

## FORUM:

## *Pittosporum undulatum* as a case study for native species that change range – how to avoid inappropriate responses?

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**Abstract:** During the past two centuries massive land use changes in Australia have altered fire regimes, changed hydrology, increased soil salinity and nutrient levels, and altered abundance and distributions of animals with which native plants interact. Such changes to plant habitats may induce changes in range of indigenous plant species. We need to consider very carefully how to treat native species that naturalise outside their previous ranges. The spread of *Pittosporum undulatum* in the Sydney region provides a case study for considering approaches to this question.

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### Introduction

*Pittosporum undulatum* Vent. (family Pittosporaceae), known as Sweet Pittosporum or simply Pittosporum, is a small tree native to certain moist forests and woodlands on fertile soils on the coast and nearby ranges in southeastern Australia. Its natural range extends from southern Queensland (Bailey 1899) to eastern Victoria. At the western end of its range it was recorded 'in rocky places about Western Port' by Mueller in 1860 (Bentham & Mueller 1863). In recent years, concern about its spread particularly in Victoria (e.g. Gleadow & Ashton 1981) has seen it branded as an 'environmental weed' for the whole of southeastern Australia (e.g. Blood 2001, Mullett 2000). It is also now reported as a weed in South Australia, Tasmania and Western Australia, presumably as a consequence of horticultural plantings (Blood 2001). However, in the Sydney region, calling it a weed has put at risk scarce remnants of vegetation where it is native.

#### *Natural range of Pittosporum undulatum in the Sydney area*

In the greater Sydney Basin Bioregion, *Pittosporum undulatum* occurs naturally in widespread sandstone gully habitats, and in the understorey of two very rare vegetation types, Blue Gum High Forest and Sydney Turpentine Ironbark Forest, that have been greatly reduced compared with their former extent (Benson & Howell 1990). Each has been listed an Endangered Ecological Community under the NSW *Threatened Species Conservation Act* 1995. Much of the area remaining of each endangered forest, especially of Sydney Turpentine Ironbark Forest, persists as small patches on edges of privately-owned farmland (e.g. Smith & Smith 1990).

#### *Range extension in the Sydney area is related to human-induced habitat changes*

Many native plants have suffered reductions in range as a result of European settlement, yet that of *Pittosporum*

*undulatum* appears to be expanding. Although Pittosporum's natural shale soil habitats in Sydney have been mostly cleared and settled, increased moisture and soil nutrients run off settled areas on shale into adjacent bushland on sandstone, making edges of this previously infertile habitat suitable for it. As it has colonised this changed habitat, *Pittosporum undulatum* has been reported as invading bushland on sandstone (Buchanan 1989a) and potentially reducing biodiversity on these sites (Brown et al. 1991, Mullett & Simmons 1995).

However, this invasion only extends as far as humans have modified the edges of the sandstone habitat (Rose 1997a, Rose & Fairweather 1997, Leishman 1990) with

- increased soil moisture and nutrients in run-off from farms and gardens, and
- reduced fire frequency close to settled areas.

Fire is known to stimulate germination of soil-stored seed of many understorey species in bushland on sandstone. Pittosporum seed germinates without light and fire, and, once established, Pittosporum's dense foliage tends to suppress growth of shrubs and herbs beneath (Gleadow 1982). Normally Pittosporum plants would be killed by periodic fires but reduced fire frequency in its natural shale and sandstone gully habitats has also allowed it to increase in abundance there (Buchanan 1991).

European settlement has also increased the abundance of birds that disperse Pittosporum's fruits and therefore aid its spread into bushland on sandstone where soil is sufficiently fertile. Pittosporum seed is dispersed by birds, including native Pied Currawongs, *Strepera graculina* (Buchanan 1989b) which have been favoured by urban gardens (Major et al. 1996), and introduced European Blackbirds, *Turdus merula* (Gleadow 1982). Under natural conditions the frequency of fruit-dispersing birds would have been low in vegetation on infertile sandstone soils, as the proportion of fleshy-fruited plant species there is small (Westoby et al. 1990).



**Fig. 1a.** Sydney Turpentine Ironbark Forest with *Pittosporum undulatum* in the understorey

The result of these changes has been *Pittosporum*'s expansion into adjoining, previously-unsuitable habitat. *Pittosporum undulatum* is not a weed in the Sydney context although it may grow inappropriately vigorously in some situations. Other native 'habitat-intruders' include the small trees *Glochidion ferdinandi* and *Omalanthus populifolius*, both in the family Euphorbiaceae (Buchanan 1989a), and the fern *Pteridium esculentum*. This type of gradual range extension may be analogous to what can be expected of some species in response to the changes in temperature, rainfall and other factors induced by climate change, and to other impacts such as changed fire regimes and increased soil moisture and nutrient status associated with European land use generally.

## Discussion

In attempts to discourage planting and stop nurseries selling it, *Pittosporum undulatum* has been branded an 'environmental weed' (e.g. Walsh & Entwisle 1996, Mullett 2000, Blood 2001). This message, originating from research in Victoria (e.g. Gleadow & Ashton 1981, Mullett & Simmons 1995), though geographically appropriate in Victoria, has been widely circulated beyond there, including in guidelines for bushland management distributed at the local council level. I would like to draw attention urgently to adverse implications for biodiversity conservation arising from *Pittosporum*'s dual native and weedy status in the Sydney region, and implications for other indigenous species that may extend their distributions elsewhere.



**Fig. 1b.** Understorey containing *Pittosporum undulatum* was cleared from this nearby Sydney Turpentine Ironbark Forest remnant on private land.

Members of the general public often don't understand any subtleties in the term 'environmental weed' — the message they receive is that *Pittosporum* is a weed that's bad for the environment, and should be eliminated! If they see it growing, even in scarce remnants of its native habitat, they are likely to get out the bulldozer and clear the whole understorey and all its associated biodiversity (Figure 1). This has been observed, with understorey of the Endangered Ecological Community Sydney Turpentine Ironbark Forest containing *Pittosporum undulatum* which has been bulldozed, clearing away other plant species, fauna associated with them, lichens, fungi, rootstocks, soil-stored seeds, associated mycorrhizas, other soil microorganisms and microfauna. Landowners may think they are doing the right thing, because of statements referring to 'the environmental weed *Pittosporum undulatum*'. Less well-intentioned people may use *Pittosporum*'s presence as an excuse to get rid of bushland. *Pittosporum* itself looks set to survive as a species, but other biodiversity in scarce forest where it occurs may well be lost.

The current response to *Pittosporum*'s increase in the Sydney area provides examples of potentially inappropriate responses that should be avoided in dealing with future range changes of native species. Labelling the species *Pittosporum undulatum* an 'environmental weed' and distributing this message widely has had unfortunate consequences. In addition to the threat to Endangered Ecological Communities described above, the idea that *Pittosporum* is a weed has become so entrenched that some bush regeneration contracts have specified its removal without follow-up treatment of affected areas. Results have included invasion of bared areas by exotic weeds such as *Lantana camara*,

*Ehrharta erecta* and *Tradescantia fluminensis*, which cannot be considered an improvement to the habitat (R. Eckhard, P. Woodard pers. comm.). Simply removing *Pittosporum* without addressing other habitat changes, soil nutrient status and especially changed fire frequency, will not restore the former vegetation (Buchanan 1989a, Rose 1997b, Muyt 2001). Treated areas need fire to stimulate recruitment from the soil seedbank of shrubs and herbs that formerly occupied the site, and measures to prevent continuing addition of soil nutrients that favour *Pittosporum*.

## Conclusion

In the case of *Pittosporum undulatum*, labelling it as a weed in order to prevent perceived loss of biodiversity has created a threat to other biodiversity. In order to counteract the effects of these past communications and prevent loss of rare forest types in Sydney, there is a need to

- Devise a strategy that conveys the message that *Pittosporum undulatum* is an appropriate native species within its original natural geographic range, (though it may be a habitat intruder in some places within this range), but that beyond this original geographic range it may behave as a weed in natural environments.
- Stop attaching a single label such as an 'environmental weed in southeastern Australia' to the species as a whole; specify precisely the location and conditions when discussing situations where it may be perceived as a problem invader.
- Use only ecologically qualified people to reduce its abundance where necessary as part of integrated management of native vegetation.
- Use, rather than abuse *Pittosporum* in its natural range, to suppress weeds and hazardous fuel growth on bushland edges!

In the case of other native species that may begin to change their ranges in response to human-induced modifications generally, I believe there is a need for more discussion on how such species should be treated. It is important to consider carefully how to communicate their status to the general public, particularly in view of the likely need for more plant species conservation to take place outside the current reserve system as distributions change in response to climate and other changes (Hughes & Westoby 1994). It is obvious from *Pittosporum*'s example that native range-changers need to be treated on a case-specific and site-specific basis, rather than lumped into a group with a single label that may be misunderstood. In the face of land use and habitat changes, we will need to think laterally and creatively about how to describe and discuss these species in order to avoid causing loss of biodiversity due to inappropriate responses in the community.

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