

Nursery and garden industry of Australia: garden escapes that are serious environmental weeds

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Summary Plants from horticulture have been highlighted as the major source of both agricultural and environmental weeds in Australia. The Nursery and Garden Industry of Australia (NGIA) has taken initiatives to define their role and responsibilities. ‘Garden Plants Under the Spotlight (GPUS), an Australian strategy for invasive garden plants’ (February 1999), initiated the program of education to industry members and the Australian gardening public, to be aware of their own roles and responsibilities to follow for the prevention of further introductions.

INTRODUCTION

‘Why is the Australian flora so special? Does it matter whether a plant is a newcomer to Australia, or has been evolving here in isolation for the last 50 million years?’ ‘Yes it does. It matters because these new plants are radically changing the Australian environment – forever. They are displacing native species, altering not only the diversity and interactions of the flora, but also its value for fauna.’ (Hussey *et al.* 1997)

Why does the NGIA have to show concern for weeds affecting the environment and agriculture? The Nairn Report (Groves 1996) states that ‘in the last 25 years, 65% of today’s weeds were introduced for use in horticulture’.

What role has the industry played in this invasion? The responsibility of such weeds has been laid squarely at the feet of the industry. Though the industry itself cannot take full blame for this figure, the practice of gardening can.

When did this invasion all start? What events set the scene for this more recent invasion? An article entitled ‘Tasmanian’s weed flora – Its early origins’ (Watson 2002) provides an interesting picture of the sequence of weed invasion into Tasmania starting with Captain Cook’s voyage on 1773 prior to leaving Bruny Island, Adventure Bay by planting fruit tree seeds before he left. ‘This planting and seed sowing activity heralded the future indiscriminate introduction of an exotic flora, which of course flourished in a disease free, and lack of natural predators eventually became today’s common invasive weeds.’ (Watson 2002)

This picture and timing of introduction to Tasmania would have been similar in most of the earlier settlements in throughout Australia, due to the same

trade routes, the rate of development, settlement and the needs of the settlers.

‘European gardens were established in the first settlements initially to provide fruits, grains and vegetables but as new European settlers arrived and set up their ornamental gardens to create their English landscape there began an array of new introduced plants for their estate gardens, hedges and exotic pastures. This, combined with the gradual disturbance of land for grazing animals and removal of timber trees in the early 1800s, destroying the understorey therefore habitats and sanctuary for fauna, provided a window of opportunity to infiltrate the compromised native communities. English holly (*Ilex aquifolia* L. Aquifoliaceae), mirror bush (*Coprosma repens* Rubiaceae), genista (*Genista hispanica* Papilionaceae), pittosporum (*Pittosporum undulatum* Vent. Pittosporaceae), polygala (*Polygala myrtifolia* L. Polygalaceae), arum lily (*Zantedeschia aethiopia* (L.) Spreng. Araceae) and watsonia (*Watsonia meriana* (L.) Mill. Iridaceae) provided the seed and/or propagule source for the future weeds infestations of today.’ (Watson 2002). ‘At the same time these large estate gardens formed, small cottage type gardens flourished in nearby country villages and since villagers could not afford the expensive fashionable plants, their gardens proudly displayed a floral spread of persistent herbaceous annuals and perennials. Verbascum (*Verbascum dumulosum* Scrophulariaceae), ivy (*Hedera helix* L. Araliaceae), Nile lily (*Agapanthus africanus* syn. *praecox* Willd. Alliaceae), pink and yellow wood sorrel (*Oxalis corniculata* L. Oxalidaceae)’ (Wilson 2002).

Plants were actively traded and swapped across the countryside by travelling villagers enabling a rapid spread into previously unaffected indigenous vegetation communities. Others became a serious agricultural weed imposing substantial economic impacts on many generations and many herbs used in estate and cottage gardens from this era came to persist as difficult to control agricultural weeds.

‘The diaries of the Rev. Robert Knopwood, the first chaplain of Hobart provide a detailed account of early horticultural activities 1804–1835. The diaries also acknowledge his enthusiasm for collecting seeds and cuttings from all available sources including fresh offerings from trading vessels in the port of Hobart.

New settlers would frequently collect plant specimens from various foreign ports of call especially South Africa on their journey to this new colony. Newtown Plant Nursery was referred to in 1815 as one of the earliest plant selling establishments. Plants such as willows (*Salix* spp., Salicaceae), poplars (*Populus alba* L. Salicaceae), English hawthorn (*Crataegus monogyna* Jacq. Rosaceae), black locust (*Robinia pseudoacacia* L. Papilionaceae), genista (*Genista hispanica* L. Papilionaceae), English and Scotch gorse (*Ulex europaeus* L. Papilionaceae), boxthorn (*Lycium ferocissimum* Solanaceae) and cotoneaster (*Cotoneaster pannosus* Franch. Rosaceae) would have been freely available at this very early nursery. Weeds galore for the colonist to spread far and wide! (Wilson 2002).

The introduction of many new exotic species can be attributed to the enthusiasm of amateur botanists such as Robert Lawrence. Importation and exchange of plant material with European horticulture and botanical institutes such as Kew Garden for the local flora, was of great interest at that time. The Wardian case to transport plants across oceans becoming more reliable by the 1830. Local trade catalogues, botanical gardens lists and order books provide a comprehensive record of the weed flora that was brought into the State. The 1850s saw new introductions of pampas grass (*Cortaderia selloana* Schult. & Schult.f. Poaceae), cotoneaster (*Cotoneaster glaucophyllus* Rosaceae), Paterson's curse (*Echium plantagineum* L. Boraginaceae), nasturtium (*Tropaeolum majus* L. Tropaeolaceae), Japanese honeysuckle (*Lonicera japonica* Thunb. Caprifoliaceae), wandering Jew (*Tradescantia fluminensis* Commelinaceae) and banana passionfruit (*Passiflora mollissima* Passifloraceae). Blackberry (*Rubus ulmifolius* Schott. Rosaceae) arrived in 1843. Boneseed (*Chrysanthemoides monilifera* (L.) Norl. Asteraceae) was used for shrub borders in estate gardens' (Wilson 2002). These early introductions set the scene for a large percentage of Australian weeds incursions and most if not now all have major eradication or management programs in place throughout the southern regions of Australia. Today, new exotic plant material sought by genuine plant collectors can expect to go through a rigorous legal selection and assessment process.

PROGRESS OF TRENDS

With the growing and expanding population these trends continued throughout the twentieth century.

Australian gardeners continued to seek new plants. Land disturbance and soil degradation continued. The generosity of gardeners ensured that the plants would spread through family and friends gardens. Nurseries and gardeners alike were oblivious to the looming

damage their activities were inflicting on our environment in these disturbed areas.

The naturalisation of many of these plants was initially seen as a novelty or accomplishment rather than the threat it was to become. The practices of dumping of garden refuse across the road into the nearby bushland or even worse, further afield whilst on a Sunday drive was common place. The picking of a bunch of naturalised freesias (*Freesia alba* × *leichtlinii* Iridaceae) to take home for Mum or family excursions to pick blackberries from the local creek or rubbish dump, to make jam, became common place family activities.

Changing fashions have always been a part of the gardening and horticulture scenes. Nursery businesses wanting to expand their production searched for new exotic plants to add to their growing lists. The already established plants which were either considered too common because of their appearance as naturalised weeds, were cast aside, or the fashion trends changed to suit the changing architecture of buildings. The rubbish dumps of the day became a haven for such cast offs and their spread into the surrounding bushland was rapid.

Further introductions such as lantana (*Lantana camara* L. var. *camara* Verbenaceae) and Australian natives being transported across borders began to naturalise, Victorian tea tree (*Leptospermum laevigatum* (Gaertn.) F.Muell. Myrtaceae) used for an early hedging era, the spread of numerous wattle species including golden wattle (*Acacia baileyana* F.Muell. Mimosaceae) out competing local species, into many states, are common examples.

The environmental impact of the naturalisation of exotic garden plants became evident. 'The Nairn Report' (Groves 1996) reported that 290 exotic species of plants had become naturalised in Australia over a 25 year period from 1971 with 65% attributed to ornamental plants for horticulture. The numbers showed increasing rate of naturalisation during that period.

'Australian Garden Thugs Facts and Figures' (Blood and Randall 1998) gives statistics that 'over 700 plants grown deliberately in gardens or sold in the trade in Australia have become weeds, of these, almost 50 are still lurking in gardens. Thirty of these are what weed people call 'sleepers' (they have the known potential to escape) while another 16 are already weedy overseas.'

STRATEGIES

NGIA and its associated horticultural media follow and create fashion for Australia's parks and gardens. The last twenty years has seen many new introductions

to the industry from overseas, as well as plant breeding and selection within Australia. During this time the Australian environment had continued to change by degradation, threatening salinity and climatic changes providing an ideal platform to launch further new weeds and the further spread of those already naturalised.

What has the industry and the associated landscaping industry been doing to in its role as horticultural promoter to the public of Australia and to prevent the number of naturalised weeds increasing? The National Weeds Strategy (NWS) (1997) sets out a goals and objectives for a strategic approach to weed problems of national significance. The Cooperative Research Centre for Weeds Management Systems (Weeds CRC) is a national initiative to support, assist or drive industry decisions and plant selections. Biosecurity Australia (BA) regulates the importation of new plant material through the Australian Quarantine Inspection Services (AQIS) weed risk assessment protocol.

NGIA's publication *The Nursery Papers* Issue No. 1998#10 titled 'Preventing the introduction of potential weeds as ornamental plants to the Industry' advises that 'AQIS carries out assessments of weed potential on all new plant imports.' New ornamental plants in particular are assessed as they are the major source of plants that, in time, may become naturalised weeds that impact on our environments. Weeds ranking and assessment systems are in place for assessment of the potential of plants including those from horticulture to become invasive and allow the appropriate management programs to be implemented. Plant Breeders Rights (PBR) has legally enforceable legislation and makes it the PBR owner's responsibility to be aware of such restrictions as noxious or invasive weeds when making submission for new plants. NGIA responsibility to the NWS is seen as coordination, policy, research, monitoring, education, advocacy and energetic weed control.

INDUSTRY RESPONSE

'Garden Plants under the Spotlight: An Australian strategy for invasive garden plants' (Blood and Randall 1998), was a project of cooperation with the Weeds CRC and the then Nursery Industry Association of Australia (NIAA) and state, territory and federal regulatory agencies. The following initiatives were put in place:

Strategy list

- To maintain the profitability of the industry during a time of increasing local council, state and territory government regulatory concerns over weeds.
- To educate and inform the Australian gardening

public about invasive garden plants through government agencies, the plant industry and the horticultural media.

- To educate the plant industry and horticultural media about invasive plants.
 - To obtain cooperation from industry and media in the promotion, sale and distribution of environmental friendly alternative plants.
 - To increase sales of non invasive garden plants.
- Community education and awareness program*
- Focus on the invasive garden plants.
 - Equip the community toolbox.
 - Promote the role of the industry and government.
 - Ensure staff are trained and skilled in providing community education.

Target groups

- Horticultural media.
- Nurseries, garden centres and landscapes.
- Local government.
- Botanic gardens and genetic resource centres.

GARDEN THUGS LIST

From an original 860 species originally identified as Garden Thugs, a list of 100 was presented of the Industry for comment. The list indicated any legislation control and as well as the state and territories where the plant has become invasive in natural ecosystems.

The final list of 52 plants was identified by the GPUS strategy as ones to be discouraged from use in Australians gardens. This list was published in NGIA publications *The Nursery Papers* (Issue No. 2000/12) titled 'Invasive plants not wanted in public or private gardens identified'. A further Issue of *The Nursery Papers* (Issue No. 2001/14) 'The facts on hazardous plants', lists plants many of the escaped exotics which are proclaimed weeds

Considerable concern was expressed that for at least the next few decades many new weeds or 'sleepers' weeds will continue to emerge from plants already present on Australian gardens and nurseries. Newer introductions such as white butterflies (*Gaura lindheimeri* Engelm. & A.Gray Onagraceae), African daisy (*Osteospermum ecklonis* (DC.) Norl. Asteraceae), dietes (*Moraea vegeta* L. Iridaceae) have been already noted as naturalising by Bushcare groups involved in weed removal from bush reserves.

The focus would be on informing the gardening public, commercial users and members of the nursery and garden industries of the need to ensure plants are not used in either public or private gardens. The Weeds CRC programs 'Garden Thugs', and 'Weed Buster Week' are conducted nationally for the nursery industry and public education.

INDUSTRY AIMS

In 2000, GPUS conducted a survey by the Weeds CRC and Agriculture Western Australia to determine nursery customers' attitudes to the sale of weedy garden plants. The result showed that an overwhelming majority of nursery customers do not want to buy and grow invasive plants in their gardens and put trust in their local nursery for the correct advice and not to have them for sale.

Fashion demands from the gardening public meant that relatively new and untested species of plants were being distributed. Computer software has been now developed to be able to make projections of a plants propensity to become invasive and allow precautions to be taken. Any new introductions would be subject to this scrutiny and existing garden plants showing weediness can be assessed. A good example of this is lantana (*Lantana camera* L. Verbenaceae) which is a well known environmental Weed of National Significance (WONS) in some states, has been projected to become invasive in Western Australia from Geraldton to Esperance and there is already evidence of naturalising in these areas (Walton 2000).

The trend to create water features in gardens has given the rise in reports of prohibited water plants such as salvinia (*Salvinia molesta* D.S.Mitch. Salviniaceae), water hyacinth (*Eichhornia crassipes* (Mart.) Solms Pontederiaceae) and arum lily (*Zantedeschia aethiopica* (L.) Araceae).

The challenge is to work with this information and follow protocols put in place for removal from sale and safe substitution. In a further issue of The Nursery Papers (Issue No. 2001/12) titled 'Discovering alternatives to garden escapes' and states that 'the issues of invasive plants, often referred to as 'weeds', is a complex one. What the industry should do about this issue is equally, or even more, complex.' It aims to highlight only the most invasive garden plants still found in the nursery trade, develop and promote an extensive list of alternatives and mostly, improve the understanding of this issue by the gardening community.

The group of invasive garden plants listed and their alternatives are direct at the NSW/ACT area. The complexity of providing such lists is highlighted and the need for industry in other states to work with local communities to provide their own lists to protect the biodiversity of the many different ecosystems found in regions throughout the country.

One of the industry's objectives is to respond to community environmental concerns. The main goal is to work out an approach that would help the gardening public not to want invasive garden plants. As most gardeners trust their nursery person for correct advice the industry can therefore play an important

role in keeping to create awareness of this issue and at the same time encourage the purchase and planting of non-invasive species.

In November 2001 the 'Flora for Fauna' campaign was launched (Moody 2001). This is a national initiative by the Nursery and Garden Industry. With the support of funding from a Natural Heritage Trust grant, 'Flora for Fauna' looks at the ways that the gardening community can be encouraged to grow suitable plants preferably Australian native plants local to each areas into home gardens to attract local flora and fauna. These gardens will become protected habitats whilst bringing many fairly sterile gardens to life. This in turn would provide further corridors for the fauna to interact with the flora between local bushland parks and reserves.

Though not directly aimed at probable weed species, lists presented for the project have provoked much comment particularly from environmental groups Australia wide who know their areas and are well aware of the garden escapes with which they deal with in their environmental management program. This has resulted with much consultation by these groups with industry and to encourage local nurseries to be more familiar with the management problems which could occur. This program has lead to the introduction of further plant species into the industry especially on the local scene.

Prompted by the GPUS programs, industry executives in all states and territories have acted and initiated educational programs with their members and the public. In the Australian Capital Territory and the Northern Territory, nurseries working with local community groups have all agreed not to sell invasive plants that will effect the biodiversity of their local ecosystems.

PROGRESS IN WESTERN AUSTRALIA

Western Australia is a world famous flora hot spot. We have over 14,000 native plants species and that figure will increase as new species are still being identified, we have 1400 weed species registered as invasive or naturalised about 40 of these have high invasive qualities and these will also increase. WA is lucky to be isolated from many infestations by geographical location and separation by an arid desert from the rest of the continent and their weeds, but ongoing vigilance is paramount.

The Nursery and Garden Industry of Western Australia (NGIWA) members are aware of the GPUS campaign. The executive has taken the initiative by having representation on steering committees for both the 'Environmental Weeds Strategy for Western Australia' for Conservation and Land Management

(CALM) and the State Weed Plan, and are seeking representation of the State Weeds Coordinating Council. They are continuing their participation to provide the best guidelines for the industry in line with the requirements of these plans. NGIWA state conference programs have highlighted the weed threats and outlined the responsibilities members have to participate in the industry's programs. The annual Garden Week has been the public arena for public awareness campaigns.

West Australian gardeners are inclined to follow trends set by horticulture media programs and publications emanating from the more populous states in the east therefore many unsuitable exotic plants have been introduced over many years with their weed invasive unknown in our different climate. The massive housing development in the last 20 years has also seen a similar increase in the introduction of exotic species to horticulture. Many of these are now 'sleeper' weeds with some already giving indications of spread.

Unfortunately at the moment the Industry in WA is being severely affected by low rainfall necessitating severe water restrictions and the outlook for consistent rainfall is limited on projections of climate change. This is causing severe hardships for many horticultural enterprises. The use of the more suitable local plants has been in decline since the last long dry spell in the 1970s with the trend to exotics requiring a high water use and unsuitable for prolonged dry seasons.

Many nurseries throughout the state are now coming under pressure from state and local government agencies, as well as, the general gardening public and community conservation groups. Plant lists are encouraged to be more in line with the environmental needs to conserve water and protect the biodiversity of the state's ecosystems from further weed invasion.

Working and cooperating with local environmental groups, many of whom are their customers to provide plants of local provenance is a major public relations exercise in the offing for many nurseries to gain benefit. Many voluntary hours have been spent pulling out weeds which have naturalised from plants which the nursery may have previously sold. National award winning Western Australian nursery, Zanthorhoea Nursery with community consultation has a local weeds strategy and substitute plant supply.

The current trend to recommend drought tolerant plants from other countries has inherent dangers as many have evolved and able to multiply in such adverse conditions. Weed assessments will determine their invasive potential.

OUTCOMES

- The aims and strategies of the GPUS programs are well known within the industry.
- The streamlining of initiative programs such as 'Flora for Fauna' is resulting in more appropriate plant selection for the differing regions of the country.
- Nurseries are changing lines of stock continuously. This education program encourages that process to continue and provides guidance as to which stock lines to avoid with suitable alternatives.
- Building lead-in times to the program will ensure that plant replacement occurs on a level playing field for all nurseries and allows stock lines to change in time for publicity to gardeners.
- Members are better informed to take responsibility, to be aware of plant invasive qualities, to remain informed of industry recommendations.
- More exposure of invasive weeds through the horticultural media is enabling the general public to be more informed.

CONCLUSION

The resistance to, or fear of loss of livelihood by the removal of particular plants species by some sections of the industry is still evident and there are those who feel their rights are being infringed by the programs when it comes to what they can grow.

Despite this 'the positive benefits gained by the NIGA in taking the lead on this issue and not waiting to have change imposed upon it are great. The credibility of the industry will be improved through positive publicity showing their environmental responsibility and sustainability. The industry, by driving this process, will be in a position to control the timing and phase ins, have a greater input to training and maximise publicity opportunities. It is good for business.' (Blood and Randall 1998).

There is ample evidence that there will be more than enough plants to replace any potential invasive species into the country's gardens and satisfy the enthusiasts. Plant breeding of both Australian native plants and the selection of suitable non-invasive exotics for use in Australian gardens is only in its infancy in Australia.

The challenge of this millennium for NGIA is to provide non-invasive plants, which do not threaten the country's biodiversity. The initiatives of Australian horticulturists and scientists will prevail to ensure that horticulture industry is not threatened, and able to provide a sound future for its members.

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