

Myrtle Rust – A major threat to the integrity of K’gari (Fraser Island)

The future integrity of K’gari is now being insidiously infected with the slow but cumulative effects of Myrtle Rust. Alarm bells began ringing loudly in 2011 when it was first detected in Queensland. Then little was heard for a while. Over the next few years the spores were quietly spreading throughout the Australian bush establishing itself without immediate visual impact. In 2013, surveys of K’gari identified rust on five species: *Austromyrtus dulcis*, *Backhousia myrtifolia*, *Homoranthus virgatus*, *Melaleuca quinquenervia*, and *Rhodamnia acuminata*. Since then, it is likely that the rust has infected more species. This FIDO Backgrounder (No 87— November 2018 by John Sinclair AO) compares the threats to K’gari (Fraser Island) with the threats of another slow-burning issue climate change and concludes that the Myrtle Rust represents a more immediate threat to the island’s ecosystems.

Austropuccinia psidii is an introduced fungal pathogen of the plant family Myrtaceae. It was first detected in Australia in April 2010. Since then the innocent-sounding myrtle rust has become "*probably the biggest threat to Australia's ecosystem*". It seems unstoppable and in the space of just a few years has spread rapidly around the world wherever plants in the Family Myrtaceae (that included all of the Eucalypts) occur. Common Australian Myrtaceae species include eucalyptus, willow myrtle, turpentine, bottlebrush, paperbark, tea tree and lilly pilly.

It threatens introduced plantations in several countries. So far about 1,200 of the 2253 native Australian Myrtaceae taxa have been identified as occurring in zones of high probability of Myrtle rust establishment.



If Myrtaceae species decline, the knock-on effects include opening of the forest canopy aiding weed invasion, changed floristic composition and retarded ecological succession.

The loss of habitat trees will impact on associated flora including epiphytic orchids, mistletoes. The loss of habitat/food trees for associated vertebrate and invertebrate fauna:

While many species are relatively tolerant, at least on new seasonal growth – but there may be cumulative effects over time. The severity ratings from seasonal growth may not reflect susceptibility at critical life stages. Impacts at seedling and coppice stages are poorly known.

Current research suggests that in just ten years Myrtle Rust could decimate key Myrtaceae communities on the island, notably *Melaleuca* swamps and rainforest pioneer taxa, and consequently the natural and cultural landscapes dependent on these ecosystems.



Myrtle rust on paperbark leaf (*Melaleuca quinquenervia*)

K’gari’ Susceptible Species

Amongst the highly or extremely susceptible species that are found on K’gari (Fraser Island) are the follow. (Note: quoted in order common names and where known **Butchulla** names and *scientific names*):

Paperbark Tea-tree **Dibing** *Melaleuca quinquenervia*, Midgim Berry (*Austromyrtus dulcis*), Carroll, **Carroor**, **Kauar** *Backhousia myrtifolia*, Qld Blue Gum, **Yura**, **Yirra**, *Eucalyptus tereticornis*, Tallowwood **Ti** *Eucalyptus microcorys*, Blackbutt **Kwai’yi** *Eucalyptus pilularis*, Swamp Mahogany *Eucalyptus robusta*, Cherry Satinash *Syzygium luehmannii*, Blue Lillypilly *Syzygium oleosum*, Common Lillypilly *Syzygium (Acmena) smithii*, Bloodwood, **Bunar** *Corymbia intermedia*, Moreton Bay Ash, **Kauwandhur**, **Kurandhur** *Corymbia tessellaris*, and event the Myrtle Mangrove *Osbornia octodonta*. Scribbly Gum *Eucalyptus racemosa/signata* is deemed relatively tolerant to highly susceptible to Myrtle Rust. Some species so far seem not to be susceptible. The trouble is that many species are at the northern limit of their range and susceptible to climate change impacts.

The Action Plan being developed is aimed at the public and targeted at increasing stakeholder awareness by:

- Ensuring maximum engagement by the non-government conservation sector;
- Engaging with stakeholders;
- Detecting impact concerns (social, cultural, economic) due to decline of wild species;
- Promoting general and sector-targeted community awareness.

Paperbarks Dibing (*Melaleuca quinquenervia*)

While there are huge threats arising from possible changes in floristic composition of K'gari's forests as outlined in Part 1 of this Background, the more worrying aspects are the much wider ecological implications as the productivity of the Myrtaceous forests to produce nectar runs down as surviving trees become progressively weaker. There is a heavy emphasis in this section on the contribution of *Melaleuca quinquenervia* to K'gari's fauna and the vulnerability of this common species to Myrtle Rust

Over half of the world's approximately 3000 species of Myrtaceous plants are native to Australia and they are an important food source and habitat for a vast array of animals, birds and insects. The host range for myrtle rust in Australia now includes 350 species of Myrtaceae from 58 different genera.

Australia has some 800 plus Eucalypt species. Eucalyptus (not including Corymbia and Angophora) is the world's second largest genus of large trees, after the figs, yet figs are spread over six continents while Eucalypts are native to one. In the Sydney region alone, there are more than twice as many Eucalypt species (over 100) as Britain has total tree species.

Threats to plant communities are also becoming more obvious, with myrtle rust affecting regeneration following disturbance such as fire, including keystone species like the broad-leaved paperbark (*Melaleuca quinquenervia*). Such species play a critical role in maintaining the integrity of an ecosystem and any change to this species may have a dramatic impact on ecological communities as a whole. Assessments to date have shown that around 40 per cent of trees are significantly affected, with regrowth repeatedly killed by infection. Myrtle rust has also been shown to prevent flowering.

The impact of myrtle rust has been seen in a range of native forest ecosystems including coastal heath, coastal and river wetlands, sand island ecosystems and subtropical and tropical rainforests. More than 50 plant species were initially identified as being highly or extremely susceptible to myrtle rust.

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Early symptoms of myrtle rust infection on young *Melaleuca quinquenervia* (left) and causing death of *M. quinquenervia* coppice regeneration (right). Photo – PBCRC

Australia's Myrtaceous Nectar flow

The true significance of the impact of Myrtle Rust results from the potential depletion to the nectar flow produced by Australia's Myrtaceous plants most notably *Melaleuca* forests. This is because Myrtaceous plants produce quantities of nectar in excess of their plant needs and this is fed to insects, birds and mammals. They are an important food source and habitat for a vast array of vertebrate and invertebrate fauna.

Far more nectar is available to birds in Australia than other continents. Sugar feeds mammals as well – fur at night replacing feathers by day at many of the same flowers. Australia's community of nectar-feeding mammals is the world's largest.

Australia's ample sunshine & depleted soils encourage plants to produce more carbohydrates than they can use. Not all the sugars they produce are converted into tissues or seeds because the low soil nutrients. The surplus sugar is fed to birds as nectar in return for pollination. Birds can thrive on this sugar because they eat insects as well to provide missing nutrients.



Melaleuca quinquenervia— flowering may be affected by rust

While Myrtle Rust may not kill trees, any reduction in the blossoming and nectar production is likely to have a very significant impact on the insects, birds and animals that are dependent on the nectar flow. This unseen direct impact is liable to have serious ecological repercussions. It is for this reason that FIDO is most alarmed at the potential to impact so heavily on the Outstanding Universal Value of K'gari.

The Fraser Island World Heritage Community Advisory Committee declared, "This pathogen has the potential to detrimentally impact the OUV of the island. It is noteworthy that the island's international significance has again been recognised through the recently announced 'Queen's Commonwealth Canopy' status of the island's rainforests – a key ecosystem threatened by myrtle rust."