

How weedy are plants recently naturalized in New Zealand?

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The problem

The current costs of weeds to New Zealand is ~\$40m in preventative expenditure and ~\$60m in lost production per year alone¹. The number of new species that potentially require control under the Biosecurity Act (1993) continues to increase. For example, 120 plant pests are listed in the 2002 Proposed Auckland Regional Pest Management Strategy².



Pueraria lobata in the USA

Naturalization is a critical step towards a plant species becoming a weed, and about 14 species do so every year in New Zealand. Casual naturalizations are those that have not yet formed self-sustaining populations or persist in the wild, whereas full naturalizations form self-

Data sources

Since 1988 there have been ~187 casual naturalizations and ~79 full naturalizations recorded among the dicotyledons, gymnosperms, and pteridophytes (all higher plants except grasses and their relatives)^{3,4,5,6}. As a guide to their potential weediness in New Zealand we determined the number of overseas lists on which they appeared, from a Global Compendium of Weeds¹⁰. This lists ~20 000 species from ~300 referenced sources covering 11 continental regions and 46 countries. Species naturalized in New Zealand come from most of these regions. The global list distinguishes merely "naturalized" species, and those listed as "weeds". For those naturalizations originating from cultivation, we determined the number of wholesale and retail nurseries outlets (n=200)¹¹.

Towards the answers

Weediness of new naturalizations

- Many species (36.2%) do not occur in other countries as either naturalized species or weeds. History can tell us little about their future in New Zealand unless we know their history of cultivation overseas.
- The majority are also naturalized elsewhere (63.8%).
- A few (11.4%) are naturalized elsewhere and have not been reported as weeds.
- Half (52.0%) of the new naturalizations are listed as weeds overseas.

Conclusions

- Most newly naturalized plant species are from horticulture and 60% are distributed via the nursery trade.
- Many newly naturalized species threaten New Zealand's biodiversity and productive systems based on their history of weediness overseas.
- The flow of new species into the environment will not be slowed unless nurseries no longer distribute them.
- Horticultural species that have progressed from "newly naturalized" to "pest" are generally too widely distributed to completely eradicate.

References

- ¹Williams, P.A., Timmins, S. Economic Impacts of Weeds in New Zealand: some examples. *In*: Pimentel, D. *et al.* Environmental and Economic Costs of Alien Plant, Animal and Microbe Invasions. CRC Press, Boca Raton, Florida.
- ²Aron, 2002. Proposed Auckland Regional Pest Management Strategy. Auckland Regional Council, Auckland.
- ³Heenan, P.B., Brethiesser, L., Cleary, D.S., de Lange, P.J., Brownsey, P.J. 1998. Checklist of dicotyledons and pteridophytes naturalized or casual in New Zealand: additional records 1994-1996. *New Zealand Journal of Botany*, 35: 155-162.
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- ⁵Heenan, P.B., de Lange, P.J., Cameron, E.K., Champion, P.D. 2002. Checklist of dicotyledons, gymnosperms, and pteridophytes naturalized or casual in New Zealand: additional records 1999-2000. *New Zealand Journal of Botany*. In Press.

The questions

- Which newly naturalized species are likely to become weeds in New Zealand? As a history of weediness in another country indicates a plant's potential weediness in a new country⁷, we determined whether these newly naturalized species are weeds overseas.
- For what purpose, if any, were these species brought to New Zealand? And since invasion success is correlated with planting frequency⁸ and proximity of propagule sources in gardens⁹, are the newly naturalized species readily obtainable for distribution around the country?

Species	Pathway	No. nurseries	No. weed lists overseas	Origin
<i>Asclepias curassavica</i>	Hort	2	21	Tropical America
<i>Campanula rapunculus</i>	Hort	3	21	Eurasia
<i>Capsicum annuum</i>	Agi	nd	11	Tropical America
<i>Canum carvii</i>	Hort	2	15	Eurasia
<i>Cucumis myriocarpus</i>	Hort	0	24	Tropics
<i>Cuscuta planiflora</i>	Acci	0	14	Eurasia
<i>Gleditsia triacanthos</i>	Hort	19	18	North America
<i>Gymnocoronis spilanthoides</i>	Hort	0	19	Europe
<i>Impatiens walleriana</i>	Hort	0	12	Africa
<i>Jacaranda mimosaeifolia</i>	Hort	15	13	Tropical America
<i>Leonotis nepetifolia</i>	Hort	1	16	Tropical
<i>Melia azedarach</i>	Hort	20	37	Tropical Asia
<i>Mesembryanthemum crystallinum</i>	Hort	0	18	Africa
<i>Ocimum basilicum</i>	Hort	4	15	Tropical Asia
<i>Pueraria lobata</i>	Hort	0	24	Temperate Asia
<i>Ranunculus ficaria</i> spp. <i>calthifolius</i>	Hort	5	18	Europe
<i>Schinus terebinthifolius</i>	Hort	1	42	South America
<i>Sisymbrium irio</i>	Acci	0	32	Eurasia
<i>Solanum torvum</i>	Hort	0	25	Tropical America
<i>Thunbergia alata</i>	Hort	1	19	Southern Africa

Plant species reported as naturalized in New Zealand since 1988 appearing on more than 10 weed lists overseas.

Pathways of new naturalizations

- Horticulture, primarily for urban gardens, provides most species (95.8%).
- Accidental introductions account for a few (2.5%) and the remainder came via agriculture or indeterminate means. These occur on an average of 11 weed lists.
- Most recent naturalizations (60.0%) are now available through nurseries with an average of 6 outlets nationwide.

Recommendation

- Biosecurity legislation and action should place greater emphasis on the important role of horticulture in general, and nurseries in particular, in the naturalization of plant pests in New Zealand.
- Public education on the role of horticulture in the naturalization of potential new plant pests should be increased.

⁷Webb, C.J., Sivas, W.R., Garnock-Jones, E.J., Brownsey, P.J. 1995. Checklist of dicotyledons, gymnosperms, and pteridophytes naturalized or casual in New Zealand: additional records 1988-1993. *New Zealand Journal of Botany*, 33: 151-182.

⁸Pheloung, P., Williams, P.A., Halley, S. 1999. A weed risk assessment model for use as a biosecurity tool evaluating plant introductions. *Journal of Environmental Management*, 57: 239-251.

⁹Mulvaney, M. 2001. The effect of introduction pressure on the naturalization of ornamental woody plants in South-Eastern Australia. *In*: Groves, R.H., Panetta, J.C., Virtue, J.G. *et al.* Weed Risk Assessment. CSIRO Plant Industry, Canberra. Pp. 180-193.

¹⁰Sullivan, J., Timmins, S., Williams, P.A. 2001. Subdivisions bring weeds to native forests. *Fauna and Flora* November: 10.

¹¹Randall, R.P. 2002. A Global Compendium of Weeds. R.G. & E.J. Richardson, Melbourne.

¹²Gaddum, M. 1999. Gaddum's plant finder. New Zealand Plant Finder, Gisborne. 273 pp.