TĀNE'S TREE TRUST

Native Forests for our Future
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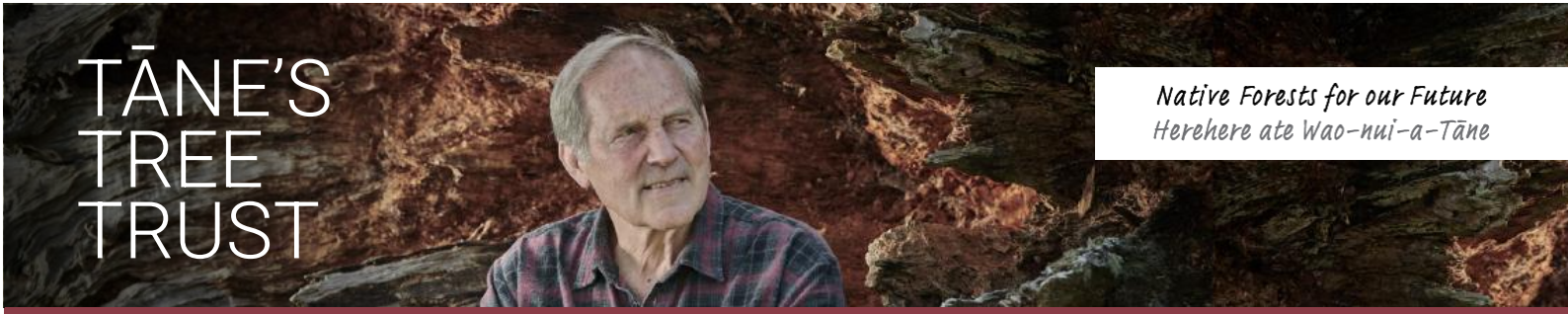

Photo: Al Guthrie, Pure Advantage

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Native plant succession beneath woolly nightshade in Northland retired pasture environments

Aotearoa New Zealand has one of the highest numbers of established non-native plant species, many of which alter successional pathways and dominate disturbed landscapes. The prevalence of shade-intolerant invasive species as pioneers during early succession in landscapes has been historically perceived to hinder native species recruitment and survival, leading to costly control efforts with varied success. The battle against these invasive plant species by restoration practitioners in Aotearoa New Zealand has been expensive, laborious, time-intensive and despite all efforts, continues – often in the name of conserving our native species to prevent their foreseen "replacement" in ecosystems by exotic species. However, in providing an ecological function in disturbed habitats (e.g. shading out exotic grasses and allowing for seedling recruitment), could these invasive pioneer species actually lead to native dominated forest outcomes?

The principle of native succession through invasive exotic tree species theoretically requires less intensive, expensive and time-consuming management methods to achieve similar restoration goals as traditional methods and therefore is of particular interest to land managers. Our study explores the ecological role of *Solanum mauritianum* (woolly nightshade/tobacco weed) on two farms in Northland, New Zealand, a species often targeted for pest plant control through expensive herbicide application, manual control methods, or both. Due to persistence in the seedbank, rapid regrowth from untreated stumps, and easy dispersal of its seed, it often re-establishes where initially controlled, growing to height rapidly. We focused on woolly nightshade's impact on native vegetation recruitment and successional processes in retired pasture environments, due to the common assumption that it has an allelopathic effect – essentially poisoning the soil around itself to inhibit species recruitment other than itself, forming a weed monoculture. We surveyed composition and structure of 16 stands with woolly nightshade as the dominant canopy species, varying in age from approximately eight to 22 years and with differing proximities to native and exotic tree seed sources. We identified and counted all species growing in these stands, measured the size and age of the dominant canopy trees, and calculated density and ratio of exotic to native woody tree species. Older stands (over 14 years) and those closer to native vegetation supported higher native tree and seedling recruitment beneath the woolly nightshade canopy, particularly for shade-tolerant species, whereas younger stands tended to have higher ratios of exotic species such as gorse and

Figure 1.1 *S. mauritianum* stand exhibiting tendency to form a monoculture in young stand approximately 10 y/o

woolly nightshade. This suggests that woolly nightshade has potential to behave as a "nurse species" resulting in native or mixed native-exotic dominated forest with time. In saying this, certain stands exhibited increased regeneration of invasive species like *Prunus campanulata* (Taiwanese cherry) and *Ligustrum* species (Tree privet/large-leaved privet), indicating the need for manage methods to prevent non-native woody tree species dominance over preferred native woody tree species. Native tree species found to be establishing beneath woolly nightshade included totara, red matipo, a variety of tree ferns, kahikatea, manuka and kanuka, all of which have some potential to shade out pioneer weeds to provide a foundation for native forest regeneration in the place of exotic species.

While woolly nightshade does appear to be able to support native regeneration through beneath its canopy, its persistent seedbank, prolific fruiting, and flammability do pose ecological risks. These findings emphasize the importance of adaptive management that balances the potential benefits of woolly nightshade with active control measures to support forest restoration in New Zealand. The balance between facilitation and competition underscores the need for context-dependent management approaches. In landscapes where woolly nightshade is present, but native seed sources are available, passive restoration strategies that allow for gradual succession may be viable. However, where woolly nightshade dominates without the presence of nearby native trees and seed dispersers such as birds (preventing the introduction and establishment of native species), active interventions such as selective thinning, seed dispersal, or underplanting may be necessary to accelerate forest recovery. Future research should focus on long-term successional trajectories to determine whether woolly nightshade stands transition naturally to native-dominated forests or persist as stable alternative states. Additionally, understanding the role of abiotic factors, such as soil conditions, proximity to seed sources, and disturbance regimes will be critical in predicting and managing its ecological impact. Experimental studies assessing different management interventions will also be valuable for refining best-practice restoration strategies.

Rhiannon Warren

Figure 3.1. A) Mamaku *Sphaeropteris medullaris,* B) Totara *Podocarpus totara,* C) Seven-finger *Schefflera digitata*, D) Kawakawa *Piper excelsum,* E) Taiwan cherry *Prunus campanulata* and F) Kanuka *Kunzea robusta* seedlings and saplings found amongst older-intermediate age *Solanum mauritianum* stands (over 12 y/o).

Small-scale screening programme for susceptible myrtle species

This article describes a Jobs For Nature project in Bay of Plenty - Te Rātā Whakamaru - a collaboration between Rotoiti 15, Scion (a Crown Research Institute) and DOC. Rotoiti 15 Trust is one of New Zealand's largest Ahu Whenua Trusts – it includes Te Arawa iwi Ngati Pikiao, Ngati Tarawhai and Ngati Rongomai.

Myrtle rust (Austropuccinia psidii) has been a major recent biosecurity incursion for Aotearoa NZ. It is an airborne fungal pathogen that attacks species in the Myrtle family, including native species such as pōhutukawa, mānuka, kānuka, rātā, maire tawake (swamp maire), rōhutu and ramarama. It was first discovered on mainland New Zealand in 2017 and initial attempts to contain and eliminate it failed. Some myrtle species are more susceptible than others. Resources on identifying and managing myrtle rust are available via Biosecurity NZ, DOC, and other organisations, e.g., https://myrtlerust.org.nz/

Symptoms first show up as bright yellow-orange powdery pustules on young leaves, shoots, fruits and flowers of myrtle species, followed by dieback of new leaf and flower buds of susceptible species – as shown in the photos below.

Te Rātā Whakamaru project involved mapping locations and monitoring the four most vulnerable native myrtle species in the Bay of Plenty, and developing a pilot study to screen for disease resistance in two highly susceptible species - ramarama (Lophomyrtus bullata) and rōhutu (Lophomyrtus obcordata) - https://scionresearch.shorthandstories.com/trw/index.html

Because myrtle rust attacks flower buds and fruit, no seeds were available, therefore, ramarama, rōhutu, and cultivars that showed some resistance were vegetatively propagated at the Scion research nursery. Some of the rooted cuttings were kept protected inside a Scion nursery greenhouse, whereas others were placed into a randomised block trial and exposed to myrtle rust in a nursery shadehouse.

Left: Close-up of myrtle rust spores on a rōhutu plant, during the early stages of infection in a previously healthy hedge, March 2021, Rotorua. There was dieback in new leaf and flower buds of most plants.
Right: April 2024, three years after myrtle rust was first detected in hedge. Most rōhutu plants have died, though some green leaves remain. No fruiting bodies were evident.

If the plants are protected from myrtle rust (in a refugium, with spraying, etc.) they can produce flowers and seed, creating an ex situ seed source to help conserve some of the genetic diversity in the population. (NB. A refugium is a sanctuary where a species' population is protected and can survive when under threat in its natural habitat. Ex situ means away from the natural habitat).

Dr Jacqueline Bond with plants that were kept back and protected from myrtle rust in a controlled greenhouse environment in another part of the Scion nursery, with the hope that these can be used as a genetic library for future work.

At one of the field monitoring sites, very little myrtle rust was seen in susceptible species, but when ramets (rooted cuttings) of these plants were exposed to myrtle rust at the Scion nursery, they became heavily infected. This indicates that the plants at this site may be protected from exposure to the spores due to their environment, which needs more research.

The pilot nursery project shows the feasibility of developing a small-scale screening programme for disease resistance, with technology transfer enabling iwi groups to respond to biosecurity threats like myrtle rust within their own rohe. Learnings have already been transferred to another iwi group in Tairāwhiti (Te Whakapae Ururoa), led by Graeme Atkins and others.

Data have been collected, but are yet to be fully analysed. It is hoped that this pilot project could be rolled out to other iwi, with the aim of germplasm conservation and breeding for resistance for at-risk myrtle species, including other vulnerable species such as swamp maire tawake, pōhutukawa, and rata species. Further funding is being sought to continue this mahi.

Dr Jacqui Aimers, Dr Jacqueline Bond, and Dr Darryl Herron

AGM and Ian Barton Symposium

In mid-October 2025, we held our Annual General Meeting at the Franklin Club in Pukekohe. Thanks to everyone who was able to join us, it was great to update everyone on all the fantastic work the trust has undertaken in the last year, and launch our new logo. You can find our AGM report for 2025 on our website at https://www.tanestrees.org.nz/site/assets/files/2476/ttt_agm_report_2025.pdf

The following day we held a memorial symposium in honour of Ian Barton our founding chairperson at the Mangatangi Hall, who lived for many years in the area and undertook various research work in the region. We heard about all the interesting and different work and groups Ian was involved with. It was wonderful to have Ian's son Stuart speak, Ian's wife Jan and numerous other family members attend. It was a great day, well attended and a thank you to our guest speakers on the day, Stuart Barton, Peter Berg, Warwick Silvester, Ian Bissett, Paul Quinlan, Bruce Burns, Eve Rutherford and Graeme Campbell.

You can find the symposium booklet covering the speeches on our website

https://www.tanestrees.org.nz/site/assets/files/1069/symposium_booklet_final.pdf

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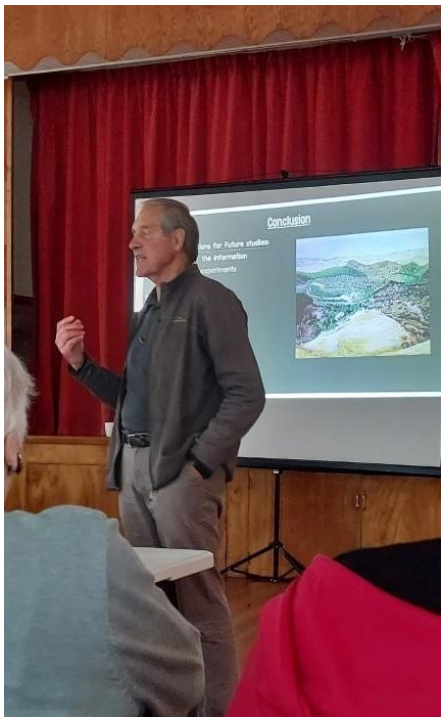

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