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Prioritization of taonga myrtle species in response to myrtle rust (*Austropuccinia psidii*) in New Zealand

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Introduction

Myrtle rust, caused by the pathogen *Austropuccinia psidii* in the Order Pucciniales, is a disease of many plants belonging to the myrtaceae. Myrtle rust infects tree species that the indigenous Māori peoples of New Zealand consider to be important cultural treasures.

Originally from Central and South America (Glen et al. 2007), it has been moving steadily around the world infecting close neighbours; Australia and New Caledonia in 2016 and New Zealand in May 2017.

New Zealand myrtaceae were extensively utilised by Māori with uses ranging from medicine, construction and food, having significant cultural value. Māori now consider these plants taonga (treasured entities). Taonga include tangible things such as land, waters, plants, wildlife and cultural works, and intangible things such as language, identity and culture, including Mātauranga Māori (Traditional Māori knowledge).

Through an extensive engagement process, we have an insight into what Māori want in a response plan that identifies a prioritization strategy for native New Zealand myrtaceae.

Cultural significance of the work

Indigenous worldviews and concerns around the impacts of myrtle rust are currently underrepresented in literature.

Clark (2011) identified economic and environmental impacts and recognised consequences for all New Zealanders. However, the sociocultural consequences for Māori have not yet been fully explored.

Apart from a short paragraph on the threat to Hawai'ian indigenous culture Loope (2010), there is no other literature citations on the impact of *P. psidii* to Australian Aboriginal or other Pacific Island communities and culture.

This work is important to both the indigenous as well as scientific communities interested in learning from one another through the sharing of knowledge, both traditional and modern.

The prioritization strategy for taonga myrtle species in New Zealand that we are proposing has three main facets

Prioritization of PLACES

The majority of our effort should be focused in areas where myrtle rust is present, with areas, supported by literature, of favourable climatic conditions a priority.

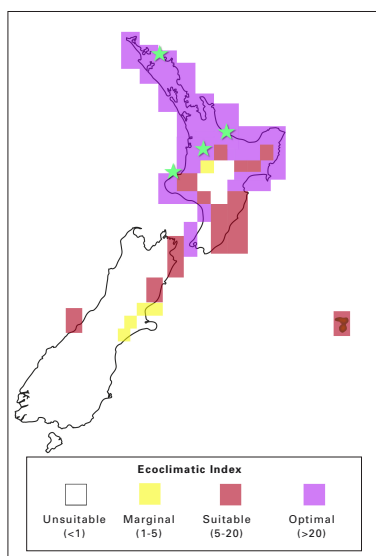


Figure 1: Map of New Zealand showing climate suitability for *Austropuccinia psidii* under current (1971-1990) climate averages as indicated by the CLIMEX Ecoclimatic Index, published by Kriticos & Leriche (2008). Green overlays indicate current hotspots for *Austropuccinia psidii* as of September 2017, Kerikeri in Northland; Te Puke in the Bay of Plenty; Te Kuiti in Waikato; and New Plymouth in Taranaki.

Prioritization of SPECIES/ GENERA

Since being discovered on mainland New Zealand, the Ministry for Primary Industries (MPI) and the Department of Conservation (DoC) have tracked known occurrences of infection by host species and geographic location. General consensus from hui we've conducted is prioritising plant species most susceptible to the myrtle rust infection. These plants, in susceptibility order, (based on confirmed numbers) are:

- *Lophomyrtus bullata*
- *Metrosideros* spp.
- *Callistemon* spp.
- *Syzygium smithii*
- *Agonis flexuosa*
- *Eucalyptus* sp.
- *Leptospermum scoparium*



Prioritization of SPECIAL INDIVIDUALS & POPULATIONS

It was impressed upon us, during hui (meetings) that there are individual species and native populations of myrtaceae in regional New Zealand that are of significant cultural importance. A considerable effort needs to be applied to ensure their conservation. Examples of these taonga (treasures) are:

Te rerenga wairua

Te Rerenga Wairua at Cape Reinga, the very tip of the North Island, is the most spiritually significant place in New Zealand and is marked by an ancient pohutukawa tree (*Metrosideros excelsa*).

It is believed that after death, all Māori spirits travel to the cape where the spirit (wairua) makes its final flight (rerenga) before moving on to the next stage of its journey.

Te Waha-o-Rerekohu

Te Waha-o-Rerekohu, situated at Te Araroa on the east coast is said to be the oldest living pohutukawa tree, being at least 600 years old.

Planted there while a marae still stood at the site, the tree presently resides on the grounds of a school.

Bartlett's Rata

This species is endemic to New Zealand with only three known forest remnants, near Cape Reinga where it was first discovered in 1975.

This species has been declared critically endangered by the ICUN and is threatened for many reasons.

The species is at severe risk from browsing animals and fire.

In the past, land clearance has threatened this species. There is also minimal genetic variation in the population as a dearth of nectar-feeding birds to pollinate the flowers and Bartlett's rata being self-incompatible, there is a reduced amount of seed production.

In 2012 there were only 25 adult Bartlett's rata left in the wild. This was a decrease from the 34 mature individuals known in 1992.

What does this mean for Māori?

In the Māori worldview, man is said to descend from Tāne, the god of the forest. This positions people and all other things in the environment as having a shared common ancestry. These whanau (family) based linkages mean that there are virtues of respect and responsibility for nature that are to be expressed. Respect for mauri, tapu, kaitiakitanga, whanaungatanga, manaakitanga, and aiopipi are expressions of these virtues. (Patterson 1994).

Because of these linkages, diseased trees affect Māori similarly to having a family member affected by a disease. It can have negative consequences on our hauora (health/ wellbeing) and quality of life. Adding to this, the Potential loss of species that we face is cause for concern for not just Māori communities but for all New Zealanders.

There are legal procedures that will have potential consequences for Māori communities too. For example, restrictions on moving plants between rohe is potentially of great concern to iwi, especially those that rely on the health of plant nurseries to sustain their peoples financially as well as iwi that have placed time and resource into environmental conservation efforts.

By no means is this prioritization strategy complete. There are many questions that need to be answered before we can begin to move on to asking the next logical set of questions. For example, knowing if and how myrtle rust affects the wood of the trees it infects would go a long way toward knowing if and how traditional uses of these taonga will be used moving forward.

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