

Serious potential, new and emerging weeds promoted in the horticultural media

Kate Blood

Department of Primary Industries and Cooperative Research Centre for Australian Weed Management,
PO Box 7, Beaufort, Victoria 3373, Australia

Summary Weed scientists and practitioners have collectively groaned over many years at the frequency and number of invasive garden plants promoted in the Australian media as attractive and hardy garden plants. The Department of Primary Industries in Victoria and the Cooperative Research Centre for Australian Weed Management (Weeds CRC) have been raising awareness about invasive garden plants and weeds with the horticultural media in Australia over a number of years.

This paper looks at the implications of promoting and adopting garden ideas and plant trends from overseas, particularly those plants that could become future serious weeds in Australia. The promotion of one serious future weed, Mexican feather grass (*Nassella tenuissima*), as a drought hardy and attractive ornamental grass for gardens is used as an example.

Keywords Horticultural media, invasive garden plant, *Nassella tenuissima*, Mexican feather grass.

INTRODUCTION

In Australia, invasive garden plants are plants that have been used in gardens, primarily for ornament or utility, and which have escaped or threaten to invade agricultural, forestry and/or natural areas.

Recent drought conditions in Australia and the subsequent water restrictions for the home gardener have increased demand for low water-use and drought-tolerant garden plants. As a consequence, ornamental grasses, succulents, cacti, hardy perennials and Mediterranean shrubs and trees have grown in popularity in recent years.

Examples of garden styles that use some of these plants are the 'prairie-style' garden, 'gravel' gardens and the 'new perennials' movement'. These rely chiefly on a combination of low water-use perennials and grasses in sweeping drifts providing seasonal variation. They have grown in popularity in Australia in the last six years. This paper looks at the promotion of such gardens and the potential increase in invasive garden plants from such promotion.

CASE STUDY

Mexican feather grass, *Nassella tenuissima* (Trin.) Barkworth (syn. *Stipa tenuissima* and *Stipa tenuifolia*) is an attractive grass from Texas, New Mexico and

central Mexico and has many other common names including Pony Tails and Angel's Hair. Despite its attractiveness, it poses a serious weed threat to Australia and is prohibited entry to this country by the Australian Quarantine and Inspection Service (AQIS). The grass produces many seed that are easily spread (Blood 2001). It is not palatable to stock, so when it invades pasture livestock avoid it and eat other pasture plants allowing Mexican feather grass to eventually take over. Its impacts and potential distribution are described in Jacobs *et al.* (1998).

Mexican feather grass is a State Prohibited Noxious Weed in Victoria (declared under the *Catchment and Land Protection Act 1994* in May 2003) and is declared in other States of Australia. It is illegal to buy, sell, possess for sale, deposit onto land, bring into or transport in Victoria declared noxious weeds.

1992–1999 The 'Encyclopaedia of ornamental grasses' (Greenlee and Fell 1992) published in the USA described Mexican feather grass as '...striking planted alone or in large masses or drifts'. A warning note was made '...reseeds readily and can become somewhat invasive'. Two UK published books on grasses, 'Gardening with grasses' (King and Oudolf 1998) and 'Grasses' (Chatterton 1998) both included Mexican feather grass, the later describing it as – '...the delicate stems and leaves become blond in late summer, and move in the lightest wind'.

Mexican feather grass was listed in 'The Aussie plant finder 1998/99' (Hibbert 1998) under a former botanical name, *Stipa tenuissima*, and was recorded as being available for sale in Victoria. Weed agencies now believe it was also available for sale in NSW in at least 1998.

An interested individual brought the presence of this grass in Victoria to the attention of the Victorian Government in December 1998 via the email discussion group Enviroweeds. Subsequent action was taken by the Victorian Government and AQIS to remove the grass with the full cooperation of the nurseries involved. Information obtained during this and subsequent discussions with the nursery industry suggest that Mexican feather grass has been in cultivation in Victoria since at least 1992 and for sale since at least 1998.

Another USA book was published on grasses in 1999. 'The colour encyclopaedia of ornamental grasses' (Darke 1999) described Mexican feather grass as 'Among the finest textured of all ornamental grasses...Very drought tolerant...may be capable of naturalizing in...California...'

With the growing awareness of the threat of this grass, a press release was issued from the Victorian Government in early 1999. The invasive grass was covered in stories by 'Australian Horticulture' magazine, 'Australian Nursery Manager' and 'The Weekly Times' newspaper in February and March 1999.

In May 1999, 'Your Garden' magazine published an article about gravel gardens and comments 'Gravel gardening is yet to take off in Australia' (McCoy 1999). Author Michael McCoy discussed the benefits of this garden style and his observations of UK horticulturist, Beth Chatto's, garden in Essex, England. A colour photograph accompanying the article included Mexican feather grass but is not labelled with a plant name. The article's author described his own garden in country Victoria based on Beth Chatto's design principles.

2000–2006 In 2000, Beth Chatto's 'Gravel garden' (Chatto 2000) was published in Australia. The gravel garden established by the author in the UK is described and illustrated in numerous colour photographs. The book promoted the use of hardy perennial plants and a number of grasses including Mexican feather grass. The author wrote, '...I avoid free-seeding grasses, but this one is too attractive to stick to rules'. The book was widely reviewed and promoted in Australia in the horticultural media without any reference to the potential impacts of the plants used.

Australian author Michael McCoy's book, 'Michael McCoy's garden' (McCoy 2000), was also published in 2000 describing his country Victorian garden following the style of garden established by Beth Chatto. McCoy commented about Mexican feather grass, 'Now banned from cultivation. I didn't think I could survive without it, but am doing OK'. Many photographs of the grass in his garden are included in the book. The book was promoted widely in the media including many garden photographs, which include Mexican feather grass.

The promotion and use of low-water use garden plants is to be commended and encouraged. However, plants need to be chosen carefully to avoid invasive species.

In April 2000, Mexican feather grass appeared in a garden exhibit of perennial flowers and grasses at the Melbourne International Flower and Garden Show. It was quickly removed and destroyed by the Victorian Government with the complete cooperation

of the exhibit designer who was unaware of the plant's weed potential.

Books on ornamental grasses continued to be published in 2000, and many from the UK are available in Australian bookshops. 'Grasses and bamboos' (Kingsbury 2000) included the comment that Mexican feather grass is 'Effective when self-sown in the cracks of paving'.

From 1999 to 2001, Mexican feather grass plants continued to be found in the trade and in gardens in Victoria, and for sale in Tasmania in 2001. As they were found, they were removed and destroyed and at all times with the full cooperation of the individuals or businesses involved. During this time, information was provided to the media about Mexican feather grass and published, for example, in Australian Horticulture, a national trade magazine.

In 2001, an article promoting the prairie-style of gardening (Bradley-Hole 2001) was published in UK magazine 'Country Life', which is available for sale in Australia and posted to Australian subscribers. It contained colour photographs of gardens containing many Mexican feather grass plants and described '...low ponies' manes of *Stipa tenuissima*'.

Mexican feather grass plants were found growing in the Adelaide Botanic Gardens SA in 2002. The plants were destroyed.

UK author Roger Grounds published two grass books in 2002. The 'Plantfinder's guide to ornamental grasses' (Grounds 2002a) describes Mexican feather grass as 'an indispensable grass that contributes grace and elegance to the garden from spring until the depths of winter'. The author goes on to describe that it 'must be among the most free-flowering of all grasses'. The other Grounds book, 'Grasses and bamboos' (Grounds 2002b) made this observation about Mexican feather grass – 'It billows beautifully with every breath of wind and flowers continuously from spring until autumn'.

'Gardens Illustrated', a UK published magazine available for sale in Australia and posted to Australian subscribers, published an article on ornamental grasses in 2003 (Gard 2003), which discussed the value of the Internet for the global sale of plants from specialist nurseries. The article described a UK based '...specialist nursery selling grasses from around the world...'. It notes, '...the internet, though, has proved a powerful tool to specialist nurseries...'

In the same edition of 'Gardens Illustrated', an article discussed the 'new perennials' movement' in gardening – the planting of sweeps of grasses and perennial garden plants (Richardson 2003). The author described the style as, 'The new perennials' movement, that planting trend in which swathes of grasses and perennial flowers create a naturalistic look that loosens

the bounds of the traditional herbaceous border, has come of age in Britain and is here to stay'.

The Australian edition of 'Weekend Gardener' (Hallinan 2003) and 'Ross Garden Magazine' (Anon 2003) both published articles in 2003 about a garden and nursery in Tasmania. The photographs of the garden show Mexican feather grass growing. The Tasmanian Government removed and destroyed the plants with the full cooperation of the owners.

In 2003, the ABC 'Gardening Australia: Flora' book (Parker and Malone 2003) was published for the first time. It contained over 20,000 plants including many invasive species in Australia. Mexican feather grass was included twice in the book under botanical names, *Nassella tenuissima* and *Stipa tenuissima*. This book was reviewed and promoted widely in Australia with no mention of the impacts or invasiveness of the plants it contained.

A number of articles in newspapers and magazines printed during 2003 included photographs of gardens containing Mexican feather grass, some photographed in Australia and some from overseas. Although the grass was not named in the accompanying captions, it is still a form of promotion. Readers can find the name from other sources.

Mexican feather grass was found spreading from a school garden in NSW in 2004 and the plants were destroyed by the NSW Government.

'Gardening Australia' magazine published an article on prairie-style gardening in 2004 (Edmanson 2004). It contained a colour photograph of a garden containing Mexican feather grass and comments '...light and airy nature of ornamental grasses such as ... *Stipa tenuissima*...'. The magazine was alerted to the invasiveness of this grass. They issued a warning in a following edition of the magazine '...this is a very serious weed and should not be planted under any circumstances' (Anon 2004). However, in the same edition of the magazine as the alert was issued, Mexican feather grass appeared in a photograph accompanying a story about roses (Patrick 2004).

Media coverage and warnings about the grass continued in 2004. In the same year, UK published book 'Gardening with ornamental grasses' (Grounds 2004) described Mexican feather grass as '10/10'.

Gardening books and magazines, which include Mexican feather grass, continue to be published in Australia and overseas (and available in Australia). Images of this grass continue to appear in the Australian media despite awareness raising efforts.

Searches for Mexican feather grass, particularly under the name *Stipa tenuissima*, on the Internet since 1999 have found many places overseas where seeds are available for sale. The concern is that people in

Australia can order seeds from overseas and have them posted to Australia. A paper on the possible introduction of Mexican feather grass to Australia via Internet orders was presented at the Australian Weeds Conference in 1999 (McLaren *et al.* 1999).

Late 2004 saw AQIS being attacked in the media (The Weekly Times 17 and 24 November 2004) for loopholes that allowed thousands of weeds to be imported into Australia. Mexican feather grass was used to illustrate the example of name synonyms (old botanical names) not being included on the AQIS database for prohibited plants thus allowing the plant to continue to enter Australia under an old name despite its prohibition (The Weekly Times 9 March 2005).

DISCUSSION

State and Territory Government agencies regularly share information about the trade in, and media coverage of, invasive plants, particularly those that are declared under legislation and potential weeds not yet declared.

Consistent editorial policy is very important for the media. Having a policy on the coverage of invasive garden plants and the avoidance of inadvertently promoting them through images is essential. This issue has been conveyed in more detail to the horticultural and other media through a series of seminars in Australia in autumn 2006 by the Weeds CRC called 'Weeds in the Media' (Cooperative Research Centre for Australian Weed Management 2006). The Victorian seminar was delivered in partnership with the Victorian Government's 'Tackling Weeds on Private Land' initiative. This initiative is developing further partnerships with the horticultural media to raise awareness of invasive garden plants.

The hunt for Mexican feather grass continues and the coverage by the Australian media about the weed threat it poses is recognised and valued. Media coverage of this, and other potential weeds, results in reports to weed agencies from the public about where these plants may be growing. It makes a difference.

A truckload of Mexican feather grass pots being offered to retail nurseries in Melbourne in 2001 was removed from circulation with the full cooperation of the grower involved. That one act is estimated to have saved Australia's economy \$39 million over the following 60 years (Cooperative Research Centre for Weed Management Systems 2001). The media coverage about the threat the grass posed at that time assisted in the identification and volunteering of the truck of plants.

The Mexican feather grass case study above illustrates the importance of media awareness about invasive species as a way of avoiding serious new

weeds in Australia. The case study illustrates the importance of being a lot better prepared to avoid the promotion of future serious weeds. What will be the next Mexican feather grass trend? Can we predict it now and prevent its promotion in Australia? Can we suggest safer alternatives? There are many more plants that are regularly promoted in gardening books and media that are widespread weeds and some that are the weeds of the future. I am concerned that a number of low water-use garden plants promoted today will become future weeds.

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The emergence of severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome (MERS)-CoV underscores the threat of cross-species transmission events leading to outbreaks in humans. Here we examine the disease potential of a SARS-like virus, SHC014-CoV, which is currently circulating in Chinese horseshoe bat populations¹. Using the SARS-CoV reverse genetics system², we generated and characterized a chimeric virus expressing the spike of bat coronavirus SHC014 in a mouse-adapted SARS-CoV backbone. Serious weed problems develop when a susceptible crop, a large weed seed bank in the soil (including both true seeds and vegetative propagules of perennial weeds), and a favorable environment for weed growth occur together. Our most troublesome annual weeds reproduce through prolific seed production, and their seeds often germinate in response to cues that competing vegetation has been removed. For example, the emerging seedling of a small-seeded weed like galinsoga or pigweed requires available nutrients from the soil almost immediately to survive and grow. Obtain correct identification of the major weeds present on the farm, and any new weedy arrivals that could cause problems if allowed to spread. These weeds generally emerge in monsoons i.e., from June to October e.g., *Cyperus rotundus* (Motha/Deela) and *Trianthema postulacastrum* (Itsit). (ii) Rabi Annuals: Rabi weeds start growing in the end of October and set seeds before summers (April-may) e.g., (*Chenopodium album*) (Bathu), *Amaranthus viridis* (Chulai) and *Medicago denticulata* (Maina). 2. Biennial Weeds: These weeds take two seasons to complete their life cycle. The best method is to prevent the entry of new weed and weed seeds in the orchards area. While purchasing nursery plants ensure that the nursery is free from weeds. No weed plant should come along the earth balls. A new terminal of relatively small dimensions and enormous potential. An electro-static generator on a new principle and of very great power. These devices and methods of operation will be explained by reference to the attached drawings in which Fig. 1 and Fig. 2 represent forms of the new open tube. Therefore to get the same vacuum in the air jet, its speed should be $280 \times [6.9]^{1/2} = 735$ meters. With a working medium at high temperature and pressure, both within practicable limits, this value can be attained and even exceeded. Thus, a gaseous jet of very high velocity affords a means for closing the end of the tube, more perfectly than any window that can be made while at the same time permitting and facilitating the exit of the particles. Though the mainstream media quickly jumped all over the graph with "fact checks" before reporting it as false, the obvious truth is that the Democrats cooked the books while most Americans were sleeping, handing the state over to Biden. Trump still has a chance to expose this fraud and hold those responsible for it accountable, but he needs to act fast. "Democrats are hard at work falsifying fraudulent ballots in Wisconsin and Michigan, but both efforts are already being challenged by Trump team members," writes Mike Adams, the Health Ranger. "Wisconsin will go into a recount, and it's highly