

On distant shores: New Zealand's natives as weeds abroad

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New Zealanders love their native plants and in equal measure despise exotic weed invaders.

It is sobering to consider that many of New Zealand's weeds are from plants that were deliberately introduced for horticultural purposes, and escaped from cultivation by 'jumping the garden fence' into the natural environment and agricultural land.

Plants such as blackberry, broom, gorse, old man's beard, and many others were introduced and propagated in earlier times but quickly escaped cultivation to become invasive, damaging natural areas and leaving a legacy that costs New Zealand millions of dollars annually in lost productivity and control measures².

Weedy naturalised plants in New Zealand now outnumber the native species. A running total (www.nzflora.info) indicates that there are more than 2370 fully naturalised taxa compared with about 2230 indigenous representatives.

So what exactly is a weed? Weeds can be considered to be plants growing where they are not wanted ('out of place') and where they have detrimental effects. An example given in *An illustrated guide to common weeds of New Zealand* (Popay et al., 2010) is red and white clovers which are valuable pasture components, but can also be real nuisances in horticultural crops and in the garden.

This explains why a few of our beloved natives can also be considered weeds within our own shores if they establish where they are not wanted and become troublesome. Furthermore, few people may realise that several New Zealand native plants have escaped cultivation to become weedy in other regions of the world.

This article profiles a diverse range of these New Zealand native rogues both here and abroad and expands upon articles by the late Graham Harris (1998, 2002).

Some 'biostatus' terms used for plants in this article

- **Native (= indigenous):** a species that occurs naturally in a country and was usually there prior to human arrival.
- **Endemic:** a species restricted to a particular area or not found naturally outside of a country.
- **Exotic:** a purposefully or accidentally introduced foreign species.
- **Naturalised:** an exotic plant that has established itself outside of cultivation.

New Zealand weed lists

There are several weed and plant pest listings for New Zealand, including environmental weeds, National Pest Plant Accord (NPPA) species and Regional Pest Management Strategy (RPMS) plants.

328 species appear on the Department of Conservation consolidated list of environmental weeds in New Zealand (Howell, 2008). This listing includes three native species considered to be environmental weeds when they establish and become problematic outside of their natural ranges: *Metrosideros excelsa* (pōhutukawa), *Muehlenbeckia australis* (pōhuehue) and *Pittosporum crassifolium* (karo).

The National Pest Plant Accord (NPPA) is a nationwide list of invasive species banned from sale, propagation and distribution. This Accord is a cooperative agreement between regional councils, government departments with biosecurity responsibilities and the nursery industry. There are 163 species listed in the current NPPA manual (MPI Biosecurity New Zealand, 2012) and under the 1993 Biosecurity Act, nurseries, garden centres and other groups and individuals can be prosecuted for growing, selling or displaying them.

Regional Pest Management Strategies (RPMS) define priorities and goals of local councils to manage or eradicate pests (both animals and plants) within their regions. Each regional council has their individual list of pest species particular to their area for control and these are reviewed at up to five-yearly intervals.

Acaena novae-zelandiae (bidibid, pipiriri, red bidibid)

Acaena is a genus of about 100 southern hemisphere species in the Rosaceae family. They are mat-forming herbaceous plants with pinnate leaves (i.e., they have leaves with more than three leaflets arranged in pairs). Their fruit form a dense ball containing numerous seeds, and in some species the seed-heads form a burr which attaches to animal fur, feathers, clothing and shoes for dispersal – to the annoyance of many a hiker. Some weedy bidibids can be a serious problem in the wool of sheep, and naturalisations in the early 1900s were through contaminants in fleeces exported from Australia and/or New Zealand.

New Zealand is well represented with 18 indigenous species (of which 14 are endemic) – *Acaena anserinifolia* (hutiwai), *A. buechananii*, *A. caesiiglauca* (the glaucous bidibid), *A. dumicola*, *A. emittens*, *A. fissistipula*,

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² Previous estimates of the yearly cost of weeds to the New Zealand economy include the pastoral sector at \$1.2 billion p.a. and the forestry industry at \$90 million p.a. In 2003 it was estimated that giant buttercup (*Ranunculus acris*) alone cost the dairy industry \$156 million in one year in lost production.

A. glabra, *A. inermis* (the spineless bidibid), *A. juvenca*, *A. magellanica*, *A. microphylla* (2 varieties), *A. minor* (also 2 varieties), *A. novae-zelandiae* (red bidibid), *A. pallida* (sand bidibid, sand piripiri), *A. profundeincisa*, *A. rorida*, *A. saccaticupula* and *A. tesca*. A few of the indigenous species and cultivars are grown as groundcovers, including *A. caesiiglaucua*, *A. inermis* 'Purpurea', and several selections of *A. microphylla* and *A. saccaticupula*.

In addition, New Zealand has two exotic species, of which one, *A. agnipila* (Australian sheep's bur), is fully naturalised. This weedy bidibid occupies short dry grassland, riverbeds, roadsides and waste places. It is distinguished by its flowers and fruits being arranged on spikes, compared to all the native species which have their flowers and fruits in globular heads.

Despite the species name 'novae-zelandiae', red bidibid is probably native to both New Zealand and Australia (although some botanists believe it to be an early Australian import). *Acaena novae-zelandiae* (Fig. 1A–B) is considered a native weed of unimproved pasture land and waste places in both countries.

Acaena novae-zelandiae is the most common naturalised bidibid in Britain and Ireland, where it can displace native vegetation and become abundant on sparsely vegetated and moderately disturbed lowland sites and coastal sand dunes. Feathers of ground-nesting birds have been found so clogged with red bidibid seed-heads that the birds have starved. This species was possibly introduced to Great Britain in about 1796 as a garden plant or, more likely, it established accidentally from imported wool. The first British record of it as a weed is in 1901, from Devon.

Red bidibid has also naturalised in coastal areas in California and is present in several other States including Hawai'i.

Through vegetative growth, one plant can cover up to 4–5 square meters under ideal conditions. Furthermore, one large plant can produce hundreds of seed-heads and each can contain 70–100 seeds.



Fig. 1 *Acaena novae-zelandiae* (red bidibid). A, mat-forming plant with seed-heads. B, close-up of mature burr showing barbs on the ends of seed. Photos: Trevor James.

***Austroderia richardii* (toetoe)**

Toetoes are tall growing grasses with long and attractive flower spikes. They belong to the Poaceae (or to the Graminae if using the alternative family name). Recently, all five New Zealand native species were transferred from the related genus *Cortaderia* to *Austroderia* – *A. fulvida*, *A. richardii*, *A. splendens*, *A. toetoe* and the Chatham Island endemic *A. turbaria* (Linder et al., 2010).

In New Zealand, these native toetoes are encouraged to be planted instead of the widely naturalised South American pampas grasses which are retained in *Cortaderia* – *C. jubata* (purple pampas grass) and *C. selloana* (pampas grass). The New Zealand species have a more graceful and ornamental

appearance but are less suitable as dense shelterbelts for which both South American species have been used. These two naturalised pampas grasses are environmental weeds, NPPA species and RPMS plants.

Conversely, one of our native toetoes is weedy abroad. *Austroderia richardii*, an endemic of the South Island of New Zealand (Fig. 2), is regarded as an environmental weed in Tasmania where it has locally naturalised in western regions. This toetoe is also considered a potential environmental weed in New South Wales, Victoria and South Australia.



Fig. 2 *Austroderia* (syn. *Cortaderia*) *richardii* (toetoe), growing in a natural New Zealand habitat near Cass, Craigieburn. Photo: Murray Dawson.

***Avicennia marina* subsp.**

***australasica* (mānawa; mangrove)**

Avicennia is a mangrove genus of up to eight species assigned to the family Acanthaceae (formerly in the Verbenaceae or Avicenniaceae)³.

Avicennia marina occurs in both northern and southern hemispheres, with three subspecies recognised. However, *A. marina* subsp. *australasica* (mānawa; Fig. 3A–C) is New Zealand's only mangrove – and the most southerly mangrove in the world – naturally occurring in the North Island (from Parengarenga Harbour south to Kawhia and Ohiwa Harbours). This subspecies is shared with the east coast of Australia (Queensland, New South Wales and Victoria) and Lord Howe Island.

As with other mangroves, *A. marina* subsp. *australasica* occurs in the intertidal zones of estuarine areas and has vertical 'breathing' roots (called pneumatophores) projecting from the mud at low tide. Mangroves play an important role in erosion control and shoreline protection by slowing water flow and reducing wave action.

³ Like several genera mentioned in this article, the taxonomic placement of *Avicennia* is contentious. Some classifications have placed it in the family Verbenaceae, and recently some botanists have placed it in its own family Avicenniaceae. However, recent phylogenetic (molecular) studies have suggested that *Avicennia* is derived from within Acanthaceae.



Fig. 3 *Avicennia marina* subsp. *australasica* (mānawa). **A**, plants growing in their estuarine habitat showing pneumatophores. **B**, opposite arranged leaves. **C**, close-up of flowers. Photos: David Glenny.

In New Zealand, mānawa is the dominant vegetation type in many northern North Island harbours and estuaries. Increased sedimentation rates, especially from degradation and deforestation of surrounding catchments, is causing the spread of mangroves in some New Zealand harbours. This may impede access, reduce water views, and decrease property values. As a consequence, some coastal residents want to remove plants (for which a resource consent is needed) but unless sediment and nutrients are reduced this is likely to be ineffective (Green et al., 2003).

Dr R.L. Bieleski (2009) recounts the unfortunate story of how propagules of *A. marina* subsp. *australasica* were collected in 1964 at Meola Creek, Auckland, exported, and planted in a salt marsh in Mission Bay of San Diego for research purposes. From there it subsequently spread to become a serious weed that has defied attempts at its eradication.

Carex species (New Zealand sedges)

Carex is an extensive genus of the true sedges comprising nearly 2000 species in the Cyperaceae family. They are widespread in cold and temperate regions of the world, or in mountains of the tropics. *Carex* are perennial rhizomatous herbs, usually with 3-angled solid stems.

New Zealand is well represented with 79 indigenous species (of which 68 spp. are endemic) and 26 exotic species (of which 23 are fully naturalised⁴).

Carex are popular for landscaping with species and cultivars suited to a wide range of environmental conditions, from wetland planting to dry areas, and from shade to full sunlight. Ornamental New Zealand native *Carex* include the reddish-brown and upright form of *C. buechananii*, red and green cultivars of *C. comans* (e.g., *C. 'Frosted Curls'*) and *C. flagellifera*, the orange-red and weeping form of *C. testacea*, and other cultivated species including *C. dissita*, *C. secta*, *C. tenuiculmis* and *C. virgata*.

Several New Zealand native *Carex* are considered to be weeds of this country where they can invade a variety of habitats (as suggested by some of their common names), including *Carex breviculmis* (grassland sedge), *C. comans* (maurea), *C. gaudichaudina* (Gaudichauds sedge), *C. geminata* (rautahi), *C. inversa* (creeping lawn sedge), *C. maorica* (Māori sedge), *C. pumila* (sand sedge), *C. secta* (pūrei) and *C. virgata* (swamp sedge).

Four New Zealand endemic species are declared weeds under the Tasmanian Weed Management Act 1999 – *Carex albula* (where it is called New Zealand hair sedge, or white sedge as it is known in New Zealand, after the bleached white tips of the leaves; Fig. 4), *C. buechananii* (Buchanan's sedge; Fig. 5), *C. flagellifera* (shining sedge; Fig. 6) and *C. testacea* (speckled sedge; Fig. 7). In the past, these four were extensively planted on roadsides in Tasmania for soil binding and beautification, and also sold widely throughout Australia as ornamentals. However, because of their weedy potential, the importation, sale and distribution of all New Zealand native sedges are prohibited in Tasmania.



Fig. 4 *Carex albula* (white sedge) cultivated at Naturally Native plant nursery. Photo: Naturally Native NZ Plants Ltd.



Fig. 5 *Carex buechananii* (Buchanan's sedge) cultivated in New Zealand. Photo: Phil Bendle.

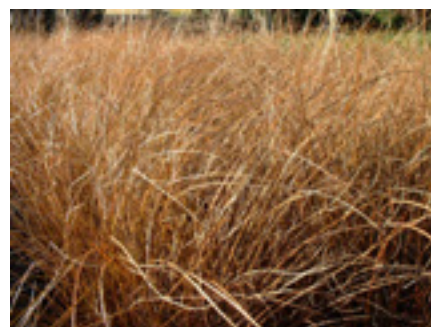


Fig. 6 *Carex flagellifera* (shining sedge) cultivated at Naturally Native plant nursery. Photo: Naturally Native NZ Plants Ltd.

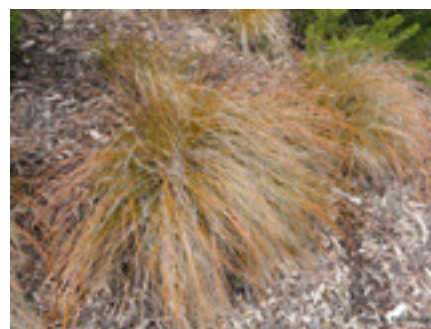


Fig. 7 *Carex testacea* (speckled sedge) cultivated at Otari-Wilton's Bush in New Zealand. Photo: Phil Bendle.

***Coprosma repens* (mirror plant, taupata) and *C. robusta* (karamū)**
Coprosma is a genus of 100 species in the Rubiaceae (coffee) family. *Coprosma* species occur naturally in New Zealand, Australia, Borneo,

⁴ Of the naturalised species, four are New Zealand environmental weeds – *Carex flacca* (blue sedge), *C. leporina* (syn. *Carex ovalis*; oval sedge), *C. longibrachiata* (Australian sedge) and *C. lurida* (sallow sedge). One species, *C. pendula* (drooping sedge, Otahuna sedge), is listed on the National Pest Plant Accord.

Java, New Guinea, the Hawaiian Islands, the Juan Fernández Islands and other islands of the Pacific Ocean. *Coprosmas* have diverse growth habits, ranging from prostrate plants and divaricating shrubs with small leaves, to small trees with relatively large leaves. They are dioecious (i.e., with separate male and female flowers on separate plants) and female plants produce berries that are orange, red or blue.

New Zealand is very well represented with 54 indigenous species of which 50 spp. are endemic. They are extensively cultivated as ornamental plants and more than 140 cultivars have been selected. Two New Zealand species have become weedy within our own shores and also in other countries.



Fig. 8 *Coprosma repens* (taupata). **A**, male plant in flower. Photo: Phil Bendle. **B**, close-up of male flowers. Photo: Phil Bendle. **C**, female plant in fruit. Photo: Leon Perry. **D**, close-up of orange-coloured fruit. Photo: Leon Perry.

Coprosma repens (taupata; Fig. 8A–D) is an endemic low-growing shrub or small tree bearing pairs of very shiny dark green leaves (hence its other common name mirror plant). It naturally inhabits the edges of coastal forest and seaside rocks on the Three Kings, North Island and northern South Island of New Zealand. However, it is now extensively naturalised throughout the South Island, Stewart and Chatham Islands.

In Australia, taupata is widely naturalised in southern and central New South Wales, in many parts of Victoria, in the coastal districts of south-eastern and southern South Australia, in Tasmania, and in the coastal districts of south-western Australia. Further afield, this species is also naturalised in Norfolk Island, Hawai'i, California and South Africa.



Fig. 9 *Coprosma robusta* (karamū). **A**, male flowers in dense clusters. Staveley, Canterbury. Photo: David Glenny. **B**, female plant in fruit. Pureora Forest Park, North Island. Photo: Murray Dawson. **C**, close-up of dark orange-coloured fruit. Pureora Forest Park, North Island. Photo: Murray Dawson.

Coprosma robusta (karamū; Fig. 9A–C) is endemic to the North and South Islands, but is inclined to become weedy and has naturalised locally on the Chatham Islands.

In Australia, karamū is an environmental weed in southern Victoria and Tasmania, and is possibly also naturalised in New South Wales.

***Cordyline australis* (cabbage tree, tī kōuka)**

Cordyline is a genus of 15–20 species of woody monocotyledons. Botanists have puzzled over the correct placement of *Cordyline* which has consequently bounced between a host of families including the Agavaceae (now Agavoideae), Asteliaceae, Dracaenaceae, Laxmanniaceae and Lomandraceae. Based on molecular evidence, *Cordyline* is commonly now accepted in Asparagaceae (subfamily Lomandroideae), although to the non-expert it seems incredulous that cabbage trees belong in the same family as the defining genus *Asparagus*!

Like some other genera mentioned in this article, New Zealand is well represented by *Cordyline*, with five indigenous species (of which four are endemic) – *C. australis* (cabbage tree), *C. banksii* (Bank's cabbage tree), *C. indivisa* (mountain cabbage tree), *C. oblecta* (Three Kings cabbage tree) and *C. pumilio* (dwarf cabbage tree). A further two species, *C. fruticosa* (Pacific Island cabbage tree) and *C. rubra*, are exotic.

However, it is the New Zealand endemic cabbage tree (tī kōuka and other common and Māori names), *Cordyline australis*, that is the best known and has the widest natural distribution throughout the North, South and Stewart Islands.

The iconic cabbage tree is one of the most widely cultivated New Zealand plants in Europe, Britain and the USA. They are hardy and tolerant of a wide range of conditions, and can be grown in containers or out in the open to provide a palm-like tropical effect in temperate regions of the world. More than 30 cultivars have been named, including those with purple or red coloured leaves and green, cream, or yellow striped variegation.

Cordyline australis is such a familiar part of the planted landscape in the south of England they have become known as Torquay palms, named after the seaside town in Devon.

Some trees are growing as far north as Scotland, along the western coast where the Gulf Stream tempers the climate. The seaside village of Plockton features an esplanade of these tropical-looking ‘palms’ (Fig. 10).



Fig. 10 An avenue of *Cordyline australis* (cabbage trees) planted at the seaside village of Plockton in Scotland. Photo: ‘Wojsyl’, via Wikimedia Commons and reproduced under the Creative Commons Attribution-Share Alike 2.5 Generic license.

Despite being so widely grown, there are relatively few places in the world where cabbage trees have become weedy. In Australia, *C. australis* has naturalised in southern Victoria, south-eastern South Australia, and has sparingly naturalised in New South Wales. It has also naturalised at Salt Point State Park in Northern California where the California Exotic Pest Plant Council listed it as a “wildland weed of secondary importance.”

***Corynocarpus laevigatus* (karaka, kopi)**

Corynocarpus is the sole member of its own family, the Corynocarpaceae. There are only five named species of these evergreen trees found naturally in the south-west Pacific: *C. laevigatus* of New Zealand, *C. cribbianus* of New Guinea and north-eastern Queensland, two subspecies of *C. rupestris* known only from a few localities in eastern Australia, *C. dissimilis* endemic to New Caledonia, and *C. similis*, the most widely distributed species, found in Vanuatu, the Solomon Islands, New Britain, New Ireland and the Bismarck Archipelago.

The New Zealand species, *Corynocarpus laevigatus* (karaka), is probably endemic to coastal forests of the northern half of the North Island. However, because the oval orange fruits have been a traditional food source (as well as the seeds, which are poisonous unless detoxified), it has been historically planted by the Māori throughout the North and South

Islands, south to Banks Peninsula (Fig. 11A–B) on the east coast, and to Okarito on the west coast. Karaka is probably naturalised on Raoul and the Chatham Islands through these deliberate and historic Polynesian plantings. Today, karaka is common in cultivation in temperate regions of New Zealand and other countries. Because the fresh seed kernels contain a lethal neurotoxin (Karakin), the species has been banned from some amenity plantings and kindergartens.



Fig. 11 *Corynocarpus laevigatus* (karaka) established at Raupo Bay, Canterbury, one of the sites on Banks Peninsula where karaka is naturalising outside of its natural range in New Zealand. **A**, mature tree in an exposed habitat. **B**, oval shaped orange fruit. Photos: Murray Dawson.

Few New Zealanders would realise that karaka is a serious weed in the Hawaiian Islands where it is an aggressive coloniser that forms dense shade which excludes other species, including some endangered native plants. Karaka was originally planted

on the island of Kaua’i in 1891 and became naturalised by 1912. It is most common at Kōke’e in the northwest of Kaua’i, where it was aerially seeded for reforestation in 1929. Along with several other invasive plant species, karaka threatens the survival of one of Hawai’i’s most endangered plants, the heau (*Exocarpus luteolus*, of the Santalaceae family) which is endemic to Kaua’i. Karaka also occurs on other islands of the Hawaiian archipelago including Hawai’i (Big Island), Moloka’i and O’ahu. The orange fruit is eaten by birds and feral pigs that disperse the seeds.

***Cotula australis* (soldier’s button) and *C. coronopifolia* (bachelor’s button)**

Cotula is a genus of 50–80 species generally known as buttonweeds or water buttons in the daisy family (Asteraceae, or Compositae as it is also known).



Fig. 12 *Cotula australis* (soldier’s button). **A**, whole plant on the palm of a hand showing its diminutive size. **B**, close-up of leaves and flower-heads. Photos: Trevor James.

Cotula australis (soldier’s button; Fig. 12A–B) is a low growing annual with rosettes of feathery leaves and small, pale yellow, button-like flower-heads. It is indigenous to New Zealand and Australia and is also a weed of both countries, where it is widespread in suburban and disturbed areas, coastal sites, gardens, lawns

and waste places. Soldier's button is now a widespread weed in temperate parts of the Old and New Worlds.

Another promiscuous and weedy buttonweed, *Cotula coronopifolia* (bachelor's button; Fig. 13A–B) is also indigenous to New Zealand and Australia, as well as southern Africa. It has larger flower-heads than *C. australis* and these are bright yellow. *Cotula coronopifolia* is salt tolerant and occurs on coastal sites, especially in shallow water, and also inland in wet and waste places. Its dispersal is aided by the corky wings of the outer seed achenes which float in water.



Fig. 13 *Cotula coronopifolia* (bachelor's button). **A**, population in flower. **B**, close-up of flower-heads. Photos: Trevor James.

Bachelor's button is a cosmopolitan weed. It is widely naturalised in coastal areas of the USA (Alaska, Washington, Oregon, California, Nevada and Arizona), in Canada (British Columbia, Quebec, Nova Scotia, New Brunswick and Prince Edward Island), and many other countries.

***Crassula helmsii* (Helms crassula, New Zealand pygmyweed)**

Crassula is a diverse and widely distributed genus of about 200 species of succulent plants in the Crassulaceae family.

New Zealand has 11 indigenous species (of which seven are endemic) and 20 exotic species (of which six are fully naturalised). *Crassula multicava* subsp. *multicava* (fairy crassula), a native of South Africa, is among most widespread in New Zealand. Fairy crassula grows on bare, exposed surfaces such as rocks, concrete walls, banks and cliff faces. It is classed as an environmental weed, an NPPA species and also subject to Regional Pest Management Strategy control.

New Zealand has contributed one of its own native crassulas as a serious weed in other countries. *Crassula helmsii* (Helms crassula; Fig. 14A–B) is a perennial, decumbent and mat forming herb, found in shallow pools of fresh water or in damp usually shaded places. It has often been treated as indigenous to both New Zealand and Australia. However, it may instead be endemic only to New Zealand because representatives there are apparently smaller and more delicate than Australian material. DNA and chromosome evidence also suggest that Australian plants might be a separate species.

It would appear that it is the New Zealand plant which has naturalised in the UK. *C. helmsii* was first introduced there in 1927, was recorded as naturalised in 1956, and became fully established from 1970. It is now regarded as a serious weed in the UK, and is one of five introduced aquatic plants banned from sale there from April 2014. This is the first ban of its kind in that country. *C. helmsii* has also naturalised in western Europe and south-eastern USA (Florida, North Carolina and Washington).

Crassula helmsii was originally grown as an oxygenating plant for ponds and aquariums. It can regenerate

from small pieces, which are easily spread by birds, boats or fishing gear, and can form dense mats that out-compete native aquatic plants.



Fig. 14 *Crassula helmsii* (Helms crassula). **A**, plant showing mat-forming habit. **B**, close-up of flowers. Photos: Trevor James.

Ironically, in New Zealand *C. helmsii* appears to be rather uncommon with a patchy distribution throughout its natural range. It is known only from the West Coast of the South Island between Karamea to just south of Haast.

***Dichondra repens* (Mercury Bay weed)**

Dichondra is a genus of perhaps nine species of prostrate, perennial, herbaceous plants, with creeping stems in the Convolvulaceae family.

Two species (*Dichondra brevifolia* and *D. repens*) are indigenous (non-endemic) to New Zealand, and one (*D. micrantha*) is fully naturalised.

Dichondra repens (Fig. 15A–C) is indigenous to New Zealand (Three Kings, North, South and Chatham Islands), many parts of Australia (Queensland, New South Wales, Victoria, Australian National Territory, Tasmania, South Australia and Western Australia) and probably Norfolk Island. It is commonly known as Mercury Bay weed in New Zealand and kidney weed (after its kidney shaped leaves) in Australia.

Mercury Bay weed is found in grassland, lawns, scrub, crops, forest clearings and margins. It may have been deliberately planted as low maintenance ground cover to replace grass lawns or it can establish spontaneously in lawns as a weed.

Mercury Bay weed has probably naturalised in many countries including China, Japan, South Africa and the USA, although the synonym *Dichondra repens* var. *micrantha* for *D. micrantha* confuses exactly what species occurs where. In California, *D. repens* has escaped gardens to become a localised weed throughout the state.

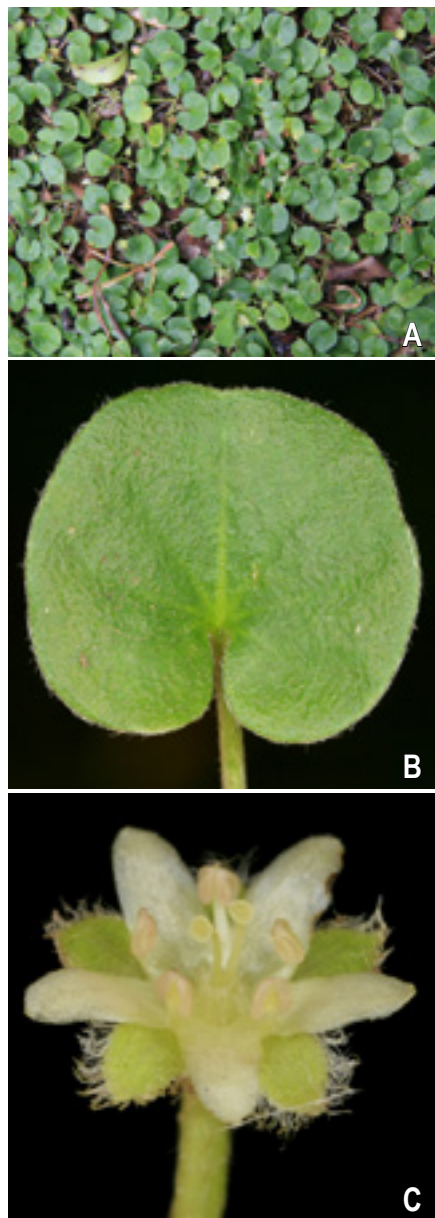


Fig. 15 *Dichondra repens* (Mercury Bay weed). **A**, plant showing prostrate habit. **B**, close-up of kidney shaped leaf. **C**, close-up of flower. Photos: Trevor James.

Dodonaea viscosa
(akeake, hopbush)

Dodonaea is a genus of about 70 species in the Sapindaceae, the soapberry family. They have a cosmopolitan distribution in tropical, subtropical and warm temperate regions of Africa, the Americas, southern Asia and Australasia. By far the highest species diversity is in Australia.

Dodonaea viscosa is New Zealand's sole native species in the genus and, including seven subspecies and much variability, it is also indigenous to Australia and throughout the tropics and subtropics.

In horticulture, akeake is a hardy fast growing shrub or small tree that thrives in windy, dry and full sun conditions. The purple foliated cultivar, *Dodonaea viscosa* 'Purpurea', is very widely grown (Fig. 16A–B). As reported by Metcalf (1987), this cultivar was discovered in New Zealand in the early 1890s, from a wild plant growing on the bank of the Wairau River, Marlborough.



Fig. 16 *Dodonaea viscosa* 'Purpurea'. **A**, a mature tree planted as a seedling by the author in the mid-1980s. **B**, purple-coloured foliage. Photos: Murray Dawson.

Although this purple-leaved cultivar is of New Zealand provenance, it was widely (but incorrectly) sold as a native selection in Australia. In Western Australia, it has escaped cultivation and is invading areas of native bush.

***Epilobium brunnescens* and *E. nummulariifolium* (creeping willow-herbs)**

There are 160–200 species of *Epilobium* of the Onagraceae family. They are erect or creeping herbs or subshrubs that have a worldwide distribution, favouring temperate climates.

New Zealand has 39 indigenous species (of which 31 are endemic) and five exotic, fully naturalised species. *Epilobium ciliatum* (tall willow-herb), a native of North America, is a very common naturalised willow-herb in New Zealand, where it occurs in lake and pond margins, swamps, drains, cultivated land and moist waste places.

Two New Zealand endemic creeping willow-herbs, *Epilobium brunnescens* subsp. *brunnescens* and *E. nummulariifolium* (Fig. 17 A–C), are frequent weeds of potted plants and were carried abroad unnoticed in this manner.



Fig. 17 *Epilobium nummulariifolium* (creeping willow-herb). **A**, plants showing long fruit pods longitudinally split open and recurved. **B**, close-up of small flowers with four deeply notched petals. **C**, close-up side view of seed capsule, split open to reveal seeds. Photos: Trevor James.

Epilobium brunnescens subsp. *brunnescens* was first recorded in the British Isles in 1904, from Craigmillar, Edinburgh, and started its main spread from the 1930s. It has now invaded much of northern and western Britain – throughout all the hills of northern England, Scotland, Wales, Cornwall, and much of Ireland excluding the central flat lands. It is common as a garden weed on damp walls, steps and gravel paths, and in the wild in drainage ditch sides, besides streams and ascending to high altitudes in the mountains. This low growing species can form patches up to 2 m across and like other willow-herbs it produces abundant seed that can be dispersed by the wind over long distances. It has been named among the 20 worst introduced weeds in Britain where it is known as ‘New Zealand willow-herb’.

***Hoheria populnea* (houhere, lacebark, ribbonwood)**

Hoheria is a genus of only six species of trees or large shrubs (*H. angustifolia*, *H. equitum*, *H. glabrata*, *H. lyallii*, *H. populnea* and *H. sexstylosa*) in the Malvaceae family, and all are endemic to New Zealand.

All species bear large, white, five-petalled flowers in profusion and (with the exception of the recently described *H. equitum* of the Poor Knights and Hen and Chicken Islands) are widely cultivated throughout New Zealand. *Hoheria glabrata*, *H. lyallii* and *H. sexstylosa* have reasonable cold tolerance and are therefore grown in Great Britain.

Hoheria populnea (houhere; Fig. 18A–C) is found naturally in coastal to montane forests in the upper North Island, north of about Hamilton. Houhere is a fast growing tree attaining up to 11 m in height and able to colonise open areas. It is widely cultivated throughout New Zealand and is often found naturalising throughout the North Island, South, Stewart and Chatham Islands.

In California *H. populnea* is considered to be a potentially invasive weed, and most of the mature trees that were growing at the then Strybing Arboretum in San Francisco (now known as the San Francisco Botanical Garden) were removed (sometime prior to being reported by Harris, 1998), along with their prolific seedlings. Californian authorities

have noted that this had been a fortunate escape for the region, as the lacebark’s weedy tendencies were caught before it was widely available to the public.

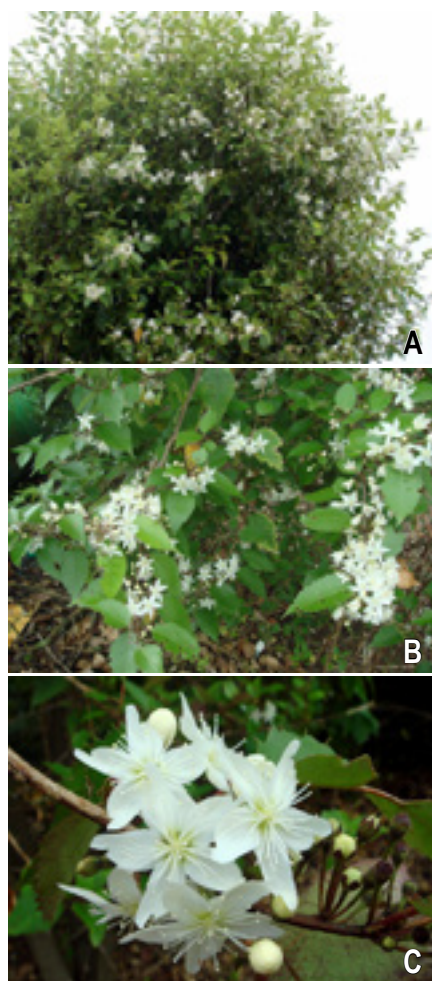


Fig. 18 *Hoheria populnea* (houhere). **A**, tree in flower. **B**, serrated leaves and flowers. **C**, close-up of flowers. Photos: Phil Bendle.

***Hydrocotyle moschata* (hairy pennywort)**

Hydrocotyle or water pennyworts as they are sometimes called, is a genus of 75–100 species found in temperate and tropical regions worldwide. They were formerly placed in the Apiaceae family, but are now in the Araliaceae. All species are prostrate perennials with long creeping stems. They are typically found in damp and shady environments.

Hydrocotyles are well-known troublesome weeds of grass lawns because of their tolerance to selective broadleaf herbicides. They can also cause problems in damp overgrazed pastures in New Zealand, creating low-growing dense mats that exclude most other vegetation.

New Zealand has 10 indigenous species (of which nine are endemic) and five exotic species (of which three are fully naturalised).

Hydrocotyle tripartita, commonly called Australian hydrocotyle after the country from which it originated, is an aggressive weed of lawns and waste places, particularly around Auckland. It has been found as far south as Waikato and as far north as Kaitia and is probably still spreading.

In New Zealand the most common endemic species that can be weedy are *Hydrocotyle heteromeria* (waxweed pennywort), *H. moschata* (the hairy pennywort; Fig. 19A–C) and *H. novae-zeelandiae*, which is quite variable with four varieties described (var. *involucrata*, var. *lobulata*, var. *montana* and var. *novae-zeelandiae*).

Overseas, *Hydrocotyle moschata* is an uncommon turf weed in the south coast of California.

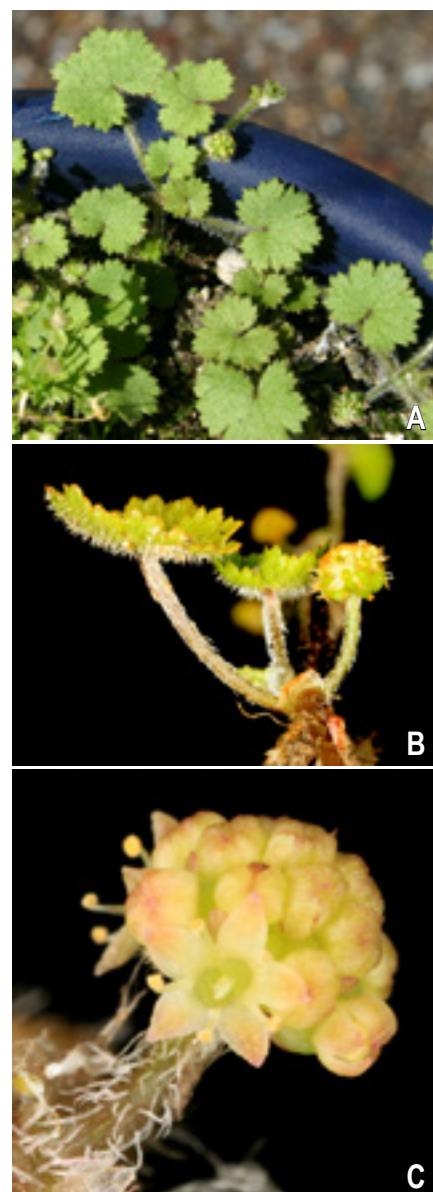


Fig. 19 *Hydrocotyle moschata* (the hairy pennywort). **A**, cultivated plant showing its prostrate and creeping growth habit. **B**, close-up side view of leaf, showing densely hairy undersides. **C**, close-up of a tiny flower-head. Photos: Trevor James.

***Leptospermum scoparium*
(mānuka, tea-tree)**

There are 87 species of *Leptospermum* (family Myrtaceae), a genus centred in Australia, where most are endemic. *Leptospermum scoparium* (mānuka or tea-tree; Fig. 20A–C) is the sole New Zealand indigenous species and is shared with mainland Australia and Tasmania where it is less variable. More than 150 garden cultivars have been named from New Zealand mānuka and have been selected for white, pink and red coloured flowers that are single or double and a range of dwarf, prostrate and upright statures. These ornamental cultivars are widely grown in many countries including New Zealand, Australia, South Africa, the UK and the USA.



Fig. 20 *Leptospermum scoparium* (mānuka). **A**, plant growing in pasture showing flowering at an early age. **B**, close-up of flowers. **C**, close-up of seed capsules. Photos: Trevor James.

Within New Zealand and away from these garden cultivars, native mānuka provides nurse cover for regeneration of native plant seedlings, stabilises the soil to help prevent erosion, and provides high value firewood, essential oils and honey (Derraik, 2008). Despite these many useful attributes, mānuka is a fast growing coloniser that can be considered weedy on New Zealand pasture land (Fig. 20A).

In Hawai'i, *L. scoparium* and the Australian species *L. laevigatum* were both planted on Lana'i during forestry efforts to stabilise eroding soils. After a number of years, both species began to spread, with *L. scoparium* becoming the more aggressive of the two, forming monotypic thickets that crowd out other plants. The first collection of it naturalising there was made in 1927. It is now found naturalised on Lana'i, Kaua'i, O'ahu (Starr et al., 2003) and East Maui (Starr et al., 2004). Mānuka is still widely cultivated as an ornamental shrub in Maui but listed as one of Hawai'i's most invasive horticultural plants (www.hear.org/hortweeds).

A 10-year old mānuka tree has been estimated to produce 8000 capsules containing an average of 400 seeds per capsule.

***Metrosideros excelsa* (pōhutukawa, New Zealand Christmas tree) and *M. kermadecensis* (Kermadec pōhutukawa)**

Like *Leptospermum*, *Metrosideros* is another member of the Myrtaceae that produces vast quantities of fine seeds that are readily dispersed by the wind. There are some 53 species of *Metrosideros*, with a natural distribution across New Zealand, New Caledonia, Hawai'i, Papua New Guinea, elsewhere across small islands of the Pacific, and with one outlier species native to South Africa.

New Zealand has 12 endemic species, and *Metrosideros excelsa* (pōhutukawa) is the most widely cultivated with more than 30 named cultivars. In New Zealand, pōhutukawa is cultivated successfully in mild locations often near the sea (Fig. 21A–B), and as far south as Stewart Island. Some of these locations, such as coastal Wellington, are well outside of its natural range and pōhutukawa occupies habitats that *M. robusta* would have when more widespread. These remnant *M. robusta* populations may

also be at risk from encroaching *M. excelsa* through possible inter-hybridisation. For these (arguable) reasons pōhutukawa is listed as an environmental weed of New Zealand. Pōhutukawa has a natural distribution on sea cliffs and in coastal forest in areas north of Poverty Bay, on the shores of the Rotorua lakes and on the Three Kings Islands.



Fig. 21 *Metrosideros excelsa* (pōhutukawa) planted along the esplanade at Sumner, Christchurch. **A**, mature tree in flower. **B**, close-up of flowers. Photos: Murray Dawson.

Overseas, pōhutukawa is cultivated in countries with mild climates and in some places it has naturalised. *M. excelsa* has escaped from cultivation in the Western Cape province of South Africa and has become a serious weed of the coastal fynbos (a major ecosystem renowned for its diversity of native plant species), where it is commonly called 'New Zealand bottlebrush'.

The closely related *M. kermadecensis* (the Kermadec pōhutukawa) has recently naturalised on Maui on the Hawaiian Islands, and is considered a pest species. Both New Zealand *Metrosideros* species are cultivated on Norfolk Island, where *M. kermadecensis* has naturalised and *M. excelsa* may be starting to naturalise.

***Muehlenbeckia complexa* (small-leaved pohuehue, wire vine)**

Muehlenbeckia is a genus of about 23 species belonging to the Polygonaceae family. They are native to the southern hemisphere, especially South America, Papua New Guinea, Australia and New Zealand.

New Zealand has two endemic species (*M. astonii* and *M. ephedroides*) and three indigenous (non-endemic) spp. (*M. australis*, *M. axillaris* and *M. complexa*).

Both *M. australis* (large-leaved muehlenbeckia, pōhuehue) and *M. complexa* (small-leaved pohuehue, wire vine) are highly variable, with tangled, much branched growth habits and dioecious flowers. In some situations, both can be considered weeds in New Zealand.

Muehlenbeckia australis is a prostrate or climbing plant native to New Zealand where it is widespread throughout. It's found in sunny habitats with climbing support, such as forest edges, cliff faces, scrub and regenerating vegetation. *M. australis* can form dense mats over the tops of shrubs and smaller trees, sometimes smothering and breaking them. It is also native to Norfolk Island where it is an endangered species.

Muehlenbeckia complexa (Fig. 22A–E) is native to New Zealand and Lord Howe Island. It is found naturally throughout New Zealand as tangled mats growing over sand dunes, rocks and coastal and lowland scrub.

Wire vine has naturalised in Western Australia and possibly also escaped from cultivation in Canberra. Similarly, it is cultivated as an ornamental plant in California (and other States) and occasionally escapes from cultivation. It is considered invasive at the Golden Gate National Recreation Area, San Francisco.

***Myoporum laetum* (ngaio)**

There are about 32 species of *Myoporum* in the Scrophulariaceae (formerly the genus was placed in its own family, the Myoporaceae). They are evergreen shrubs to small trees, with glabrous (hairless) vegetative parts and leaves often dotted with glands. Flowers are bell-shaped and the fruit is a berrylike succulent drupe, generally white to purple coloured, and often spread by birds. Species are naturally found in New Zealand, Australia, Pacific islands including Hawai'i, Mauritius and China.

New Zealand has four indigenous species – the widespread endemic *Myoporum laetum*, the Kermadec ngaio *M. rapense* subsp. *kermadecense*, the recently described *M. semotum* of the Chatham Islands, and *M. obscurum*, indigenous to Raoul Island and Australia.



Fig. 22 *Muehlenbeckia complexa* (wire vine). **A**, foliage and tangled stems. Photo: Phil Bendle. **B**, close-up of leaves. Photo: Phil Bendle. **C**, close-up of male flowers. Photo: Phil Bendle. **D**, close-up of female flowers. Photo: Trevor James. **E**, close-up of fruit showing dark, three-grooved nuts held in a fleshy cup. Photo: Trevor James.

Australian ngaio (also called boobialla), *Myoporum insulare*, is fully naturalised in New Zealand, where it is an environmental weed and a National Pest Plant Accord plant.

In some parts of New Zealand (e.g., urban Auckland, Wellington and along stretches of the Kaikoura coast) there are hybrid swarms between Australian (*M. insulare*) and New Zealand (*M. laetum*) ngaio. Both species have been cultivated as fast growing hedges or windbreaks, as they withstand coastal winds, salt spray and drought. The leaves and fruits of both species (and others in the genus) contain a liver toxin Ngaione which is poisonous to livestock.



Fig. 23 *Myoporum laetum* (ngaio). **A**, mature tree growing at Pigeon Bay, Banks Peninsula, Canterbury. Photo: Murray Dawson. **B**, close-up showing leaf dotted with glands. From Victory Beach, Otago Peninsula. Photo: Murray Dawson. **C**, flower and fruit. Photo: Phil Bendle.

New Zealand ngaio (Fig. 23A–C) has been introduced to several countries including Spain, Portugal, Chile and the United States. It has become a serious invasive weed in coastal southern California and part of Mexico's Baja California peninsula, forming dense thickets that out-compete native plants. It is on the California noxious weeds list as 'a most invasive wildland pest plant' and there are programmes for its control. *Myoporum laetum* is also invasive on Robinson Crusoe Island (formerly Isla Más a Tierra, the second largest island of the Juan Fernández Islands off the coast of Chile).

***Phormium tenax* (New Zealand flax, harakeke)**

Like *Cordyline*, *Phormium* has also been assigned to a range of monocotyledonous plant families, including the Agavaceae (Agavoideae), their own family the Phormiaceae, the Hemerocallidaceae and most recently, the Xanthorrhoeaceae.

Phormium is a remarkable genus of only two species, *P. cookianum* (mountain flax, wharariki) and *P. tenax* (New Zealand flax, harakeke). Both subspecies of *P. cookianum* (subsp. *cookianum* and subsp. *hookeri*) are endemic to New Zealand.

Phormium tenax (harakeke) has often been considered indigenous to both New Zealand and Norfolk Island because it was abundant when discovered on Norfolk Island by Cook's expedition in 1774⁵. However, its historical absence from adjacent Phillip Island, the lack of fossilised *Phormium* pollen grains on Norfolk Island⁶, and the knowledge that Polynesians had visited before the British provides evidence that harakeke may have instead been introduced to Norfolk Island by earlier Polynesian settlers (Coyne, 2009).

Harakeke has long been used by Māori for textiles, cordage and nets. There are probably around 50 distinctive named weaving varieties, and more than 220 cultivars selected, with green, yellow, red, purple and variegated leaves on plants of various stature. The ornamental cultivars are grown in many countries around the world.

In the 19th century and up the mid-20th century, harakeke was the basis of a large fibre industry in New Zealand, providing rope, fabric, matting and other fibre products. During that time it was planted on islands such as St Helena and Tristan da Cunha in the South Atlantic, and the Isle of Man in the Irish Sea with an aim to establish similar industries there.

On St Helena, the economy of the island became heavily dependent on harakeke fibre (Fig. 24) until the industry collapsed in the 1960s, when harakeke fibre could no longer compete with the new synthetic fibres. The last flax mill closed on St Helena in 1966⁷ but harakeke continued to grow wild (it was first recorded as naturalising by 1852) and became extremely widespread and troublesome (Fig. 25), damaging the island's ecosystem, and threatening a unique flora of 43–49 endemic species of flowering plants and 13–16 endemic ferns.



Fig. 24 Prisoners using a sisal hemp raspador on St Helena Island, 1911. After the closing down of the sugar mill in 1899 use was then made of the area for turning the raw flax into long soft fibres ready for weaving into rope. Photo: Wikimedia Commons.



Fig. 25 *Phormium tenax* (harakeke) growing as dense weeds near Diana's Peak, St Helena Island. Photo: Michelle Heyes, www.kevinandmichelle.co.uk.

On Tristan da Cunha, 2430 kilometres south of St Helena and also in the middle of the South Atlantic, harakeke was traditionally used for roof thatching where other materials were in short supply. Thatching was typical until 1961 but continued to some degree until the late 1980s before being fully replaced by zinc roofs. On 19th December 2012, the island opened the Tristan Traditional Thatched House Museum using harakeke once again as roof thatch (Fig. 26A–C) and following the traditional quarried stone construction techniques for the walls of the building. Harakeke is also considered an invasive weed on the island.



Fig. 26 *Phormium tenax* (harakeke) used to construct the traditional Tristan Thatched House. **A**, cutting the flax ready for thatching, 29 October 2012. **B**, thatching day, 7 November 2012. **C**, a team photograph outside the newly thatched house, 7 November 2012. Photos courtesy Tourism Department Tristan da Cunha.

Elsewhere in the world, harakeke has also naturalised in Australia (Tasmania, south-eastern South Australia, eastern New South Wales,

⁵ William Wales, the ship's astronomer, wrote: "Near the shore the ground is covered so thick with the New Zealand Flax Plant that it is scarce possible to get through it." The potential value of harakeke was directly responsible for the island's inclusion as an auxiliary settlement in the British Government's plan for the colonisation of New South Wales; Norfolk Island was colonised in March 1788.

⁶ Although *Phormium* pollen grains are often underrepresented and hence difficult to detect in peat samples.

⁷ There is an excellent account of the history of flax milling on St Helena at <http://jcgimshaw.blogspot.co.nz/2011/06/flax.html>.

and possibly southern Victoria), Hawai'i (Big Island, Kaua'i Island and Moloka'i Island), Robinson Crusoe Island (Juan Fernández Islands), and probably elsewhere such as Chile, Spain and South Africa.

As a weed, harakeke grows into dense clumps that crowd out native vegetation. A single flower stalk can produce up to 10,000 seeds which are winged and dispersed by wind.

***Pittosporum crassifolium* (karo), *P. eugenoides* (lemonwood, tarata) and *P. tenuifolium* (black matipo, kōhūhū)**

Pittosporum is a genus of about 200 species of trees and evergreen shrubs in the Pittosporaceae family. Their natural range extends from New Zealand, Australia, Oceania, eastern Asia and some parts of Africa.

New Zealand has 23 endemic species and one fully naturalised species, *Pittosporum undulatum* (sweet pittosporum, also called Australian cheesewood and Victorian box). Sweet pittosporum, originally endemic to moist areas on the Australian east coast has extended its natural range in southern Australia and has become naturalised on Lord Howe Island and Norfolk Island. It is also one of the most invasive species of this genus in other countries, and has widely naturalised in New Zealand, Guam, India, China, South Africa, St Helena, southern Europe (France, Spain and Portugal), Hawai'i, California, Mexico, the Caribbean, South America (Columbia, Bolivia, Chile, southern Brazil) and elsewhere.

Pittosporums are popular garden subjects for their low maintenance and glossy evergreen foliage. There are more than 60 named cultivars derived mainly from three New Zealand endemic species: *Pittosporum crassifolium*, *P. eugenoides* and *P. tenuifolium*. Although not as troublesome as *P. undulatum*, these three New Zealand species have occasionally escaped cultivation in other countries to become weedy.

Pittosporum crassifolium (karo; Fig. 27A–C) has naturalised in south-eastern Australia (southern Victoria and the coastal districts of central New South Wales), Norfolk Island, Hawai'i and the Isles of Scilly in Britain. In California plants were

considered to be 'weeds in cultivation' but they may now have also escaped into the wild.



Fig. 27 *Pittosporum crassifolium* (karo). **A**, tree. **B**, red flowers. **C**, close-up of woody fruit capsule. Photos: Phil Bendle.

In New Zealand, karo is considered endemic to the upper half of the North Island (East Cape and north from about White Cliffs to Te Pahi, and Three Kings and Great Barrier Island). However, plantings and extensive bird dispersal of the seed has extended the distribution of karo widely throughout New Zealand including the South, Stewart, and Chatham Islands.

Pittosporum eugenoides (lemonwood; Fig. 28A–C), has occasionally naturalised in south-eastern Australia, where it is regarded as an environmental weed in Victoria and a minor or potential environmental weed in New South Wales. Lemonwood is invasive

on Robinson Crusoe Island (Juan Fernández Islands) where it has also escaped from cultivation.



Fig. 28 *Pittosporum eugenoides* (lemonwood). **A**, tree. **B**, flower-head showing yellow flowers, a colour unusual in other species of *Pittosporum*. **C**, old fruit capsules. Photos: David Glenny.

Pittosporum tenuifolium (kōhūhū; Fig. 29A–C) is the third New Zealand endemic pittosporum to have become weedy abroad. Like the others, kōhūhū has also naturalised in temperate south-eastern Australia (southern Victoria and sub-coastal districts of central New South Wales) and possibly also Tasmania. It is also said to have naturalised in California and Robinson Crusoe Island.



Fig. 29 *Pittosporum tenuifolium* (kōhūhū). **A**, tree. **B**, dark red flowers. **C**, fruit capsules. Photos: Phil Bendle.

***Solanum aviculare* and *S. laciniatum* (pōporo)**

Solanum (of its namesake family Solanaceae) is a diverse genus of trees, shrubs and herbs that include crop plants such as tomatoes (previously species of *Lycopersicon*) and potatoes, as well as ornamental plants cultivated for their flowers and fruit, and weeds such as nightshades. Current estimates consider the number of *Solanum* species to be between 1500 and 2000.

New Zealand has three indigenous species (the closely related pōporos, *S. aviculare* and *S. laciniatum*, and the small flowered nightshade *S. nodiflorum*; none of which are endemic), as well as 27 exotic species (of which 20 are fully naturalised and 7 are casual escapes).

Solanum aviculare is indigenous to New Zealand (where it is called pōporo), eastern Australia (commonly known there as kangaroo apple), Lord Howe Island, Norfolk Island (where it is possibly extinct), and also the West Papua Province of Indonesia and Papua New Guinea.

In some parts of southern Australia, this species has naturalised beyond its natural range, on both western and eastern coastal areas. In New Zealand, the natural range of *S. aviculare* includes Kermadec, North, South and Chatham Islands. In the South Island, it occurs south to about Banks Peninsula and Westland. It is sometimes an urban weed in New Zealand.



Fig. 30 *Solanum laciniatum* (poroporo). **A**, plant in flower. Photo: Phil Bendle. **B**, flowers. Photo: Murray Dawson. **C**, mature fruit. Photo: Phil Bendle.

Solanum aviculare (or possibly *S. laciniatum* as the distinction between these two are not always clear in overseas references) has also naturalised in New Caledonia, Hawai'i (Lana'i), in western USA (California and Oregon) and probably elsewhere.

The leaves and unripe fruit of both *S. aviculare* and *S. laciniatum* contain the toxic alkaloid solasodine which can be extracted and used as a precursor for producing contraceptive pills and other steroidal compounds. Both species are commercially cultivated for this purpose in China,

eastern Europe and Russia and have probably naturalised in these countries as well.

Solanum laciniatum (Fig. 30A–C) is closely related to *S. aviculare* with which it shares the common name pōporo in New Zealand. It too is indigenous to Australia (and called the large kangaroo apple, among other common names), where it naturally occurs in south-eastern Australia and Tasmania. It has extended its natural range in both Australia and New Zealand. In New Zealand it occurs naturally in the North, South, Stewart and Chatham Islands and is also a common urban weed.

***Tetragonia tetragonioides* (kōkihi, New Zealand spinach)**



Fig. 31 *Tetragonia tetragonioides* (New Zealand spinach). **A**, plant. **B**, leaves and flowers. **C**, close-up of flower. Photos: Trevor James.

Tetragonia is a genus of about 57 species in the family Aizoaceae, native to temperate and subtropical regions mostly of the southern hemisphere (New Zealand, Australia, southern Africa and South America).

New Zealand has two species, *Tetragonia implexicoma* and *T. tetragonoides*, both indigenous and non-endemic.

Of all *Tetragonia* species, the best known is *T. tetragonoides* (Fig. 31A–C) which is used as a leafy food crop. Among other common names, it is known as New Zealand spinach, but this belies the fact that it is also indigenous to Australia, Japan, Chile and Argentina.

It has become naturalised in many parts of the world. For example, in the USA, it is weedy in many States (including California, Connecticut, Florida, Georgia, Massachusetts, North Carolina, North Dakota, New York, Ohio, Pennsylvania, Washington, Wisconsin, West Virginia), the Hawaiian Islands and Porto Rico.

Summary

This article provides a comprehensive survey of native New Zealand plants from a diverse range of families – namely the Acanthaceae, Aizoaceae, Araliaceae, Asparagaceae, Asteraceae, Convolvulaceae, Corynocarpaceae, Crassulaceae, Cyperaceae, Malvaceae, Myrtaceae, Onagraceae, Pittosporaceae, Poaceae, Polygonaceae, Rosaceae, Rubiaceae, Sapindaceae, Scrophulariaceae, Solanaceae and the Xanthorrhoeaceae – that have become weedy in other regions of the world.

Not surprisingly, these regions – such as in southern Australia, Tasmania, mild regions of the UK and the USA including especially California, and oceanic islands such as Hawai'i and the Juan Fernández Islands – have similar climates or conditions to the native New Zealand habitats where the plant species are originally from.

Some New Zealand species, such as *Austroderia richardii* (toetoe), *Coprosma repens* (taupata) and *C. robusta* (karamū), *Cordylina australis* (cabbage tree), *Epilobium brunnescens* and *E. nummulariifolium* (creeping willow-herbs), *Metrosideros*

excelsa (pōhutukawa), *Myoporum laetum* (ngaio), and several native pittosporums, are endemic and originally found nowhere else before they became weedy in other areas.

Others are indigenous to New Zealand and at least one other country (and typically including Australia), such as *Acaena novae-zelandiae* (red bidibid), *Cotula australis* (soldier's button) and *C. coronopifolia* (bachelor's button), *Dichondra repens* (Mercury Bay weed), *Leptospermum scoparium* (mānuka), *Solanum aviculare* and *S. laciniatum* (pōroporos) and *Tetragonia tetragonoides* (New Zealand spinach). This means that for some, their weedy distributions may not necessarily have been a result of spread from New Zealand.

Excluded from this article are weedy species that are indigenous to numerous countries including New Zealand. Some can have southern hemisphere distributions, such as *Pteridium esculentum* (bracken), and others have near-cosmopolitan distributions as exemplified by the likes of jersey cudweed, *Pseudognaphalium luteoalbum* (also known as *Helichrysum luteoalbum* and several synonyms). Jersey cudweed is so widely distributed that it is unclear where it is native and where it is naturalised.

Final comments

Many of the New Zealand native plants mentioned in this article have been traditionally, culturally, aesthetically, horticulturally and at times economically important – the very reasons why they were first cultivated and distributed so widely. People continue to enjoy these positive qualities in environments where the plants are not out of place and troublesome. After all, one person's weed is another's treasure!

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