weeds. Examples include bulrush (*Typha orientalis* C.Presl) from eastern Australia, now invading wetlands near Perth, and *Juncus usitatus* L.Johnson and *J. polyanthemus* Bucken (and their hybrids) from eastern Australia found invading pastures south of Perth (Hussey *et al.* 1997); also *Marsilea mutica* Mett. in Tasmania (Rozeffelds *et al.* 1999). More species are likely to become problematic in future, for example black spear grass (*Heteropogon contortus* (L.) P.Beauv. ex Roem. & Schult.) in central Australia (Peter Latz personal communication) The number of accidentally translocated species is probably underestimated due to uncertainty about pre-European distributions. For example mimosa bush (*Acacia farnesiana* (L.) Willd.), often considered exotic despite Leichhardt's eighteenth century record from remote north Queensland (Leichhardt 1847), has probably expanded its range with stock movements. It is a very serious weed.

Plants may also establish feral populations when they are cultivated outside their original range as garden, timber, aquarium, land rehabilitation, arboretum or tannin plants. Deliberately translocated plants are causing more problems than accidentally translocated plants because many more species and individuals are translocated. Garden plants provide the largest pool of invasive species. They are considered further below.

Plants become weeds within their original range when they multiply in numbers and displace other life forms. This can be a response to changing fire regimes, changed grazing pressure, nutrient enrichment, soil disturbance, or a combination of these. Woody weed invasion of pastures in western New South Wales and Queensland is the best known example. Kleinschmidt and Johnson (1977) list 43 native woody weeds in Queensland including *Eucalyptus* L'Hér. *Acacia* Miller, *Melaleuca* L. and *Eremophila* R.Br. species. In Tasmania the rare endemic shrub *Melaleuca pustulata* Hook.f. has become a very serious woody weed on two sheep farms (Low in press). The displacement of Kangaroo grass (*Themeda triandra* Forrsk.) pastures by black spear grass in Queensland is also well documented (Shaw 1957). Spear grass seed awns are so troublesome to sheep that farmers were forced to convert to cattle.

Australian plants can also become weeds of crops, lawns and waste places. The CSIRO Handbook of Australian Weeds (Lazarides *et al.* 1997) lists large numbers of native plants recorded as crop and pasture weeds. Success as weeds of Australian species of *Rumex* L. and *Commelina* L. matches the success of exotic species within the same genera. In the Riverina of New South Wales, nine of the ten most commonly recorded weeds of rice are locally native plants (McIntyre and Barrett 1985).

Australia even has plants that are now threatened species in the wild, but which grow mainly in degraded situations as roadside weeds. The nationally endangered *Lepidium hyssopifolium* Desv. is one such. In Tasmania it occurs at 28 sites, only one of which could be described as natural. Kirkpatrick and Gilfedder (1998) note: 'The majority of sites are on roadsides underneath exotic tree species, with a substantial minority in the home yards of farms'. When cultivated in Melbourne for conservation it escaped onto a nearby footpath and is now spreading there as a weed (Neville Scarlett personal communication). Several threatened *Acacia* species, for example *A. perangusta* (C.T.White) Pedley also do well on disturbed road verges.

Plants multiplying within their original range cause many conservation problems (Low in press). The threats posed by sweet pittosporum (*Pittosporum undulatum* Vent.), burghan (*Kunzea ericoides* (A.Rich.) J.Thompson) and coast tea tree (*Leptospermum laevigatum* (Gaertner) F.Muell.) are well documented (Mullett 2001, Carr 2001). In other examples, broad-leaved tea tree (*Melaleuca viridiflora* Solander ex Gaertner) invasion of grasslands on Cape York Peninsula poses a threat to the endangered golden-shouldered parrot (*Psephotus chrysopterygius* Gould) (Garnett and Crowley 1997, 2000), and rainforest invasion of buttongrass (*Gymnoschoenus sphaerocephalus* (R.Br.) Hook.f.) moors in Tasmania is potentially a threat to the endangered orange-bellied parrot (*Neophema chrysogaster* Latham.) (Low in press). These invasions, and also the ecological problems caused by rainforest expansion into wet sclerophyll forest in the Wet Tropics (Harrington and Sanderson 1994), pose conceptual problems, because they probably represent vegetation responding naturally to a cessation of Aboriginal burning (Low in press). A similar quandary is posed by coast tea tree. If it was confined to coastal dunes only by past Aboriginal fires (i.e. by human intervention), should we not allow it to reclaim its former habitat further inland?

It is important to note that Australian animals as well as plants become ecological and economic pests. Many species now live outside their original ranges as a

result of accidental and deliberate translocations (Low in press). Examples that are serious pests include redback spiders (*Latrodectus hasseltii*) in eastern Australia (Low in press), pandanus leafhoppers (*Jamella australiae* Kirkaldy) in southern Queensland (Smith and Smith 2000), crimson rosellas (*Platyercus elegans* Gmelin) on Norfolk Island (Garnett and Crowley 2000), and masked owls (*Tyto novaehollandiae* Stephens) on Lord Howe Island (Garnett and Crowley 2000). Other animal species have become pests in situ, by increasing their population density, for example kangaroos, koalas and mosquitoes. Australian plants, animals and diseases have also become very serious pests overseas (Low 1999).

## Garden plants

### History

The first Australian gardening book appeared in 1835 (Crittenden 1985). It was Thomas Shepherd's *Lectures on the Horticulture of New South Wales*, and it concerned itself only with vegetables. A second book appeared just three years later, covering flowers, and it included native species. It was the *Manual of practical gardening adapted to the climate of Van Diemen's Land containing plain and familiar directions for the management of the kitchen, fruit and flower gardens, nursery, greenhouse and forcing department for every month of the year*, by Daniel Bunce (Crittenden 1985). This book was revised and republished in Melbourne as *The Australian Manual of Horticulture* (Bunce 1850). Bunce encouraged readers to dig up young forest shrubs for transfer to the garden. Many of the species he recommended (*Dillwynia* Smith, *Daviesia* Smith, *Prostanthera* Labill., *Zieria* Smith species) prefer low-nutrient soils and do not grow well in Melbourne today.

Ferdinand von Mueller's *Select plants readily eligible for Victorian industrial culture* (1881), spoke highly of some plants such as flame tree (*Brachychiton populneus* (Schott & Endl.) R.Br.), which now sprouts as a weed around Sydney and Brisbane. In the *Handbook of Australian horticulture* (1892), H.A. James devoted thirty pages to Australian plants. James was the first to push native species strongly, observing that 'plants and flowers indigenous in Australia do not appear to have received from Colonial nurserymen and amateur gardeners, that consideration which their beauties may fairly claim'. Many of today's weeds star in his weighty tome, including Cootamundra wattle (*Acacia baileyana* F.Muell.), golden wreath wattle (*Acacia saligna* (Labill.) H.L. Wendl.), Queensland silver wattle (*A. podalyriifolia* Cunn. ex G.Don), coast teatree and sweet pittosporum.

The next milestone was *Australian plants suitable for gardens, parks, timber reserves etc.* (1911), by William Guilfoyle,

director of the Melbourne Botanic Gardens after von Mueller. In this, the first book devoted to growing native plants, Guilfoyle listed hundreds and hundreds of species, including 53 hakeas and 127 wattles, in what was less a gardening book than a dictionary of useful plants. Around the same time, horticulturist Edward Pescott spoke at horticultural societies around Victoria promoting 'Australian flowers for Australian gardens' (Pescott 1912). Pescott, like James, could complain that native plants had been neglected. 'Australian patriotism gives its patronage very largely to industrial, political, and similar subjects,' he observed, 'but in horticulture it has apparently been the fashion that any plant which could carry the distinction of being imported is far preferable to one which owns Australia for its native habitat'.

It was not until the 1950s that Australian plants genuinely became popular. Native gardening books finally appeared, including *Australian plants for the garden* by wildflower devotee Thistle Harris (Harris 1953). The Society for Growing Australian Plants formed in Victoria in 1957.

What becomes clear from this history is that very few native plants were genuinely popular in gardens in the past, but those that were include many of today's worst weeds. Sweet pittosporum seeds were selling in the United States by 1826 (Mack 1991). James spoke very highly of sweet pittosporum as a hedge plant in 1892. The forty plant species mentioned by Pescott (1912) included four of today's worst invaders: sweet pittosporum, bluebell creeper (*Sollya heterophylla* Lindley), Cootamundra wattle (*Acacia baileyana*) and golden wreath. These plants have a hundred year's head start over species brought into cultivation more recently. We are thus likely to see many more Australian plants on our weed lists in future. A species such as rusty pittosporum (*Pittosporum ferrugineum* W.T.Aiton ex Dryand.), which is unknown to most weed experts today but which is highly invasive near the Gold Coast (Low in press), appears destined to become a major weed. There may be many similar species on their way to becoming serious invaders.

### Regional perspective

Victoria has far more invasive Australian plants than other states. Carr (2001) lists more than 200 species. At Mt. Martha (site of a former arboretum) 38 species have been recorded (Carr *et al.* 1991). Fewer than 60 species are recorded from Western Australia (Greg Keighery, unpublished data), and far fewer species from Queensland and the Northern Territory. Only three species (*Schefflera actinophylla* (Endl.) Harris, *Corymbia torelliana* F.Muell., *Nephrolepis cordifolia* (L.) Presl)

are significant weeds around Brisbane (Low 1993), and Darwin has only three naturalised species (*Acacia dunnii* (Maiden) Turrill, *A. mangium* Willd., *A. mountfordiae*), none of which is serious (Colin Wilson personal communication).

The problems appear to be worst in Victoria (and around Adelaide and Canberra) because of a large human population growing native plants, and a highly disturbed environment offering many opportunities for establishment of weeds, both native and introduced.

### Directions of spread

Large numbers of species have naturalised well south of their original ranges. Umbrella tree (*Schefflera actinophylla*) was originally found about as far south as Gladstone but is now found south to Sydney. Cadagi (*Corymbia torelliana*), from the Atherton Tableland is very invasive around Brisbane (Low 1993). Silky oak (*Grevillea robusta* A.Cunn. ex R.Br.) and lemon-scented tea tree (*Leptospermum petersonii* F.M.Bailey) from southern Queensland and northern New South Wales are now invasive in Victoria (Carr 1993). Plants from the mainland are succeeding in Tasmania (Rozeffelds *et al.* 1999). Southward range extensions have also occurred among insects, such as the pandanus leafhopper (*Jamella australiae* Kirkaldy) and orange palmdart (*Cephrenes augiades* Felder), and presumably represent a response to natural global warming.

Plants are also spreading between temperate eastern and Western Australia (Hussey *et al.* 1997), into regions with matching climates. South-western Australia has no native rainforest plants but the region around Walpole has an ideal climate for temperate rainforest species. Large numbers of plants from Western Australia are naturalizing in Victoria (Pigott 2001).

A third direction of spread with severe ecological implications is from mainland Australia to Norfolk and Lord Howe Islands. Sweet pittosporum is one of Lord Howe's two worst weeds (Ian Hutton personal communication).

### Defining 'Native plants'

In Australia today, an 'exotic' plant, to most people, is one from overseas, and a 'native' plant a plant from Australia. But The World Conservation Union (IUCN) (McNeely 2000), defines an alien (or exotic) species as one that is 'introduced outside its normal past or present distribution'. By this definition all of the plants mentioned here are 'exotic' invaders. Australians should not let political boundaries dictate biological categories. Australia is one of world's largest countries, and had the continent been carved up into smaller nations, as Europe is, a gardener in Sydney would not call a plant from Perth a

'native plant'. Perth is as far from Sydney as Portugal from Russia or Belgium from Arabia. Gardens of Australian plants should not be called 'native gardens' but 'national gardens'.

Gardening with native plants is commonly thought to benefit the environment. But as Wolschke-Bulmahn (1996) notes "Advocacy of the use of 'native' plants may be a moral response to some of the many environmental problems we have all over the earth. However, there is no reason for a native plant doctrine, nor for the assumption that so-called native plants would serve environmental goals. The segregation of good and bad plants, natives and non-natives, and the condemnation of the latter as aggressive invaders is too simplistic and helps to mask problems rather than engage them."

Gardeners should grow non-invasive plants. Whether plants are Australian or foreign matters much less than whether they are invasive or benign.

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