Wise Up To Weeds!

What's Inside:

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Manaaki Whenua
Landcare Research

What's to Become of Native Forest Remnants Infested With Tradescantia?

Many of you will be familiar with the sight of the invasive weed tradescantia (*Tradescantia fluminensis*) carpeting the ground in native forest remnants. What impact is this weed having on native woody seedlings and the ability of these forest remnants to regenerate? Do dense infestations reduce the light available for native seedlings and is there a relationship between available sunlight and the amount of tradescantia? Rachel Standish (Massey University), Alastair Robertson (Massey University) and Peter Williams (Landcare Research, Nelson) have recently been seeking answers to these questions.

The trio conducted a study in three podocarp/broadleaved forest remnants in the lower North Island. They set up plots in each of these lowland forest remnants in areas with dense infestations of tradescantia and in nearby areas with little or no tradescantia. Within these plots, they measured the amount of tradescantia (biomass), the plant species in the forest canopy, the abundance and height of native woody seedlings and the light available to both tradescantia and native seedlings.

Alastair Robertson (Massey University).

Rachel Standish knee-deep in tradescantia carpeting the ground in a forest remnant.

"We found the abundance and species richness of native woody seedlings decreased dramatically as the amount of tradescantia increased," Rachel explained. "This can be directly attributed to lower light levels underneath tradescantia." For example, at 100% weed cover, light levels were reduced to 1–2% of full light (measured nearby in an open field).

"We also found native woody seedlings varied in their sensitivity to increasing amounts of tradescantia," said Rachel. For

example, kawakawa (*Macropiper excelsum*) was most sensitive, declining sharply as the amount of tradescantia increased, while kohekohe (*Dysoxylum spectabile*) persisted at 100% cover of the weed. However, the longer-term survival of kohekohe seedlings in areas with more than 90% weed cover was very low. Pigeonwood (*Hedycarya arborea*), mâhoe (*Melicytus ramiflorus*), tîtoki (*Alectryon excelsus*) and pukatea (*Laurelia novae-zelandiae*) were all moderately tolerant to invasion by the weed. "From these results we would expect that over time a forest remnant invaded by tradescantia would probably comprise more kohekohe and less kawakawa than a forest without the weed," Rachel concluded.

"Our measurements showed tradescantia biomass increased dramatically as the available light increased from zero to 10% of full light," said Rachel. "Therefore imposing shade (1.3 to 5% full light) on infestations is likely to result in a decrease in the amount of tradescantia and an increase in the abundance of native seedlings." This could possibly be achieved by close plantings of canopy-forming native trees and may be one way of restoring native forest remnants infested with tradescantia. More research is underway to test this theory.

This study was funded by the Foundation for Research, Science and Technology. Rachel Standish received a postgraduate scholarship from the Dept of Conservation.

For the full story see: Standish, R.J.; Robertson, A.W.; Williams, P.A. 2001: **The impact of an invasive weed *Tradescantia fluminensis* on native forest regeneration.** *Journal of Applied Ecology* 38: 1253–1263.

Kiwi Icon Goes Bush

The commercially successful common kiwifruit (*Actinidia deliciosa)*, has been bred from plants originating from China. Seed was first introduced into New Zealand in 1904, but large-scale commercial production did not take off until the mid-1970s. Recently, commercial production of two close relatives, *A. chinensis*, sold as ZESPRI™ GOLD, and arguta kiwifruit (*A. arguta)*, has begun in this country.

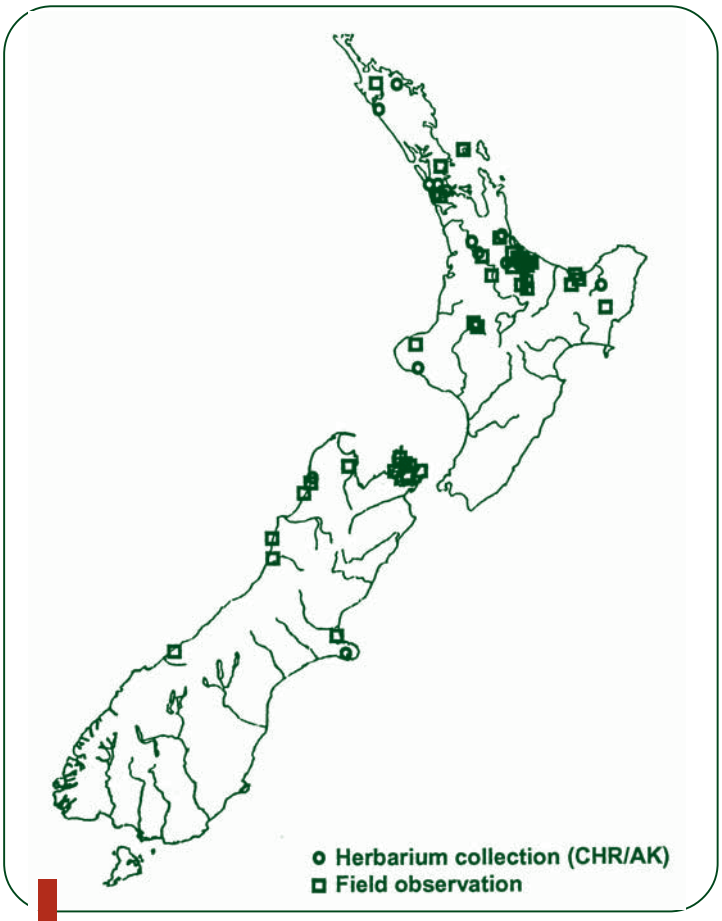
It took about 50 years for common kiwifruit to "jump the fence"and turn up in the wild. Since the industry boom in the late 1970s increasing numbers of wild common kiwifruit plants have been recorded, often (but not always) being found close to commercial kiwifruit orchards.

Little is known about the ecology of wild kiwifruit in New Zealand. Recently Jon Sullivan (Landcare Research, Auckland) and Peter Williams (Landcare Research, Nelson) studied the distribution and characteristics of wild kiwifruit, in order to assess its weed potential.

While most wild kiwifruit is concentrated in the Bay of Plenty Region, where most kiwifruit cultivation has occurred, the plant has also been found in scattered locations from Northland to South Westland and Canterbury (see MAP). Arguta kiwifruit and another species, *A. polygama,* have recently been recorded at one site in Te Puke. ZESPRI™ GOLD kiwifruit has yet to be found in the wild in New Zealand.

Common kiwifruit has many attributes that make it a potentially nasty weed. The plant appears able to grow in a wide variety of habitats including scrub, gullies, young and old stands of native bush, and pine plantations. Vines are vigorous, woody and fast growing, able to overtop pine seedlings and native saplings. "Wild kiwifruit vines are capable of reaching >20 m high into the upper forest canopy," said Jon. Smothered plants underneath are shaded and may break under the added weight. Kiwifruit plants are also very long-lived. Vines first planted in New Zealand in the 1930s are still in production and one cultivated vine of arguta kiwifruit in Korea is 600 years old! "Just one 30-year-old wild vine is capable of smothering 1000 m^2 of scrub and young bush," explained Jon. Seedlings appear to be moderately shade tolerant and can establish in tree fall gaps within mature forest. The plant is also capable of growing over a reasonably wide temperature range. "While young kiwifruit shoots are

Wild common kiwifruit (Actinidia deliciosa) *smothering young native bush in Te Puke.*



The distribution of wild common kiwifruit (Actinidia deliciosa) *in New Zealand.*

relatively frost tender, properly acclimatised plants have been found to tolerate sub-zero winter temperatures," said Jon. Taken together these observations suggest that wild kiwifruit is likely to slow or prevent the regeneration of native bush and cause problems in commercial pine plantations.

People have been major players in the spread of wild kiwifruit. Early orchard practices meant reject fruit or vine parts were often dumped into gully areas. Farmers also feed reject fruit to stock, which provides food for silvereyes, the prime suspects for moving kiwifruit seed into neighbouring forest areas. "The ability of wild common kiwifruit to spread via seed is high since each wild fruit contains about 300 seeds and hundreds to thousands of fruit can be produced in a season by a large female vine," noted Jon.

"Applying the Dept of Conservation's weed priority ranking system places wild common kiwifruit in the highest weed impact category, category A," explained Jon. "Around Te Puke, wild common kiwifruit is easily as bad as the worst environmental weeds in the region – banana passionfruit, woolly nightshade and wild ginger."

Recent imigrants, ZESPRI™ GOLD and arguta kiwifruit, could be just as weedy as their cousin, unless they can be prevented from establishing in the wild.

"The good news is that controlling wild common kiwifruit populations and maintaining them at low densities should be a realistic proposition," predicited Jon. "The plant still has a relatively restricted distribution in the wild, seed viability in the soil appears limited to about 3 years, and plants do not start producing fruit until they are about 5 years old."

In surveys, Clint Cameron (a summer student at Environment B.O.P) and Environment B.O.P contractors, John Walters and Les Eltringham, have documented about 500 sites with wild common kiwifruit in a 50 km^2 area around Te Puke. "Results showed the population is currently dominated by juvenile plants, and is rapidly beginning to increase in density," said Jon. "We believe this is a critical time to commit to weed control in the Te Puke area, while these juvenile plants are too young to reproduce. If left unchecked, the potential for spread into neighbouring areas is huge and control will become increasingly expensive and impractical," warned Jon.

Fortunately Environment B.O.P have been quick off the mark, and in an initiative spearheaded by John Mather (Plant Pest Co-ordinator) they have developed methods to successfully control wild kiwifruit. These are currently being employed by contractors, John Walters and Les Eltringham (Te Puke Enterprise Agency), funded by Environment B.O.P, ZESPRI and HortResearch.

This study was funded by Environment B.O.P.

Highway Dwellers: A Hybrid Method Has Been Developed to Characterise the Vegetation Along Road Networks

Landcare Research scientists, led by Jake Overton (Hamilton), have developed a hybrid method for characterising the vegetation along complex road networks. The approach involves combining state-of-the-art computer-based methods (including rigorous probability sampling schemes, modern database management and spatial analyses using geographic information systems [GIS]) with traditional descriptive surveys. Combining these two very different methods utilises the strengths of each one.

The public road network is a familiar and necessary part of the modern New Zealand landscape. Most of the land bordering public roads (the roadside reserve) has some sort of vegetation on it, and the extent of this land is surprising. "We estimate there are 140,000 ha of roadside reserve in New Zealand, which is an area greater than our fifth-largest national park, Tongariro," said Jake. "If it was a real national park, it would be the only one visited by everyone in New Zealand!"

While the main aim of road management is to provide safe and efficient transport, roadsides can have other positive aspects such as providing a refuge for native plants and creating special habitats where rare native plants can grow. However, roading activities may harm remnants of native vegetation and produce unsightly earthworks. Roads also provide disturbed habitats, which are perfect for weeds and can act as corridors for weed invasion.

"The results of our vegetation surveys showed the roadside reserve in the Waikato Region has an average of 7% weed cover, only slightly lower than the cover of native plants," said Jake. Blackberry, broom and gorse were the three most commonly encountered weeds. Using a modelling technique called GRASP (Generalised Regression Analysis and Spatial Prediction) data from vegetation surveys at specific points along the roadway were combined with environmental data to generate a map that predicts total weed cover for all the roadsides in the region.

Using the spatial modelling techniques, it is also possible to map the expected distribution of a specific weed species. "Heidi McGlone (Environment Waikato) conducted a survey to record the presence and absence of common pampas (*Cortaderia selloana*), at sites 3 km apart along most of the state highway network in the Waikato Region," said Jake. "The results were used to produce a map that predicts the probability of common pampas being present at any site in the region." These predictions can be a useful tool for weed management. For example, the map for common pampas identifies high-density areas of the weed, where the planting of native ground cover plants is likely to be a more cost-effective technique for controlling the spread of pampas than using large amounts of herbicide.

"We have also used the same techniques to study native plant diversity along roadsides," explained Jake. The method can be applied equally well to studying other road characteristics such as traffic safety, pollutants and traffic density.

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