# Lord Howe Island Palms

## *Howea forsteriana* and *Howea belmoriana.*

***Howea forsteriana*** left, and ***Howea belmoreana*** centre, palms endemic to Lord Howe Island, growing in cultivation at the University of Auckland, New Zealand. Photograph: Kahuroa, Public domain, via Wikimedia Commons.

Lord Howe Island is a small, isolated subtropical island of volcanic origin, located 600 km from the Australian mainland. The island's isolation is reflected in the very high levels of endemism, almost half the plant species are found only on Lord Howe Island and nowhere else in the world.

Curiously, four species of palm are found on this *very* small island of just 14.55 km$^2$: *Howea forsteriana* (the common Kentia Palm); *Howea belmoreana* known as the Belmore Sentry Palm; and two others, *Hedyscepe canterburyana* and *Lepidorrhachis mooreana.*

Kentia palms were great favourites in Victorian times. They flourished in low light and were ideal for Victorian parlours – hence the name *parlour palm* - and seed export from Lord Howe Island that began in the 1870s continues to the present day.

Lord Howe Island looking south. Photo: Dr David Meagher, School of BioSciences, University of Melbourne

However, the two *Howea* palms have been of particular interest to biologists interested in species evolution. It has been estimated that the common ancestor of these two palms probably arrived from Mainland Australia between 4.5 and 5.5

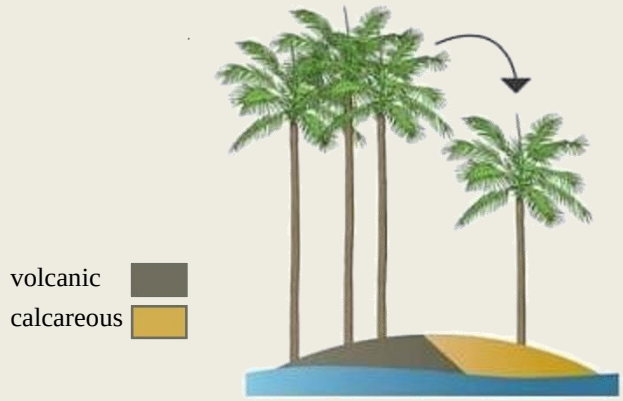
million years ago and yet they grow in close proximity on parts of the island (i.e., *sympatric speciation*). They are wind pollinated so their continuing existence as distinct species cannot be ascribed to specific pollinators (bees, wasps, flies, beetles etc.) that might favour just one species. What precipitated speciation? The answer must lie belowground.

Belmore Palms grow successfully on volcanic soils but are unable to grow on calcareous soil. In contrast, Kentia Palms grow successfully on calcareous soil but not as well on volcanic soil. So why don't Kentia Palms grow well in the volcanic soils? Researchers investigated soil water, pH, salinity, chemical composition, and finally looked to the microbial communities of the soil. They found that neither species grew well in sterilized soil (mycorrhiza-free conditions) but Kentia Palms grew no better in unsterilized *volcanic soil*, leaving researchers to assume that Kentia Palms cannot utilise the mycorrhizal fungi of volcanic soils for their mineral nutrition. By contrast, Belmore Palms are mycorrhizal on volcanic soils, explaining their relative success on these richer soils compared to the Kentia Palms.

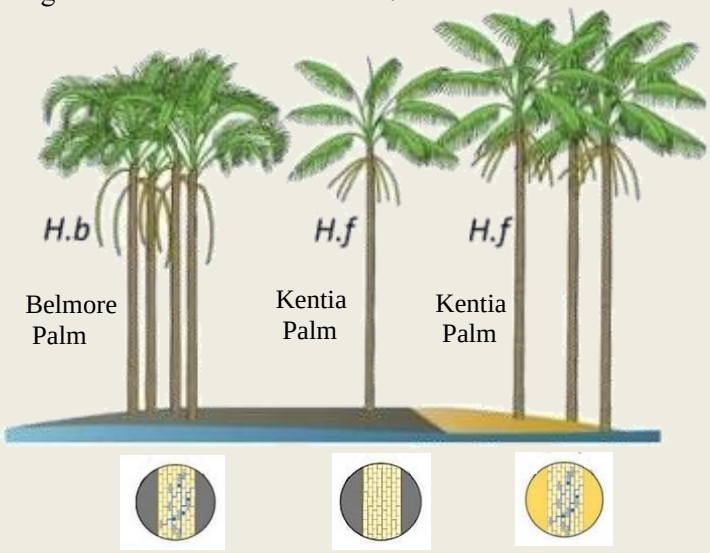
Timing of flowering was also found to be related to soil types. Calcareous soils, those in which Kentia Palms thrive, are low in nutrients causing a shift in flowering time, producing flowers about six weeks before the Belmore Palms growing on rich volcanic soils. The difference in flowering times between the two wind-pollinated palm species was deemed by biologists to be more than sufficient to interrupt the breeding process and result in speciation.

So it seems that the Belmore Palm evolved on volcanic soils from a common ancestor that arrived from Australia between 4.5 and 5.5 million years ago. Between 2 million and 500,000 years ago, the Kentia Palm, diverged from that common ancestor colonising the island's calcareous soils.

**Lord Howe Island – view from Mount Gower Summit.**
**Photo: Dr David Meagher**




5.5 – 6 million years ago, a common ancestor colonises volcanic soil. Much more recently, 2 million – 500,000 years ago, *Howea forsteriana*, the Kentia Palm, diverged from that common ancestor colonising the island's calcareous soils.




Present times – the common ancestor on volcanic soils has evolved to become the Belmore Palm, *Howea belmoreana.* Kentia Palms, *Howea forsteriana*, growing on volcanic soils lack the vigour of those growing on calcareous soils. The success of each species is related to its ability to utilise specific mycorrhizal fungi in the soil.
Diagrams modified from Alun Salt (2017): *Botany One*: *https://www.botany.one/2017/10/how-do-you-grow-a-palm-the-secrets-in-the-soil/*

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