Number 21 May 2002

What's New In Biological Control of Weeds?

What's Inside?

Manaaki Whenua
Landcare Research

A Miner Triumph against Old Man's Beard

Recently our confidence in the old man's beard leaf miner (*Phytomyza vitalbae*) and leaf fungus (*Phoma clematidina*) has been given a large boost. After a tip-off from Ben Minehan (Marlborough District Council) Simon Fowler paid a special visit to Marlborough to check on reports of spectacular damage. He was not disappointed.

In the short time since the leaf miners were first released (1996) they have spread well and colonised old man's beard (*Clematis vitalba*) infestations up and down the country. It has become quite usual to find one or two mines per leaf pretty much anywhere you look. Laboratory studies have suggested that one mine per leaf can reduce the growth of small plants by about 17%. Extrapolation of these results indicates that two or three mines per leaf might reduce growth of small plants by as much as 50%. How these results might translate to large plants in the field has remained a mystery until this autumn, when we have had our first insight into what might be possible.

"Higher than usual levels of leaf miner attack, around 10–

Heavily mined leaves at Para Swamp.

15 mines per leaf, have been noticeable throughout Marlborough this season," reports Ben. However, one site on the main road between Blenheim and Picton, known as Para Swamp, has been outstanding. "There were so many mines on the leaves that it was hard to count them, but I would estimate that there were about 20–30 mines per leaf," enthused Simon. Any green material not attacked by the miner was getting walloped by the fungus, which was released here in 1999. "The old man's beard was looking pretty stunted and sorry for itself and opportunistic native plants were already beginning to take advantage of its reduced vigour."

We now eagerly wait to see what happens at this site next year, and whether other sites begin to follow suit. It is heartening to know that we have been able to achieve useful results at one site already with only two agents. We still have the saw fly (*Monophadnus spinolae*) up our sleeve (which we are still hopeful of being able to release and establish widely soon) and we are renewing investigations into the potential of the bark beetle (*Xylocleptes bispinus*).

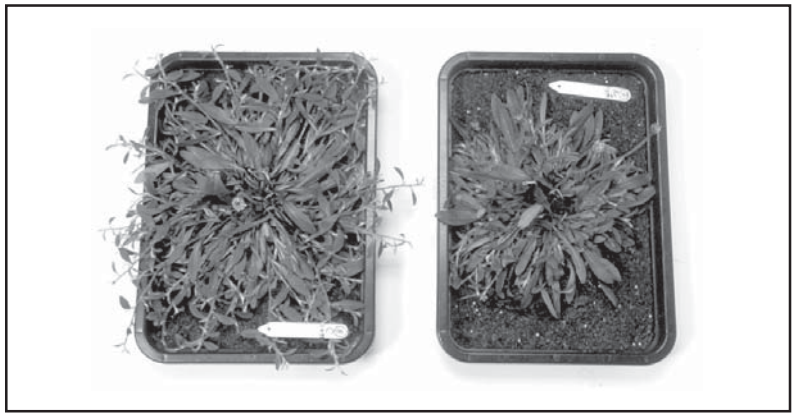
So, watch out old man's beard – you might just have to go after all!

German Allies

Over the last 6 months we have had a German student, Matthias Klöppel, working with us at Lincoln. Matthias is studying for a Diploma in Landscape Architecture (focusing on plant ecology) at the University of Applied Science, Wiesbaden, near Frankfurt. "I really wanted to go somewhere I could practice my English and escape the German winter," confided Matthias. We were keen also to get an extra pair of hands. Matthias carried out some glasshouse experiments to give us an idea of how we might expect the newly released hieracium gall wasp (*Aulacidea subterminalis*) to perform here. The gall wasp is a European species and, since our population originates from the Black Forest in Germany, it seemed fitting to have Matthias work on it.

The gall wasps attack the stolons of mouse-ear hawkweed (*Hieracium. pilosella*) and orange hawkweed (*H. aurantiacum*) and reduce their ability to spread vegetatively by producing daughter plants at the tips. In the glasshouse experiments galled plants tended to be slightly smaller with weaker root systems than undamaged plants (gall formation uses up valuable nutrients, reducing the amount available for plant growth). The wasps had the biggest impact on mouse-ear hawkweed plants grown under ideal conditions. The main stolons of these galled plants were only a quarter the length of those produced by plants not exposed to the wasps. However, mouse-ear hawkweed rarely grows under optimal conditions in the field. More typically it is found in arid, nutrient-poor grasslands and is usually under some kind of stress.

The good news is that the wasps can also perform quite nicely on stressed plants. Although each plant was exposed to only eight of the tiny wasps, their developing offspring interfered with nearly three-quarters of all the daughter rosettes that these experimental plants were attempting to produce. This suggests that even small populations of wasps could shut down much of the vegetative reproduction that goes on in the plants. Plants under stress (e.g. low water, low nutrients, or competition) produced slightly fewer and smaller galls than unstressed plants, but the difference was not large enough to be statistically significantly. Nutrient- or water-stressed plants produced fewer, shorter and more highly branched stolons. Plants fighting to compete with other pasture plants produced longer, thinner stolons. Both branched and thin stolons tend to result in weaker daughter plants. Branching could also be advantageous to the wasps by providing them with more areas to attack.



Mouse-ear hawkweed plant attacked by gall wasps (right) compared with a plant not attacked by gall wasps (left).

Matthias working on his experiments.

Matthias' study leads us to expect that the hieracium gall wasp is likely to be a successful control agent. Matthias commented that he "really enjoyed the opportunity of tramping around the South Island and the cheap cost of living in New Zealand." We can also report that he did achieve his goal of improving his English although we can't say that our summer was too hot weather-wise. Matthias has now returned home to complete his studies. He thinks he might like to do either further ecological research, landscape planning, or perhaps even a doctoral study. We wish him the best for the future!

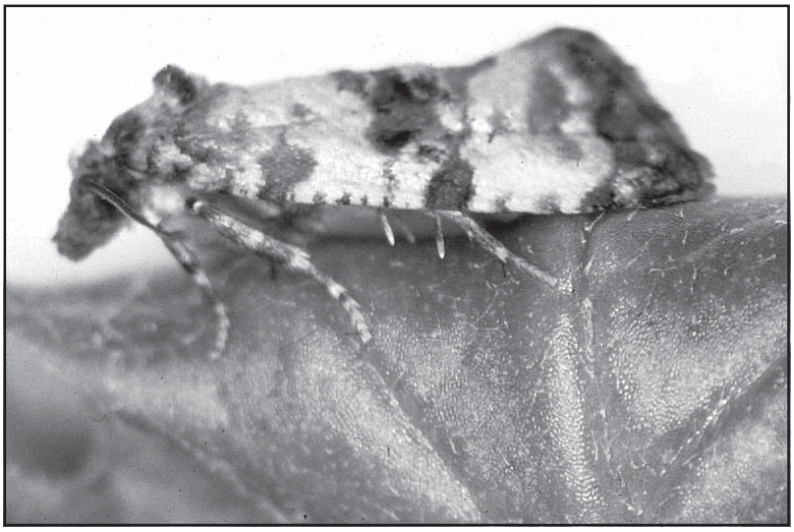
Hot Gossip

New contact details

We have changed our email domain name to make it easier for people to contact us and understand the difference between Landcare Research and other similarly named groups like the New Zealand Landcare Trust and landcare groups. So from now on if you want to send us an email please use the following format: **surname+first initial@landcareresearch.co.nz** (eg. hayesl@landcareresearch.co.nz) and if you want to visit our newly revamped website type in www.landcareresearch.co.nz. The old addresses will continue to work indefinitely until all stocks of printed items such as the pages for "The Biological Control of Weeds Book" have been used up and are ready to be reprinted. Speaking of websites, we are planning to put considerably more information about weeds and biological control methods on our website over the next couple of years.

One of our staff, **Helen Harman** has relocated from Lincoln and is now based at our **Mt Albert Office**, Private Bag 92170, Auckland (Ph 09 815 4200 ext 7167, fax 09 849 7093, email harmanh@landcareresearch.co.nz).

By all accounts the **ragwort flea beetle** (*Longitarsus jacobaeae*) is getting stuck in to ragwort (*Senecio jacobaea*) and reducing it to low levels in many areas. However, we have a growing suspicion that the beetle is not able to thrive everywhere. One such problem area seems to be along the West Coast of the South Island, where it may just be too wet for the beetles to do well. Fortunately there are other ragwort agents out there that we could call on if need be. For example, another similar **flea beetle** (*Longitarsus flavicornis*), a **plume moth** (*Platyptilia isolodactyla*), and a **leaf and crown-boring moth** (*Cochylis atricapitana*) have all been released in Australia and are showing promise. In Tasmania, both ragwort flea beetles (*L. jacobaeae* and *L. flavicornis*) have been released and, although conditions there are quite similar to parts of New Zealand, "our beetle" has been vastly outperformed by the other one. Over the past year we have been working with the **New Zealand Landcare Trust** to encourage the formation of a **community ragwort action group on the West Coast** to champion the cause of bringing in additional ragwort agents. Public meetings were held in April, a group has been formed, and a number of organisations have pledged financial or other assistance to the project (West Coast Regional Council, Westland Conservancy of the Department of Conservation, Federated Farmers, Westland Dairy Company, Timberlands West Coast, and DEXCEL). We are helping this group to submit proposals to AGMARDT's Progressive Farming Grants and MAF's Sustainable Farming Fund, and we will keep you posted on the success of these applications in future issues.



D. McLaren, Keith Turnbull Research Institute

Ragwort leaf and crown-boring moth

Craig Sixtus has begun studying the two gorse seed feeders as he works towards a Masters degree at Lincoln University. Craig will be measuring the amount of seed that the **gorse seed weevil** (*Exapion ulicis*) and the **gorse pod moth** (*Cydia succedana*) are destroying at various sites around the South Island where both agents are now well established. The study sites are East Takaka and Wainui Bay (Tasman), McLeans Island (Christchurch), Hinewai (Banks Peninsula), Twizel (South Canterbury), and Wainakarua (North Otago). The results should be extremely useful, as so far we have only measured the impact of both agents at one site near Darfield (where the amount of seed destroyed varied enormously within the site), and will help to build up a much clearer picture of how useful these seed feeders are likely to be. Craig is also going to study aspects of the life history of the gorse pod moth that are not well understood, such as the temperature threshold for egg development and how many larval instars there are, as well as its phenology (i.e. the timing of its life cycle here in New Zealand, how many generations it completes etc.).

8TH INTERNATIONAL CONGRESS OF PLANT PATHOLOGY
ICPP 2003
CHRISTCHURCH NEW ZEALAND

The opportunity to take part in another international conference is coming our way. The **8th International Congress of Plant Pathology** is being held in Christchurch 2–7 February 2003. Please note that a workshop on biological control of weeds using pathogens will be held immediately prior to the conference (Saturday 1 February) and a field trip to look at weed issues on Banks Peninsula is being organised for the following day. This will be another great opportunity to rub shoulders with some of the world's leading scientists in this field. For further information about the "Biocontrol of Weeds with Pathogens" workshop check out the website http://events.lincoln.ac.nz/icpp2003/workshop.htm.

Have you found a new weed?

The Department of Conservation (DOC) has recently published two free weed fact sheets for the Wellington Conservancy entitled "*Have you seen these plants in the Wellington Conservancy*?" and "*Have you seen these aquatic plants*?". The species included in these fact sheets are not known to occur in the region, and could present a huge problem for native plant and animal communities if they established there. Each fact sheet has photos of the species, and lists some of their characteristics to aid identification. DOC would like people to look out for the species during their travels, and inform them immediately if they think they have found one. This will greatly help DOC to prevent these from plants colonising and stop them before they become a major problem. If you would like a copy of either free fact sheet please contact DOC, Technical Support Team, Wellington Conservancy, P.O. Box 5086, Wellington (Ph 04 472 5821).

Still Searching!

Californian thistle (*Cirsium arvense*) is the most common thistle in New Zealand, and so far it has proven to be one of the most difficult biological control targets. Only one of the insects released to attack the plant, the gall fly (*Urophora cardui*), is showing any promise at all, and it is not yet widely established. On the pathogen side of things, there is still a good chance that a mycoherbicide may become available in future.

Back in 1999 a group of concerned farmers and regional council employees in the Otago/Southland area formed The Californian Thistle Action Group*. This group has made a concerted effort to rear the gall flies in special cages outdoors to enable widespread releases to be made. However, it has proven to be easier said than done with quite variable results – at the end of the day rearing insects is often not easy! There are also some question marks about whether the gall flies will ever be able to establish widely in New Zealand. Experience has shown that sheep make a beeline for galled plants and particularly seem to enjoy this special added-protein snack—nice maybe for the sheep, but a disaster for the gall flies! Obviously more agents are urgently needed to add pressure to the plant, and researchers are still working on it.

The native range of Californian thistle is believed to include most of Europe, northern Africa, and large areas of Asia (including Afghanistan, Iran, Pakistan, and eastern China), but this has been difficult to ascertain with any certainty since human migration and agricultural practices have allowed the plant to become a widespread weed throughout most of temperate Europe and Asia. Californian thistle also grows under a wide range of environmental conditions so there are lots of places to look for potential control agents. However, some places have not until recently been (or still aren't) safe or easy to visit so only western Europe has been thoroughly surveyed for potential control agents. Areas of central and western Asia are now being targeted, with central Russia visited in 1999, Uzbekistan in 2000, and Armenia in 2001. André Gassmann, of CABI Bioscience, Switzerland, is leading the team of researchers looking for new agents on our behalf. They are still planning to survey Siberia, China, Mongolia, and Tibet, as well as revisiting Pakistan and Turkey.

Over the four decades that researchers have been looking, quite an assemblage of insects have been found on Californian thistle, but most have not been sufficiently host specific or damaging enough, or have been just plain too difficult to work with. Specificity is particularly critical for agents intended for areas like North America that have native thistles to contend with, and it is not looking too hopeful that additional acceptable species can be found for that region. Fortunately we do not have any native thistles here in New Zealand and so we have many more options open to us.

Leading contenders

Experience has also shown that, with its extensive creeping root system, the plant can be quite hard to knock back and is not too troubled by a bit of damage to its leaves. Researchers are now mainly focusing their attention on finding potentially more harmful root and stem feeders that may have the added bonus of allowing

* The Californian Thistle Action Group gained a 3-year grant from the Agricultural and Marketing Research and Development Trust (AGMARDT) in 1999. The overseas work that they have helped to support has also received funds from The North American Canada Thistle Consortium (including Agriculture and Agri-Food Canada, South Dakota Department of Agriculture and Maryland Department of Agriculture).

Table 1. The top five current prospects under consideration for Californian thistle control

Aceria anthocoptes Gall-forming mite	Potentially very specific and damaging. Common in the Balkans and recently found in the USA (Maryland). Need to determine the host range of the mite in the field, and carry out molecular studies to compare mites from Europe with those discovered in the USA.
Altica carduorum Foliage-feeding beetle	Has been released in New Zealand and failed to establish. There may be better strains available in Armenia or Asia (Uzbekistan, China). Need to collect and import better strains and obtain permission to release.
Apion onopordi Root-feeding weevil	Can vector the fungus, *Puccinia punctiformis*, but the weevil is uncommon in the thistle's native range. Need to check if host races exist on different species of thistles and begin preliminary host range testing.
Cleonus piger Root- and crown-feeding weevil	May contribute to Californian thistle control in some places in Canada. Not originally considered sufficiently host specific for us. However, there may be a more specific strain in Armenia, which has unusual larval behaviour, and is worth more attention. Weevil larvae were found in roots >15 cm below the ground and such deep root-mining has not been described before. Need to clarify taxonomy and begin preliminary host range testing.
Luperus nr. *altaicus* Foliage-feeding beetle	Several chrysomelid beetles have been collected in Armenia, including this locally common and damaging one. Need to clarify taxonomy and begin preliminary host range testing.

naturally occurring pathogens to gain entry to the plant. A shortlist of what are currently believed to be the most promising insects and what needs to happen next is summarised above in Table 1. Negotiations are currently underway regarding what work will be funded in 2002/03.

One agent that featured was amongst the top prospects this time last year has since been ruled out. A root-boring moth (*Euhagena palariformis)* that was believed to attack Californian thistles in Turkey is no longer thought to be associated with the plant. Despite digging up plants to examine the roots, researchers found no sign of the moths. Pheromone traps were also used, including in areas where the moth had previously been collected (no Californian thistles could be seen nearby but there were large stands of slender-winged thistles (*Carduus pycnocephalus)),* but only a small number of moths collected in one trap. Eggs were obtained from two trapped females but the resulting larvae did not survive when placed on Californian thistle. Winged thistle does not appear to support the moths either so the true host is still a mystery.

Fungal forays

As well as looking for suitable biological control agents with six legs there has been considerable effort both here and overseas to find fungal solutions to the problem. Graeme Bourdôt, of AgResearch (based at Lincoln), has been working for a number of years with a pathogen known as *Sclerotinia sclerotiorum*. "This fungus has a wide host range and, amongst other things, can make your lettuces to go brown

CABI Bioscience

Mite (Aceria acanthoptes) *damage on Californian thistle.*

and slimy," explained Graeme. It can also be extremely damaging to Californian thistles (see picture below), but natural outbreaks in the thistle do not occur very often or over large areas. Because *S. sclerotiorum* is already here, widespread, and not terribly specific, Graeme has taken the mycoherbicide approach with this pathogen. Initially there were concerns that a mycoherbicide using this active ingredient might cause damage to desirable neighbouring crops, like peas, through dispersal of the spores after the thistle had been killed. "However, trials designed to assess the level of risk showed that normal background levels of spores were achieved within 5 m, and dispersal models indicate that a 60-m safety zone would be adequate," revealed Graeme. Background levels of the resting bodies produced by the fungus (sclerotia) were also achieved in treated areas about 3–4 years after application so the withholding period for planting susceptible crops would not be too onerous either.

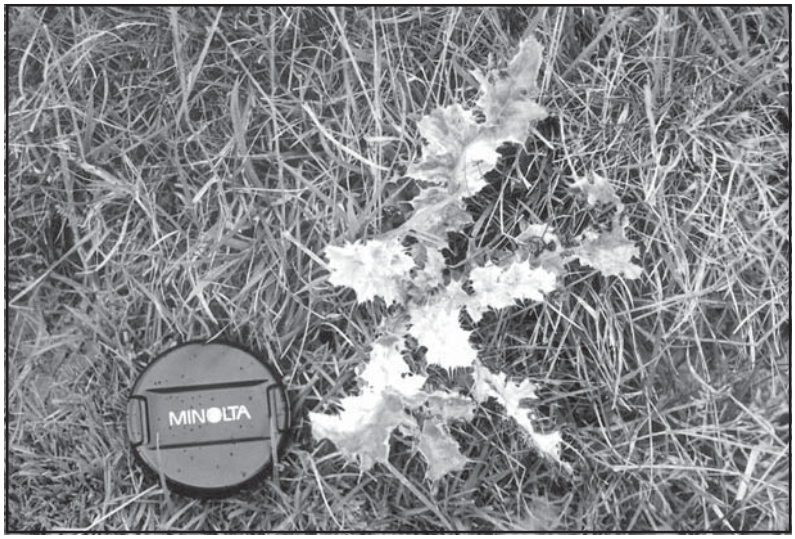
The greatest challenge has turned out to be not around safety but in developing a suitable formulation – a common problem with mycoherbicides. Trial formulations applied in the spring have proven to be capable of reducing thistles to low levels, but the results have been erratic. This is believed to be to due to a lack of adequate moisture at times for infection. For this reason Graeme has now turned his immediate attention to using *S. sclerotiorum* against other weeds that more commonly grow in wetter areas, e.g. ragwort (*Senecio jacobaea*) and giant buttercup (*Ranunculus acris*). He is also supervising a PhD study by Brenda Pottinger (Lincoln University) to gain a better understanding of the infection process of this fungus so that improved formulations can be developed. AgResearch scientists are using new "bio-polymer" technologies to improve the reliability of biopesticides.

G. Bourdôt

A trial near Lincoln showing in the foreground how well S. sclerotiorum *can knock back Californian thistles under good conditions.*

Some unusually sickly looking Californian thistles were noticed in the Manawatu in 1999. Adrian Spiers (Idein Technologies Ltd) isolated the pathogen *Phoma exigua* var. *exigua* from them. A *Phoma* sp. had previously been described as a weak leaf spot pathogen on Californian thistle, but the one found in the Manawatu was causing considerable damage and is likely to be a new record. Records of *P. exigua* damaging thistles (many species may be affected) are now starting to come in from all over the country. Typically plants become chlorotic (yellow-looking) and then turn brown as they die. The symptoms are quite different from the other fungus (*Puccinia punctiformis*) that you commonly see on Californian thistles. Plants affected with this rust are usually covered in brightly coloured spores (yellow, orange or brown). In light of the new find, Graeme and Nick Waipara (HortResearch) are planning to compare the potential of *P. exigua* with *S. sclerotiorum* against Californian thistle. We will keep you posted on the outcome in future issues.

For further information about the pathogen work described above you can contact Graeme by email (graeme.bourdot@agresearch.co.nz) or phone (03) 983-3973.



A. Spiers

Young plant infected with P. exigua *var.* exigua *showing marked yellowing.*

What is the cost of Californian thistle?

The Californian Thistle Action Group contracted the Clutha Agricultural Development Board to undertake a survey of farmers in February 2000 to find out how Californian thistle affected them and what it cost them to control the plant. The survey found that the thistle caused problems for farmers finishing lambs (by increasing the likelihood and severity of the viral infection "scabby mouth"), and producing quality hay, winter feed, and grain crops. The farmers estimated that they spent on average $1,200 a year chemically controlling the plant. Many commented that they were actively trying to reduce chemical usage, but nearly half of respondents said that the cost of chemical control was increasing. Most farmers also mowed and topped their thistles. The survey concluded that the Otago/Southland Region probably spends annually about $6.6 million on chemicals, $18 million on mowing and topping, and $2.4 million on scabby mouth vaccine, which comes to a grand total of $27 million per year, or about $4,500 per farm. This seems like a reasonable estimate given that a 1989 survey of farms in the same region by Mitchell and Abernethy** estimated that Californian thistle cost the region, at that time, about $21 million or about $3,500 per farm, and a subsequent survey of farmers near Gore yielded a figure of $3,100 per farm.

** Mitchell, R.B.; Abernethy, R.J. 1993: Integrated management of California thistle in pasture. *Proceedings of the 46th New Zealand Plant Protection Conference.* Pp. 278–281.

Aloha from Hawai'i

Hugh examining banana passionfruit (P. tarminiana) *in Hawai'i.*

Hugh Gourlay recently travelled to Hawai'i to help further the cause of biological control of gorse (*Ulex europaeus*), banana passionfruit (*Passiflora* spp.), and wild ginger (*Hedychium* spp.). Before he left, Hugh sent over some New Zealand banana passionfruit plants*, so they would be ready for him to begin initial testing of the fruit-feeding fly *Zapriothrica* nr. *nudiseta* upon his arrival. He also checked on progress with other banana passionfruit agents including the leaf spot fungus (*Septoria passiflorae*) and the shoot- and flower-feeding moth (*Pyrausta perelegans).* The fungus is doing well (see "Honey I shrunk the weed", Issue 19) but the moth is struggling, possibly due to heavy parasitism. "We are hoping to co-fund (with our Hawai'ian colleagues) a survey in South America in 2004 to look for additional new agents and collect colonies of agents that the Hawai'ians have worked on previously and warrant further study," explained Hugh.

Kahili ginger (*Hedychium gardnerianum*) has also invaded thousands of hectares of Hawai'an forests. Researcher Rob Anderson is developing a bioherbicide for kahili ginger using a bacterium (*Ralstonia solanacearum*). "I have put the wheels in motion to get Rob out here on an exchange scheme next January," revealed Hugh. There is a lot of interest in whether the technique might be appropriate for use here too, so we need to check that conditions are likely to be suitable for the bacteria and that our ginger populations are susceptible.

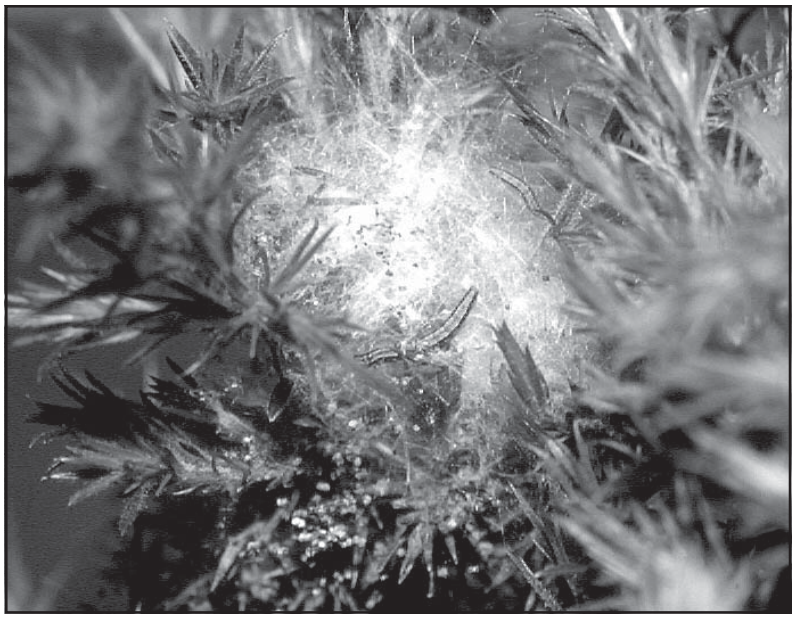
Hugh has been undertaking host range tests for a number of years on various gorse agents for the Tasmanian Institute of Agricultural Research. Lately, he has been testing the gorse soft shoot moth (*Agonopterix ulicetella),* but lab tests have not clearly demonstrated the safety of this agent. "The gorse soft shoot moth is abundant at a site on the Mauna Loa volcano, so I was able to plant out a couple of the problematic species that I was still a bit unsure about," said Hugh. These plants will later be checked for damage by our gorse colleagues, Patrick Conant and Clyde Hirayama (USDA). The site at Mauna Loa is also home to good numbers of gorse thrips (*Sericothrips staphylinus),* so Hugh collected some more of the Portuguese strain to boost our rearing colony here. Finally Hugh touched base with a major project on the integrated management of gorse that has just begun at this site (funded by Parker Ranch). Hugh will be involved in this project by testing, and hopefully later establishing, the gorse pod moth (*Cydia succedana)* in Hawai'i.

* A recent taxonomic revision now lists four *Passiflora* spp. under the collective heading of "banana passionfruit" in New Zealand. They are: *P. tripartita* var. *mollisima* (was *P. mollisima*), *P. tripartita* var. *azuayensis* (was probably also known as *P. mollisima*, quite rare), *P. tarminiana* (was *P. mixta*) and, *P. mixta* (was also known as *P. mixta*, quite rare). Our only native species (*P. tetandra*) and commercially grown passionfruit (*P. edulis*) are in different subgenera to the weedy ones.

Winter and Spring Activities

Winter is the time when many of you will be able to have a bit of a breather on the biological control front as many of our bugs will shut down for the duration. However, winter can be a good time to check nodding thistle crown weevil (*Trichosirocalus horridus*) release sites. Some weevils lay eggs all year round, but the bulk of them begin to lay in the autumn and the damage to the rosettes becomes more noticeable as the winter progresses. As the grubs feed in the crown, they produce a black waste substance (frass), and the ribs of the surrounding leaves take on a reddish-brown colour at the base. The leaves of damaged rosettes become less prickly and start to look a bit like dandelion leaves. You may see rosettes that look like this at any time of the year, but the damage is usually most obvious later in the winter and in early spring. If you dig a damaged rosette out of the ground and cut it in half with a pocket knife, you should be able to see the white grubs feeding inside. As well as nodding thistles (*Carduus nutans*) the weevil attacks cotton (*Onopordum acanthium*), marsh (*Cirsium palustre*), plumeless (*Carduus acanthoides*), Scotch (*Cirsium vulgare*), slender-winged (*Carduus pycnocephalus*) and winged (*Carduus tenuiflorus*) thistles, so look out for damage to these plants too. Crown weevils can also usually be harvested and shifted around as late as June.

We suggest that you use the off-season to make plans for the coming spring, and get up to date on the paperwork. If you have any outstanding release or recovery forms, then please send them in without delay so we can ensure our nationwide databases remain as up to date as possible. Also start thinking about suitable release sites for any new agents that you may be receiving from us next season, and planning harvesting operations and field days for things like broom seed beetles (*Bruchidius villosus*), broom psyllids (*Arytainilla spartiophila*), gorse pod moths (*Cydia succedana*), and gorse thrips (*Sericothrips staphylinus*). Spring is also the best time to check mist flower fungus (*Entyloma ageratinae*) and gorse colonial hard shoot moth (*Pempelia genistella*) release sites. The colonial hard shoot moth caterpillars remain tiny throughout the winter and put on a growth spurt in the spring as they forage on young buds, shoot and flowers. Look out for the communal webs (which can get up to 20 cm across) with green-and-brown striped caterpillars inside. The caterpillars' feeding damage and balls of frass should also be quite obvious and help you to distinguish these webs from spider webs.



Typical gorse colonial hard shoot moth web, note caterpillars, webbing and frass (at bottom).

Tell Me More…

Question: My ragwort has come back. What has gone wrong? Has the ragwort flea beetle stopped working?

No, don't hit the panic button, as this is to be expected! Even though the ragwort flea beetle (*Longitarsus jacobaeae*) has been doing an excellent job in recent years at taking out ragwort plants (*Senecio jacobaea*), there is still a huge seed bank in the soil just waiting for the right conditions to grow.

When flea beetles are released on to ragwort it usually takes a few years for their numbers to build up to the stage when they start to make a dent in their host. As the beetles become numerous the ragwort usually begins to decline quite rapidly to low levels. When there are only a few plants left for the beetles to utilise, their numbers also take a nosedive. This state of affairs, where ragwort populations are kept low by a small resident flea beetle population, can continue for some time. However, if something happens to suddenly promote ragwort growth (e.g. drought, overgrazing, or pugging, which opens up gaps in pasture) you can suddenly have a bumper crop of ragwort on your hands. The small resident flea beetle population is suddenly spoilt for choice and unable to attack all the plants available. However, now that its host is again abundant the flea beetle population can grow accordingly and eventually bring the ragwort back under control again. This boom/bust cycle is likely to be repeated many times before the seed bank is exhausted. Even then there may be some years when ragwort temporarily becomes bad again if conditions favour the growth of this weed and/or do not suit the control agents.

What can I do to help?

- Avoid activities that promote ragwort growth – basically anything that opens up pasture.
- Avoid activities that harm the agents, e.g. spraying the rosettes when the agents are developing inside and are unable to escape. If you must spray your ragwort then use one of the more beetle-friendly products, such as metsulfuron methyl (Escort®) when mobile adults are the dominant life stage (see the "The Biological Control of Weeds Book" for more details about using herbicides with ragwort flea beetles).
- Check that the beetles are indeed still present and if necessary arrange for a top-up release.

NB. Ragwort flea beetles are not able to control ragwort growing in all situations. See Hot Gossip page 4.

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