#113

AUG 2025

BIOECONOMY SCIENCE INSTITUTE

Manaaki Whenua Landcare Research

Weed Biocontrol

WHAT'S NEW?

Contents

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COVER IMAGE:

Adult African tulip tree beetle

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Register now for ISBCW 2026!

Next year, the Bioeconomy Science Institute will be hosting the International Symposium on Biological Control of Weeds (ISBCW) from 8–13 March 2026 in Rotorua. This quadrennial event is the premier gathering for weed biocontrol researchers and practitioners worldwide. The symposium provides an important opportunity for participants to exchange updates on weed biocontrol research and work programmes, renew ties of friendship, develop new collaborations, and discuss the future of the biological control of weeds.

Full and day registration is now open with standard rates closing on 31 Dec 2025 (https://isbcw-rotorua.com/registration/). Funding is available to support attendance – please see the link here: https://isbcw-rotorua.com/support/

The programme lineup includes a variety of talks, workshops, and posters, with keynote speakers and other leading experts from across the globe sharing their latest work. There are still some spots available if you wish to present on your research or practical experience and projects with biocontrol. Abstracts and workshop submissions close 30 September 2025.

There will be an opportunity to participate in local field trips that showcase weed biocontrol in New Zealand, while exploring our stunning landscapes. A range of social events are on offer, including a welcome dinner and cultural performance at Te Puia, an international beverage evening, a banquet dinner and tour at Hobbiton, and the symposium's grand finale dinner. There will be a post symposium trip to Rarotonga, the largest of the Cook Islands, which will offer a unique opportunity to learn more about the pivotal role of biocontrol in the Pacific.

To find out more about the event and stay up to date with the latest news, please sign up on the ISBCW Rotorua website (http://www.isbcw-rotorua.com/#register). We also invite you to share information about this symposium widely with those who may be interested.

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Scan the QR code to sign up to ISBCW updates

African tulip tree beetle exceeds early expectations in Rarotonga

In mid-June, two Bioeconomy Science Institute, Manaaki Whenua Group staff, Quentin Paynter and Lynley Hayes, travelled to Rarotonga to monitor the establishment and spread of the African tulip tree beetle (*Paradibolia coerulea*). In collaboration with the Cook Islands National Environment Service, Ministry of Agriculture and the Te Ipukurea Society, this beetle was introduced there in 2021 to control the African tulip tree (*Spathodea campanulata*). This invasive tree is considered one of the world's 100 worst invasive species and is widespread in Rarotonga. Biocontrol of African tulip tree is one of the flagship projects of the Natural Enemies – Natural Solutions (NENS) programme led by the Bioeconomy Science Institute, Manaaki Whenua Group which sits under the Pacific Regional Invasive Species Management Support Service.

After conducting their monitoring checks, Quentin and Lynley were delighted to report that the African tulip tree beetle is exceeding their expectations. Signs of the beetles were found at all five release sites, with significantly more damage than in June 2024 when the release sites were last monitored. Every size of the African tulip tree, from small plants to large trees, in the sun and the shade, are being attacked. Moderate damage was common on all plants inspected up to 500m away from the release point. The beetles are dispersing well as the NENS team found signs of them on most plants checked all around the island, even on isolated plants around Avarua, the capital of the Cook Islands. Given most of the beetle releases were only made in 2022, their performance at this early stage bodes extremely well for successful biocontrol of African tulip tree.

Lynley highlighted that "the Cook Islands is leading the way with using natural enemies to control African tulip tree in the Pacific. The release of the African tulip tree beetle in Rarotonga in 2021 was a world first." The extent of the problem only became apparent in Rarotonga following some remote sensing work done in 2023 which revealed the infestation to be much more extensive than previously thought. "We were shocked to see the extent of African tulip tree spread across the entire island" said Paul Peterson, a Bioeconomy Science Institute, Manaaki Whenua Group senior technician who led the work in Rarotonga. Paul, Andrew McMillan and Ben Jolly (all from the Manaaki Whenua Group) used satellite, aerial and drone imagery to estimate that 1.6% of Rarotonga's land area was infested with the African tulip tree. This work is discussed in more detail in Issue 106.

Since controlling African tulip tree using herbicides or mechanical means is expensive and labour intensive, biocontrol was sought as a solution. With the help of Rhodes University in South Africa the African tulip tree beetle was introduced to Rarotonga from Ghana. Both the adults and larvae damage the African tulip tree. As adults, this flea beetle feeds on the upper leaf surface of the African tulip trees, removing leaf material of the host plant and leaving feeding holes. When disturbed, the beetles are capable of rapidly jumping, hence the name flea beetle. The adults lay eggs on the leaf surface, and the emerging larvae burrow into the leaf and mine within the leaf structure. They remove large amounts of leaf tissue without breaking the epidermal layers of the leaf.

The Bioeconomy Science Institute, Manaaki Whenua Group is working with Fiji, Samoa, Tonga and Vanuatu who all hope to be able to release the beetle before the end of 2025. Tonga is currently rearing the beetles, and Fiji is also preparing to start rearing the beetles once the import permit is approved. In Samoa, importation and rearing will begin once an upgrade to facilities is finished in September.

Along with the African tulip tree beetle, the African tulip mite (*Colomerus spathodeae*) is another biocontrol agent for the African tulip tree. It was released in 2016 in Rarotonga and has established well in the Cook Islands. This mite forms galls on the new leaves and shoots of the African tulip tree, diverting nutrients that the tree would otherwise use for growth and reproduction. Galling ranges from slight to heavy with some significant damage to growing tips of the African tulip trees observed.

To complement the damage from the African tulip tree beetle and mite, Rhodes University is currently working to explore the suitability of a new pod and shoot-feeding moth found in Cameroon for this invasive tree. All in all, the biocontrol programme for African tulip tree is going very well.

This work was initially supported by the Managing Invasive Species for Climate Change Adaptation in the Pacific project, funded by New Zealand's Ministry of Foreign Affairs and Trade (NZMFAT). Since July 2024 it has been supported by the Restoring Island Resilience project, also funded by NZMFAT, and administered by the Secretariat of the Pacific Regional Environment Programme as part of the Pacific Regional Invasive Species Management Support Service.

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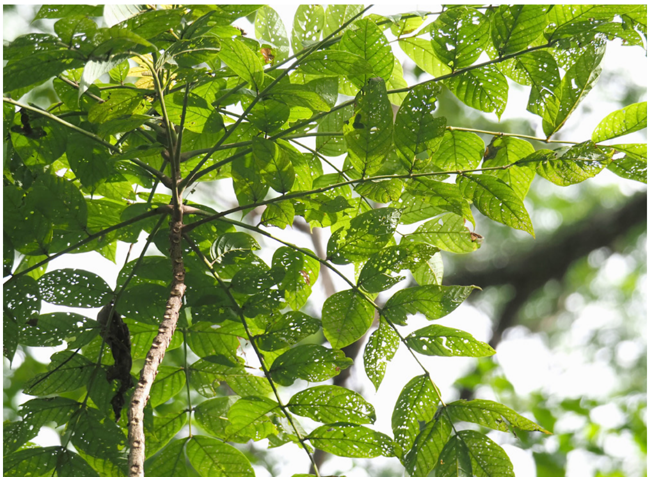


Adult beetles feeding in the canopy

It's time to tackle lagarosiphon

More than 10 years after first proposing to target lagarosiphon (*Lagarosiphon major*) for biocontrol, the Bioeconomy Science Institute, Manaaki Whenua Group has finally started preparing a release application for the Environmental Protection Authority (EPA). The candidate agent is a leaf-mining fly (*Hydrellia lagarosiphon*) whose larvae mine the leaves of lagarosiphon, particularly around the shoot tips, reducing photosynthetic capacity and biomass accumulation.

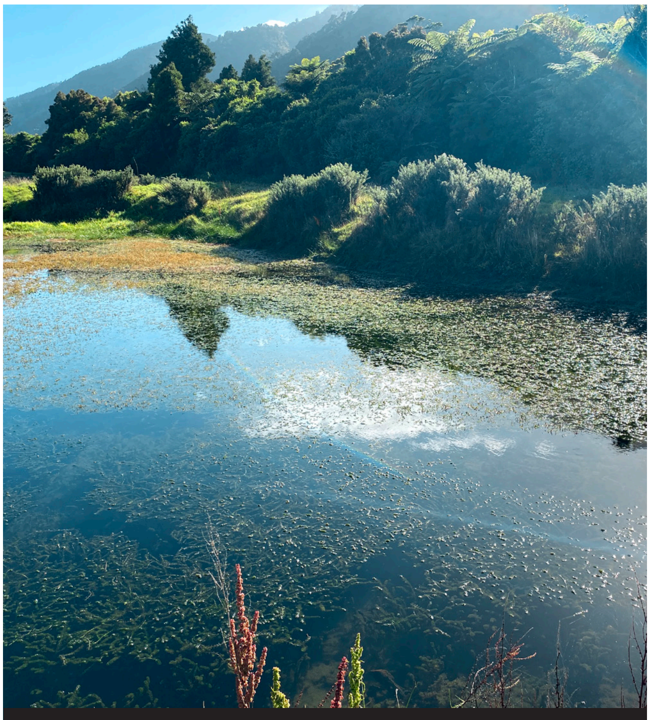
Lagarosiphon is a rooted, perennial, submerged aquatic macrophyte native to southern Africa that has invaded other regions of the world, most notably Ireland and New Zealand (NZ), but also several other European countries and Australia. Comonly known as oxygen weed, lagarosiphon was spread around the world as an aquarium plant, although large infestations cause local deoxygenation of water through changing water chemistry. In NZ, lagarosiphon forms dense and extensive underwater mats in lakes and slow-flowing rivers, outcompeting native aquatic plant species, disrupting water flows, increasing the risk of flooding, interfering with recreational activities such as fishing and boating, and reducing the aesthetic value of NZ's beautiful lakes. Lagarosiphon is also a significant pest in our hydro lakes in the South Island as plants can block power generation equipment by clogging intakes.

Lagarosiphon is dioecious (male and female flowers are on separate plants), and only female plants occur outside of the native range. Hence, reproduction is exclusively vegetative – plants spread via broken stem fragments which produce roots, giving rise to new plants and new infestations.

Currently available control methods in NZ include herbicides (mainly Diquat), mechanical and suction dredging and the application of weed matting to provide a shading effect. However, all of these have several disadvantages – they are costly, time-consuming, labour intensive, potentially have adverse environmental impacts and only provide a short-term solution. Biocontrol offers the potential for sustained long-term management of lagarosiphon in NZ with low environmental risk. The *Hydrellia* leaf-mining fly proposed for release is multivoltine, which means it has multiple generations per year, with many overlapping generations throughout the warmer months. Female flies lay eggs singly or in small clusters, primarily on emergent shoot tips of lagarosiphon. Newly hatched larvae initially feed on the small leaflets in the crown of shoot tips, before moving down the shoots to mine older leaves.

While biocontrol of floating aquatic macrophytes such as water lettuce (*Pistia stratiotes*) and salvinia (*Salvinia molesta*) have been highly successful in several regions of the world, classical biocontrol of submerged aquatic macrophytes, such as lagarosiphon, has only been attempted three times with variable success of the first two programmes initiated, and the third is too early to assess. *Hydrilla* (*Hydrilla verticillata*) was targeted for biocontrol in the USA where the weed is one of their most problematic and widespread weeds. Four insect biocontrol agents were released (two weevils and two leaf-mining flies in the *Hydrellia* genus). Lack of establishment, climate and biotype mismatches and other factors hampered successful control. Another leaf-mining fly in the *Hydrellia* genus was released as a biocontrol against egeria/dense water weed (*Elodea densa* synonym *Egeria densa*) in South Africa, and while there is some visible impact on the plants, the fly is heavily parasitised by local parasitoids specialising in native congeneric *Hydrellia* spp. Parasitism of biocontrol agents can be a major impediment to achieving population densities required to significantly reduce target weed populations. The third programme is against cabomba (*Cabomba caroliniana*) with a weevil (*Hydrotimetes natans*) released in Australia in 2023.

When these concerns were highlighted, we embarked on a research project to fully evaluate the feasibility of using biocontrol as a management tool for lagarosiphon in NZ and its potential for success. A PhD student, Nompumelelo Baso, from Rhodes University in South Africa led several aspects of the research. We tested the Enemy Release Hypothesis (ERH) by comparing plant biomass, surface cover, and aquatic plant diversity in water bodies with lagarosiphon in the native range of South Africa, where the candidate biocontrol agent is present, and in NZ, where lagarosiphon was presumed to not have any significant natural enemies. The aim of this research



Lagarosiphon invading a lake in the South Island was to provide insights into whether lagarosiphon is a serious weed here because of a lack of natural enemies to keep it in check, and that this can be reversed using biocontrol. We also conducted surveys throughout the distribution range of the weed in NZ to determine the herbivorous arthropod fauna associated with lagarosiphon in NZ. This aimed to determine the risk of parasitism of the leaf-mining fly, and the presence of any potential natural enemies already damaging the target weed. Additionally, Nompumelelo used MaxEnt Species Distribution models to assess current and future climatic suitability of lagarosiphon in NZ and mechanistic modelling to determine suitability of the NZ climate for establishment of the candidate biocontrol agent. Lastly, she assessed the propensity of female flies to deposit eggs on artificial substrates to test the adaptability of oviposition behaviour in systems where lagarosiphon shoot tips don't reach the water surface.

The research showed that lagarosiphon has higher biomass and cover in NZ compared to the native range and that overall species richness and abundance of aquatic species is reduced in NZ compared to South Africa. Further, feeding damage to lagarosiphon and numbers of herbivores associated with the plant were higher in the native range compared to the invasive range. All these findings are consistent with the ERH, suggesting that biocontrol has the potential to be an effective tool to assist in the management of the weed in NZ.

The NZ surveys of lagarosiphon found a native aquatic moth (*Hygraula nitens*) feeding on and damaging lagarosiphon. This sparked a separate, more intensive study on the moth – more on this in a later issue - and although the damage can be impressive and will likely complement damage from the leaf-mining fly (should it be released), the moth is polyphagous, and thus augmenting its populations could risk higher rates of herbivory on its native host plants, potentially further disrupting native aquatic plant communities already threatened by invasive aquatic weeds. Further, the NZ surveys did not find any similar herbivore species closely related to the candidate agent. This, combined with a knowledge that no *Hydrellia* spp. are associated with submerged aquatic plants in NZ strongly suggest the risk of parasitism of the lagarosiphon leaf-mining fly to be very low. Without specialist parasitoids and predators present in NZ, the leaf-mining fly could reach high population densities capable of causing a decline in lagarosiphon populations.

Species distribution modelling indicated that more than 90% of NZ is suitable for invasion by lagarosiphon (dependent on suitable aquatic habitats), and that climate change will have limited impact on climate suitability for the weed. Interestingly, there was a lack of climatic overlap between the native and invaded ranges, providing evidence for lagarosiphon's adaptability to a wide range of environmental conditions.

Lagarosiphon on a lakebed

Degree-day modelling predicted that the leaf-mining fly could complete between 4.5 and 9.3 generations per year in NZ, dependant on differing climates throughout the weed's distribution range. This suggests the fly could establish well and sustain viable populations in most parts of the country invaded by lagarosiphon. Nompumelelo's research also demonstrated that female flies will lay eggs on artificial substrates if lagarosiphon is below the water surface. Hence, it will be possible to facilitate establishment of the fly in water bodies where plants don't reach the water surface, however this is not the case for many water bodies invaded by lagarosiphon.

All these findings provide convincing evidence that biocontrol of lagarosiphon is worth pursuing. Host range testing of the leaf-mining fly was completed in Ireland in the early 2010s and included representatives of NZ's most closely related native aquatic flora. We now have all the information and data required to build a strong case for release approval for this candidate agent for lagarosiphon. However, prior to submitting the application to the EPA, there is much work to be done on consultation and engagement with stakeholders and Māori, and conducting a full assessment of the economic, environmental and social risks, costs and benefits of biocontrol of lagarosiphon with the leaf-mining fly.

This project is funded by the National Biocontrol Collective and Manaaki Whenua – Bioeconomy Science Institute's Strategic Science Investment Fund of the Ministry for Business and Innovation.

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Spotting trouble early

Every two years, thousands of rural landowners take part in the Survey of Rural Decision Makers (SRDM) – a nationwide effort to understand what's happening on the ground in NZ's food and fibre sector. In the last three rounds of the survey (2019, 2021 & 2023) we have included questions about a particularly thorny issue: weeds of the future.

Weeds cost landowners time and money. Biocontrol can be an effective long-term option to manage weeds. However, biocontrol tends to be applied to weeds that are already widespread because of the high upfront costs of developing a biocontrol programme, which can be up to millions of dollars.

We know that controlling weeds in earlier phases of their invasion can be far more cost effective than waiting for them to become widespread. Can we reconcile this intellectual understanding with the reluctance to invest the high upfront costs needed to develop biocontrol for weeds when their distribution is relatively limited and they can be managed by other means?

Since 2019, the SRDM has included a question asking rural land managers to list weeds on their properties that aren't a big problem yet, but that they expect might require management within the following five years. We wrote about these first results from the 2019 survey in Issue 96. Now, we wanted to examine results from 2021 and 2023 as well to study if there were repeated weeds or trends in the survey responses.

On top of acting as an early-warning system by picking up on weeds that are only starting to become apparent or are spreading into new areas, the survey serves two important purposes in the context of biocontrol: First, it helps us assess whether our current system for prioritising target weeds for biocontrol is fit to identify the weeds that landowners are concerned about. Second, it highlights opportunities for 'repeat' biocontrol programmes, where we could piggy-back on successful efforts overseas using agents that have already been tested and have proved their effectiveness.

One of the best predictors for the success of a biocontrol programme is previous success elsewhere, says Ronny Groenteman, who led this 'Weeds of the Future' study. We have shown previously (Issue 71) that such 'repeat' programmes are significantly cheaper to adapt for New Zealand in comparison to the cost of starting a novel programme that has not been worked on elsewhere.

We have used this knowledge previously when prioritising widespread weeds as biocontrol targets. Here we suggest that this knowledge can help justify the economics of developing biocontrol for weeds that are still a small problem, to avoid letting them get out of hand in the first place.

Interestingly, we were already aware of many of the weeds named in the survey because they have either been targeted with biocontrol already, are current targets for which biocontrol is being actively developed, or have been flagged as future priorities. This suggests the current framework we use for prioritising weed targets for biocontrol successfully identifies most of the weeds that landowners are concerned about. However, many participants continued to name long-established weeds like gorse or thistles as 'weeds of the future'. That these weeds get mentioned repeatedly in successive

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Oxeye daisy

iterations of the survey suggests that they may be still popping up in places where they have not previously been a problem.

While many of the weeds mentioned by survey respondents were the 'same old' widespread weeds, some of the named emerging weeds have not been considered for biocontrol in New Zealand yet. Dock (*Rumex* spp.), for instance, was the most frequently named herbaceous weed not currently on the list for biocontrol, with nearly 500 mentions across the three survey repetitions. It is a pasture weed that livestock tend to avoid, and it can quickly take over areas, especially in poorly drained soils. "It has already been successfully targeted by biocontrol in Australia," says Luise Schulte, who analysed the data and trends from the survey, "unfortunately, this might still be a tricky target, as we have native dock species in New Zealand. It means we will have to run additional testing to confirm the agents used in Australia are safe, or we would have to start from square one to look for novel agents. Both scenarios bring up the cost of a programme".

Another standout was prickly pear cactus (*Opuntia* spp.), the most frequently named 'off the list' woody weed. While it's not yet a widespread weed here, and was mainly mentioned by landowners in northern regions, it has a notorious history overseas. In Australia, prickly pear cactus once spread over millions of hectares before being brought under control in the 1920s by introducing several agents, most importantly the cactus moth (*Cactoblastis cactorum*) – to date one of the most well-known biocontrol successes globally. "The warming climate might speed up the spread of prickly pear further south in New Zealand," says Luise, "so it's definitely a low hanging fruit worth looking into as a biocontrol target here."

Wild carrot (*Daucus carota*), oxeye daisy (*Leucanthemum vulgare*), and burdock (*Arctium* spp.) were also mentioned as possible future concerns. Some of these may prove tricky to manage – for example, wild carrot's close relationship to cultivated carrots might limit the biocontrol options – but others, like oxeye daisy, could be explored further. A root moth has been released against oxeye daisy in 2023 in Canada and is currently under investigation for release in Australia. With a relatively modest investment non-target species of importance to NZ could be included in testing already taking place overseas, saving us the cost of running a complete set of tests here.

While the survey data has its flaws – people might list weeds that bother them currently instead of their predicted future weeds, and common plant names can be vague or used inconsistently – the survey serves to shine a light on emerging weeds that might otherwise be missed by existing prioritisation processes. Importantly, it lets researchers track changes over time and spot early warning signs.

Prickly pear after attack by *Cactoblastis cactorum*

The team plans to continue including the 'weeds of the future' question in future surveys, and hopes to keep building the case for strategic, cost-effective biocontrol responses. "The number of weed species New Zealand might appear overwhelming, says Ronny, "yet, with a bit more forward-looking planning, and investment that is modest in the greater scheme of things, we can use biocontrol to nip in the bud some clear suspects that have demonstrated their potential to become big problems elsewhere. We can get ahead of the game".

The survey of 2025 is currently under way. You can find more information about the Survey of Rural Decision Makers and past results here: www.landcareresearch.co.nz/SRDM

FURTHER READING

Schulte L, Groenteman R, Fowler S 2025. Identifying emerging weeds as targets for biocontrol in New Zealand: What can we learn from the Survey of Rural Decision Makers? New Zealand Journal of Agricultural Research 68(7): 2456–2475. DOI: 10.1080/00288233.2025.2527676

This study is part of MWLR's Beating Weeds and the Environmental Preferences Programmes, both funded by the Ministry of Business, Innovation and Employment's Strategic Science Investment Fund.

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Survey of Rural Decision Makers

Spring Activities

Most biocontrol agents become active during spring, making it a busy time of year to check release sites and move agents around.

Broom shoot moth ***(Agonopterix assimilella)***

- We are unsure if this moth has managed to successfully establish in New Zealand, so we will be interested to hear if anyone can find any sign of them. Late spring is the best time to check release sites: look for the caterpillars' feeding shelters made by webbing twigs together. Small caterpillars are dark reddish-brown and turn dark green as they get older.

Darwin's barberry weevil ***(Berberidicola exaratus)***

- Establishment has been confirmed in Southland and the Greater Wellington region. High densities were found only in Southland where the weevils are currently being redistributed to new sites.
- Beat plants at release sites later in the spring to see if any of the small (3–4 mm long), blackish adults can be found. Also examine the fruits for signs of puncturing. Please let us know what you find.

Giant reed gall wasp ***(Tetramesa romana)***

- We don't know if the gall wasp is successfully establishing in New Zealand, so we will be interested to hear about updates from release sites. Look for swellings on the stems caused by the gall wasps. These look like small corn cobs on large, vigorous stems, or like broadened, deformed shoot tips when side shoots are attacked. The galls often have small, circular exit holes made by emerging wasps.
- It will probably be too soon to consider harvesting and redistribution if you do see evidence of the gall wasp establishing.

Honshu white admiral ***(Limenitis glorifica)***

- Look for the adult butterflies at release sites from late spring. Look also for pale yellow eggs laid singly on the upper and lower surfaces of the leaves, and for the caterpillars. When small, the caterpillars are brown and found at the tips of leaves, where they construct pontoon-like extensions to the mid-rib. As they grow, they turn green, with spiky, brown, horn-like protrusions.
- Unless you find lots of caterpillars, don't consider harvesting and redistribution activities. You will need to aim to shift at least 1,000 caterpillars to start new sites. The butterflies are strong fliers and are likely to disperse quite rapidly without any assistance.

Lantana leaf rust ***(Prospodium tuberculatum)***

- Check sites where the leaf rust has been released, especially after a period of warm, wet weather. Look for yellowing on the leaves, with corresponding brown pustules and spores, rather like small coffee granules. A hand lens may be needed to see the symptoms during early stages of infection. If the rust is well established, then extensive defoliation may be obvious.
- Once established, this rust is likely to be readily dispersed by the wind. If redistribution efforts are needed, the best method is to harvest infected leaves, wash them in water to make a spore solution, and then apply this to plants.

Moth plant beetle ***(Freudeita cupripennis)***

- This beetle has established in Auckland, Bay of Plenty, Northland and Waikato. Look for adult beetles on the foliage and stems of moth plant. The adults are about 10 mm long with metallic orangey-red elytra (wings cases) and a black head, thorax, and legs. The larvae feed on the roots of moth plant so you won't find them easily.
- The beetles can be harvested if you find them in good numbers. Aim to shift at least 100 beetles to sites that are not yet infested with the beetle.

Privet lace bug ***(Leptoypha hospita)***

- Examine the undersides of leaves for the adults and nymphs, especially leaves showing signs of bleaching.
- If large numbers are found, cut infested leaf material and put it in chilly bin or large paper rubbish bag, and tie or wedge this material into Chinese privet at new sites. Aim to shift at least 1,000 individuals to each new site.

Ragwort plume moth ***(Platyptilia isodactyla)***

- October is the best time to check release sites for caterpillars, so look for plants with wilted, blackened or blemished shoots with holes, and an accumulation of debris, frass or silken webbing. Pull back the leaves at the crown of damaged plants to look for large, hairy, green larvae and pupae. Also check where the leaves join bolting stems for holes and frass. Don't get confused by larvae of the blue stem borer (*Patagoniodes farinaria*), which look similar to plume moth larvae until they develop their distinctive bluish coloration.
- If the moth is present in good numbers, the best time to shift it around is in late spring. Dig up damaged plants, roots and all. Pupae may be in the surrounding soil so retain as much as possible. Shift at least 50–100 plants, but the more the better. Place one or two infested plants beside a healthy ragwort plant so that any caterpillars can crawl across.

Tradescantia leaf, stem and tip beetles
(Neolema ogloblini, Lema basicostata, N. abbreviata)

- Look for the distinctive feeding damage of the adult beetles and larvae on the stems and leaves of tradescantia.

For the leaf and tip beetles, look for the external-feeding larvae which have a distinctive faecal shield on their backs.

- If you find them in good numbers, aim to collect and shift at least 100–200 beetles using a suction device or a small net. For stem beetles it might be easier to harvest infested material and wedge this into tradescantia at new sites (but make sure you have an exemption from MPI that allows you to do this).

Tradescantia yellow leaf spot *(Kordyana brasiliensis)*

- The smut fungus is now well established in many parts of the North Island. Look for the distinctive yellow spots on the upper surface of the leaves with corresponding white spots underneath, especially after wet, humid weather. Feel free to take a photo to send to us for confirmation if you are unsure, as occasionally other pathogens do damage tradescantia leaves.
- The fungus is likely to disperse readily via spores on air currents. If human-assisted distribution is needed in the future, again you will need permission from MPI to propagate and transport tradescantia plants. These plants can then be put out at sites where the fungus is present until they show signs of infection, and then planted out at new sites.

Tutsan beetle *(Chrysolina abchasica)*

- It is early days for most tutsan beetle release sites, but the best time to look for this agent is spring through to mid-summer. Look for leaves with notched edges or whole leaves that have been eaten away. The iridescent purple adults are around 10–15 mm in size, but they spend most of the day hiding away so the damage may be easier to spot. Look also for the creamy-coloured larvae, which are often on the underside of the leaves. They turn bright green just before they pupate.

Tutsan moth *(Lathronympha strigana)*

- We don't yet know if the tutsan moth has established so are keen to hear if anyone can find them. Look for the small, orange adults flying about flowering tutsan plants. They have a similar look and corkscrew flight pattern to the gorse pod moth (*Cydia succedana*). Look also for fruits infested with the larvae.

Other agents

You might also need to check or distribute the following this spring:

- boneseed leafroller (*Tortrix* s.l. sp. *chrysanthemoides*)
- broom gall mites (*Aceria genistae*)
- broom leaf beetle (*Gonioctena olivacea*)
- gorse soft shoot moth (*Agonopterix ulicetella*)
- gorse thrips (*Sericothrips staphylinus*)

Privet lace bug

- gorse colonial hard shoot moth (*Pempelia genistella*)
- green thistle beetle (*Cassida rubiginosa*).

National Assessment Protocol

For those taking part in the National Assessment Protocol, spring is the appropriate time to check for establishment and/or to assess population damage levels for the species listed in the table below. You can find out more information about the protocol and instructions for each agent at: www.landcareresearch.co.nz/assets/Discover-Our-Research/Biosecurity/Biocontrol-ecology-of-weeds/2022/guidelines-and-techniques/National-assessment-protocol-specific-guidelines.pdf

Target	When	Agents
Broom	Oct–Nov Oct–Nov Sept–Oct Aug–Sept	Leaf beetle (*Gonioctena olivacea*) Psyllid (*Arytainilla spartiophila*) Shootmoth (*Agonopterix assimilella*) Twig miner (*Leucoptera spartifoliella*)
Lantana	Oct–Nov (or March–May)	Blister rust (*Puccinia lantanae*) Leaf rust (*Prospodium tuberculatum*)
Tradescantia	Nov–April Anytime	Leaf beetle (*Neolema ogloblini*) Stem beetle (*Lema basicostata*) Tip beetle (*Neolema abbreviata*) Yellow leaf spot fungus (*Kordyana brasiliensis*)

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Who's Who in Biological Control of Weeds?

Alligator weed beetle (*Agasicles hygrophila*)	Foliage feeder, common, often provides excellent control on static water bodies.
Alligator weed beetle (*Disonycha argentinensis*)	Foliage feeder, released widely in the early 1980s, failed to establish.
Alligator weed moth (*Macrorrhinia endonephele*)	Stem borer, common in some areas, can provide excellent control on static water bodies.
Blackberry rust (*Phragmidium violaceum*)	Leaf rust fungus, self-introduced, common in areas where susceptible plants occur, can be damaging but many plants are resistant.
Boneseed leaf roller (*Tortrix* s.l. sp. "*chrysanthemoides*")	Foliage feeder, established and quite common at some North Island (NI) sites but no significant damage yet, limited by predation and parasitism.
Bridal creeper rust (*Puccinia myrsiphylli*)	Rust fungus, self-introduced, first noticed in 2005, widespread and providing good control.
Broom gall mite (*Aceria genistae*)	Gall former, becoming widespread in some regions, beginning to cause extensive damage to broom at many sites, especially in the South Island (SI).
Broom leaf beetle (*Gonioctena olivacea*)	Foliage feeder, establishment confirmed at sites in both islands but not yet common, impact unknown.
Broom psyllid (*Arytainilla spartiophila*)	Sap sucker, becoming common, some damaging outbreaks seen, but may be limited by predation, impact unknown.
Broom seed beetle (*Bruchidius villosus*)	Seed feeder, common in many areas, now destroying up to 84% of seeds at older release sites.
Broom shoot moth (*Agonopterix assimilella*)	Foliage feeder, recently released at limited sites as difficult to rear, appears to be established in low numbers at perhaps 3 sites.
Broom twig miner (*Leucoptera spartifoliella*)	Stem miner, self-introduced, common, often causes obvious damage.
Californian thistle flea beetle (*Altica carduorum*)	Foliage feeder, released widely during the early 1990s, failed to establish.
Californian thistle gall fly (*Urophora cardui*)	Gall former, extremely rare as galls tend to be eaten by sheep, impact unknown.
Californian thistle leaf beetle (*Lema cyanella*)	Foliage feeder, only established at one site near Auckland, where it causes obvious damage and from which it is dispersing; also recently reported in Hawke's Bay.
Californian thistle rust (*Puccinia punctiformis*)	Systemic rust fungus, self-introduced, common, damage usually not widespread.
Californian thistle stem miner (*Ceratapion onopordi*)	Stem miner, attacks a range of thistles, released at limited sites as difficult to rear, establishment success unknown.
Green thistle beetle (*Cassida rubiginosa*)	Foliage feeder, attacks a range of thistles, released widely and some damaging outbreaks beginning to occur.
Chilean needle grass rust (*Uromyces pencanus*)	Rust fungus, released at SI sites in Canterbury and Marlborough in 2024, only SI populations likely to be susceptible for strain approved release.
Darwin's barberry flower bud weevil (*Anthonomus kuscheli*)	Flower bud feeder, first approval in 2012 expired, reapplication approved in 2025. Releases dependent on funding for recollections.
Darwin's barberry rust (*Puccinia berberidis-darwinii*)	EPA approval received in 2025, release planned for spring 2025.
Darwin's barberry seed weevil (*Berberidicola exaratus*)	Seed feeder, releases began in 2015, difficult to rear so widespread releases will begin once harvesting from field is possible, establishment confirmed in Southland.
Field horsetail weevil (*Grypus equiseti*)	Foliage and rhizome feeder, field releases began in 2017, establishment is looking likely, further releases ongoing.
Giant reed gall wasp (*Tetramesa romana*)	Stem galler, field releases began in late 2017, establishment not yet confirmed.
Giant reed scale (*Rhizaspidiotus donacis*)	Sap sucker, approved for release in 2017, first field releases made early in 2021, establishment not yet confirmed.
Gorse colonial hard shoot moth (*Pempelia genistella*)	Foliage feeder, from limited releases widely established only in Canterbury, impact unknown, but obvious damage seen at several sites.
Gorse hard shoot moth (*Scythris grandipennis*)	Foliage feeder, failed to establish from a small number released at one site, no further releases planned due to rearing difficulties.
Gorse pod moth (*Cydia succedana*)	Seed feeder, common in many areas, can destroy many seeds in spring but not as effective in autumn, not well synchronised with gorse flowering in some areas.
Gorse seed weevil (*Exapion ulicis*)	Seed feeder, common, destroys many seeds in spring.
Gorse soft shoot moth (*Agonopterix umbellana*)	Foliage feeder, common in parts of the SI with some impressive outbreaks seen, well established and becoming widespread in the North Island, impact unknown.
Gorse spider mite (*Tetranychus lintearius*)	Sap sucker, common, often causes obvious damage, but ability to persist is limited by predation.
Gorse stem miner (*Anisoplaca pytoptera*)	Stem miner, native, common in the SI, often causes obvious damage, lemon tree borer has similar impact in the NI.
Gorse thrips (*Sericothrips staphylinus*)	Sap sucker, common in many areas, impact unknown, likely limited by predation.
Heather beetle (*Lochmaea suturalis*)	Foliage feeder, has virtually eliminated heather from all of the 60,000+ ha infestation at Tongariro National Park and Rotorua since 1996.
Hemlock moth (*Agonopterix alstromeriana*)	Foliage feeder, self-introduced, common, often causes severe damage.
Hieracium crown hover fly (*Cheilosia psilophthalma*)	Crown feeder, released at limited sites as difficult to rear, thought unlikely to have established.
Hieracium gall midge (*Macrolabis pilosellae*)	Gall former, established but spreading slowly in the SI, common near Waiouru, where it has reduced host by 18% over 6 years, very damaging in laboratory trials.
Hieracium gall wasp (*Aulacidea subterminalis*)	Gall former, established and spreading well in the SI but more slowly in the NI, appears to be having minimal impact, although it reduced stolon length in laboratory trials.
Hieracium plume moth (*Oxyptilus pilosellae*)	Foliage feeder, only released at one site due to rearing difficulties, did not establish.
Hieracium root hover fly (*Cheilosia urbana*)	Root feeder, released at limited sites as difficult to rear, thought unlikely to have established.
Hieracium rust (*Puccinia hieracii* var. *piloselloidarum*)	Leaf rust fungus, a combination of deliberately introduced and self-introduced strains are present, common, causes slight damage to some mouse-ear hawkweed, plants vary in susceptibility.

Horehound clearwing moth [*Chamaesphecia mysinformis*] **Horehound plume moth** [*Wheerleria spilodactylus*]	Root feeder, released at limited sites in late 2018, may have established at low levels at one site in the Mackenzie District. Densities too low to confirm establishment. Foliage feeder, released at limited sites in late 2018, initially thought to have established at sites in North Canterbury and Marlborough, causing obvious damage. Later disappeared from these sites, reintroduction planned in late 2023.
Honshu white admiral [*Limenitis glorifica*] **Japanese honeysuckle stem beetle** [*Oberea shirahatai*]	Foliage feeder, field releases began in 2014, already well established across northern Waikato and the Bay of Plenty. Also records from Northland and Wellington. Stem miner, field releases began in 2017, rearing ongoing in preparation for more field releases, establishment confirmed at one site in Canterbury.
Lantana blister rust [*Puccinia lantanae*] **Lantana leaf rust** [*Prospodium tuberculatum*] **Lantana plume moth** [*Lantanophaga pusillidactyla*]	Leaf and stem rust fungus, releases began autumn 2015, does not appear to have established to date. Leaf rust fungus, releases began autumn 2015, established well and causing severe defoliation already at several sites in Northland. Flower feeder, self-introduced, host range, distribution and impact unknown.
Mexican devil weed gall fly [*Procecidochares utilis*] **Mexican devil weed leaf fungus** [*Passalora ageratinae*]	Gall former, common, initially high impact but now reduced considerably by Australian parasitic wasp. Leaf fungus, probably accidentally introduced with gall fly in 1958, common and almost certainly having an impact.
Mist flower fungus [*Entyloma ageratinae*] **Mist flower gall fly** [*Procecidochares alani*]	Leaf smut, common and often causes severe damage. Gall former, common now at many sites, in conjunction with the leaf smut provides excellent control of mist flower.
Moth plant beetle [*Freudeita cupripennis*] **Moth plant rust** [*Puccinia araujiae*]	Root and foliage feeder, field releases began in late 2019 and are ongoing. Established at several sites in the North Island. Rust fungus, approved for release in 2015 but not released yet as waiting for export permit to be granted.
Nodding thistle crown weevil [*Trichosirocalus horridus*] **Nodding thistle gall fly** [*Urophora solstitialis*] **Nodding thistle receptacle weevil** [*Rhinocyllus conicus*]	Root and crown feeder, becoming common on several thistles, often provides excellent control in conjunction with other thistle agents. Seed feeder, becoming common, can help to provide control in conjunction with other thistle agents. Seed feeder, common on several thistles, can help to provide control of nodding thistle in conjunction with other thistle agents.
Old man's beard bud-galling mite [*Aceria vitalbae*] **Old man's beard leaf fungus** [*Phoma clematidina*] **Old man's beard leaf miner** [*Phytomyza vitalbae*] **Old man's beard sawfly** [*Monophadnus spinolae*]	Gall former, stunts new growth, approved for release in 2019, first field releases took place in 2021, establishment confirmed in several regions of the country. Leaf fungus, initially caused noticeable damage but has become rare or died out. Leaf miner, common, damaging outbreaks occasionally seen, but is limited by parasitism. Foliage feeder, limited releases as difficult to rear and only established in low numbers at a site in Nelson, more released in North Canterbury in 2018, establishment confirmed at this site.
Privet lace bug [*Leptoypha hospita*]	Sap sucker, releases began spring 2015, establishment confirmed in Auckland and Waikato, some promising early damage seen already in shaded sites.
Purple loosestrife agents [*Galerucella calmariensis*] [*Galerucella pusilla*] **Purple loosestrife stem weevil** [*Hylobius transversovittatus*] **Purple loosestrife flower weevil** [*Nanophyes marmoratus*]	Leaf-feeding beetle approved for release in 2024. First releases planned for spring/summer 2025. Leaf-feeding beetle approved for release in 2024. First releases planned for spring/summer 2025. Root-feeding weevil approved for release in 2024. First releases planned for spring/summer 2026. Flower-feeding weevil approved for release in 2024. No releases planned until impacts of other agents have been fully assessed.
Cinnabar moth [*Tyria jacobaeae*] **Ragwort crown-boring moth** [*Cochylis atricapitana*] **Ragwort flea beetle** [*Longitarsus jacobaeae*] **Ragwort plume moth** [*Platyptilia isodactyla*] **Ragwort seed fly** [*Botanophila jacobaeae*]	Foliage feeder, common in some areas, often causes obvious damage. Stem miner and crown borer, released widely, but probably failed to establish. Root and crown feeder, common, provides excellent control in many areas. Stem, crown and root borer, recently released widely, well established and quickly reducing ragwort noticeably at many sites. Seed feeder, established in the central NI, no significant impact.
Greater St John's wort beetle [*Chrysolina quadrigemina*] **Lesser St John's wort beetle** [*Chrysolina hyperici*] **St John's wort gall midge** [*Zeuxidiplosis giardi*]	Foliage feeder, common in some areas, not believed to be as significant as the lesser St John's wort beetle. Foliage feeder, common, nearly always provides excellent control. Gall former, established in the northern SI, often causes severe stunting.
Scotch thistle gall fly [*Urophora stylata*]	Seed feeder, released at limited sites but becoming common, fewer thistles observed at some sites, recent study suggests it can have a significant impact on seed production.
Sydney golden wattle gall wasp [*Trichilogaster acaciaelongifoliae*]	Gall former, released at limited sites in 2022 in Manawatū-Whanganui, establishment not yet confirmed.
Tradescantia leaf beetle [*Neolema ogloblini*] **Tradescantia stem beetle** [*Lema basicostata*] **Tradescantia tip beetle** [*Neolema abbreviata*] **Tradescantia yellow leaf spot** [*Kordyana brasiliensis*]	Foliage feeder, released widely since 2011, established well and causing major damage at many sites already. Stem borer, releases began in 2012, establishing well with major damage seen at several sites already. Tip feeder, releases began in 2013, appears to be establishing readily, no significant impact observed yet. Leaf fungus, field releases began in 2018 and are continuing, establishment confirmed at several sites and promising damage seen already at one site in the Waikato.
Tutsan beetle [*Chrysolina abchasica*] **Tutsan moth** [*Lathronympha strigana*]	Foliage feeder, difficult to mass rear in captivity so limited field releases made since 2017. Appears to have established at several sites. Foliage and seed pod feeder, field releases began in 2017 with good numbers released widely, establishment success unknown.
Woolly nightshade lace bug [*Gargaphia decoris*]	Sap sucker, established at many sites but only reaches high and damaging densities at shaded sites.

Further Reading

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Biocontrol Agents Released in 2024/2025

Species	Releases made
Moth plant beetle (*Freudeita cupripennis*)	4
Old man's beard sawfly (*Monophadnus spinolae*)	3
Horehound plume moth (*Wheeleria spilodactylus*)	5
Field horsetail weevil (*Grypus equiseti*)	5
Sydney Golden Wattle bud-galling wasp (*Trichilogaster acaciaelongifoliae*)	10
Total	**27**