

## Emerging ecological weeds within Canterbury – current distributions and potential threats

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**Summary** Surveillance monitoring of *Carex pendula*, *Furcraea parmentieri* and *Maytenus boaria* has shown these species are spreading in Canterbury. This is the first record these species are spreading significantly in New Zealand even though the harsh climatic extremes of Canterbury are thought to help prevent the establishment of new weed species. The traits enabling these species to spread are highlighted, and reasons for their apparent increased distributions and threats to other habitats are discussed. Accurate and ongoing information on the location of infestations is pivotal to formulating future management programmes.

**Keywords** Canterbury, new weed invasions, spread, distribution, *Carex pendula*, *Furcraea parmentieri*, *Maytenus boaria*.

### INTRODUCTION

Canterbury is not generally regarded as an environmental weeds hotspot in New Zealand. Surveillance monitoring has identified three introduced species (*Carex pendula*, *Furcraea parmentieri* (formally *F. bedinghausii*) and *Maytenus boaria*) spreading in Canterbury. This is the first evidence of these species spreading significantly in New Zealand. They are not recognised as weeds outside of Canterbury and reasons for their increased distributions and threats they may pose to natural habitats are discussed.

*Carex pendula* (Cyperaceae) (drooping sedge) is a tall sedge with long drooping spikes (Healy and Edgar 1980). It is shade tolerant, grows in damp forest margins, riparian habitats and clay soils (Bailey and Bailey 1976). It appears to be tolerant of both fresh-water and saline water. The natural distribution of *C. pendula* is Europe, West Asia and North Africa (Healy and Edgar 1980) and spreads by seed and vegetatively. In New Zealand it has been misidentified as the native sedge *Carex lessoaniana*, sold in retail outlets as native *Carex geminata* and mistakenly used in revegetation plantings (de Lange *et al.* 2005, Gatehouse 2009). In Canterbury it is referred to as ‘Otahuna sedge’ because the first known record was at the Otahuna homestead in Tai Tapu in 1962 (Allen Herbarium 2010, Trevor Partridge pers. comm.). *C. pendula* is currently found along the Avon and Heathcote rivers in Christchurch,

Otahuna homestead in Tai Tapu (Allen Herbarium 2010), the Middlebrook stream in Rangiora and Ashburton Domain and Coniston Pond in Ashburton (ECAN 2010). Limited numbers of *C. pendula* plants have been recorded in Auckland, Palmerston North and Wanganui (de Lange *et al.* 2005). *C. pendula* has also naturalised in New South Wales and Victoria (Australia) and the United States (Hawaiian Ecosystems at Risk Project 2010a).

*Furcraea parmentieri* (Agavaceae) is a succulent with a central rosette and stiff blue/green leathery leaves (Bailey and Bailey 1976, Department of Conservation 2009). It is an endangered species from the Neovolcanic Axis region of Mexico, can attain a height of 8 m and grows in the alpine grasslands of volcanic slopes (Padilla *et al.* 2008). *F. parmentieri* is also a casual alien in the British Isles (Hawaiian Ecosystems at Risk Project 2010b). *F. parmentieri* is a relatively new plant in New Zealand but *F. foetida* has naturalised on Kawau Island and in Denham Bay on Raoul Island (Healy and Edgar 1980). *F. parmentieri* is a casual alien in New Zealand (Allen Herbarium 2010). It forms a 3 m woody trunk and after approximately 10 years, produces a flower spike (5 m) that contains multiple bulblets that fall to the ground forming new plants (Bailey and Bailey 1976, Department of Conservation 2009). In Canterbury it has produced flower spikes after 6 years (R. Wisker pers. comm.). Each plant has the potential to contain hundreds to thousands of bulblets. Once the plant has finished flowering the adult plant dies leaving a woody stump. *F. parmentieri* has also been observed spreading vegetatively with smaller rosettes forming around the mother plant, or new plants forming in close proximity to the mother plant through layering. *F. parmentieri* can be easily confused with other succulent species including *Agave* sp., *Beschorneria yuccoides* and *Yucca* sp. *F. parmentieri* was first collected at 4000 m in 1857 from Mt Acusca, Mexico, by Benedikt Roezl (David 2009). It is now a widely available species worldwide. The first recorded plant in New Zealand was in the Christchurch Botanic Gardens in November 1983 by W.R. Sykes.

*Maytenus boaria* (Celastraceae) Chilean mayten is a woody tree that can attain a height of 25 m in

cultivation (Webb *et al.* 1988). *M. boaria* has been recorded as naturalised in New Zealand (Mahon 2007) and the United States (Hawaiian Ecosystems at Risk Project 2010c) and is problematic in Spain (Sullivan 2008). *M. boaria* has been widely planted throughout New Zealand in amenity plantings for street trees and urban environments. A.J. Healy first recorded it in Canterbury in 1975 (Allen Herbarium 2010). Male and female trees are hard to distinguish and females produce prolific quantities of fruit with two red oily seeds in each fruit. Dense carpets of seedlings can form under vegetation and seedlings can grow in dark conditions (Joe Cartman pers. comm.). Trees sucker forming dense thickets (Webb *et al.* 1988), which can be considerable distances from the original tree (Joe Cartman pers. comm.).

The purpose of this paper is to show that new weed species can establish in Canterbury, bring attention to three new weed species, and discuss threats to biodiversity and reasons why they have been underreported. An opportunity exists to eradicate these species if a coordinated and systematic control programme was established.

#### MATERIALS AND METHODS

The locations of all *C. pendula* and *M. boaria* plants have been recorded by Department of Conservation, Christchurch City Council, Environment Canterbury and Landcare Research staff. GPS reference points were entered into the Environment Canterbury weed surveillance database (ECAN 2010). In 2009 a more systematic approach was initiated to confirm current locations and survey for new ones. Location information has been supplemented by opportunistic surveying by Christchurch City Council, Environment Canterbury and Landcare Research staff. Prior to 2009 there was no reliable information on the location and extent of *F. parmentieri*. Upon finding the first naturalised site in 2009 surveillance monitoring of *F. parmentieri* was instigated by recording the GPS reference points of bulblets and plants that had layered.

There are five known locations of *C. pendula* in Canterbury distributed predominantly along rivers and ponds (ECAN 2010). Each location contains multiple plants of varying densities.

Eight locations of *F. parmentieri* have been recorded. Observations confirm that plants are spreading by both bulblets and vegetatively into coastal and rocky habitats. This is the first record of *F. parmentieri* naturalising in New Zealand, as there are no other known records (W.R. Sykes pers. comm.).

Over 40 locations of *M. boaria* trees are now known (ECAN 2010). Trees are spreading by seed and layering into a wide variety of habitats including open

pasture, shelterbelts, parklands and native plantings. Records include seedlings and suckers that seem to occur up to a 1 km radius from the source tree.

#### DISCUSSION

This is the first evidence that *C. pendula*, *F. parmentieri* and *M. boaria* are spreading significantly in New Zealand and appears to be unique to Canterbury. The common perception of weedy regions in New Zealand is areas with long growing seasons, moderate climates or concentrated urban centres, such as Northland, Auckland and Nelson-Marlborough. Canterbury too, has a highly modified landscape with very little native habitat left. It is dominated by the Canterbury Plains, which has climatic extremes of warm dry summers and cold winters with hard frosts and snow. However, Canterbury also has areas that experience much less climatic temperature and moisture extremes such as montane regions in the Southern Alps, areas in Banks Peninsula and the Canterbury coastline. Pockets of more moderate climates combined with suitable habitat may be providing conditions suitable for these species to begin to spread. They have potential to increase in distribution and to also threaten native habitats. Christchurch contains the greatest number (1123) of fully naturalised weed species within any city in the country (Commercial Horticulture 2007) and is known as the 'The Garden City'.

Historically, *C. pendula* has been mistaken for a native species (Trevor Partridge pers. comm.) and distribution was probably underestimated. Plants may have been present up to a century ago (Colin Meurk pers. comm.). Plants can grow to 2.5 m in height (Healy and Edgar 1980) and can probably out compete native riparian species. It can also spread into pasture and woody margins (Gatehouse 2009). Personal observations suggest that *C. pendula* is salt-tolerant and could also begin to encroach into estuarine environments.

There is little information on the environmental tolerances of *F. parmentieri* but it appears to a hardier plant than first thought. Viable bulblets have been observed in sandy and rocky soils. If plants increased in density they may begin to displace native coastal and rocky shrub land herb species and even other weed species present, such as boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*). Canterbury has a large number of plant nurseries growing a wide range of stock (W.R. Sykes pers. comm.). *F. parmentieri* has increased in popularity over the past 10–15 years, which is a likely reason why it is only now beginning to spread.

The introduction of female *M. boaria* trees in the mid 1980s was a catalyst for spread (Joe Cartman pers.

comm.). *M. boaria* is a prolific grower and can produce viable seed after 3 years. Birds probably disperse seed and it is not known if seed is viable in water. Although limited recordings exist of it in various parts of the country (Auckland, Wanganui and Gisborne) (Allen Herbarium 2010) it is now wide spread and increasing its distribution in Canterbury (Allen Herbarium 2010, ECAN 2010). *M. boaria* is an inconspicuous plant and locations have probably been underreported until 2009. It can also be confused with the exotic species *Salix fragilis* and native species *Hoheria angustifolia*. Control of *M. boaria* is challenging. It is resistant to some herbicides and drilling or removal of the main tree increases the vigour of suckers (Joe Cartman pers. comm.). All these factors combined mean this species may pose a greater threat to biodiversity than other weeds that already have legal restrictions, e.g. *Berberis darwini* (Darwin's barberry).

*Carex pendula*, *F. parmentieri* and *M. boaria* were all first recorded in urban environments and the majority of known populations are still confined to urban areas. Surveillance monitoring is showing plants are beginning to radiate out from urban environments into areas with higher biodiversity significance, including Banks Peninsula, Birdlings Flat, Kaiterete spit and Port Hills, although direct threats to native biodiversity are still speculative. If these species had been first recorded in native habitats their invasive traits may have been investigated earlier and they may have already been assigned legal status as plant pests. It may be too expensive to control new weeds by the time their threat to biodiversity is recognised and additional surveillance, monitoring and research data are collected (Harris and Timmins 2009). The Christchurch City Council is now controlling *C. pendula* along the Heathcote River. There is no management of *F. parmentieri*, although there are trials underway to help determine the best control method. Individual *M. boaria* trees are being drilled, cut and removed but there is no systematic approach to limiting spread.

There is a perception that weeds are more of a problem in the North Island of New Zealand. However, these new weeds demonstrate Canterbury also has favourable conditions for new pest plants to establish. Plant species are now surviving in Canterbury that previously did not (W.R. Sykes pers. comm.) and patterns of species invasions may differ between regions. For example, it has only taken 16 years for *F. parmentieri* to become naturalised in Canterbury.

The increased 'spread' of these species in Canterbury could partially be a result of more accurate recordings in recent years. It is essential the intensity of the surveillance programme is maintained to gather accurate information on distribution to help direct

future management. There is an opportunity for early intervention for all three species before they spread further. Accurate and consistent identification is pivotal to this programme as poor observation, misidentification and subsequent underreporting have hampered obtaining information on the full extent of infestations.

None of these species are recognised by local authorities as weeds outside of Canterbury and hold no legal status. Some initiatives are already underway in Canterbury to counter the spread of *C. pendula*, *F. parmentieri* and *M. boaria*. The Christchurch City Council lists *C. pendula* and *M. boaria* on the draft Christchurch City Council pest management plan (Christchurch City Council 2009). Weedbusters has also promoted *C. pendula* and *M. boaria* as weeds of the month to increase awareness of their potential threat and gain more information on distribution, and the Department of Conservation lists all three species on the local surveillance weeds list (Department of Conservation 2009). Known populations are relatively confined to urban areas and eradication of *C. pendula*, *F. parmentieri* and *M. boaria* is achievable within Canterbury.

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