2. Why New Zealand plants?

Native plants

New Zealand has a unique assemblage of **indigenous** (native) plants—some 2360 vascular plants (ferns, conifers and flowering plants) all told. Eighty percent of these native plants are not found anywhere else—these are the **endemics.**

Plants are important for New Zealand's ecosystems as the primary producers feeding a multitude of native animals (insects, birds, reptiles) and fungi directly or indirectly via a food chain—as the saying goes, "all flesh is grass". The native plants have also been important resources for the Māori—providing food, shelter and materials for everyday use.

New Zealand's geological past gives a clue to the origins of New Zealand's flora.

New Zealand was once attached to a great southern continent named **Gondwanaland.** That included Africa, South America, Madagascar, India, Australia and Antarctica. Plate tectonics, or continental drift, saw these land masses drift apart and oceans begin to separate them preventing animals and plants from directly crossing to the next land mass (see Figures 1 and 2). Once separated only plants and animals able to disperse across seas where able to reach other lands.

Evidence points to New Zealand separating from Australia some 60–80 million years ago—prior to the demise of the dinosaurs. Although closer to the South Pole at the time it retained an assemblage of **ancient rafters**—tuatara, kauri, kahikatea, rimu, beech trees, probably ratites (moa and kiwi ancestors). In isolation these plants and animals and plants evolved and were joined by "**drifters**"—plants and animals able to cross the Tasman Sea through wind or bird dispersal. These too continued to evolve in the New Zealand environment. Box 1 shows how the flora has changed since the original castaways colonised New Zealand 80 million years ago.

Over time many plant extinctions have taken place, although of our recent flora, only six species are now believed to be globally extinct. Even today we still receive new natural immigrants from Australia, such as the orchid *Pterostylis alveatua* that has established in the Nelson area in recent years. In 2006, a single plant of *P. alveata* was found growing in the Hutt Valley, north of Wellington.

Pterostylis alveata.

Box 1: Colonisation of New Zealand by plants

Original castaways (colonised NZ at least 80 million years ago: Jurassic–Cretaceous–dinosaur age):
Ferns (some)
Gymnosperms ➔ Araucarian pines including *Agathis* and podocarps, *Libocedrus, Sequoiadendron spp. (*extinct now).
Angiosperms ➔ Southern beech (*Nothofagus brassii group)*, tawa, rewarewa, fuchsias

Early colonisers (Paleocene–Eocene): 65–35 million years ago
Metrosideros; *Nothofagus fusca* group; *Dicksonia*

Early west wind drifters (Oligocene–Miocene): 35–5 million years ago
Nīkau palm, coprosmas, kōwhai
Coconut palm—now extinct
Gum trees (*Eucalyptus*)—now extinct
Wattles (*Rycosperma*)—now extinct

Later west wind drifters (Pliocene–Pleistocene): 5–0.01 million years ago
Native orchids and hebes (koromiko)

Recent west wind drifters (Holocene): 0.11 million years ago to present
Native orchids
Pomaderris apetala (tainui)

20th century arrivals
Natural dispersal: *Myrmechila trapeziformis*
Human-assisted dispersal: Exotic plants introduced deliberately or accidentally by humans include ***cultivated plants*** (some arrived with Polynesian settlers) some of which are part of the ***weed flora***—naturalised exotic (non-native) plants.
Today's New Zealand flora is a mix of indigenous and exotic species, with the number of exotic species escaping into the wild increasing each year. By 2006 there were approximately 2500 exotic plant species growing wild in New Zealand.

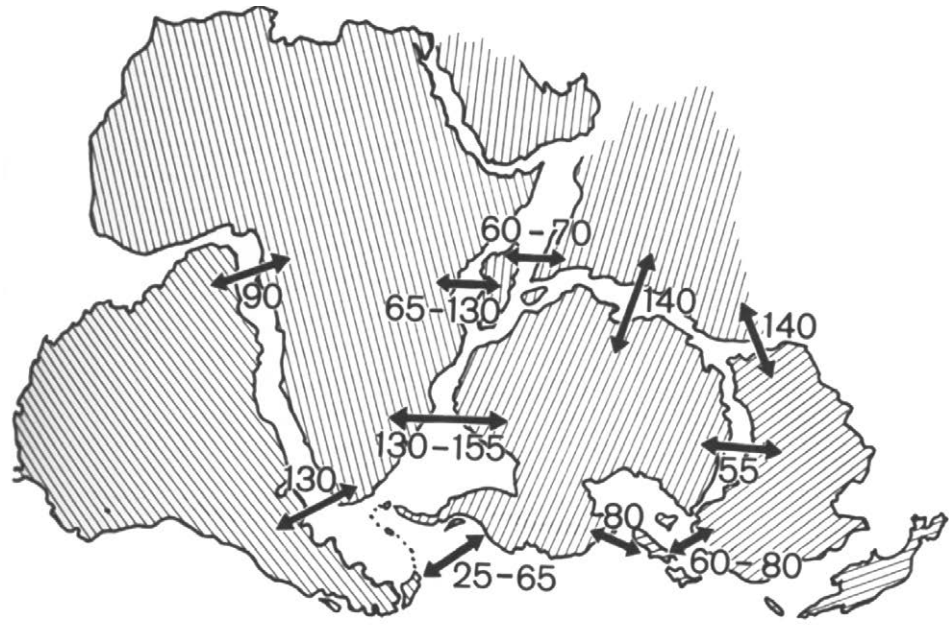


Figure 1: The rifting of Gondwanaland (source: Stevens 1980).Timing in millions of years of splitting apart of the Gondwana land masses

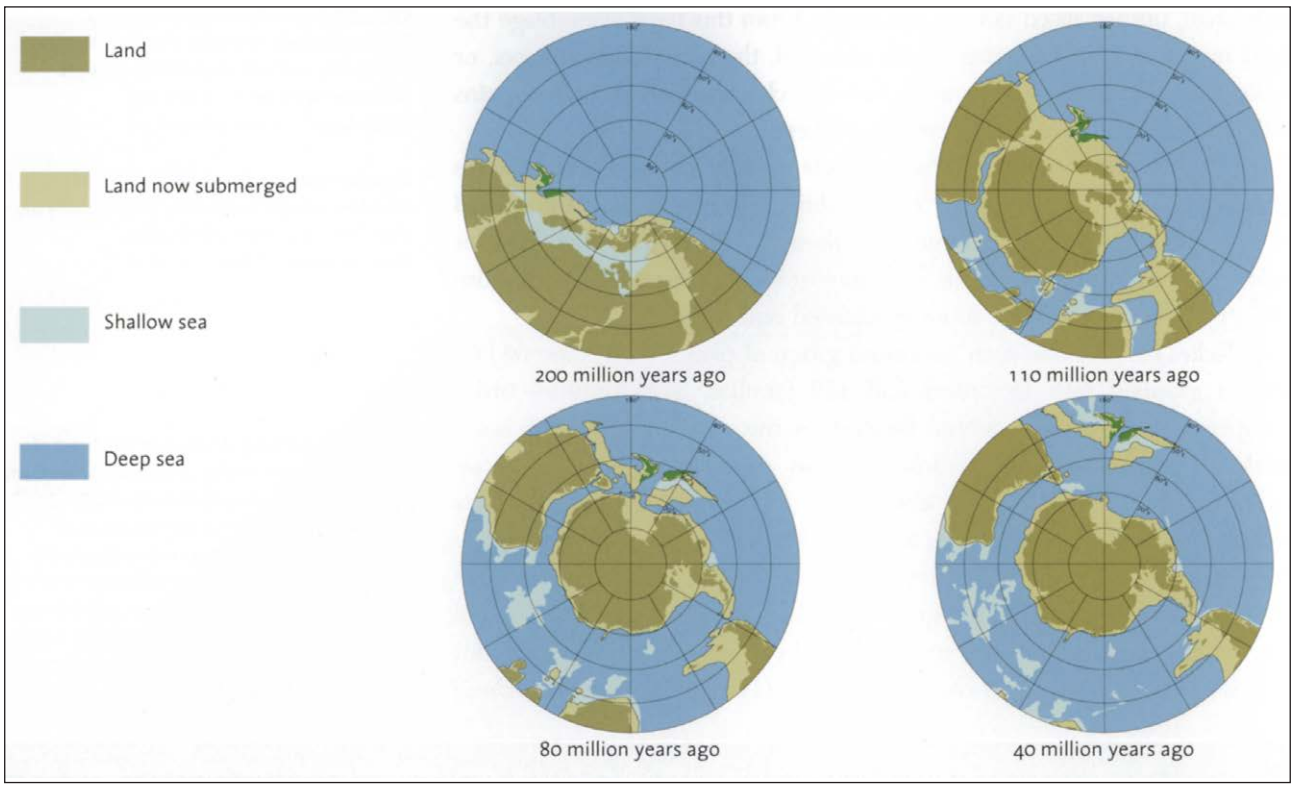


Figure 2: From: Philip Simpson's Pohutakawa and Rātā – New Zealand's iron hearted trees, Te Papa Press. Published with permission.

Exotic plants

Exotic plants have been brought to New Zealand over many centuries and for many reasons. Some species were brought accidentally; some were deliberately introduced as garden ornamentals (such as *Tradescantia fluminensis* / wandering willie) or as food crops (such as *Solanum tuberosum* / potato and *Actinidia deliciosa* / kiwifruit). Other exotic plants, such as *Pinus radiata* and *Cupressus macrocarpa*, have been planted in New Zealand for use in forestry. There are now more than 35,000 exotic plant species in New Zealand but not all of these occur in the wild—the majority of exotics are still confined to gardens and urban landscapes. But of these exotic plant species, by 2007, 2440 had naturalised into the wild. That means exotic plant species now outnumber indigenous species in New Zealand and exotics are establishing in the wild at a rate of approximately 12 species per year. Whether a plant becomes a weed depends on the species and the location.

Weeds are by definition plants that are not wanted in a particular place. Weeds are exotic plants that are capable of persisting and reproducing by seeds, spores or vegetative means to form populations where they are not wanted. Some weeds only persist in cultivated lands—horticultural and agricultural weeds that compete with cultivated plants. Other weeds are capable of growing in areas of native vegetation, particularly after disturbance—these are **environmental weeds** which pose the greatest threat to native vegetation and habitats.

Some exotic plants are so thoroughly naturalised that many consider them to be native. Some weeds are closely related to native plants. For example, pampas grasses from South America and species of native toetoe belong to closely related

genera—*Austroderia* and *Cortaderia*—and can be confused (see exercise page 9). Sometimes the news is not all bad: gorse for instance, can sometimes act as a nurse crop for native bush regeneration.

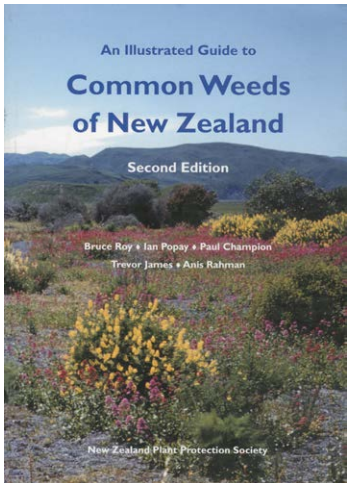
Environmental weeds can harm native plants by:

- Smothering them—particularly climbers such as old man's beard and moth plant
- Competing with native plants for living space, resources, pollinators, seed disseminators
- Preventing / suppressing natural regeneration by smothering seedlings, biochemical warfare (allelopathy)
- Increasing fire risk e.g., gorse
- Harbouring pests
- Altering successional processes

Exotic plants can also play a role in changing the character of a landscape.

More information about weeds

There are many sources of information about exotic plants and weeds in New Zealand. A very useful resource is the website of the New Zealand Plant Conservation Network—www.nzpcn.org.nz. It contains fact sheets for all environmental weeds in New Zealand including photos for most species and also has a checklist of the naturalised plants in New Zealand.



An "Illustrated Guide to common Weeds of New Zealand" Bruce Roy, Ian Popay, Paul Chapman, Trevor James, second edition by the New Zealand Plant Protection Society covers a wide range of weeds.

Some volumes of the Flora of New Zealand also include exotic species.

Many regional councils and the Department of Conservation have weed publications and offer advice on their management.

Examples of additional website resources include:
www.doc.govt.nz/conservation/threats-and-impacts/weeds/

Purple Loosestrife; Christchurch City Council: www.ccc.govt.nz/guides/PurpleLoosestrife/

Fact sheets and other information about many weed species; Environment Bay of Plenty: www.envbop.govt.nz/land/plants/pest-plants.asp

Toetoe (*Austroderia*) or pampas (*Cortaderia*)?
Tall white seed heads on a giant grass plant are a feature in New Zealand. Some are native species, collectively known as toetoe, but others are introduced species called pampas which have naturalised throughout New Zealand and are now considered weeds. Find a specimen of one of these grasses and use the following test to see whether or not it is native:

- Hold a leaf with two hands and give a sharp sideways tug. If it snaps cleanly it is pampas. Toetoe has more main veins and the leaves are tougher.

Once you have tried this test a few times, see what other differences you can find. The following key will help to identify all *Austroderia* and *Cortaderia* species in New Zealand:

1	Leaf-blade with prominent midrib and several conspicuous lateral ribs; leaf-sheath evidently glaucous, remaining entire and strict. Flowers Spring to mid-Summer. (*Austroderia*; endemic spp.)	2
	Leaf-blade with prominent midrib only; leaf-sheath not glaucous, later curling up and fracturing into short segments. Flowers Autumn. (*Cortaderia*; naturalised spp.)	6
2	Leaf-sheath with long hairs; all flowers ♂. Chatham Island species.	7. *A. turbaria*
	Leaf-sheath glabrous; flowers on separate plants all ♂, or all ♀.	3
3	Leaf-blade margins very slightly scabrid.	4
	Leaf-blade margins very strongly scabrid and cutting at mid-point.	5
4	Leaf-blade glabrous above ligule; ligule 1 mm; contra-ligule absent; caespitose.	1. *A. fulvida*
	Leaf-blade densely hairy above ligule; ligule 3 mm; contra-ligule present; rhizomatous. North Island species.	5. *A. splendens*
5	Leaf-sheath ivory under waxy coating; culm internodes ivory. North Island species.	6. *A. toetoe*
	Leaf-sheath green under waxy coating; culm internodes green.	3. *A. richardii*
6	Leaf-blade blue-green above, dark green below; rachis finely silky hairy; plants ♀ and ♂; lemma hairs of ♀ floret arising throughout.	4. *C. selloana*
	Leaf-blade dark green on both surfaces; rachis minutely scabrid; all plants ♀; lemma hairs mostly arising above palea height.	2. *C. jubata*

Adapted from: http://floraseries.landcareresearch.co.nz/pages/Taxon.aspx?id=_15a3308f-cd4b-4b76-9aa3-51888203dcad&fileName=Flora%205.xml

Leaf sheaths of naturalised *Cortaderia* species (pampas) curl and fracture when old.

Long hairs on leaf-sheath of *Austroderia turbaria*.

Waxy coating on leaf-sheath of *Austroderia toetoe*.