



What's New In Biological Control Of Weeds?

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Manaaki Whenua
Landcare Research

New Look News

Over the years we've really appreciated all the positive feedback we've received about this newsletter, and we are committed to continuing to ensure that information about biological control of weeds is as accessible as possible.

Recent changes in other technology have convinced us that after 21 black-and-white photocopied issues it is time for a bit of a facelift, and we hope that you'll find this printed version even more readable and appealing than previous issues.

We have also recognised that other information about weeds, particularly weed ecology, has not been so readily available to end-users and we have decided to do something about it. You will notice that with this issue we have

included a new supplement "Wise up to Weeds!" which we intend to produce twice a year. "Wise Up To Weeds!" replaces the old "Weed ID News" and will continue to feature stories from our herbarium staff. However, it will also feature research from our government-funded "Invasive Weeds Programme" and any other stories we consider may be useful to all you weed warriors out there.

Don't forget that we now have a great range of options for delivering these newsletters to you. We can send you a hard copy, an electronic copy (Adobe Acrobat PDF file), or a message when new issues are available on our website. If you wish to take advantage of one of the latter options please contact Lynley Hayes (hayesl@landcareresearch.co.nz).

"Now this won't hurt a bit"



Other Good Reads

Landcare Research also puts out other newsletters that you may not be aware of. "Stowaways" is produced annually by Jacqueline Beggs and features articles about invasive invertebrates already present in New Zealand, as well as species that have the potential to wreak havoc should they arrive. "Vertebrate Pest Research" (formerly "Possum Research News") is produced 2-3 times a year by Caroline Thomson and Jim Coleman and features articles on our mammalian pest research. "Discovery" is produced quarterly by Diana Leufkens and provides updates on a range of projects, across the spectrum of Landcare Research's activities, in a single publication to help busy people involved in environmental and resource management to keep up with the state of play. "Te Taio" is a brand new publication that we will be producing twice a year to inform people about the latest thinking on threats to and ways of protecting biodiversity. All of these publications will be made available on our website (www.landcareresearch.co.nz/publications/newsletters). However, if you would like to receive a hard copy, please notify the following people:

"Stowaways" – Jo Rees,
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"Te Taio" – Sue Gibb, Landcare
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Hot Gossip

Landcare Research has recently upgraded its **website** and staff in the Invasive Weeds Programme are working on substantially improving the amount of information available about our invasive weed research in general, and biological control in particular. After consulting with a number of end-users about what would be useful to them, **Chrys Horn** has made a start on this large undertaking (see <http://www.landcareresearch.co.nz/research/biosecurity/weeds>). It is our intention to eventually make the whole

of "The Biological Control of Weeds Book" available online, as well as relevant scientific papers, reports, and links to other useful websites. We also hope to be able to produce a regularly updated summary about how all our biological control programmes are progressing nationwide. If you have any feedback or suggestions for improvements please contact Chrys (hornc@landcareresearch.co.nz).

Jane Barton (née Fröhlich) has made a move away from the big smoke to life down on the farm near Te Kuiti. Jane will still be working for us on a contract basis and her new contact details are: Jane Barton, Mairoa, RD5, Te Kuiti (Ph 07 877 8252, email jane.barton@ihug.co.nz). Because the pathology component of our biological control programmes seems to be growing in importance (most new projects these days feature plant diseases as promising prospective agents) we are in the process of finding another pathologist to join our Auckland-based team.



What's the Story Morning Glory?

Recently we were asked to investigate the possibility of a biological control programme for that ever so striking but naughty climber, blue morning glory (*Ipomoea indica*). Blue morning glory, like so many of our weeds today, was introduced as an ornamental and widely grown for its abundant attractive flowers, which start off a purplish-blue colour and later fade to pink.

The plant was first recorded as having escaped into the wild in 1950 and is now commonly found in coastal and largely frost-free areas of the North Island and northern South Island. Like other weedy climbers blue morning glory can be so vigorous that it smothers trees and shrubs, and threatens bush remnants. It spreads vegetatively, rooting easily from stem fragments, and can therefore be accidentally spread by people who carelessly dispose of garden waste. The plant is also known to have produced seed at at least one site near Tauranga. Once established, blue morning glory can be difficult to eradicate. Current control methods are labour-intensive and follow-up treatments are usually required.

The Convolvulaceae, to which blue morning glory belongs, is a large cosmopolitan family including desirable species such as kūmara (*Ipomoea batatas*) and moon flower (*I. alba*), other weeds (*Convolvulus* spp.), and five threatened New Zealand native species (*Convolvulus fracto saxosa*, *C. verecundus* subsp. *verecundus*, *I. pes caprae* ssp. *brasiliensis*, *Calystegia marginata*, and *Wilsonia backhousei*). "This means



Blue morning glory

that any potential biological control programme would require agents with a high level of host specificity," reports Peter McGregor, who researched this feasibility study.

Little is known about the natural enemies of blue morning glory. Tomato spotted wilt tospovirus (TSWV) is known to attack the plant but it would

not be a suitable candidate as it also attacks tomatoes. *Ipomoea* yellow vein virus (IYVV) has been recorded from a single

blue morning glory plant, but little else is known about this pathogen at present. A white fly with a wide host range (*Bemisia tabaci*) is known to attack the plant, and several pests of sweet potato and other crops are known to cross over too, but none of these are likely to be suitable either. So for a biological control programme to go ahead, one of the first tasks would be to survey the plant in its native

range to find more-specific natural enemies.

"It's not clear exactly where we would need to look," revealed Peter. Blue morning glory has been widely grown as an ornamental for a long time throughout tropical and temperate parts of the world and there is some uncertainty over its native range. Probably the best places to search would be in the Pacific region, South America and parts of Asia with a similar climate to here. One encouraging prospect is that blue morning glory and kūmara are both widely grown in the Pacific so it should not be difficult to find out if any prospective agents also attack kūmara.

So in summary a biological control programme seems feasible provided suitable, highly specific agents could be found that would not attack kūmara or closely related native species. Anyone planning a cruise round the Pacific in the near future?

"It's not clear exactly where we would need to look"

Sawflies Not So Painful

This time last year we nearly washed our hands of old man's beard sawflies (*Monophadnus spinolae*) after several years of struggling to mass-rear them without much success. No one has ever attempted to mass-rear this insect before, so it has been a case of trial and error, based on our considerable previous experience with lots of other insect species.

We ran up against some tricky obstacles. The larvae would complete development and burrow down into the soil to pupate, and were often never seen again. Like many insects they can delay emergence for a whole year as a survival strategy, but we also seemed to get high mortality at this stage. We also had major problems producing enough females.

Commonly the sex ratio of a new generation of flies would be skewed to around 14–15 males for each female. As anyone who has ever embarked on a breeding programme for any kind of animal knows, you need lots of females and only a few males and the other way round just doesn't get you anywhere fast! So if we ended up with anything at all, it was a bunch of frustrated and lonely male sawflies (the males usually come out first so they can pounce on any females as soon as they emerge) and equally frustrated rearing staff.

“So if we ended up with anything at all, it was a bunch of frustrated and lonely male sawflies”

In the end we decided to make one last concerted effort, and after much soul-searching, consultation with other entomologists, throwing around of ideas, experimentation, and 7 days a week of relentless slog, we are now getting some excellent results. Hugh Gourlay and Julia Wilson-Davy

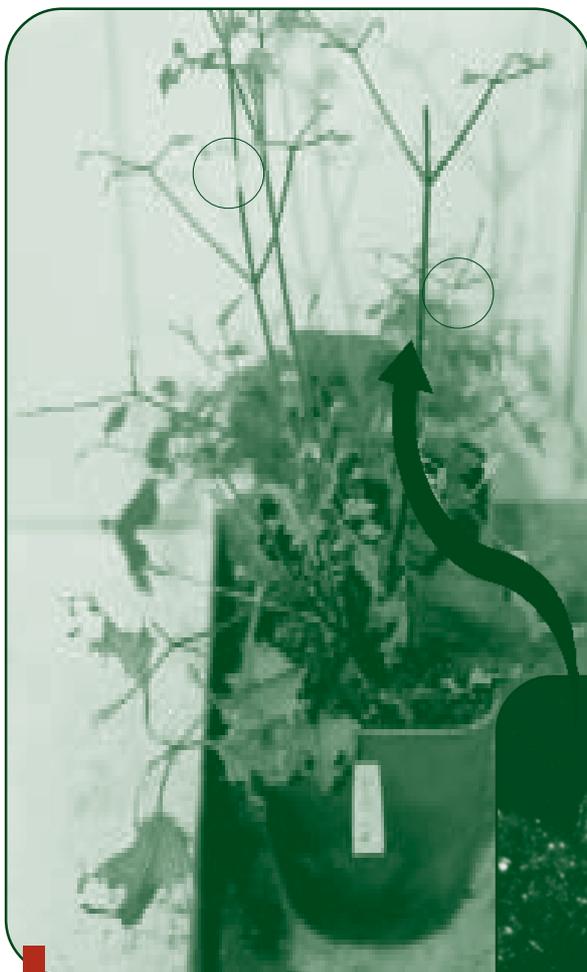
have been responsible for unravelling the secret life of sawflies. “We now suspect that when females emerge and possibly detect pheromones released by other females close by, they may be triggered to lay mainly male eggs,” revealed Julia. “We can get them to produce more female eggs by making sure that there are only males present, and we have got the ratio down to a more respectable 3–4 males for each female.”

The rate of successful adult emergence has also been vastly improved. We now suspect that we probably didn't give large larvae a chance to burrow into soil early enough (rearing is mainly done on cut material not whole plants). “We have recognised that when the larvae suddenly become extremely active they are ready to pupate,” explained Julia. This burst of activity helps the larvae to find a suitable pupation site, but it doesn't last long before the pupation process kicks in

and they become immobile – if the larvae aren't safely tucked away in a suitable position by this time then they probably don't survive.

As you have been reading this story you may have been wondering why we are persisting with an insect that seems to be a hopeless breeder? After all, successful





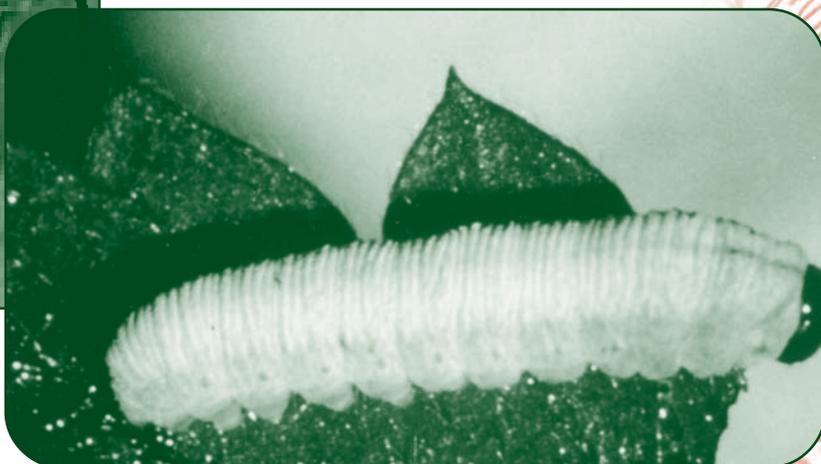
Plant in process of being stripped by sawflies.

find out what makes them tick before we are required to churn out thousands.

Up until this year the sawflies had only been released at two sites, close to Lincoln. The first site suffered a major flood soon after and was subsequently cleared. It is too soon to know the fate of the other site, but enthusiastic weed busters may have compromised establishment by

What constitutes a suitable release site for sawflies?

Choose a site that is not near a river or on an area of land that is prone to flooding. Select an old man's beard infestation that covers the ground in several layers of leaves and vines. The site should not be too shady and should have good drainage. Do not choose a site where the old man's beard grows up into the trees only and does not cover a large area of the ground.



control agents need to be fairly robust and able to build up damaging numbers within a respectable time frame. The problem here is probably not the insect itself, but our lack of understanding about their needs and the artificial conditions that we are keeping them in. Other classic examples where this has happened to us include the broom seed beetle (*Bruchidius villosus*) and the gorse pod moth (*Cydia succedana*), which we struggled to mass-rear but which have since gone on to be extremely prolific once released outdoors. The reality is that we don't have the luxury of 10 years to play with control agents and

unexpectedly chopping down some of the vines. In August we made three experimental releases as we had sawflies coming out our ears and needed to offload some – we are not sure whether releasing the flies this early in the spring will be successful or not. By the time you read this we will have made five official releases and will be close to making a couple more. We intend to keep the rearing programme fired up to full throttle for at least another year so that we can provide sawflies to all those who want them in the near future.

Training Workshops

There are still some spaces available on our advanced biological control of weeds workshops at Auckland (20–21st February 2003) and Lincoln (3–4th April 2003).

Please contact Lynley Hayes (hayesl@landcareresearch.co.nz or Ph 03 3256 701 ext 3808) if you might be interested in attending one of these courses.

Honeymoon over for Bridal Creeper?

Believed to be an up and coming weed in New Zealand, bridal creeper (*Asparagus asparagoides*) is already classified as a Weed of National Significance in Australia (see website <http://www.weeds.org.au/natsig.htm>). The plant forms large mats of underground tubers that allow it to completely dominate an area and stop any other plants from getting a look in. New infestations continue to pop up with monotonous regularity, and birds feeding on the fruits are believed to be responsible for this. The implementation of a biological control programme against bridal creeper is now in full swing in Australia. Three agents have been released, and all are showing great promise.

A little leafhopper (*Zygina* sp.) was the first agent to be released in July 1999. School children and community

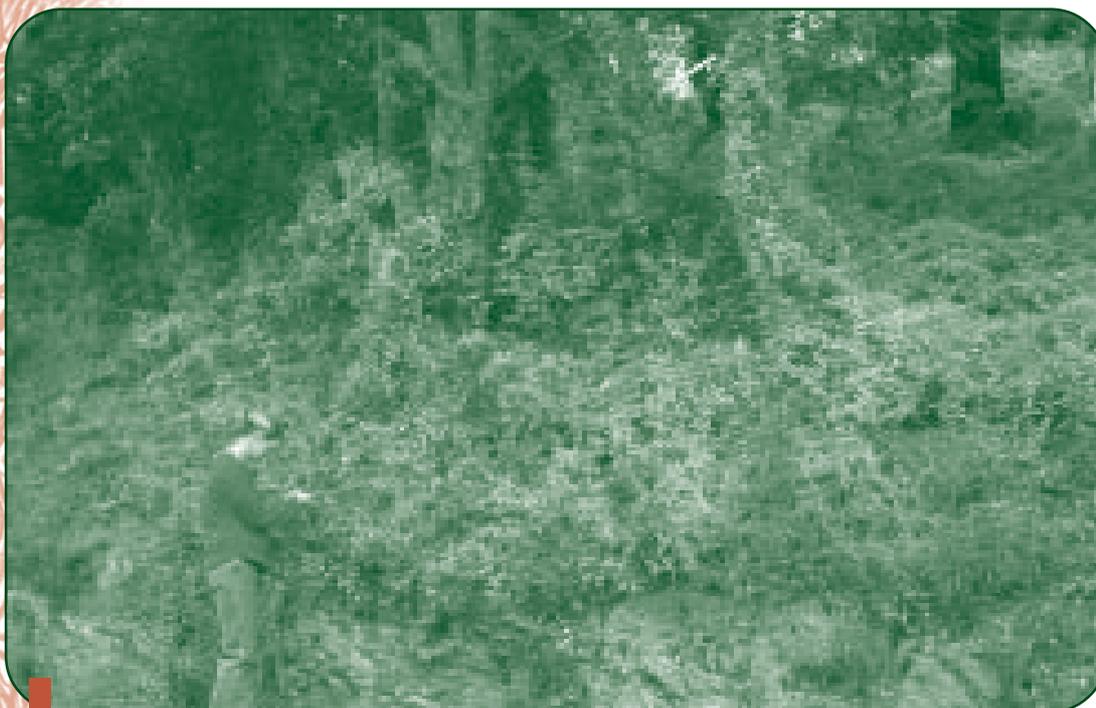
groups undertook their own rearing programmes to ensure this tiny sap-sucker was released widely without delay. "The leafhopper is establishing well and already causing major damage to bridal creeper infestations in Western Australia, South Australia and New South Wales," reports Kathryn Batchelor of CSIRO Entomology. When plants are subjected to a heavy leafhopper attack they can be severely defoliated and forced to use up some of the reserves they have tucked away in their underground tubers. The amount of fruiting is also reduced.

The second agent released, a rust fungus (*Puccinia myrsiphylli*), hasn't been sleeping on the job either. Since its debut in July 2000 the rust has been released at more than 550 sites, and community groups have again helped to make this possible. Once the disease takes hold bridal creeper plants are severely weakened and may even die. "Already we are seeing bridal creeper becoming less competitive at

the first sites where the rust was released," reports Louise Morin, of CSIRO Entomology and the CRC for Australian Weed Management. "In New South Wales and Western Australia, where conditions have been most favourable to the rust, few fruits have been produced on plants heavily infected by the rust. This is an excellent initial outcome that will help reduce further spread of the weed," suggests Louise.

A third control agent for bridal creeper was released for the first time in July this year. The larvae of a foliage-feeding beetle (*Crioceris* sp.) are the damaging stage and they feed on leaves and shoots. Hopefully this beetle will establish successfully and

"Already we are seeing bridal creeper becoming less competitive"



Ruth Aveyard (CSIRO Entomology) surveys bridal creeper near Narooma (NSW) heavily damaged by the rust.

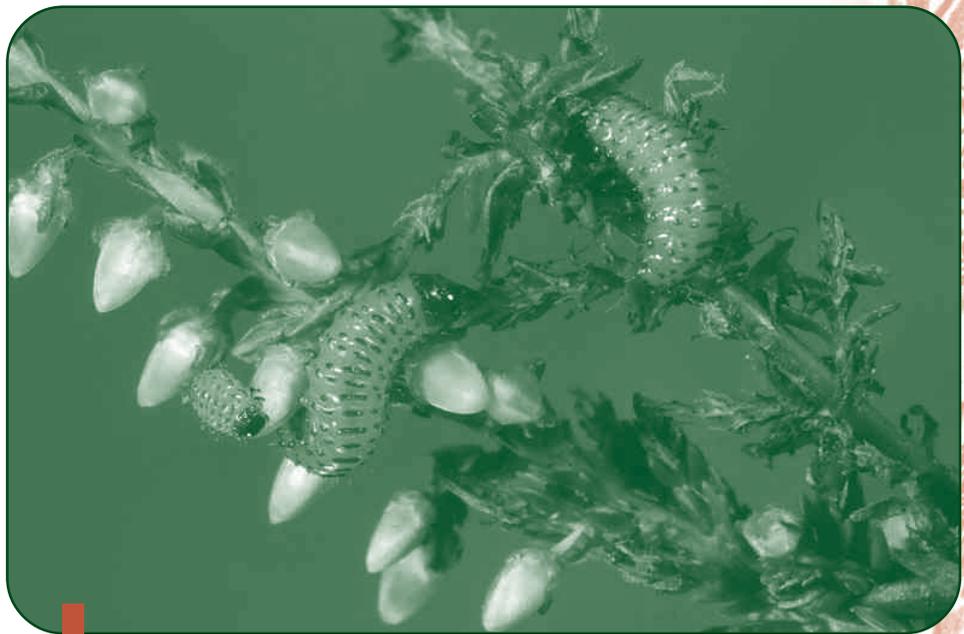
be able to further suppress the plant's ability to climb, make fruit and spread to new areas.

With such a strong and promising line-up of control agents it looks like the honeymoon may now be well and truly over for bridal creeper!

Things To Do This Summer

We all need to get a chance to kick up our heels and take a summer holiday so it's quite handy that there isn't too much work to do on the biocontrol front at this time. However, things you might need to plan for include:

- Harvesting broom seed beetles (*Bruchidius villosus*) – the beetles seem to be dispersing quite well under their own steam but you will still be able to speed things up by giving them a helping hand. If you are redistributing the beetles while they are still inside the pods, you need to keep a close eye on pod development. Do not harvest the pods until they are brown and mature, but be aware that a spell of hot weather can cause the pods to ripen rapidly and burst open – it won't matter if a few have already burst.
- Harvesting cinnabar moth caterpillars (*Tyria jacobaeae*) – cinnabar moth still has a patchy distribution in New Zealand, but it appears to be on the increase, at least in some regions. The moth can be difficult to establish in some areas and the reason why is not always obvious. If you have been unsuccessful in a particular area in the past then it's probably better to try somewhere else. Be careful not to cook your caterpillars by leaving them out in the sun in plastic containers or in a hot car. Keep them as cool as possible using chillybins and freezer pads, and get them to their new homes as soon as you can.



Heather beetle larvae

Include the minimum amount of plant material that they need to survive the journey, as cut ragwort can sometimes give off gases in hot weather that can be toxic to the caterpillars inside a poorly ventilated container.

- Checking gorse colonial hard shoot moth (*Pempelia genistella*) release sites – the caterpillars remain tiny throughout the winter and put on a growth spurt in the spring as they forage on young buds, shoots and flowers. Late spring is the best time to look for this agent as the caterpillars and webs will be at their largest (up to 2.5 cm long and 20 cm across, respectively). Check the gorse near the release point for webs with green-and-brown-striped caterpillars inside. Feeding damage and balls of frass should also be quite obvious and help you to distinguish these webs from spider webs. The webs should remain obvious for some time over the summer after the

caterpillars have pupated. If you are lucky you may see the moths themselves in December/January sitting close to old webs, but they will be difficult to distinguish from other moths.

- Checking on heather beetle (*Lochmaea suturalis*) release sites – unless heather beetles are present in large numbers and have caused a lot of damage to the plants they are likely to be hard to find. The adult beetles tend to drop to the ground when disturbed and the greyish-white larvae can also be hard to spot. The best ways to check on the establishment success or spread of this agent is by beating heather plants with a stick over a white sheet or beating tray, or by using a sweep net.

Remember to read up the relevant pages in "The Biological Control of Weeds Book" before embarking on any of these activities!

Biological Control of Weeds Glossary – an Alternative Interpretation...

Hopefully by now many of you will have seen the glossary that was distributed with the last batch of pages for "The Biological Control of Weeds Book" in August. We compiled this glossary to help demystify the terminology and jargon we commonly use. While we were working on the glossary we couldn't help but think of some other, slightly more humorous, meanings for some of the words. So just for fun, here are some of the ones that made us giggle:

bolting – what plants do to try to escape from control agents (you can run but you can't hide!)

bug – insect that annoys the hell out of plants

classical biological control – programmes so old they began in ancient Greece

gall – end result of cheeky insects causing plants to swell up with rage

garden leaf-vacuum – device that can

be used to quickly double the number of insects you have by splitting them in half

grub – insect with poor personal hygiene

inundative control – throw everything you've got at the problem and hope that something works

larva – very hot young insect

mass-rearing – when everyone prays like mad that we will produce enough insects

model – exquisitely well-behaved control agent

mine – not yours so hands off!

mite – but probably won't

mycoherbicides – mythical substances, rumoured to exist

nocturnal – things that only come out at night to avoid researchers and biosecurity officers

nymph – slender, decorative insect that flits seductively from plant to plant but doesn't do anything useful

pooter – a device that can help you to taste insects

recover – what control agents have to do after being shipped around the country



"Inundative Control"

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