Winter — 2003

Protect

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Protect

Winter 2003

Magazine of the New Zealand Biosecurity Institute

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with regard to the biosecurity conference the latter is planning i

Editor's Note

The pre-NETS issue of *Protect* seems to follow hard on the heels of the last one.

NETS2003, being held in Nelson in conjunction with the Vertebrate Pest Management Intitute of New Zealand, promises to be an interesting event with opportunities for the public to get involved.

This issue, along with the news from the executive, has a good round up of branch news and a report of a combined gathering of the two northern-most branches, at Ruakura where members heard about biosecurity work under way at the Crown Research Institutes in the region.

What started out as a "stop-gap" job for Peter Joynt has kept him on his toes and involved for more than two decades. He outlines his career in the Member Profile.

The weed awareness campaign, Weedbusters, is gathering momentum with an Establishment Group representing the major players in biosecurity organising, and date set for the launch of the campaign.

Manchurian wild rice is the focus of this issue's Practical Control Tip. The species is clogging waterways and smothering stream banks in the north.

Last, but by no means least, is Sean Weaver's overview and extensive bibliography of scientific papers on various aspects of genetically modified organisms in the context of biosecurity. For anyone wishing to become informed on some of the facets of this thorny issue, this is a valuable resource. Don't let it confuse you as you work your way through it — it is set out in sections with an outline of one aspect followed by a bibliography on that topic. It seemed easier to come to grips with it that way rather than lumping all the references at the end.

Carolyn Lewis rattles a few cages on the topic of acronyms, in the endpaper which concludes this edition.

Thanks for your contributions. The deadline for the Spring issue of *Protect* is the first week of September.

Have a good and worthwhile time at NETS2003.

Col Pearson
Editor

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Email: **col.pearson@caverock.net.nz**

News from the Executive

NETS2003

By the time you are reading this, "Biosecurity at the Centre of New Zealand" will be about to kickoff (see page 7). For those of you who aren't able to attend there will be a full report on NETS in the next edition of this newsletter. For those of you who will be at Nelson, please make a special effort to attend our AGM on the Wednesday afternoon instead of sloping off for some extra kip etc. In order to make up a quorum, our constitution requires us to have 20% of our financial members present, which at the time of writing means about 40-odd people. We promise that the AGM will be as short and sweet as possible. Please make every effort to attend — we value your support!

Bright*Star's Biosecurity Conference

Some of you may have seen the fliers for this "inaugural" conference to be held in Wellington on August 20-21 (just over a month after our conference). We are not too happy about these professional conference organisers getting in on the action and charging the seemingly exorbitant amount of $1900 for registration to the two-day conference. We always knew that NETS was ridiculously good value!

The Executive has written to Brightstar outlining our concerns (see Appendix 1) and has also contacted some of the speakers to make them aware of our concern. Interestingly two of the speakers got straight back to us to say that they had decided to pull out once they saw the registration fee and advertising claims.

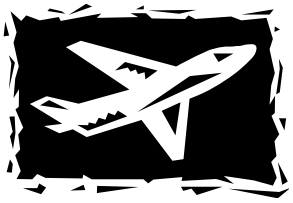
We need to think about how we can capture the senior management-type audience that they are obviously targeting, to get them to our own conference. It makes better sense to have all the players attending one affordable event.

New Members

We would like to warmly welcome the following new members:

John Bain – Forest Research, Rotorua
Lisa Jamieson – Hortresearch, Auckland
Dan O'Halloran – Department of Conservation, Bay of Islands
Erik Van der Spek – Department of Conservation, Kaitaia
Shane Hona, Nick Waipara and **Darren Ward** – Landcare Research, Auckland
David Slaney – Public Health, Wellington
Amy Fletcher – University of Canterbury, Political Science Department

Travel/Study Awards



Don't forget that applications close on September 30, 2003. Refer to our website for further details about the awards and the relevant paperwork.

Branch AGMs

See Branch News for information about the various branch AGMs and who the office holders will be in 2003/04. It is pleasing to see some new faces stepping forward.

Thank You

I would like to thank the Cawthron Institute for continuing to allow us to use their domain name for our website and for paying for the privilege too. The NZBI is lucky to have such great support!

Weedbuster Establishment Committee

Carolyn Lewis has been selected as the NZBI representative on the Weedbuster Establishment Group (see page 14). This group has been set up to explore the range of expectations for the Weedbusters programme and to develop a National Strategy for Weedbusters, including setting strategic direction, desired outcomes, and building a framework of actions and commitments for lead groups and agencies.

The Establishment Group will be getting together for a workshop in Christchurch on July 30-31. Please contact Carolyn if you have any thoughts, queries or suggestions regarding the NZBI's contribution to the Weedbuster campaign (email Carolyn at **stevebluett@wave.co.nz**).

Posters

After much agonising over design, we hope to have copies of our new poster ready to give away at Nelson NETS. The poster is designed to raise awareness about the NZBI and biosecurity threats to New Zealand.

We plan to produce one AO size copy for each branch and at least 500 A3 size copies so that all our members can put them up far and wide. If funds permit, we may also print a second design at a later date. Thanks to Carolyn Lewis, Melanie Newfield, Rod Smart, and especially to Peter Berben for bringing this idea to fruition.

Next issue

Carolyn Lewis has kindly agreed to take over the production of *Protect* from me after this issue. This means that she will be responsible for sourcing stories

News from the Executive Continued

and ensuring that Col gets copy on time, as well as helping out with proofreading and editing. Please help her out by, at the very least, suggesting ideas for stories (**stevebluett@wave.co.nz**). We would particularly like people to put up their hands to be subjects for our member profiles, which I'm sure you all enjoy reading!

Bye for now
Lynley 

Tom Jessup

Sadly one of our former long-standing members, Tom Jessep, passed away on the June 23 after a battle with cancer.

Tom retired in 1997 after 40 years of working for the DSIR and later Landcare Research battling various pests. We made Tom a fellow of the NZBI at our AGM last year in recognition of his contribution, particularly to biological control of thistles.

Tom will be sadly missed by all those who knew him but the legacy of his work will live on.

NETS2003

Biosecurity in the centre of New Zealand

The annual New Zealand Biosecurity Conference is being held in Nelson on July 9-11 at the Rutherford Hotel. The conference is being staged by the New Zealand Biosecurity Institute, in association with the Tasman District Council, the Nelson City Council, the Marlborough District Council, the Department of Conservation, the Cawthron Institute and Landcare Research.

The theme for this year's conference is Biosecurity in the Centre of New Zealand. The emphasis is on biosecurity at the centre of our nation — Nelson and Marlborough — where the South Island meets the North.

"If we are to adequately protect our country against the serious effects of unwanted pests, then we need all New Zealanders to work together to present a united front. It is critical that people working at the forefront of biosecurity keep up to date with best practices, and improve their understanding of other people's perspectives so that progress is not compromised through unnecessary conflict. The New Zealand Biosecurity Institute is playing a key role in allowing these things to happen," NZBI President Lynley Hayes says.

"This year the New Zealand Biosecurity Institute is holding its national conference in association with the Vertebrate Pest Management Institute of New Zealand. The conference will focus on national initiatives including the new Biosecurity Strategy for New Zealand as well as local themes and examples of pest management in action. Themes include how to get the best value for our investment in biosecurity, how we can best manage risks, and looking at priorities for the seafood, wine and forestry industries. There will also be focused workshops including a 'Weedbuster' session, which will be open to the public," says Dr Mike Taylor, Chairman of the Conference Organising Committee.

The 'Weedbuster' workshop session will be held on the Friday afternoon from 2.30-3.30pm at the Rutherford Hotel. Members of the public and schools are invited to attend this free session and take the opportunity to ask a "Panel of Experts" questions relating to weed identification and control. There will also be real-life samples of some of the worst weeds around Nelson and Marlborough, including aquatic weeds.

"The Vertebrate Pest Management Institute of New Zealand welcomes the opportunity to join the New Zealand Biosecurity Institute at this year's conference. Ten speakers will present papers in a full afternoon session with topics ranging from the development of a strategic approach to biosecurity and biodiversity issues, to managing pest species such as wild horses, stoats, possums and rabbits. While the management of pest species themselves will be a central theme, there will also be a strong emphasis on the all important management of public perceptions and the involvement of communities and other stakeholders in pest programs," National Vertebrate Pest Management Institute President Bill Simmons says.

This will be the fifth time that the Nelson/Marlborough area have hosted the event in the Institute's 53-year history, and visitors to Nelson will be treated to a very diverse programme with papers presented by a wide range of speakers from those developing national policy on biosecurity right through to regional pest control officers at the "coal face" of pest control.

Delegates are also being encouraged to visit one of the Nelson region's extensive national parks — Abel Tasman, Kahurangi or Nelson Lakes — at the conclusion of the three-day conference.

For further information: **Ben Minehan**
03 578 5249
021 344 045

A full programme is now available on the NZBI website www.biosecurity.org.nz

News from the Branches

Canterbury Branch

The Canterbury Branch continued its fine tradition of mixing business with pleasure by holding its AGM at an Indian restaurant this year. The banquet meal at Tulsi was thoroughly enjoyed by all and capped off a very enjoyable evening.

Laurence Smith and Jan Crooks kindly offered to continue in their roles as chair and secretary respectively for another term. Jenny Williams has agreed to take over the role of branch executive member.

The Canterbury Branch intends to hold at least two events in the coming year. It was agreed that we should hold an activity to coincide with Weedbuster Week (October 13-17) and decided that a boneseed-out day on the Port Hills would be most appropriate.

We will also try again to organise a day on aquatics at some stage (this fell through in 2002/03).

Finally, the AGM discussed the possibility of offering to hold NETS2005 in Christchurch and all were in favour of doing so. A subcommittee has been formed to consider possible venues.

Lynley Hayes

Otago/Southland Branch update

Wilding weekend: The group that gathered to remove wilding pines on Cattle Flat Station last February. About 15,000 trees were removed from 145ha. Some of the country was steep as in the photo overleaf.

After all the hullabaloo associated with organizing and running NETS 2002, the “Roaring Forties” branch took a breather for the rest of the year. There were no more organised events held during 2002/2003. Take heed Nelson/Marlborough — running a conference can do that to you!

Wilding weekend grows

A handful of branch members made it to the wilding tree weekend at Cattle Flat Station, northern Southland, in February 2003, a major source of *Pinus contorta* seed. This was the third year the event has taken place.

Southland/Otago Branch update Continued

It's gone from humble beginnings of a single work day to which 25 people turned up, to an entire weekend with around 50 eager folk primed to rid some high country of its unwanted "contorted coniferous intruders".

The tally for the weekend was a whopping 15,000 trees removed over an area of 145ha. The views were inspiring, the weather was kind and the food was plentiful. Despite clambering around like thar for a couple of days, a good weekend was had by all.

The dates for next year have been set for February 14-15, 2004. Book it in your calendar if you're interested in coming along.

Window on things aquatic

The NZBI's own "aqua-weedo" Paul Champion visited our fair region for an aquatic weed identification workshop in March 2003. Branch members went along to see what problems the northerners are facing, and also to discover what could be coming this way.

The magnitude of aquatic weed threats is frightening and we can consider ourselves fortunate many have not made it down this way yet. You could argue many wouldn't survive down here in our cooler climate anyway. Let's ensure we don't have the misfortune to prove whether this is in fact the case.

Branch personal change

Our AGM was held in May 2003 and gave members a chance to catch up after the quiet year. NETS "burn-out" took its toll on Keith Crothers who decided to stand down as Chairperson/Executive Member for the branch. Well done to Keith for keeping the branch going during some quiet years and for being the main guy for NETS 2002.

I (Randall Mine) stepped up to replace Keith and Lisa Maria (ORC) has come on board as branch secretary. Its good to have Otago folk back as active members. Most had retired/moved on and although still interested, often have other priorities than getting along to AGM's. Fair play to them too I say. They've done their bit previously and good on them for keeping their membership going.

Internal biosecurity barrier mooted

The feasibility of establishing an internal biosecurity barrier at Cook Strait was discussed at the AGM. The topic has not been favourably received to date, but its still on our agenda. South Island local authorities have put a remit to Local Government New Zealand regarding this. Otago/Southland want the NZBI to add its voice to the cause and members are preparing a remit based on the one put to LGNZ. We're intending to bring this to NETS 2003 for further discussion.

Yet to come

Upcoming events to keep in mind for the branch are two biological control field days — one in late 2003, the other in early 2004 — and the wilding tree weekend at Cattle Flat Station.

A weed tour of Otago/Southland could also be on the cards if there is sufficient interest from members to organize it. We're looking to the DOC weed techos of the branch (Muzza and springbok Pete) to take the lead on this one. Well, it was their idea!

All for now.
Cheers

Randall Milne

Central North Island Branch report

The branch combined with the Northland-Auckland Branch recently for an afternoon seminar. Each branch held its AGM separately and then combined to discuss general NZBI issues, socialise over lunch and then listen to four speakers in the afternoon. Look for Alison Gianotti's full report on the day elsewhere in this issue.

Our AGM was well attended, with over half of our members there. We welcomed in our new office holders: Carolyn Lewis as the Chairperson, Esther Francis-van den Bosch as Secretary Treasurer and Paul Champion as Executive Member. There is an up-beat feeling in the branch at present and the new team will surely build on this. The next year should see some interesting meetings and excursions.

Plant Pest Identification course

The major initiative from the CNI team this year has been to identify the need for a training course for plant biosecurity people to allow them to identify plants on the National Plant Pest Accord List, and to develop that course largely from within the branch. If you are in this field, look for a three-day course to be run in Auckland towards the end of this year or in the New Year. A big thank you to Paul Champion, David Stephens, Ian Popay and Esther Francis-van den Bosch for the work they have put in here.

All members should be inspired to see something very useful develop at a branch level. The more people that attend branch meetings, the more "fizz" that is generated, and the more likely it is that that fizz is converted into action.

It is hard to keep up with all of the goings on in a large branch, but a special congratulations this time round to Heidi Pene (formerly McGlone) who also converted "fizz" into action and married recently.

All this talk of fizz has me off in search of the pub, so "adios" for the last time from me.

Pete McLaren
Outgoing Chairman
(but at times reclusive)

Joint meeting of the Northland/Auckland and Central North Island branches

On May 28, the Central North Island and Northland/ Auckland branches held a very successful joint meeting in Ruakura. Organised by Peter McLaren (Env. BOP) and Paul Champion (NIWA), the meeting drew a record crowd from far and wide.

The meeting kicked off with Paul Champion talking about the Weed Identification Workshops he is hoping to run later this year. These were initiated after concerns raised at a CNI branch meeting and the content will be based on feedback provided to Esther van den Bosch (HortResearch) by potential users of the course (i.e field staff). Paul Champion, Ian Popay (DOC) and David Stephens (Env.Waikato) have been working on the finer details. The focus will be on important weed species on the Plant Pest Accord List that are hard to identify, being easily confused with other species. Ewen Cameron and his team at the Auckland Museum Herbarium are likely to be involved in preparing the course content and resources.

Meeting participants then had the opportunity to view a host of different live and pressed plant specimens, including vines, grasses, aquatics, trees and shrubs, expertly put together by Rod Smart (ARC). After lunch and a chance for people from the two branches to meet each other, we listened to a series of talks outlining the biosecurity research being conducted at Ruakura by staff from a number of different organisations.

The first speaker was Murray Towler (Business Manager, Biosecurity Services, AgriQuality) who presented an interesting talk about the work they are doing on contract from MAF to deal with several potentially serious insect pests that have recently taken up residence in New Zealand.

First up was the infamous painted apple moth eradication programme in Auckland. The eradication effort has employed a combination of removing host plant material, aerial spraying and release of sterile male moths. Monitoring shows that painted apple moth numbers have decreased dramatically as a result. In February 2003, the population was 2% of that recorded at the same time in 2002.

Meeting participants discussing weed display items.

Joint meeting of branches Continued

Another nasty, capable of eating 600-plus plant species, the fall web worm, recently made its home in someone's backyard in the Auckland suburb of Mt Wellington. Eradication staff threw the book at it and have not found any other populations despite extensive monitoring in the area.

In contrast, the gum leaf skelotiniser may unfortunately be here to stay. As the name suggests eucalypt species are its favourite food and this is the problem. In the Manukau area of Auckland, where it has recently been found, eradication would require removal of host material from an estimated 11,000 trees over 20,000 hectares!

On the positive side, the national surveillance programme for the asian gypsy moth, which has been operating since 1993, recently found its target. A major pest for the forestry industry, the moth was recently discovered in Hamilton as part of this routine trapping programme. As a result the Hamilton region is now bristling with traps and staff have also implemented a ground survey.

Last but not least, the red headed ash borer, which chews through deciduous trees, has been discovered under pallets in an industrial area in Mt Wellington.

AgResearch investigations

Then Trevor James from AgResearch gave us an overview of the biosecurity work under way Members of its research team are conducting work to discover the fate of herbicides in the environment. The good news is that a study has shown that only 1% of the herbicide applied to a maize crop can been found in the runoff after subsequent heavy rain. Work has also shown that New Zealand soils have a high organic content which helps to absorb chemicals. It is hoped that understanding the processes involved will lead to more effective herbicide application and lower chemical residues.

Other work includes predicting weed seed emergence. Results of a long-term study have indicated that thistle seeds are capable of surviving in the soil in excess of 50 years, while ragwort seeds can persist for up to 18 years. Research is also being conducted to determine the periods when a crop is most vulnerable to weed invasion and the best use of herbicides when multiple pasture weeds are present.

Recently they have conducted a study for MAF to assess the risks of weed seeds found on the leafy parts of imported pineapples. A surprising number of weeds were recovered, with 12 different species being found. Not surprisingly, many of these were of tropical origin. The top three worst weeds were *Chromolaena odorata*, *Paspalum conjugatum* and *Brachiaria mutica*. Subsequently, MAF inspection has revealed that overseas pineapple growers have been leaving weeds to die on top of the pineapple plants. Stopping this practice has dramatically reduced the numbers of weed seeds coming into New Zealand on the pineapples!

HortResearch work

Next Brian Ward from HortResearch summarised the work being conducted on invasive weeds and animal pests. Research is under way to develop non-spray application techniques for herbicides for a number of weeds including tree privet, ginger, willow, elaeagnus and japanese honeysuckle. Techniques employed include injection systems, "paint" rollers, drilling and then applying herbicide, and gel formulations.

Work is also being done on methods to control the varroa bee mite and a national survey of Argentine ants. Researchers are also hard at work developing smarter ways to kill animal pests. Strategies include high-tech bait stations, bait which sends out a scent to attract the target animal, bait additives that act as memory blockers so the pest forgets that it doesn't like the bait taste, and infrared imaging of pests.

Meeting participants discussing weed display items.

NIWA's aquatic weed research

Last but no means least, Debra Hofstra from NIWA described work being conducted with invasive aquatic weeds by the aquatic plant group in Hamilton. Trials have been set up to evaluate control methods for aquatic weeds, to assess the competitive ability of potential aquwatic weeds (plants in the country but not naturalised) and to evaluate potential impacts on biodiversity through hybridisation between alien and native species.

Previous research has shown

Joint meeting of branches Continued

that the herbicide triclopyr amine has successfully controlled alligator weed, significantly reducing plant biomass and cover. Current trials are under way to determine the minimum dose of the herbicide which still gives control of the weed in the aquatic situation. Trials have also been set up to assess the competitive interactions between alien species, such as *Hygrophila polysperma* and *Hydrocotyle verticillata*, and desirable native species as well as other invasive exotics. These plants are currently in the country but little is known about their performance here and their likely impacts on our native aquatic flora.

Work is also being conducted to assess the lesser-seen impact of alien aquatic species on native biodiversity, such as the formation of hybrids. While straight out displacement of native species is a major factor that impacts on native biodiversity, hybridisation between exotic and native species can also occur. Work is currently under way to determine whether *Potamogeton crispus* has been hybridising with its Kiwi relative *P. ochreatus* in New Zealand.

After Debra's talk we had the opportunity to view the competitive interaction and alligator weed trials.

Alison Gianotti

Member Profile: Peter Joynt

It's a bit of a worry when, at this stage of your career, you are asked to do a profile of your self. You start to think that maybe some one is expecting you to disappear and we better get him to write something before it's to late! However, it is really nice to be invited to do so, so here goes.

Married to Marjorie, we have two adult sons and two grandchildren. I was raised and educated in the rural community of Ruawai on the banks of the Kaipara Harbour in Northland. This area has been my home for most of my adult life.

Given this background and being raised on a farm, it is little wonder that after trying my hand in the airforce plus a couple of other occupations, I took up dairy farming when the opportunity arose — first as a manager then sharemilking, and finally, at the fairly young age of 23, farm ownership. This was a time of quite small holdings and I enthusiastically set about the amalgamation of several small farms into one over the next few years.

Peter Joynt

A bout of poor health and a desire to try other areas of work resulted in us deciding to quit the farming industry and in 1982 I was offered the position of Noxious Plants Officer with the Otamatea County Council. I thought at the time that this would be a nice little stop-gap job for a short period, never dreaming that 21 years on I would be still here and still enjoying the work.

Amalgamation of the small district councils was on the horizon, so in 1985 I decided to move up the road to a senior Noxious Plants officers position at the Hobson County, based in Dargaville. In 1990, this whole area was re-established as the Kaipara Distict and responsibility for administering Plant and Animal Pest control was transferred to the regional councils. In 1992 I was appointed to the position of Regional Plants Officer for the Northland Regional Council .

With the introduction of the Biosecurity Act in 1993 some pretty major changes where taking place in the way we worked and was a time of steep learning for us all as we struggled to come to terms with the Biosecurity Act, and terms such as "Organisms" "Pest" "Section 76 Analysis" and what it all meant to us as plant officers.

To assist regional councils develop their individual strategies, a national Biosecurity Generic Guidelines Group was formed and I was invited to participate. The name was such a mouthful that we quickly adopted the name of "BGGs". This group was the first of many which local government has subsequently put together to work collaboratively with new legislation.

An important part in the development of our careers has been the Institute, formerly known as the Noxious Plants Officers Institute, which for many years ran and administered the training programme for Noxious Plants Officers complete with training officers and supervisors for new recruits. On looking back, I have some very fond memories of some wonderful conferences and lasting friendships made, how we established a network of people who readily shared their knowledge and experiences. Also of many characters that were around at the time and who, despite some of the outrageous antics they and many of us got up to, helped make the Institute what it is today.

In 1997, I was elected as President of the Noxious Plants Officers Institute, at this time the Institute was actively seeking to widen its appeal outside of plants people to include persons in the wider field of biosecurity. So at the 1997 NETS held at Lincoln University, we accepted changes to the constitution and adopted the name of New Zealand Biosecurity Institute and I was very proud to accept the position of Inaugural President.

This move, while applauded by most of our employers and managers at the time, caused a few grumbles amongst a small number of people who thought that we were aiming above our rightful position. F ortunately that attitude has disappeared and the Institute is now widely acknowledged as an appropriate representative group of professionals continuing to attract an ever-widening membership. The continued growth and nurturing of our Institute is of the utmost importance to all involved with New Zealand biosecurity and it is pleasing to see the growth and development in the years since it's formation.

New technology such as GIS, GPS, digital photography, computers etc. have all been wonderfull tools and the challenge to learn hase radically altered the way we do our business. However, the outdoor environment that goes with the job, the ability to interact with the community, the responsibility and freedom to work unsupervised with landowners, groups, and other individuals have been the most enjoyable parts of the job. This alone, I believe, probably accounts for many of the long career paths that some of us "older brigade" have had and continue to enjoy. Although I'm now known as a Biosecurity Officer, I'm still based in Dargaville and the Kaipara is still my "patch". I look forward to a few more years yet and the continued association with a great bunch of professional people.

Peter Joynt

Weedbusters update

What do Weed Warriors, Stop the Spread, Watch for these Weeds, Horrible Hornwort, War on Weeds, and Purple Peril all have in common?

Apart from being fine examples of alliteration, they are all great weed awareness campaigns and educational programmes with the potential to grow and thrive under the Weedbusters umbrella.

In this latest update, find out about the Weedbusters Establishment Group, get the low-down on the Weedbusters launch, and learn about how you can take part.

Weedbusters is a weeds awareness and educational programme, for which DOC is acting as a catalyst. If Weedbusters is new to you, check out pages 13-14 of the Summer *Protect* and page 16 of the Autumn *Protect* (on the NZBI website, **www.biosecurity.org.nz**)

Weedbusters is our chance to pool resources, add national consistency to what we're doing and create a synergy to raise weeds awareness and inspire "weed-busting" behaviour. Weedbusters is gaining momentum by the day. New cross-agency links are being forged, existing links are being strengthened, and the foundations for a multiple-agency campaign are being built.

Establishment Group

In the last issue of *Protect* we invited expressions of interest from people to represent the NZBI on the Weedbusters Establishment Group and we are delighted to announce that Carolyn Lewis (from Waikato) has accepted the role.

The Establishment Group is made up of representatives from a spectrum of agencies and groups with an interest in Weedbusters.

To date Establishment Group members are:
Jack Craw (for the Biosecurity Managers Group);
John Randall (for MAF);
Adrienne Tollemache (for Protect NZ);
Carolyn Lewis (for NZBI);
Lynley Hayes (for Landcare Research);
Jeremy Kennerly (for Nursery and Gardening Industry Association);
Don Ross (for Landcare Trust);
Mike Peters (for NZ Ecological Restoration Network);
Susan Timmins (for DOC Science and Research);
Keith Briden (for DOC Southern Region);
Ian Popay (for DOC Northern Region);
Amber Bill (for DOC, Weedbusters).

The Establishment Group will meet at the end of July for a two-day workshop which aims to:

- Explore the range of expectations for the Weedbusters programme
- Develop a National Strategy for Weedbusters — including setting strategic direction, desired outcomes, and building a framework of actions and commitments for lead groups and agencies.

If you have any ideas for Weedbusters, please contact your representative on the group.

Launching Weedbusters

Another important event is the Weedbusters Launch. The launch will be held on the evening of Tuesday, October 14 in Wellington. This is our opportunity to show the country that weeds are a serious problem — so serious that central government, local government, industry and community groups are all joining forces to communicate this issue.

We are hoping to co-ordinate as much activity and media attention about weeds as we can before, during and after the launch. If you would like to be part of getting Weedbusters up-and-running, please consider any weeds events (e.g. volunteer days, displays, talks, training, weed control) that are coming up which you can promote as Weedbuster activities. If you would like a template for a national Weedbusters media release, or want to make inquiries about Woody Weed (rumours have it that the rascal has slipped into the country), or want to use the Weedbusters logo, email Amber Bill (DOC's National Weeds Awareness Co-ordinator): **abill@doc.govt.nz**

Practical Control Tips

Manchurian wild rice — the alien invader can be stopped

By Deborah Hofstra and Paul Champion
National Centre for Aquatic Biodiversity and Biosecurity
NIWA,
Hamilton
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P.Champion@niwa.co.nz

Zizania latifolia, commonly known as Manchurian wild rice, or Manchurian ricegrass, is a giant semi-aquatic grass that has smothered riverbanks, invaded pastures, and run rampant through drainage channels as it continues its invasion of our waterways.

A native of Asia, Manchurian wild rice was originally introduced to New Zealand around the turn of the 20th century in the ballast carried by timber ships, which was discarded on the banks of the Northern Wairoa River.

Indication of size — Manchurian wild rice in Northland, dwarfing Peter Joynt from Northland Regional Council.

Although introduced accidentally as one of the few aquatic weeds not introduced deliberately e.g. as an ornamental pond plant, it has also been deliberately planted in the Hauraki Plains area, supposedly to stabilise stop-banks. However, rather than stabilise banks, Manchurian wild rice can in the longer term cause them to slump and encourage erosion of bank material. Commonly found growing in soft mud, its growth intensifies the wet soft soil conditions that may cause the deterioration of stop-banks. In addition to stop-bank slumping, Manchurian wild rice causes a host of other problems wherever it is present in New Zealand. For example, it invades drainage channels preventing access to them and impeding water flow, in turn increasing the likelihood of flooding. Unless intensive grazing is maintained in pastures adjacent to Manchurian wild rice-filled drains, it will also invade these areas, encouraged by the flooding it causes by blocking the drains.

Flowering Manchurian wild rice which in its native range in Asia is cultivated as a food plant.

This plant is also extremely invasive in native vegetation and appears to reduce the diversity of vegetation it invades, displacing small-stature species and enveloping taller vegetation. In general, species enveloped by dense growths of this grass would be unable to reproduce and sustain themselves under those conditions, resulting long-term in Manchurian wild rice becoming a monoculture.

Within its native range in Asia (Taiwan, eastern China, and South East Asia) there are no reports of nuisance growths of Manchurian wild rice. This may be attributed to the intensive landuse practices surrounding its cultivation as a food plant. Manchurian wild rice is cultivated for its edible seed, rhizomes, young shoots and stem bases. In addition,

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Manchurian wild rice herbicide trial site showing from the left; haloxyfop, control (green), and imazapyr to the right

galls induced by the smut fungus, *Ustilago esculenta*, on Manchurian wild rice are cultivated and used as a summer and autumn vegetable.

In New Zealand, Manchurian wild rice is typically found on the berm of waterways, where it is tolerant of both fresh and brackish water, and is commonly found on the tidal reaches of rivers. It forms dense stands around 3-4m in height, with a strong, deep, root system with bulky spreading rhizomes that extend several metres down into soft sediment. Established plants increase in area due to rhizome extension, which can grow to over 10m from the nearest shoot. Dispersal to new sites is by water movement of seeds and rhizome pieces, as well as transfer on contaminated drainage machinery, which is recognised as a major factor in the spread of Manchurian wild rice between catchments.

The current distribution of Manchurian wild rice is predominantly in the Kaipara district of Northland centred around its site of introduction, the Northern Wairoa River, near Dargaville, and associated waterways. Smaller infestations occur within the Whangarei and Far North districts, as well as in Rodney and Waitakere districts (Auckland), Hauraki Plains (Waikato) and Kapiti Coast (Wellington). Potentially Manchurian wild rice could infest any lowland wetland especially the margins of still or flowing water bodies in New Zealand.

To stem its progress a combination of both physical and chemical control options have been investigated in the past with varying results. Physical control methods have varied, depending on the site in which the plant is growing. Mechanical diggers have commonly been used, but pose the risk of transferring rhizome fragments to new sites. Northland Regional Council has identified this as the main method of dispersal and actively promotes cleaning of drainage machinery before use in uninfested areas. Mowing, grazing, burning and a combination of these have been used to control Manchurian wild rice that has spread to pastures, but must be constantly maintained to prevent plants from becoming large and unpalatable, because stock will only graze new Manchurian wild rice shoots.

Past herbicide trials in New Zealand have evaluated sodium chlorate, sodium TCA, dalapon (2,2-dichloropropionic acid) in combination with amitrole, paraquat, and glyphosate. None of these products will eradicate Manchurian wild rice, although some do demonstrate herbicidal activity, reducing the height and/or cover of Manchurian wild rice and preventing it from flowering and thus eliminating its chances of dispersal by seed. More recent use of grass-specific herbicides showed some promise.

NIWA included Manchurian wild rice in their Aquatic Plant Management Research Programme (FRST funded) because there were limited effective control options available and it is a highly ranked weed species. Its weediness was assessed using the NIWA Aquatic Weed Risk Assessment Model and based on the concerns of water body managers. This research evaluated new tools for the control and management of Manchurian wild rice.

The tools trialed were three herbicides that had previously been used with some success in different regions in New Zealand for the control of nuisance rhizomatous marginal grasses including Manchurian wild rice, phragmites and spartina. Two of these — haloxyfop (Gallant®) and quizalofop (Targa®) — were evaluated because they are grass selective products. The third product, imazapyr (Arsenal®), is a broad-spectrum herbicide that had been used to successfully control the nuisance marginal aquatic species, phragmites.

Trials to control Manchurian wild rice were conducted

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in containers at NIWA's experimental facility at Ruakura and in field plots near Dargaville (in conjunction with Northland Regional Council (NRC)). Trials were monitored for more than a year and each product was evaluated at several different rates.

In containers both haloxyfop and imazapyr were successful in significantly reducing the leaf biomass of Manchurian wild rice. In the field plots, the best results were also achieved with haloxyfop at rates as low as 0.5 kg ha^{-1} using very high water rates (1600 L ha^{-1}), which reduced the cover of Manchurian wild rice to below 10% for more than a year. This rate is equivalent to a ca 40% reduction in the amount of haloxyfop required to control Manchurian wild rice than that previously recommended by NRC.

From the information resulting from these trials and ecotoxicological studies carried out at NIWA, NRC has obtained a consent to control all Manchurian wild rice within its region and hase a programme to progressively control it, beginning with isolated areas outside of the main infestation zone.

We would like to thank NRC for funding part of this research and especially Peter Joynt who assisted with organisation of the field trial.

Biosecurity and GMOs in NZ

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Assessing the likely impact that the introduction that genetically modified organisms could have on New Zealand's biosecurity is not easy. The following article is an annotated bibliography of peer-reviewed scientific publications on risks associated with GMOs that are relevant to biosecurity in this country. It is not an exhaustive list but provides a starting point for those interested in seeing whether there is any substance to cautionary perspectives on GMOs, and what that substance might be.

When mustelids were being considered for introduction in the 19th century, it took place amid cautionary protest from those who understood the likely effect on native birds. In spite of this, a groundswell of farmers and politicians in the 1880s pushed for the introduction and liberation of mustelids for the purpose (target effect) of controlling rabbits.

After the release of mustelids into the environment, people began to experience some of the non-target effects of this biosecurity breach. Walsh (1893)[1] asserted that these new organisms not only failed to eliminate (or adequately control) rabbits, "but are already, in the destruction of native birds, and their depredations of the fowl yard, proving themselves an intolerable nuisance".

Stoats: There are similarities between the debate at the time of the introduction of mustelids into New Zealand with today's debate surrounding the introduction of genetically modified organisms.
Photo: Dept. of Conservation

In other words, the benefits of the target effect were not realised, and the costs associated with the non-target effects outweighed any advantage of having them. But by then it was too late – the genie was out of the bottle and there was no way of putting it back. It was an irreversible risk that did not pay off.

There is a lot in common with the current debate concerning GMOs where the benefits of agricultural innovations are being touted to outweigh the risks, and yet there are ecologists and natural historians today sounding a lot like Buller, who in 1895, "raised [his] voice in protest at so insane a policy… but all to no purpose. The [new organisms] were turned loose north and south, and have now become so firmly acclimatised in a country where the conditions of life are so favourable to their existence that no power on earth will ever dislodge them."[2]

But is comparison with the well-intentioned folly of the fathers of the nation simply rhetoric without substance? Are the cautionary tales of those opposed to the commercial release of GMOs simply unscientific drivel from luddites who do not understand the science and are averse to the march of progress? And is genetic engineering a "power on earth" that could at long last stop them in their tracks?[3]

Biosecurity and new organisms

From a biosecurity point of view, GMOs are new organisms and this is why the legislation controlling them (the HSNO Act) is also the legislation for controlling the importation of new organisms into the country. The difference being that a GMO becomes new within our borders whereas an imported organism is only new to us. If we are to make scientifically based decisions concerning the biosecurity aspects of GMOs it is important that the biosecurity risks (and the science documenting these risks) are taken fully into account. This leads to two broad types of science in the GM

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spectrum: the science of GM innovation and benefits (the science of target effects), and the science of GM risks (the science of non-target effects). For a more conventional analogy this would be a little like the science that shows that stoats kill rats on the one hand, and the science that shows that stoats kill native birds on the other.

From a biosecurity point of view, the science concerning existing or potential non-target effects is somewhat more relevant, because these encompass the risks that need to be managed, or prevented from taking place. In the stoat example, if we had a robust scientific record of the effects of stoats on birds in their home habitats in other countries then we could use this science to evaluate the potential effects of stoats on our own native wildlife as part of a risk assessment considering a proposal to introduce them for the first time. Unlike the 19th century stoat decision, we do have a robust (and growing) scientific record on the risks of GMOs, and we would be unwise to ignore it. This science does not tend to get much press perhaps because it would make a black and white (luddites vs scientists) story a little too complex for a text or sound bite.

With controversial and complex issues like genetic modification it is often difficult to develop an informed opinion if we do not have access to all the relevant facts. If we make a decision on the basis of only part of the story we may make a bad decision. This theme somewhat characterises the frustration that many ecologists have had with engineers for decades. It is not that the technology is evil, or that engineers are determined to ignore the broader systems picture, but that sometimes it takes an ecologically trained mind to comprehend the non-target effects of engineering solutions, whether it is a hydro-dam, a road, a hotel, a pesticide, or a genetic modification. Adjusting our solutions to take adequate account of the ecological dimension of reality is what sustainable development is all about.

Risk science

For a sustainable knowledge economy, we need to make use of all of the knowledge in the knowledge basket and not just the good news. Risk science is a messenger that does not always bring good news and for some it is an “intolerable nuisance,” particularly those who have made a decision about something before looking carefully at the risks. In the case of genetic engineering there are many of them and some are complex, but not too complex for an informed decision-maker to understand.

What follows is an annotated bibliography of peer-reviewed scientific publications on risks associated with GMOs that are particularly relevant to biosecurity in New Zealand. It is not an exhaustive list but it is certainly a starting point for those interested in seeing (a) whether there is any substance to cautionary perspectives on GMOs, and (b) what that substance might be. Rather than interpret all of this, it was decided simply to present it and let the science speak for itself. It is also an opportunity to make it available in a transparent fashion so that anyone can follow up on this theme. In other words, what is presented below is a decision-making resource. The bibliography has been restricted to scientific publications, avoiding those that are clearly not peer reviewed.

The themes include:

- risks associated with the technology of transgenics itself, which leads to molecular non-target effects and genomic instability,
- horizontal gene transfer and gene flow beyond the target genome and into other genomes (including the risks of superweeds),
- risks of new diseases in animals,
- the evolution of resistance to insecticidal plants in insect populations, and
- effects of insecticidal plants on non-target insects and soils.

Risks inherent in the system of genetic modification itself

One of the most significant debates on the risks of genetic engineering is whether risk assessments should be restricted to risks associated with particular applications of the technology or whether there are any risks associated with the technology itself. If there are problems with the technology itself then the scope of risks are much greater than case-by-case concerns. One of the key issues here centres around the inability to control the location of the transgene (millions of copies) in the host genome. The consequent potential disruptions to the host genome (with the potential to produce unpredictable effects) are one of the most significant and fundamental criticisms of transgenics (transfer of genes from one genome to another) among scientific commentators. Genetic engineering is not restricted to transgenics but a great deal of the innovations being put forward, especially for the release of GMOs in agriculture and forestry, concerns GMOs produced by means of transgenics. Another fundamental issue inherent to transgenics as a whole is the instability of the transgene, its unpredictable behaviour in the host genome, and its

Biosecurity and GMOs in NZ Continued

propensity to recombine (i.e. become something different to what was designed), and/or jump out of the genome (and escape into other non-target genomes).

Experimental evidence shows that the transgene produces unpredictable consequences unrelated to the expression of that particular gene. In other words, the unpredictable consequences predicted by gene ecologists (resulting from the disruption of the host genome by transgene insertion) are borne out with empirical evidence.

Allison, R.F., Greene, A.E., and Schneider, W.L. (1995). RNA recombination in virus resistant transgenic plants. Proceedings and Papers from the 1996 Risk Assessment Research Symposium. **http://www.nbiap.vt.edu/brarg/asym96/allison96.htm**

Bergelson, J., Purrington, C.B., and Wichmann, G. (1998). Promiscuity in transgenic plants. *Nature* 395, 25.

DeVires, J., Meier, P., and Wackernagel, W. (2001). The natural transformation of the soil bacteria *Pseudomonas stutzeri* and *Acinetobacter* sp. By transgenic plant DNA strictly depends on homologous sequences in the recipient cells. *FEMS Microbiology Letters* 195: 211-215.

Donegan, K.K., Palm, C.J., Fieland, V.J., Porteous, L.A., Ganio, L.M., Schaller, D.L., Bucao, L.Q. and Seidler, R.J. (1995). Changes in levels, species and DNA fingerprints of soil microorganisms associated with cotton expressing the *Bacillus thuringiensis* var. *kurstaki* endotoxin. *Applied Soil Ecology* 2, 111-124.

Donegan, K.K., Seidler, R.J., Doyle, J.D., Porteous, L.A., Digiovanni, G., Widmer, F. and Watrud, L.S. (1999). A field study with genetically engineered alfalfa inoculated with recombinant *Sinorhizobium meliloti*: effects on the soil ecosystem. *Journal of Applied Ecology* 36, 920-936.

Gebbard, F., and Smalla, K. (1999). Monitoring field releases of genetically modified sugar beets for persistence of transgenic plant DNA and horizontal gene transfer. *FEMS Microbiology Ecology* 28: 261-272.

Ho, M.W., Ryan, A., and Cummins, J. (1999). Cauliflower mosaic viral promoter – a recipe for disaster? *Microbial Ecology in Health and Disease*. 11: 194-197.

Ho, M.W., Ryan, A., and Cummins, J. (2000). CaMV35S promoter fragmentation hotspot confirmed and it is active in animals. *Microbial Ecology in Health and Disease*. 12: 189.

Ho, M.W., Ryan, A., and Cummins, J. (2000). Hazards of transgenic plants with the cauliflower mosaic viral promoter. *Microbial Ecology in Health and Disease*. 12: 6-11.

Ho, M-W., Traavik, T., Olsvik, O., Tappeser, B., Howard, C.V., von Weizsacker, C. and McGavin, G.C. (1998). Gene technology and gene ecology of infectious diseases. *Microbial Ecology in Health and Disease* 10, 33-59.

Holmes, B. (2002). Genetically engineered fungus bites back at the crops it's meant to save. *New Scientist,* 28 September 2002, 7.

Horvath, H. Jensen, L. Wong, O., Kohl, E., Ullrich, S., Cochran, J., Kannangara, C., and von Wettstein, D. (2001). Stability of transgene expression, field performance and recombination breeding of transformed barley lines. *Theoretical Applied Genetics* 1: 1-11.

Jackson, R.L., Ramsay, A.J., Christensen, C.D., Beaton, S., Hall, D.F. and Ramshaw, I.A. (2001). Expression of mouse interleukin-4 by a recombinant ectromelia virus suppresses cytolytic lymphocyte responses and overcomes genetic resistance to mousepox. *Journal of Virology* 75, 1205-1210.

The following paper is a reply to the one above, and makes the argument that the effect of the transgene should have been predictable. Whether or not this is true however, the fact is that competent scientists were not able to predict the effect.

Müllbacher, A. and Lobigs, M. (2001). Creation of killer poxvirus could have been predicted. *Journal of Virology* 75, 8353-8355.

Koga, A., Shimada, A., Shima, A., Sakaizumi, M., Tachida, H. and Hori, H. (2000). Evidence for recent invasion of the medusa fish genome by the *Tol2* transposable element. *Genetics* 155, 273-281.

Kumar, S. and Flandung, M. (2000). Transgene repeats in Aspen: molecular characterisation suggests simultaneous integration of independent T-DNAs into receptive hotspots in the host genome. *Mol. Gen. Gentl* 264: 20-28.

Kumpatla, S.P., Chandrasekharan, M.B., Lyer, L.M., Li, G., and Hall, T.C. (1998). Genome intruder scanning and modulation systems and transgene silencing. *Trends in Plant Sciences* 3: 96-104.

Miller, D.G., Rutledge, E.A., and Russell, D.W. (2002). Chromosomal effects of adeno-associated virus vector integration. *Nature Genetics* 30: 147-148.

Nowak, R. (2001).Disaster in the making. *New Scientist* 13 January 2001, 4.

Quist, D., and Chapela, I.H. (2001). Transgenic DNA introgressed into traditional maize landraces in Oazaca, Mexico. *Nature* 414: 541-543.

Sengeløv, G., Kristensen, K.J., Sørensen, A.H., Kroer, N. and Sørensen, S.J. (2001). Effect of genomic location on horizontal transfer of a recombinant gene cassette between *Pseudomonas* strains in the rhizosphere and spermosphere of barley seedlings. *Current Microbiology* 42, 160-167.

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Siciliano, S.D. and Germida, J.J. (1999). Taxonomic diversity of bacteria associated with the roots of field-grown transgenic *Brassica napus* cv. Parkland. *FEMS Microbiology Ecology* 29, 263-272.

Siciliano, S.D., Theoret, C.M., de Freitas, J.R., Hucl, P.J. and Germida, J.J. (1998). Differences in the microbial communities associated with the roots of different cultivars of canola and wheat. *Canadian Journal of Microbiology* 44, 844-851.

Svitashev, S., Ananiev, E., Pawlowski, W.P. and Somers, D.A. (2000). Association of transgene integration sites with chromosome rearrangements in hexaploid oat. *Theoretical and Applied Genetics*. 100:872-880.

Tax, F.E., and Vernon, D.M. (2001). T-DNA-associated duplication/transformations in Arabidopsis. Implications for mutant analysis and functional genomics. *Plant Physiology* 126: 1527-1538.

Gene therapy trials and unpredictability of transgene

The viral vector used to insert the transgene has shown to have a higher chance of inserting itself into a position on the genome where its expression would cause cancer than can be accounted for by chance effects. This highlights one aspect of the unpredictable nature of transgene insertion. Although this is not a biosecurity issue in itself, it does reinforce the concerns among scientists that the methods of transgenics are not conducive to producing predictable, and stable outcomes. What this can mean for biosecurity is the production of unpredictable constructs in animals or plants that could pose a biosecurity risk. We are however, in the early stages of fully understanding the scale of consequences of such unpredictability, and we need to decide whether controls need to be put in place to restrict the potential for adverse effects. This points to the employment of the precautionary principle which does not assert that we avoid progress in science, but that we are careful with how we advance.

Buckley, RH. (2002). Gene therapy for SCID – a complication after remarkable progress. *The Lancet* 360, 1185-1186.

Check, E. (2002). A tragic setback. *Nature* 420, 116-118. (News and views).

Check, E. (2002). Regulators split on gene therapy as patient shows signs of cancer. *Nature* 419, 545-546. (News and views).

Dixon, N. (2002). Cancer scare hits gene cures. *New Scientist* 12 Oct. 2002, 4-5.

Hargreaves, S. (2002). Rules on gene therapy are tightened after leukemia report. *British Medical Journal* 325, 791.

Li, Z, Dullmann, J, Schiedlmeier, B, Schmidt, A, von Kalle, C, Meyer, J, Forster, M, Stocking, C, Wahlers, A, Frank, O, Sotertag, W, Kuhlcke, K, Eckert, H-G, Fehse, B and Baum, C. (2002). Murine leukemia induced by retroviral gene marking. *Science* 296, 497.

Smaglik, P. (2000). Germline therapy needs tight control, says US panel. *Nature* 407, 278 (news and views).

Vertical and horizontal gene transfer

Survival of transgenic DNA in mammals (Horizontal Gene Transfer)

One of the biggest environmental and human health concerns associated with genetic modification is the ability to contain viable genetic material so that it does not spread to non-target species, crops or organisms. If viable DNA could only be transmitted by means of reproduction then containment would be relatively easy. The movement pathways for viable DNA are now understood to be far more complex. In recent years a significant stream of scientific research has shed light on the transfer of genes horizontally (i.e. outside the reproductive process and across species barriers).

In order to contain genetic material, one needs to establish effective barriers to the movement viable DNA into the wider environment. The normal pathways of DNA movement need to be removed or significantly obstructed. There are many pathways through which viable genetic material can travel. Pathways for genetic exchange for a genetically modified organism include the passage of DNA:

- From living cells of a GMO to bacteria either in the gut or in the soil
- From living cells of a GMO to the gut of parasites that can then disperse and reproduce at some distance of the GMO

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- From dead or decaying cells of a GMO to bacteria
- In the form of naked GMO DNA that is attached to soil particles or contained in dung
- From bacteria to other organisms in the food chain.

This passage of genetic material can then include any pathway by which bacteria travel in a viable form, such as by means of inoculation of soils, movement in ground water and surface water flows, in effluent that is carried elsewhere, on dust particles that are wind blown, in the gut of blood-feeding insects and other parasites. If genetic material is transferred horizontally from bacteria to other organisms and taken up into the genome of those organisms then the pathways for the movement of transgenes (the genetically engineered gene) will include the normal movements and reproductive strategies for those organisms. Fences at the edge of a field trial or a commercial plantation of a GM crop present no barrier to the movement of DNA.

Daane, I.L., Molina, J.A.E., Berry, E.C. and Sadowsky, M.J. (1996). Influence of earthworm activity on gene transfer from *Pseudomonas fluorescens* to indigenous soil bacteria. *Applied and Environmental Microbiology* 62, 515-521.

Doerfler, W. and Schubbert, R. (1998). Uptake of foreign DN from the environment: the gastrointestinal tract and the placenta as portals of entry. *Wein Klin. Wochenschr* 110/2, 40-44.

Duggan, P.S., Chambers, P.A., Heritage, J. and Forbes, J.M. (2000). Survival of free DNA encoding antibiotic resistance from transgenic maize and the transformation activity of DNA in ovine saliva, ovine rumen fluid and silage effluent. *FEMS Microbiology Letters* 191, 71-77.

Forano, E. and Flint, H.J. (2000). Genetically modified organisms: consequences for ruminant health and nutrition. *Ann. Zootech* 49, 255-271.

Martin-Orue, S.M., O'Donnell, A.G., Arino, J., Netherwood, T., Gilbert, H.J., and Mathers, JC (2002). Degradation of transgenic DNA from genetically modified soya and maize in human intestinal simulations. *British Journal of Nutrition* 87, 533-542.

Mercer, D.K., Scott, K.P., Bruce-Johnson, W.A., Glover, L.A. and Flint, H.J. (1999). Fate of free DNA and transformation of the oral bacterium *Streptococcus gorndonii* DL1 by plasmid DNA in human saliva. *Applied and Environmental Microbiology* 65, 6-10.

Nielsen, K.M., Bones, A.M., Smalla, K. and van Elsas, J.D. (1998). Horizontal gene transfer from transgenic plants to terrestrial bacteria – a rare event? *FEMS Microbiology Reviews* 22, 79-103.

Nikolich, M.P., Hong, G., Shoemaker, N.B. and Salyers, A.A. (1994). Evidence for natural horizontal transfer of *tetQ* between bacteria that normally colonize humans and bacteria that normally colonize livestock. *Applied and Environmental Microbiology* 60, 3255-3260.

Schubbert, R., Hohlweg, U., Renz, D. and Doerfler, W. (1998). On the fate of orally ingested foreign DNA in mice: chromasomal association and placental transmission to the fetus. *Molecular and General Genetics* 259, 569-576.

Schubbert, R., Lettmann, C. and Doerfler, W. (1994). Ingested foreign (phage M13) DNA survives transiently in the gastrointestinal tract and enters the bloodstream of mice. *Molecular and General Genetics* 242, 495-504.

Schubbert, R., Renz, D., Schmitz, B. and Doerfler, W. (1997). Foreign (M13) DNA ingested by mice reaches peripheral leukocytes, spleen, and liver via the intestinal wall mucosa and can be covalently linked to mouse DNA. *Proceedings of the National Academy of Sciences USA* 94, 961-966.

Willerslev, E., Hansen, A.J., Binladen, J., Brand, T.B., Thomas, M., Gilbert, P., Shapiro, B., Bunce, M., Wiuf, C., Gilichinsky, D.A., and Cooper, A. (2003). Diverse Plant and Animal Genetic Records from Holocene and Pleistocene Sediments. *Science* 300: 791-795.

Risks of transgene flow from GM plants to their wild relatives (super-weeds)

Of particular concern to biosecurity is the potential for weed species to become more robust and more prevalent, and the potential for the development of new weeds. Serious concerns have been raised in the scientific community about the risks of transgene escape into the wild relatives of crop plants (particularly for herbicide resistant engineered plants) leading to super-weeds. Such weeds will not respond to the chemicals normally used to control them, necessitating an increase in the volume and toxicity of chemicals required to control such weeds. There is also a concern that insect resistance genes (in plants) may escape into the wild (particularly in a less toxic form than in a crop plant) leading to the more rapid development of resistance in insect populations. The science of gene flow influences on weediness is still in its relatively early stages and much of the research so far has focused on the mechanisms for gene flow (between crops and their wild relatives) as a natural phenomenon and the effects of this in the case of herbicide-resistant or insect-resistant transgenic plants.

A number of the papers listed below have shown the existence of gene flow from a transgenic crop to a wild

Biosecurity and GMOs in NZ Continued

relative. The implications of this for biosecurity are yet to be fully understood among scientists, although theoretical concerns combined with empirical evidence that such concerns are valid seems to define the current state of knowledge. There will be debate as to the ability to manage this situation, and whether the external costs of such gene flow outweighs the risks. (It is not known whether the scientific papers marked with '*' were peer reviewed, but they were published in the proceedings of a scientific conference on gene flow.)

Bartsch, D., S. Driessen, A. Gathmann, A. Hoffmann, M. Lehnen, T. Muecher, C. Saeglitz, U. Wehres, and Schuphan, I. (2002). Monitoring the Environmental Consequences of Gene Flow from Transgenic Sugar Beet. Pp. 78-93. Proceedings of the Gene Flow Workshop, The Ohio State University, March 5 and 6, 2002.

Brown, J., Thill, D.C., Brown, A.P., Brammer, T.A., and Nair, H. (1995). Gene transfer between canola (*Brassica napus*) and related weed species**.** Proceedings and Papers from the 1996 Risk Assessment Research Symposium. **http: //www.nbiap.vt.edu/brarg/brasym96/brown96.htm ***

Chèvre, A-M., Eber, F., Baranger, A., and Renard, M. (1997). Gene flow from transgenic crops. *Nature* 389, 924.

Dalton, R. (2002). Superweed study falters as seed firms deny access to transgene. *Nature* 419, 655.

Ellstrand, N.C. (1992). Gene flow by pollen – implications for plant conservation genetics. *Oikos* 63(1): 77-86.

Ellstrand, N.C., Prentice, H.C., Hancock, J.F. (1999). Gene flow and introgression from domesticated plants into their wild relatives. *Annual Review of Ecology and Systematics* 30: 539-563.

Ellstrand, N.C., and Schierenbeck, K.A. (2000). Hybridization as a stimulus for the evolution of invasiveness in plants? *Proceedings of the National Academy of Sciences* 97(13): 7043-7050.

Ellstrand, N.C. (2002). Gene Flow from Transgenic Crops to Wild Relatives: What Have We Learned, What Do We Know, What Do We Need to know? Pp. 39-46. Proceedings of the Gene Flow Workshop, The Ohio State University, March 5 and 6, 2002.

Giddings, G.D., Hammilton, N.R.S., and Hayward, M.D. (1997). The release of genetically modified grasses. Part 2: The influence of wind direction on pollen dispersal. *Theoretical and Applied Genetics* 94: 1007-1014.

Halfhill, M.D., Millwood, R.J. Raymer, P.L. and Stewart, Jr. C.N. (2002). *Bt*-transgenic oilseed rape hybridization with its weedy relative, *Brassica rapa. Environmental Biosafety Research* 1: 19-28.

Holt, J. (2002). Prevalence and Management of Herbicide-Resistant Weeds. Pp. 47-57. Proceedings of the Gene Flow Workshop, The Ohio State University, March 5 and 6, 2002.Jergensen, R., Hauser, T., Mikkelsen, T., and Ostergard, H. (1996). Transfer of engineered genes from crop to wild plants. *Trends in Plant Science* 1(10): 356-358.

Jørgensen, R.B., Anderton, B., Snow, A. and Hauser, T.P. (1999). Ecological risks of growing genetically modified crops. *Plant Biotechnology* 16, 69-71.

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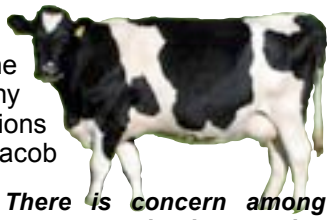
Biosecurity and GMOs in NZ Continued

Transgenic animals and prion diseases



There is concern among some scientists that transgenic animals may create conditions that foster the development of new prion-borne diseases.

Prions are self-replicating proteins that can cause serious diseases. There is concern among some scientists that the engineering of transgenic animals may create conditions that foster the development of new prion-borne diseases. Prion diseases are sometimes called spongiform encephalopathies due to the appearance of the brain tissue following post mortem examinations. Prion diseases in animals include scrapie (sheep), TME or transmissible mink encephalopathy (mink), CWD or chronic wasting disease (muledeer, elk), and BSE or bovine spongiform encephalopathy (cows). In humans prions cause CJD (Creutzfeld-Jacob Disease), GSS (Gerstmann-Straussler-Scheinker syndrome), FFI (Fatal familial Insomnia), Kuru, and Alpers Syndrome.

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Resistance to Bt Toxin

Bacillus thuringiensis is a bacterium that produces a natural insecticide. The insecticide is used in organic agriculture as a non-toxic means of insect pest control. Biotechnologists have engineered plants to express this toxin by transferring a copy of the gene that codes for the toxin from the bacterium to a plant genome. One of the theoretical issues arising from any pesticide (this applies to conventional chemical pesticides as well as bioengineered pesticides) is the effect of a killing substance on the target population. Because a target population is a biological entity, and as such, subject to evolutionary and ecological processes, evolutionary ecologists would predict that a substance designed to kill insects would at the same time act as a selection pressure for resistance to the same substance.

This theoretical concern has been repeatedly demonstrated in conventional agriculture with the evolution of resistance to antibiotics in human medicine and in the evolution of resistance to chemical pesticides in agriculture. There are over 500 species of insect known to be resistant to insecticides (Green et al 1990). Because Bt toxin is an insecticide, and because it is constantly present in the host plant (i.e. 24 hours a day for the life of the plant) the argument from analogy would suggest that bioengineered Bt plants would produce a very high degree of selection pressure selecting for resistance to this toxin. This theoretical concern, expressed by scientists when Bt toxin was being promoted as a target effect in agricultural genetic engineering, has also produced empirical evidence of such selection pressure (as predicted), together with a range of other non-target effects.

The implications of resistance to Bt toxin for biosecurity are the insect equivalent of superweeds — superbugs. Bt is only one of the insecticidal plant products being developed by biotechnology companies but it does provide a good example of the pitfalls of this approach to agricultural production. Whilst primarily an agricultural liability, it is still important to the biosecurity of our agricultural landscapes, in terms of the ability to sustain a set of primary production systems in a way that is not heavily dependent on expensive technofixes to pest problems. With pest resistance to bioengineered pesticides we increase our dependency on a bioengineering or chemical treadmill in the agricultural landscape. This treadmill is an expensive one and can have the effect of diminishing our ability to employ ecologically based management of agricultural production. The pests that develop resistance to pesticides (chemical or bioengineered) become more and more robust in evolutionary terms, and more and more of a problem to control.

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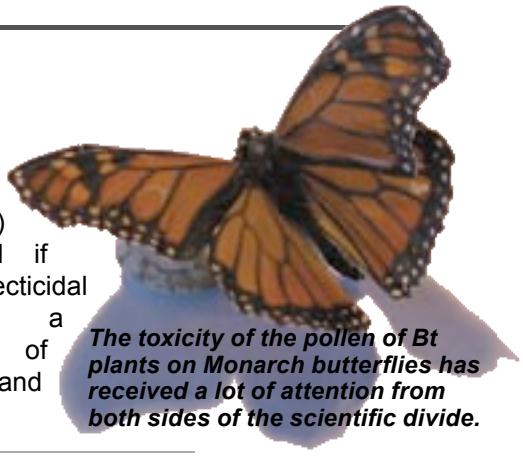
Non-specificity of Bt insecticidal plants (non-target effects) (Monarch butterfly studies)

Some of the non-target risks associated with transgenic insecticidal plants include non-target effects on beneficial organisms (e.g. insects and soil micro-fauna). The toxicity of the pollen of Bt plants on Monarch butterflies has received a lot of attention from both sides of the scientific divide. As a biosecurity issue this is significant for potential effects on non-target beneficial insect populations (and/or food webs) in New Zealand if bioengineered insecticidal plants become a normal feature of the agricultural and forestry landscape.



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Effects of insecticidal endotoxins on soils and soil microfauna

The biosecurity of soils is another issue worth considering when assessing the risks of genetically modified organisms in the environment. Our soil resources are living systems upon which we balance our export earnings as a nation as well as our food basket. Disruptions to the ecology of soils as a result of insecticidal toxins from plant material are generating significant interest among soil ecologists.

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Conclusion

It should be clear from this collection of scientific publications that we do have considerable scientific evidence of the general and specific risks associated with genetically modified organisms. It is not difficult to get this information for anyone with access to a library and a computer. This is quite different to the situation in the 19th century when access to information was fundamentally different and when little or no scientific studies had been conducted on the risks associated with the new organisms that were being considered for release into the New Zealand environment. If we are to enjoy the benefits of innovation we need to ensure that we are mindful of the risks and that we make decisions on the basis of all of the science in front of us and not just a select portion.

Concerns in the scientific community about the wisdom of releasing GMOs into the environment (of any country) are mounting, particularly because political decisions concerning the release of GMOs frequently ignore much of the science on this issue. The concern of ecologically minded scientists has recently led to the launching of an Independent Science Panel in the UK in May 2003 and the release of its report, *The Case for a GM Free Sustainable World*[4] in June 2003, seeking a

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ban on all commercial releases of genetically modified organisms. There is also an open letter to world governments by 616 scientists from 73 countries calling for a ban on the commercial release of GMOs.[5]

To argue that the GM debate is one of science versus well-intentioned (or misguided) emotion is clearly incorrect. It is a truly scientific debate of historical proportions. Our decisions concerning the release of GMOs into the New Zealand environment will be permanent decisions, and so in this sense we stand at a cross roads: do we go for full commercial release, in spite of the science to the contrary? Or do we take a more conservative approach by delaying commercial releases, using all of the science available to make a scientifically robust decision, and in the meantime keep GMOs within contained laboratories?

(Endnotes)

[1] Walsh, P. (1893). The effect of deer on the New Zealand bush, a plea for the protection of our forest reserves. Transactions and Proceedings of the New Zealand Institute 25:435-439 cited in King, C. (1984). Immigrant killers. Introduced predators and the conservation of birds in New Zealand. Auckland, Oxford University Press, p 88.

[2] Buller, W.L. (1985). Some curiosities of birdlife. Transactions and Proceedings of the New Zealand Institute 27: 134-142 cited in cited in King, C. (1984). Immigrant killers. Introduced predators and the conservation of birds in New Zealand. Auckland, Oxford University Press, p 88.

[3] To clarify, this article is primarily concerned with the release of genetically modified organisms into the environment. A lot of genetic engineering takes place in contained laboratories where there is no release of a self-replicating organism modified by means of transgenics (the insertion of gene constructs from one genome to another). Immunocontraception is one of these applications where no GMO is released into the environment and hence is not necessarily within the scope of this article. On the other hand, if genetically modified vegetable baits (e.g. carrots or potatoes) engineered to produce an immunocontraceptive protein are grown outside the laboratory as part of the production process, then this aspect of possum control would fall within the scope of this review. The GM plants (not necessarily the possums) would be subject to the issues discussed below.

[4] See: **http://www.i-sis.org/ispr-summary.php**

[5] To see this letter and those who have signed it, go to: **http://www.i-sis.org.uk/list.php**

The use of GMOs is obviously highly controversial. If you would like to express an opinion on their use in New Zealand for the next issue of *Protect*, contact the Editor.

End paper

PERSONAL OPINION

AN ODE TO ACRONYMS

or *How to Confuse the Public in Nine Easy Steps.*

I was interested to read in the Autumn 2003 *Protect* that Wellington Regional Council will be concentrating its invasive plant species efforts on Key Native Ecosystems (KNEs) in its area.

That's interesting, I thought, must be something like the Key Ecological Sites (KESs) that we have in the Waikato.

But could they be the same as the Sites of High Public Value (SHPVs) in the Tasman Nelson region, or even the High Value Areas (HVAs) of Southland? horizons.mw nicked this one, it seems, and then added its own touch, creating High Value Conservation Areas (HVCAs), which Auckland promptly commandeered and tweaked to create High Conservation Value Areas (HCVAs).

Meanwhile, Hawkes Bay Regional Council opted for High Ecological Sites (HESs) as they decided that High was better than Key. Do they mean that these sites only occur above a certain altitude? Must check that out…

And I thought the great Plant Pest vs Pest Plant divide was bad. It's enough to make you cry.

Now, I am not for one moment suggesting that there was not a very good reason for each regional council creating its own term, or that, heaven forbid, the variations were simply a subliminal cry for autonomy from regions that felt that they needed to yet again stamp their individuality on their own plans (or 'go one better' as my Gran used to say). Nor am I implying that these regional councils do not think that their carefully crafted definitions are not the best thing since sliced bread, and infinitely superior to those terms coined by other regional councils. But I do find it frustrating that a new concept, which requires wide public acceptance and support if it is to succeed, especially as many of these sites are on private land, is being introduced in such a way that the very people we need to reach are likely to get lost in the semantic one-upmanship.

Once again, those working in regional councils around the country have lost a Key Educational Opportunity (KEO) to work together to promote what should be a Simple And Yet Desperately Important Idea (SAYDII) – that there are Certain Sites That Have Values That We Want To Protect.

Hey, maybe that's it – CSTHVTWWTP! Perfect! Wonder if it will catch on? I won't be holding my breath.

Carolyn Lewis

Below is a copy of the letter written by the NZBI to Bright*Star in regard to the Biosecurity Conference that Bright*Star plans to hold in Wellington in August.
Bright*Star's reply is on the following page.

4 June 2003

Stuart Sang
Project Manager
Bright*Star Conferences
PO Box 3181
Auckland 1015

Dear Stuart

Recently, a number of our members received an invitation to attend Bright*Star's Biosecurity Conference in Wellington in August 2003. We are concerned that this event is being run only a month after the New Zealand Biosecurity Institute's own conference, which is being held in Nelson in July 2003, and yet is being promoted as a new initiative within the field of biosecurity and "the most informative biosecurity conference in New Zealand this year!" We are disappointed that you were made fully aware about our conference and its themes by one of the organisers at an early stage but decided to proceed anyway. We are also disappointed that many of our themes are being mirrored in your conference.

The New Zealand Biosecurity Institute (NZBI) is a non-profit making incorporated society whose aim is to "preserve and protect New Zealand's natural resources from the adverse impacts of invasive pests". We have around 250 members throughout New Zealand, from organisations such as MAF, MOH, regional councils, unitary authorities, city councils, universities, Landcare Research, Hortresearch, Forest Research, NIWA, AgResearch, Agriquality, Cawthron Institute, Department of Conservation, Dupont, Dow Agrosciences, Forest and Bird, NZ Biosecure, NZ Water Management, Nursery and Gardening Industry Assocation, as well as a number of private biosecurity contractors – in fact, most organisations involved in implementing biosecurity measures in this country are represented. Our membership ranges from senior management to field officers, and our annual national conferences (this year will be our 53rd one) provide a wide range of speakers and topics to cater for this mixture. This year the New Zealand Vertebrate Pest Management Institute is joining forces with us at our Nelson conference.
We acknowledge that you have the right to organise a conference on any topic

you like, however, we would like to suggest that any future advertising reflects the reality that your conference is not the only one of its kind on offer in New Zealand and focuses on highlighting the differences between our events. We suspect by the size of your registration fee that you are trying to cater to quite a different audience, perhaps industry players who want to know more about initiatives being taken to prevent biosecurity incursions in this country. It is unlikely that any of our members could afford your registration fee of $1900 and we are disappointed that we will therefore be excluded from this event.

We believe that it is imperative that all New Zealanders work together to present a united front against unwanted pests and we will continue to do everything in our power to make this to happen. We would welcome an opportunity to discuss these matters with you and explore options about how we could better complement each other's efforts in future.

Yours sincerely

Carolyn Lewis (Executive Member) and Lynley Hayes (President)
New Zealand Biosecurity Institute

Dear Lynley and Carolyn
Thank you for your comments and questions regarding the upcoming Bright*Star biosecurity conference. I am fully understand the concerns that you have regarding our conference and hope to address them within this email.
Before I continue, however, I would like to offer my personal, and also my company's, condolences in respect to your and the scientific community's loss because of Friday night's tragedy. No words can help in such circumstances, only the sincere drive to carry on the work that these leading minds contributed to.
When I was doing my research on biosecurity, I did look closely at your conference structure, speakers and target audience, as well as the date of your annual event. My interpretation of their conference was that it was a very "hand-on" type of conference for those people who were in the operational areas of biosecurity. The cost structure for the conference seemed to support this interpretation. Furthermore, I feel that the large numbers of people who will come to your conference will be able to do significant networking among themselves.
The upcoming Bright*Star conference, in comparision, is set at a much higher level, with a strategic approach to the issues facing the industry. The target market for the Bright*Star conference are those policy implementers
and senior operations people, and with a push into some private sector organisations. In other words, this conference would more appeal to upper and middle management. The content of the programme is solely based on the feedback from the people I spoke to during my research, and so of course there will be over-lap in content with your event because they both address some significant concerns in the biosecurity industry. I am expecting only around 30-40 or so delegates for our 2 day event rather than the hundreds that will probably attend your event.
In regard to the promotional letter sent to prospective delegates, it is because of the differences in target markets, as well as the strong likelyhood that the attendees at our two conferences will be mutually exclusive that the wording was chosen. The statement that this will be the most informative biosecurity conference in New Zealand this year is a view I believe is true for our target market, but have already ensured that the expression (or anything similar) will not be used again.
I completely agree with your belief that all New Zealanders should work together with respect to biosecurity issues. It is imperative that the public and businesses are educated on the dangers of a biosecurity incursion, and take that step beyond education into action. It is because of this view that I feel that the Bright*Star conference is not redundant as it helps reinforce the message. I would have liked to have done more with the Institute on this event but the organiser I spoke to during my research seemed pretty adament that the Institute's focus was on their event and wanted no part in our event at all. In future, if we were to run the event again, I would welcome the chance to work with you to ensure that our events complement each other.

Kind regards
Stuart Sang
Project Manager
*Bright*Star*