



Wise Up To Weeds!



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Wild Ginger Affects Some Forest Processes

The dense patches of wild ginger commonly seen in native forests of Northern New Zealand can cover up to one hectare and often exclude most other ground cover plants.

Peter Williams (Landcare Research, Nelson), Chris Winks (Landcare Research, Mt Albert) and Wim Rijkse (Landcare Research, Hamilton) have been investigating the impact these invasions have on forest ecosystem processes by studying areas of sparse and dense wild ginger in two conifer-broadleaved forests near Opononi and Whangarei.

"To see if wild ginger is having an impact on these forests, we measured a whole host of factors related to the structure,

species composition and regeneration of the plant community," explained Peter. "We found the most important difference between areas of sparse and dense wild ginger related to the density and species of woody seedlings." The density of woody seedlings was significantly lower in stands of dense wild ginger. These areas also tended to have a sparse sub-canopy layer and fewer saplings when compared with areas that were not badly infested with the weed.

"We also found the number of different woody seedling species was lower in areas invaded by wild ginger," related Peter. "Interestingly, the most common woody seedlings to poke their heads through infestations of the weed were species with large seeds such as karaka (*Corynocarpus*

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Simon Fowler emptying a litter fall trap above wild ginger.

Weed Ecology Workshops

Earlier this year Landcare Research ran two very successful weed ecology workshops, one in Auckland in February and the other at Lincoln in April. The workshops were a new venture for us and proved popular with nearly 140 people participating overall. Following very positive feedback from those who attended, we will be offering more workshops covering weed ecology research and issues, in the 2003/2004 financial year. For more information or to register your interest in attending, see the 'training opportunities flyer' with the May issue of **What's New in Biological Control of Weeds?**, or contact Lynley Hayes hayesl@landcareresearch.co.nz, (03) 325 6701 ext 3808 or Alison Gianotti gianottia@landcareresearch.co.nz, (09) 815 4200 ext 7084.

New Zealand are great dispersers of native seeds (superheros) or dispersers of weed seeds (villains).

The silvereve (*Zosterops lateralis*), also called waxeye or white-eye, emigrated from Australia in the 1850s. They are not fussy diners, and eat insects and nectar as well as fruit.

"The effectiveness of a seed disperser depends on the quantity and quality of seed dispersed," Margaret explained. "Silvereys seem to be very effective when it comes to the quantity of seed dispersed." Fruit is an important part of their diet and they are partial to many different species. Silvereys are capable of swallowing small fruit (<10 mm diameter) whole, ingesting the seeds with the fruit. "Studies have



Wild ginger in flower

laevigatus), kohekohe (*Dysoxylum spectabile*) and nikau (*Rhopalostylis sapida*)." This was somewhat surprising, since these species were a very small component of the seed rain (the seeds falling onto the forest floor). This was mostly made up of species with small seeds such as *Coprosma* spp. and red mapou/matipo (*Myrsine australis*). "The ability of seedlings from large-seeded species to establish in dense wild ginger more readily than smaller seeded species probably reflects the trend for large seeds to be associated with shade tolerance," explained Peter. "The changes we have recorded for woody seedlings in areas with dense wild ginger suggest forest successional pathways are likely to be affected so a different forest canopy may result, compared with places where wild ginger is sparse."

"We were also interested to see if large infestations of wild ginger were having an effect on nutrient cycling in the two forests we studied," said Peter. "We measured the characteristics and the chemical composition of the soil and litter fall in areas of dense and sparse

wild ginger, but we were unable to detect any differences that could be attributed to invasion by the weed." So, although dense crowns and rhizomes represent a substantial pool of nutrients on the forest floor, this study did not find any evidence to suggest wild ginger is affecting ecosystem nutrient cycling.

This study was funded by the Foundation for Research, Science and Technology.

For the full story see: Williams, P.A.; Winks, C.; Rijkse, W. in press **Forest processes in the presence of wild ginger (*Hedygium gardnerianum*)**. *New Zealand Journal of Ecology*.

The Silvereve as a Seed Disperser; Superhero or Villain?

Using results from her PhD research, Margaret Stanley, Landcare Research, Mt Albert, has recently been exploring whether silvereys in

shown that silvereyes usually swallow 5–15 small fruit in one sitting, depending on the size of the fruit,” reported Margaret. “With larger fruit, silvereyes try to avoid the seeds, although they are not always successful, as we found viable seeds of poroporo (*Solanum aviculare*) in faecal samples.” Silvereyes are abundant and widespread throughout New Zealand, travel in flocks, and regularly visit the same feeding spot. All these factors greatly increase the potential for seed transport.

Silvereyes are also masters where the quality of seed dispersal is concerned. “The results from my PhD research and other studies show that silvereyes defecate viable seed, and in one case passage through the gut actually increased the ability of seed to germinate!” exclaimed Margaret. Silvereyes are also fast movers, and spend much less time in one feeding spot (<1 minute), than it takes for seed to pass through their gut (up to 30 minutes). “This greatly increases the chance that dispersed seed will germinate and survive, since it is likely to be dispersed some distance away from the parent plant.”

So, silvereyes are superheros at seed dispersal. Unfortunately, this also paints them as villains when it comes to transporting weedy species. There are records of at least 19 weeds being dispersed by silvereyes (see text in box). Margaret’s research found silvereyes passed viable seeds of inkweed (*Phytolacca octandra*). “I would say silvereyes have the potential to disperse all fleshy fruited weeds with fruit smaller than 10 mm in diameter.” Since they also have a habit of accidentally ingesting seeds while pecking at larger fruit, other species

with large fruit and small seeds, such as woolly nightshade (*Solanum mauritianum*), could also be dispersed. Silvereyes are also adventurous eaters and are not put off by new types of food or levels of toxin. They also regularly travel between landscape types, greatly increasing the chance of weeds spreading into native areas.

“Silvereyes are probably spreading most of our small fleshy fruited weeds



at the same time as dispersing native fleshy fruited plants,” concluded Margaret. “They are the Jeckylls and Hydes of the bird world!”

Weedy fruit eaten by silvereyes

- Acacia (incl. *A. dealbata*, *A. melanoxylon*)
- African boxthorn (*Lycium ferocissimum*)
- Banana passionfruit (*Passiflora* spp.)
- Barberry (*Berberis glaucocarpa*)
- Blackberry (*Rubus fruticosus*)
- Black nightshade (*Solanum nigrum*)
- Bridal creeper/smilax (*Asparagus asparagoides*)
- Chinese privet (*Ligustrum sinense*)
- Christmas berry/peppercorn (*Schinus terebinthifolius* & *S. molle*)
- Elder (*Sambucus nigra*)
- Flowering currant (*Ribes sanguineum*)
- Hawthorn (*Crataegus monogyna*)
- Himalayan honeysuckle (*Leycesteria formosa*)
- Holly (*Ilex aquifolium*)
- Inkweed (*Phytolacca octandra*)
- Japanese honeysuckle (*Lonicera japonica*)
- Lantana (*Lantana camara*)
- Strawberry tree (*Arbutus unedo*)
- Tree privet (*Ligustrum lucidum*)

Hawkweeds Invade the High Country

Hawkweeds (*Hieracium* species) have the potential to alter native tussock grassland communities significantly.

A team of researchers led by Colin Meurk (Landcare Research, Lincoln) have recently completed a 10-year study documenting vegetation changes in the tussock grasslands of the Mackenzie Basin in the South Island. They established study sites in areas dominated by fescue tussock (*Festuca novae-zelandiae*), silver tussock (*Poa cita*), red tussock (*Chionochloa rubra*) and snow tussock (*C. rigida*). "Our experiment was designed so we could assess the effects of sheep and/or rabbit grazing," Colin said, "and we were also particularly interested in changes in *Hieracium* cover." The complex nature of these tussock grassland systems makes it difficult to draw precise conclusions. However, some definite trends were evident.

The most striking differences over the study period (1990–2000) occurred in the fescue and silver tussock grasslands. "Areas of fescue grassland where mouse-ear hawkweed (*H. pilosella*) was initially a minor component showed a marked increase in the weed as well as a corresponding decrease in a host of native species by the year 2000,"

related Colin. This happened regardless of sheep and/or rabbit grazing. One ray of hope was provided by the recovery of a few native shrubs, such as New Zealand broom (*Carmichaelia* species) and matagouri (*Discaria toumatou*) in areas with low grazing pressure. Colin believes this represents the start of a very slow succession to canopy-forming native shrubland.

The most dramatic differences in the silver tussock grasslands occurred in areas either totally ungrazed or subject only to rabbit grazing. Here silver tussock declined in response to the expansion of the sheep-palatable exotic plants, cocksfoot (*Dactylis glomerata*) and viper's bugloss (*Echium vulgare*). "We attribute the dramatic increase in exotic species following reduced grazing, to the high natural fertility of these sites, which has been further enhanced by top-dressing," concluded Colin.

The good news is that the vegetation composition of red and snow tussock grasslands was generally stable over the study period, and these grasslands appear to be more resistant to invasion by hawkweeds. "However, mouse-ear hawkweed did increase between the tussocks and king devil hawkweed (*H. praealtum*), with its

more upright form, grew better without grazing," related Colin. "Successful biological control of hawkweeds would be a very useful management tool for improving the biodiversity of these grasslands, especially if it was able to alter the competitive balance in favour of smaller native herbs."

"Overall, our results suggest removal of sheep and rabbit grazing in fescue, snow and red tussock grassland offers the best opportunity for gradual regeneration of the native tussocks, shrubs and palatable herbs, provided woody weeds can be controlled," Colin concluded. "Conserving high fertility silver tussock grasslands will require careful grazing management to combat aggressive exotic weeds."

This study was funded by the Foundation for Research, Science and Technology and the Department of Conservation.

For more information see:

Meurk, C.D.; Walker, S.; Gibson, R. S.; Espie, P. 2002: **Changes in vegetation states in grazed and ungrazed Mackenzie Basin grasslands, New Zealand, 1990-2000.** *New Zealand Journal of Ecology* 26 (2): 95–106.

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