

Summer – 2011

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# Protect



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# Protect

Summer 2011

Magazine of the New Zealand Biosecurity Institute

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The New Zealand Biosecurity Institute can be found on the web at [www.biosecurity.org.nz](http://www.biosecurity.org.nz)



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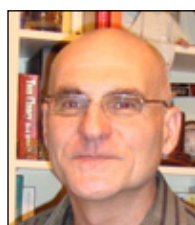
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## NZBI news

## Editor's Note

I hope everyone is looking forward to a well deserved Christmas break after what has certainly been an unforgettable year.

This year was also my first as *Protect* editor. I have learned a lot as I have gone along. I would like to thank my predecessor, Lynne Huggins, for setting up the processes which have allowed the production to be trouble free. Mostly I would like to thank all contributors.

Please think about *Protect* when you are involved in interesting work you think others would like to hear about. Also think about sending in profiles or a few tips for newcomers, and managers please encourage your team members to think about what they can offer other members through *Protect*.

My last Institute-related activity of the year was

to attend a meeting this month about the Institute's archive project. A core of members is keen to see this project gain momentum. Please support them and join in if you would like to be part of the project. A short item on their progress appears on page 6.

Holiday Homework: Keep an eye out for pest Christmas icons this holiday season – holly, ivy, deer, wilding pines, wild ham, turkeys, donkeys, geese, and even camels do not delight everyone, somewhere at home or nearby. *Protect* will publish the best Christmas pest icon story.

Happy and safe holidays one and all.

Best wishes  
**Chris Macann**  
Editor

## News from the Executive

I hope you are all looking forward to a well-deserved break after what for many has been a challenging and anxious year.

Many of our members work for organisations which have been involved in restructuring this year, among them MAF, DOC, and some CRIs and councils. There has certainly been a lot of uncertainty outside work as well, particularly for those members from Christchurch.

For me, it has been a year of change. As well as my new role in the Institute as President, I also have a new job in a new place. I have moved to Bay of Plenty Regional Council to work on the development of a new biosecurity database.

I am looking forward to another productive year for the Institute in 2012. Our first NETS in partnership with the NPCA will definitely be a highlight.

Another exciting project is gathering momentum. As I write, a group of enthusiastic members are meeting

to discuss a way ahead for the Institute's archiving project. I encourage members to stay in touch with this group and support them.



I am sad to note the passing of former President Peter Joynt. Peter was President of Institute of Noxious Plants Officers at the time of forming the NZBI. His service to the biosecurity sector will be very much missed. As his Institute colleagues have said in their tribute, which appears in this issue, he loved his work and the people involved. To still be battling wild rice at the age of 73 is a testament to a man who truly believed in the cause to his very core.

Finally I hope you and your families have a happy and safe Christmas and New Year.

**Pedro Jensen**  
President  
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# Biosecurity personnel profile: Sara Moylan

Role: Biodiversity Monitoring Advisor  
Greater Wellington Regional Council

## How long have you been in the job?

Seven years.

## What motivates you to be involved in biosecurity?

Protecting New Zealand's biosecurity ensures that our wonderful biodiversity, and our environmental life support system, is protected now and for future generations.

## What has been your career path to your current position?

I have always been fascinated with the natural environment and spent many hours watching my hero, David Attenborough, as a child. Biology was my favourite subject all through high school. I studied for my BSc at Massey University, moving there from Auckland and graduating with a double major in zoology and ecology. I then undertook my Masters and conducted my thesis at Zealandia (Karori Wildlife Sanctuary) studying the release of six captive-reared kaka. It was an amazing experience to follow these birds as they found their feet and started to breed; they are incredibly intelligent and I got to know each one individually. I was then lucky enough to get a job at Greater Wellington, first in the monitoring team for Biosecurity and now as a Biodiversity Monitoring Advisor.

## What makes up a normal day for you?

My job is incredibly varied, I may be out in the field, at my desk crunching data, designing a new project, making GIS maps or writing a report. I could be in one of many technical group meetings or in the workroom

**"My job changes season by season and year to year, it's never the same and I am never bored."**



*Never bored: Sara Moylan.*

counting invertebrates. My job changes season by season and year to year, it's never the same and I am never bored.

## What do you enjoy the most about your job?

The variety of the work I get to do, the challenges of developing new projects and visiting many beautiful and remote parts of the region. I get to do natural science for real and what other job is there that you can get paid to go sit under a tree and watch birds all morning? The fantastic and dedicated people I work with are also an important bonus.

## NZBI archive project gathers momentum

An informal group of New Zealand Biosecurity Institute members is working to investigate developing a national archive for the Institute and its predecessor organisations.

The initial stage of the project aims to take stock of available historical assets, establish a competent team, and ensure the Institute's support and

continuing involvement. Members involved in the work, which is still in its early stages include Ray Clarey, Craig Davey, Peter Russell, Lynne Huggins and Dave Galloway.

Ray said the work so far has resulted in a formal scoping proposal. He suggests the next step is a formal plan and funding proposal.

## Tribute

# Peter Joynt, a major contributor to biosecurity in Northland and nationally

Former Institute president Peter Joynt died suddenly at his home in Ruawai on November 11, aged 73. Peter was Institute President from 1996 to 1998 at the time it became known as NZBI. His colleagues contributed this tribute to Peter.

**P**eter's work in biosecurity, particularly pest plants, spanned 29 years. He began a career working with weeds in 1982 for the Otamatea County and was trained at Flock House (Bulls) as a noxious plants officer, later gaining a proficiency certificate in the Noxious Plants Act.

Coming from a farming background Peter well understood the challenges faced by land managers battling agricultural weeds in Northland. At that time Northland farmers were at war with the likes of gorse, Bathurst burr, nodding thistle and African feather grass. Having grown up in the Kaipara, Peter knew the families, farmers and land around his area. This background and an affable approach meant that access onto land and farmer co-operation were freely given.

Peter served in the role of noxious plants officer for Hobson County and the Kaipara District until 1990 when his role was transferred to the Northland Regional Council. The 1993 Biosecurity Act presented new challenges which Peter embraced and he took a lead role in the development of Northland's first Regional Pest Management Strategy including public consultation.

His time with the regional council saw Peter filling a senior role in weed management, managing staff and driving a broader, more ambitious suite of projects including the projects to eradicate spartina and Manchurian wild rice. He was successful in obtaining a 10 year resource consent for using aerially applied herbicides to control spartina throughout Northland which involved winning the confidence of different agencies and marine stakeholders. He also managed the eradication programme for the Kaipara Harbour.



*Peter Joynt: Strived for the best.*

**'To still be battling wild rice at the age of 73 is testament to a man who truly believed in the cause to his very core.'**

NZBI President  
Pedro Jensen

The wider programme of spartina eradication which resulted has been one of the pest plant success stories for Northland.

Peter valued relevant qualifications which would build the skills of plant pest officers and he assisted the development of training courses including qualifying as a workplace assessor for the Local Government Agriculture Training Scheme. Peter was also a member of a small team which developed the first quality assurance programme for Northland's pest management in conjunction with Telarc. By the time he was ready to retire at the age of 70 Peter held certificates in agricultural pesticides, a certificate of study in agricultural pest destruction (a two year course), had attended numerous Growsafe and other council-related training programmes and was an authorised person for the National Pest Plant Accord as well as a warranted officer under the Biosecurity Act.

A full-on career wasn't enough for Peter and he also had a lifetime of serving the Ruawai community as president of the local Lions, and standing on school boards and community clubs. Peter also served time as a community board member,

being Chairman of the Ruawai Community Board for at least three years.

Peter retired formally from the council on August 1, 2008, however 15 days later he was back at work leading probably the largest project of his career – against Manchurian wild rice. Peter brought his usual enthusiasm and determination to this project which has been another success story that he can be proud of and he has laid a solid platform for others to follow.

Peter loved this work and the people involved. He sought challenges and strived for the very best result

## Tribute

in everything he attempted. His work will carry on but in Peter we have lost a real soldier who will be sorely missed by all his colleagues. He was a very loyal NRC officer who had the right attitude to achieve outcomes using both regulation and advice.

It was as much due to Peter's efforts as anyone's that NZBI became a united organisation, such was his nature of always including everyone in decisions and making people feel that their contribution was valued. Jack Crow recalls that it was Peter who first suggested the name "Biosecurity Institute", which at the time was a very radical idea, and he had a fair bit of work to do with the various organisations in getting them to agree

to it. He was the perfect person for the job because of his considerable diplomacy skills. Peter was also a superb chair of committees, always giving everyone a fair hearing and always striving for consensus. He was ever the peacemaker and brought a lot of harmony to proceedings. He was a natural communicator, a massive contributor to the Institute, particularly in its infancy.

Institute president Pedro Jensen said to still be battling wild rice at the age of 73 is testament to a man who truly believed in the cause to his very core.

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**Peter Joynt b July 26 1938 – d Nov 11, 2011**

## Report on the EMAPI Conference

# Alignment of weed research and weed management seen as crucial

**Peter Raal**

Department of Conservation  
Otago Conservancy

I attended the 11th International Conference on the Ecology and Management of Alien Plant Invasions (EMAPI) in Szombathely, Hungary, from August 30 to September 3 this year. The theme of the conference was "Bridging the Gap between Scientific Knowledge and Management Practice".

EMAPI is highly influential in shaping the research for the study of plant invasions worldwide. Thirty four countries were represented at the conference and all aspects of invasion science were covered by the scientific presentations and posters.

At the conference Stefan Gous, of SCION, and I co-presented a paper titled "Dense Wilding Conifer Control with Aerially Applied Herbicides in New Zealand" and a poster titled "Aerial Spot Spray Control of Wilding Conifers in New Zealand".

## Key points learned

Weeds are the second greatest cause of loss of biodiversity after habitat destruction. To be better weed control managers and develop effective long-term weed control strategic management approaches we need to better understand the drivers of invasion. Some of the concepts discussed included:

- Conceptualising and properly understanding propagule pressure and how this influences the invasion front.
- Understanding the vectors and pathways of how weeds move locally, regionally and globally and how these can be managed (i.e. understand the dynamics of biological and human mediated distribution and what this actually means for management).
- Properly understanding the impacts of the weed on ecosystem services using objective criteria and a common international currency so that managers can make properly informed decisions whether or not to implement control measures. This will enable decision makers to prioritise control of weeds for the maximum benefit to ecosystem services.
- Weed scientists and managers need to create more networks and exchange more information to make weed control more effective globally.

**Although it is recognised that weeds are a major threat to biodiversity, scientists worldwide are doing very little applied research with the regard to the management of weed populations.**

- Scientists and managers need to understand the new challenges being created by climate change and start predicting future priorities for invasive plant management.

- Scientists and managers need to form better links with the aim of making the science done much more objective and effective for the benefit of native biodiversity at the landscape scale.

- Weed scientists and managers need to look for common interests with other scientific disciplines in order to strengthen the foundations of invasive weed science and management.

## Research trends and future directions

For the last 25 to 30 years international weed research has predominantly concentrated on the invasiveness of weeds (invasion ecology, genetic and biogeography studies), the invasibility of ecosystems (what makes ecosystems or communities susceptible to weed invasions) and the evaluation of the impacts of weeds on biodiversity values. Recently a new suite of weed research has emerged which concentrates on fields relating to the sociology of weed invasions, perception of invasive species to affected persons or communities, the economics of weed invasions and vector science (how weed species are moved around the world).

It was clear from the conference that, although it is recognised that weeds are a major threat to biodiversity, scientists worldwide are doing very little applied research with regard to the management of weed populations. Less than 10% of the papers presented had a management component to them. This was a concern given that the theme of the conference was "Bridging the Gap between Scientific Knowledge and Management Practice".

It was stated by the few managers at the conference that from nearly three decades of research weeds are still spreading apace and not being effectively managed. This is taken as an indication that research is not answering the right questions in terms of management on the ground and/or that research results are not

## EMAPI Conference

reaching the target audiences.

In response to the above, the forum was asked to set management questions for scientists to consider answering. Questions relating to the identification, detection and mapping of weeds (due to new technologies such as LYDAR and GIS making this possible) and macroecological perspectives of weeds at the local, regional and landscape scales would be most favourably considered.

The scientists also commented that management should be embodied in risk assessment models on invasive species rather than looking only at the local or regional approach. This is despite the fact that many established weeds are considered to be beyond the risk assessment phase.

**The scientists also commented that management should be embodied in risk assessment models on invasive species rather than looking only at the local or regional approach.**

## Border biosecurity

# Footwear as a biosecurity risk – border and post-border implications

Mark McNeill, Craig Phillips, Sandra Young and Lee Aalders

AgResearch  
Lincoln and Ruakura

A recent New Zealand study has provided the first quantitative data on the biosecurity hazards that contaminated footwear could introduce to New Zealand's natural estate and agricultural sectors.

Soil on footwear and other items carried by passengers arriving at New Zealand airports from overseas is regarded as a significant biosecurity risk. MAF screens passengers at the border to detect and clean contaminated items before they enter the country. However, this is labour intensive, time consuming and inconvenient for passengers. Moreover, the risk may vary with the source and condition of the soil. To better define the diversity and abundance of biosecurity hazards in soil on shoes, we conducted a research project with support from the Better Border Biosecurity (B3) programme, MAF and DOC. Our aims were to help MAF to validate and optimise its footwear screening and treatment procedures, and to develop a robust basis for longer-term work evaluating relative risks between different pathways.

## What is on footwear?

The project surveyed organisms present in soil that had been removed from the soles of footwear carried in the baggage of international aircraft passengers arriving in New Zealand. As such, there was a mix of hiking boots (57% of samples), followed by miscellaneous footwear (22%), sport shoes (12%), and golf shoes (10%). This survey recorded a high incidence, abundance and diversity of viable bacteria, fungi, nematodes and seeds, as well as several live mites. The bacteria and fungi included plant pathogenic species. On average, each gram of soil removed from passengers' shoes contained 2.5 seeds, 41 nematodes and high counts of both bacteria and fungi.

Overall, between 52% and 84% of genera recovered from contaminated footwear contained potentially harmful species regulated by MAF. The incidence and abundance of soil organisms varied with sample weight, footwear type and season at the port of departure, so it may be possible to optimise inspections to target the riskiest footwear.



*Three different types of footwear were used in the study that compared two disinfectants, a surfactant and pure water.*

## Controlling potentially unwanted microbes

Allied with this research, we evaluated the effectiveness of disinfectant treatments to control soil micro-organisms. MAF's standard procedure had involved dipping in a solution of Virkon™ followed by scrubbing. Three different types of footwear (running shoes, gumboots and hiking boots) were used in the study that compared two disinfectants (Virkon and TriGene Advance™), a surfactant (polysorbate 80) and pure water. One of the footwear cleaning treatments mimicked the standard MAF procedure (e.g. a brief dip in the liquids followed by scrubbing). The other cleaning approach was a 10-minute soak in the liquids followed by scrubbing. Soles were swabbed for microbes before and after washing, and culturable bacteria and fungi were counted.

The disinfectants reduced bacteria numbers by

## Border biosecurity

99% compared with 98% for both surfactant and water. Virkon was the best treatment for bacteria, both with the brief dip and the 10-minute soak, but it was not significantly better than the other treatments. Soaking also reduced bacterial numbers compared to the dip treatment, but not significantly. For fungi, the two disinfectants, surfactant and water all yielded similar reductions of 97%. Given the good performance of all the treatments, and the only very marginal benefits of Virkon, MAF has since reduced its use of this product.

**Footwear washing bays may help reduce the spread of potentially unwanted organisms into sensitive areas. The challenge is to make the approach effective both in terms of removing unwanted organisms and achieving a high rate of compliance.**

species establishments arising from treading of dirty footwear can occur.

Our results also have implications for MAF, DOC and regional authorities when managing movements of visitors through ecologically sensitive areas or quarantine zones as evident in the efforts to control the spread of PSA. For example, footwear washing bays may help reduce the spread of potentially unwanted organisms into sensitive areas. The challenge is to make the approach effective both in terms of removing unwanted

organisms and achieving a high rate of compliance.

Further B3 work is looking at the incidence and viability of organisms associated with soil found on sea containers. This will help to determine whether the survival of soil organisms is greater when they are transported in protected conditions (e.g. in luggage) rather than unprotected environments (e.g. external surfaces of sea containers). Ultimately, we aim to develop methods for targeting management resources at the most hazardous soil pathways.

### Border and post-border implications

Our results showed that MAF's efforts to intercept and clean contaminated footwear are justified. The disinfectant study suggested that cleaning footwear with pure water was a suitably effective method of removing potentially dangerous bacteria and fungi, as well as seeds, nematodes and the occasional live insect. Although the airport study confirmed there are inherent risks from contaminated footwear, it did not attempt to measure the probability that harmful organisms entering New Zealand on footwear could become established. Examples like the spread of weeds around huts in national parks, however, suggests

Some of the results of the footwear study were highlighted in a poster at NETS 2011.

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- McNeill MR, Phillips CB, Young S, Shah F, Alders L, Bell N, Gerard E, Littlejohn R** 2011 Transportation of no indigenous species via soil on international aircraft passengers' footwear. *Biological Invasions* 13 (12): 2799-2815.
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## Research

# Putting ants' eating habits to the test

**Melissa Mathieson**  
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Temporal variation in toxic bait, carbohydrate and protein preference and toxic bait efficacy in Argentine (*Linepithema humile*) and Darwin's ants (*Doleromyrma darwiniana*).

In New Zealand Argentine and Darwin's ants are well established and Argentine ants especially are spreading at a rapid rate. These ants have become well established pests since their introduction into New Zealand over 20 years ago (Harris 2002; Ward et al. 2010; Keall and Somerfield 1980; Keall 1979). Both species have thrived in warmer regions of the North and South islands and are largely distributed around cities with ports and coastal areas (Ward et al. 2010; Don 2007). These invasive ants are directly disruptive to people by infesting gardens and orchards, nesting in homes, and invading food stores. They can also have negative economic consequences such as threatening agricultural, crop and food sectors (Ward 2009; Ward et al. 2010; Vega and Rust 2001) and a potential loss of land value in infested areas. Recently I conducted research on toxic bait and food preferences and toxic bait efficacy in Argentine and Darwin's ants. This research is fundamental in providing new information for future control options. Future control options may then be improved by using this information to develop new bait formulations, to determine better ways of bait application and timing, and to increase levels of bait uptake.

## Toxic bait preference experiment

I investigated Argentine and Darwin's ants' preference for four different toxic baits over a year. These baits were; Xstinguish™, Exterm-an-Ant® and two DuPont™ products; Advion® ant gel and Advion® ant bait arena. Xstinguish contains the toxin fipronil (0.1%), Exterm-an-Ant contains boric acid and sodium borate, and Advion ant gel and Advion ant bait arena both contain indoxacarb (at 0.05% and 0.1% concentrations, respectively). Both ant species showed similar preference for Xstinguish™, Exterm-an-Ant and Advion ant gel for much of the year (Despite differences in bait matrix and toxins). Interestingly too, the preference for Xstinguish, Exterm-an-Ant and Advion ant gel were not statistically different from each other, just from Advion ant bait arena. Advion ant bait arena contains both protein and carbohydrate attractants, yet it was mostly unattractive for both ant species indicating problems with toxin level, choice of attractant and/or matrix.



Argentine ant, *Linepithema humile*

## Food preference experiment

Carbohydrate and protein preference were also investigated in both ant species over a year. Sucrose and casein were chosen as the carbohydrate and protein source, respectively. These foods were provided in varying concentrations. Food preferences varied between species and within species considerably throughout the year, although Darwin's ant consistently favoured foods higher in carbohydrates (likely due to little interest in casein protein). Argentine ants showed a significant preference for protein over carbohydrates during December and January. An increased interest in protein was likely due to a reproductive phase. Further experiments need to be conducted to determine when Darwin's ants start to show interest in protein uptake by using a more attractive protein source.

## Toxic bait efficacy experiment

The successful control of invasive ants with toxic baits is largely limited by bait efficacy and uptake. An effective bait needs to be palatable and attractive, contain a low toxin level (so that the bait is non-repellent), have a relatively long and stable field life and persist in a colony long enough to effect queens and larvae (Rust et al. 2004; Stanley 2004). Also the toxin must still be effective when diluted through the levels of the colonies via trophallaxis (Rust et al. 2004; Stanley 2004). The critical aspect of toxic bait efficacy is its ability to kill queens and brood. I used Argentine ant

## Research

laboratory colonies to compare the efficacy of Xstinguish, Exterm-an-Ant, Advion ant gel and Advion ant bait arena. Xstinguish was the most successful bait overall. Interestingly enough although Xstinguish was in a paste form which may have been comparatively more difficult to ingest over the liquid bait Exterm-an-Ant (Silverman and Roulston 2001), its toxin was more effective as it produced a 100% mortality rate in ant colonies in half the time as Exterm-an-Ant. Or this finding may suggest that only a small amount of Xstinguish was actually needed to produce a complete mortality rate in the colony and that the concentration of fipronil in Xstinguish was high enough to induce colony death when only a small amount was consumed (and in the shortest time frame). Exterm-an-Ant also produced a 100% mortality rate, but only after 13 days, twice as long as the Xstinguish treatment (Fig 2.b). Perhaps this occurred because although Exterm-an-Ant was a liquid and readily attractive to ants, it may have had a lower toxin level resulting in a slower kill rate, and/or it may have taken longer to reach the queens and larvae because it is a carbohydrate bait. Xstinguish was highly toxic but was still not 100% effective even when colonies starved for 24 hours. The results clearly illustrate the influence of starvation on bait uptake and

**If temperatures are greater than 10 degrees and there is a high number of ants foraging, baiting can occur in late winter, but if not, baiting can be carried out as soon as temperatures and ant numbers increase, preferably in mid-late spring.**

mortality and that baiting may be more successful when ants are in a higher level of starvation.

## Conclusions

Based on this study's findings, Xstinguish and Exterm-an-Ant appear to be the best choices for the control of Argentine and Darwin's ants, as these baits were highly preferred year round and they also produced complete mortality in laboratory colonies. From this study, Advion ant bait arena is not highly preferred by either of these ant species and thus may not be an effective bait for controlling ant populations.

Overall, I recommend bait application with Xstinguish and Exterm-an-Ant in late winter-spring, depending on temperatures and foraging activities. If temperatures are greater than 10 degrees and there is a high number of ants foraging, baiting can occur in late winter, but if not, baiting can be carried out as soon as temperatures and ant numbers increase, preferably in mid to late spring. This is likely to maximise bait uptake as ants will be starved, and foraging for both food sources for energy (for workers) and protein for queens and brood, so it is likely they will consume either protein or carbohydrate baits. Secondly, I would conduct another round of baiting treatment with both baits (Xstinguish and Exterm-an-Ant) in summer when Argentine ants have been shown to undergo a second wave of reproduction. This would hopefully eradicate brood that may have escaped the first round of baiting. Also, if future studies are conducted on hemipteran control and if it has an effect on ant bait uptake, this may provide another important facet to improving baiting strategies of these ant species.

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## Animal pest research

# Fertility control vaccines for possums: progress, challenges and prospects

**R**esearch on non-lethal methods of possum control in New Zealand is focused on fertility control and aims to develop publicly acceptable humane immunocontraceptive vaccines suitable for delivery in bait to free-living possums.

Since 2000, Janine Duckworth and her team at Landcare Research, in collaboration with Karen Mate and Carmen McCartney from University of Newcastle Australia, have tested a range of injectable vaccines targeting the possum egg coat or zona pellucida (ZP). They have identified several marsupial-specific ZP proteins that prevent the fertilisation of eggs in possums but which have no effect on the fertility of bird and non-marsupial mammal species such as chickens and mice.

Janine's team have also assisted Lynne Selwood from Melbourne University to identify molecules that play a key role in the development of possum embryos. Some of the molecules from the early embryos appear to be unique to marsupials and injectable vaccines targeting two of them (proteins CP4 and VAP1) cause long-term infertility in treated female possums.

Vaccine delivery to free-living possums has been a major challenge. Two delivery systems have been evaluated. First, in collaboration with Petra and Werner Lubitz at the University of Austria, bacterial ghost vaccines (BGs – particulate vaccines derived from non-living empty cell envelopes of gram-negative bacteria) engineered to express possum ZP molecules have been shown to significantly reduce both the fertilisation rate of artificially inseminated possums and the conception rates of naturally bred possums when the BG vaccine is delivered via oral or eye/nose routes. However, the initial promise of this work has not been fulfilled, as the team has been unable to sufficiently improve the immune response intensity and longevity to make the BG vaccines practical for field application. This is despite developing new forms of BGs capable of expressing the ZP antigen at higher levels, and encapsulated formulations to prevent the breakdown of proteins by enzyme and acid degradation in the gastrointestinal tract.

Recently, therefore, the team reviewed potential delivery systems for fertility control vaccines in possums, and identified replication-limited poxviruses (such as recombinant vaccinia virus) as a potentially promising approach to developing an oral vaccine for possums. This choice was based on the highly successful oral rabies vaccine used to control rabies in



**Frank Cross with possum and vaccine. Vaccine was applied to the external surface of the nose and into the mouth to simulate the natural feeding behaviour of possums.**

Photo: Jane Arrow, Landcare Research

**The key to advancing the live vaccine concept for possum fertility control research to reality will be adequate funding.**

wildlife in the USA and Europe for the last 20 years. As the first step in evaluating this live vaccine approach, in collaboration with Steve Fleming from the University of Otago, possums were exposed to a recombinant vaccinia virus expressing a model protein. The virus was applied to the external surface of the nose and into the mouth; a route of delivery designed to simulate the natural feeding behaviour of possums. The recombinant vaccinia virus established a short-term infection, and 14 of 15 treated possums developed antibody responses to the model protein. This is the first report of an Australian marsupial demonstrating an immune response to a recombinant antigen in a vaccinia virus.

The potency and longevity of vaccinia-based vaccines expressing an immunocontraceptive antigen in possums are yet to be confirmed. However, these initial results, and the extensive safety and efficacy precedents set by the commercial oral rabies vaccines used overseas, highlight the promise of recombinant vaccinia as a vaccine delivery system for fertility and disease control in possums and other marsupials. Janine's team now has two pieces of the possum control puzzle: antigens that reduce possum fertility plus a potential means of delivering these proteins immunologically to possums via an

## Animal pest research

oral route. The key to advancing the live vaccine concept for possum fertility control research to reality will be adequate funding to put these two components together. Following the closure of the Possum Biocontrol Outcome Based Investment funding stream (OBI) last year, this proof of concept research has been funded by Landcare Research. The challenge is to secure ongoing funding to support the research needed to move the fertility control vaccine from concept to reality.

### In collaboration with:

Karen Mate, Carmen McCartney Marsupial Research Laboratory, University of Newcastle, Australia; Lynne Selwood, Reproduction and Development, University of Melbourne; Petra Lubitz, Werner Lubitz Bird-C GmbH & CoKEG & Dept of Medicinal Chemistry, University of Vienna; Steve Fleming, Virus Research Group, Department of Microbiology & Immunology, University of Otago.

Contact: [duckworthj@landcareresearch.co.nz](mailto:duckworthj@landcareresearch.co.nz)

## Biodiversity

# Botanic gardens and the spread of environmental weeds

**Philip Hulme**

Lincoln University

**B**otanic gardens are acknowledged to play a major role in the protection of biodiversity through ex situ preservation of endangered plant species; research to underpin conservation, and public outreach. Yet, increasing evidence highlights the role botanic gardens might play in plant invasions across the globe.

Botanic gardens, often in global biodiversity hotspots, have been implicated in the early cultivation and/or introduction of most environmental weeds listed by IUCN as among the world's worst invasive species. IUCN Red-listed species account for only 3.5% of species in botanic gardens and are found in few collections. Most plants are ornamentals with a better representation of major invasive species than Red-listed species. When other important correlates of alien plant richness are taken into account, a significant effect of botanical gardens on alien plant species richness across the world is found. The variation explained by botanic gardens is around 10% which is consistent with these institutions being only one source of alien plants, with other sources of alien plant introduction such as the use of species in erosion control, landscaping, and horticulture as well as feral crops and grain contaminants also contribute

to alien plant species richness. Furthermore, these results highlight that the establishment of botanic gardens is strongly related to socioeconomic factors such as population density and per capita GDP.

The risks posed by invasive species in living collections should not be underestimated but a balanced approach

is required that ensures the minority of problem species are dealt with effectively and with stakeholder support. Voluntary codes of conduct to prevent the dissemination of invasive plants from botanic gardens have had limited uptake with few risk assessments undertaken of individual living collections. Information sharing on invasive plants would significantly improve weed risk assessments and inform listing in Index Seminum to ensure invasive species are not shared among botanic gardens.

**A stronger global networking of botanic gardens to tackle biological invasions involving public outreach, information sharing and capacity building is a priority.**

A stronger global networking of botanic gardens to tackle biological invasions involving public outreach, information sharing and capacity building is a priority to prevent the problems of the past occurring in the future. As a result, botanic gardens can play a key role in the management of invasive plants worldwide and further consolidate their position as leading players in global plant conservation.

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## Animal pest research

# Rats and resistance to anticoagulants – a problem in New Zealand?

**Phil Cowan & Dianne Gleeson**  
Landcare Research & EcoGene

The UK, Europe, USA, and parts of Asia currently have major problems with rat populations that are resistant to the anticoagulant poisons used to control them. Although this problem was first detected in populations exposed repeatedly to Warfarin, it has now extended to most other first generation anticoagulants (e.g. Diphacinone), and there are occasional reports of rats resistant to second generation anticoagulants (e.g. Brodifacoum).

New Zealand makes extensive use of anticoagulants for pest management, not only for control of rodents in urban areas and on farms as in other parts of the world, but also for broadscale control of rabbits (e.g. Pindone), and possums (e.g. Brodifacoum) and rodents in native habitats (e.g. Diphacinone). Because anticoagulants for possum control are regularly used in bait stations, rats are often exposed to them as well. The scale and nature of anticoagulant use is unique to New Zealand. For those reasons, with funding from the Ministry of Science and Innovation, we have begun a precautionary screening of rat populations in New Zealand looking for evidence of anticoagulant resistance. Most examples of anticoagulant resistance have been recorded in Norway rat populations. However, in New Zealand the common rat over most of the country is the ship rat, so just to be safe we are checking all three species of rats found in New Zealand (Norway, ship, kiore), as well as rabbits.

Fortunately, we don't need to bring lots of rats into captivity and undertake feeding trials to test for resistance – at least not to begin with. The genetic basis of anticoagulant resistance was discovered recently, namely changes (mutations) in the DNA code of a gene called VKORC1 that is involved in the blood clotting process. Researchers then conducted feeding trials with anticoagulants and identified the

mutations that are associated with anticoagulant resistance in rats. This means we can extract DNA from small tissue samples from rats (the tips of the tails of dead rats are ideal), and screen the DNA for these mutations in the EcoGene laboratory. If we find any of the mutations known to be associated with resistance, the next step will be to trap more rats from that site and undertake feeding trials to confirm the problem.

A wide range of individuals, community groups, regional council staff, and Department of Conservation staff have been helping by sending in rat tails from their trapping programmes. So far we have screened more than 300 rats, mostly ship rats but also some Norway rats and kiore, from 16 sites around New Zealand including some offshore islands. We have identified a number of mutations in the DNA sequence of the VKORC1 gene, but fortunately none of them are known to be associated with

anticoagulant resistance. Assaying rabbits has been more of a challenge and has required significant adaptation of the methodology, but EcoGene has recently got the method working.

The absence of resistance mutations so far is not surprising because many of our samples have come from areas with little poison use, and part of the value of these samples is in establishing the background level of mutation to interpret selection pressure for resistance. Over the next 12 months we will be focusing rat collection on high risk areas – those where anticoagulants have been used repeatedly and/or rats have proved difficult to control – such as farms and sites with long-term pest control programmes. If you have problem areas with rats, especially Norway rats, and are willing to help with sample collection, please get in touch and we will send you a collection kit (contact: [cowanp@landcareresearch.co.nz](mailto:cowanp@landcareresearch.co.nz)).

**The absence of resistance mutations so far is not surprising because many of our samples have come from areas with little poison use, and part of the value of these samples is in establishing the background level of mutation to interpret selection pressure for resistance.**

## Comment

# Biosecurity and the politics of fear

Threats to human health may seem a lot more terrifying than hazards to agriculture, but proportionally more investment in better border biosecurity has the potential to bring greater dividends to society than much of the current investment in biodefence countermeasures, says Professor Philip Hulme of Lincoln University's Bio-Protection Research Centre.

Writing in the international journal *Science* in October this year, Professor Hulme says that since the widespread panic caused by the 2001 anthrax mailings, the United States has invested billions of dollars in research and development of biodefence countermeasures, but that these funds could be better invested.

"Biodefence research focuses on particularly nasty pathogens such as anthrax and plague, which while top candidates for would-be bioterrorists, are otherwise of limited public health significance.

"These human pathogens are also technically very difficult to produce, handle and disseminate, further limiting the real risk of their use as weapons by rogue organisations. In fact, the most likely way these pathogens will establish in the United States is via national research establishments, either through deliberate release by malevolent insiders or inadvertent leaks from laboratories."

Professor Hulme says economies face greater risks from low-technology, high-impact threats targeting plant and animal, rather than human, health, explaining that deliberate releases of serious insect pests or diseases of crops or livestock could have a considerable impact on global markets. He says that a wide range of countries, including the United States, are known or suspected to have been involved in anti-crop programmes or agroterrorist acts in the past.



Professor Philip Hulme

**'Economies face greater risks from low-technology, high-impact threats targeting plant and animal, rather than human, health.'**

Professor Philip Hulme

However, he adds that such actions are dwarfed by the agricultural impact of unintentionally introduced pests and diseases, and that this is an area which is seriously underfunded.

"Given the scale and low predictability of such unintentional threats, it is surprising that the frontline agency in agricultural biosecurity in the United States, the Animal and Plant Health Inspection Service [APHIS], receives a fraction of the resources devoted to biodefence and has suffered progressive cuts in its operating budget. The value of the damage prevented and mitigated annually as a result of plant and animal health monitoring and surveillance, roughly matches the federal funds APHIS receives each year. Unfortunately, this reality is not reflected in either the priorities or performance of the Department of Homeland Security, under whose jurisdiction APHIS border inspections have operated since 2003."

New Zealand is a world leader in biosecurity and is no stranger to agroterrorism, with the hoax threat to release foot and mouth disease (FMD) on Waiheke Island in 2005 costing the New Zealand taxpayer about \$2 million.

Professor Hulme suggests that while the risk of extremists, sociopaths or disgruntled citizens threatening New Zealand agriculture can rarely be predicted, building a robust national biosecurity system is the key to managing these unknowns.

"For example, the mandatory National Animal Identification and Tracing scheme (NAIT) scheduled to start in 2012, while not designed to prevent the risk of FMD being introduced to New Zealand, will certainly ensure any outbreak can be managed more effectively than in the past."

Contact: [Philip.hulme@lincoln.ac.nz](mailto:Philip.hulme@lincoln.ac.nz)

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## World's worst pests

# Plant pests: The biggest threats to food security?

The threat posed to crop production by plant pests and diseases is one of the key factors that could lead to "a perfect storm" that threatens to destabilise global food security. Already, the biological threat accounts for about a 40% loss in global production and the problem is forecast to get worse, scientists warn. BBC News asked Dr Matthew Cock, chief scientist for CABI, a UK-based agri-environment research organisation, to compile a list of the worst plant pests threatening crops around the world.

Scientists can be difficult; we have so many ways in which things can be measured, analysed or compared that sometimes it seems as if we never agree on anything.

So when I was asked "which are the world's worst agricultural pests?" my answer was simply that the question cannot be answered.

How do we define a pest? What measure would you use? How would you value that measure? Not only do perceptions of the worst problems vary according to geography, they also vary from year to year.

It is an unfortunate fact too that despite a general consensus on the threats from pests and diseases to global production, actual monitoring and evaluation of damage caused globally is very poorly understood.

The following list is by no means definitive therefore, nor a serious attempt to prioritise the threats posed by different agricultural pests.

All we are trying to do is to raise awareness of the immense range of pests and diseases that threaten agricultural crops, the devastation they can cause, and the difficulties in controlling them.

Scientists working in the field may disagree with our nominations; if they do, I welcome them to join the debate and share their own ideas, add a comment to this article or visit CABI's Plantwise blog at [www.plantwise.org](http://www.plantwise.org).



**Throughout history, the impact of plant pests and diseases, such as potato blight, can devastate lives.**

**Scientists working in the field may disagree with our nominations; if they do, I welcome them to join the debate and share their own ideas.**

## Worst historical pest – the desert locust

Locust swarms may vanish for many years, only to break out of their endemic regions after periods of abnormally high rainfall.

Another nomination is human beings, *Homo sapiens*. This species could appear in several categories, but we include it just once here, for it's sometimes accidental, sometimes purposeful habit of introducing pests to new habitats where they flourish through lack of natural controls.

A recent example of the latter was the deliberate introduction of witches' broom disease of cocoa, *Crinipellis pernicioso*, in Brazil. The motive was a social one – to weaken the political power of the powerful cocoa landowners, and it achieved its desired effect: production across the region fell 75%. Brazil went from being the world's third-leading cocoa producer to 13th place.



***Schistocerca gregaria*: a pest since biblical times, they fly in unexpectedly, strip a field bare in an hour and consume a very wide range of crops.**

## Hardest pest to control – South American rubber blight

The rubber tree is a native of South America but very little of the commodity is produced there. The principal reason is the fungus *Microcyclus ulei* has resisted all attempts to control it for more than 100 years.

In the 1920s, it notoriously defeated Henry Ford's attempts to grow rubber for car tyres in the eponymous Fordlandia, Brazil, losing him an investment in today's terms of US\$250 million.

Also worth considering in this category is coffee wilt disease, *Fusarium xylarioides* which spreads insidiously through the soil and on machetes used to prune the



## World's worst pests

trees. The only way to halt it is a scorched-earth policy of pulling up all trees in infected plots and then waiting a year before replanting - plus another four years until you get a full harvest again.

### Most expensive – western corn root worm

In terms of the amount of pesticides once used to control *Diabrotica virgifera virgifera* and the expense of developing a resistant GM-strain, this beetle is a strong contender.

Under control for many years now, maize has been one of the few crops to show steady yield increases and for this the resistant strain can take credit.

Now, though, there are signs that resistance is breaking down.



### Greatest human impact – potato blight

The *Phytophthora infestans* fungus caused the Irish potato famine (1845-1852), during which one million people died and a further million emigrated from Ireland, causing the population to decrease by about 24%.

Another candidate is coffee leaf rust, *Hemileia vastatrix*, a fungus that devastated coffee production in Sri Lanka (Ceylon) in the 19th century and famously led to a switch to tea drinking in the UK.



But tea picking requires more continuous labour than coffee, so the Tamil migrants from India that used to go home after the coffee harvest ended up settling in the country, which led to catastrophic sectarian strife over a century later.

### Worst for storage – Khapra beetle

This insect, *Trogoderma granarium*, is difficult to control because it feeds on a variety of dried materials and is resistant to insecticides and can go long periods without food. Infestations can result in up to 70% grain damage, making products inedible and unmarketable.



### Climate change threat – mountain pine beetle

The cumulative effect of the current outbreak of *Dendroctonus ponderosae* in British Columbia, Canada, has killed 13 million hectares of lodgepole pine forest and released an estimated 270 million tonnes of carbon, converting the forest from a carbon sink to a large net carbon source.

Generally, climate change is likely to mean that many wood-boring pests of cold northern climes will become more destructive, since higher temperatures will increase winter survival and possibly enable an extra generation in the summer.

Ironically then, northern forests, seen as a bastion against climate change, will become more threatened by it.



### Most imminent threat – wheat stem rust strain Ug99

The *Puccinia graminis tritici* strain of wheat rust was discovered in Uganda in 1998 and has subsequently spread across Africa, Asia and the Middle East. In fact, seven races of the Ug99 lineage have now been identified.

New resistant varieties that yield more than current popular varieties are being released and promoted, but a major effort is needed to displace current susceptible varieties with those that have durable resistance.



### Most resilient pest – Colorado potato beetle

*Leptinotarsa decemlineata* is a strong candidate for this award, having managed in the space of about 50 years to develop resistance to 52 different compounds belonging to all major insecticide classes (including cyanide).

This beetle therefore has effectively beaten the chemists.

Wherever possible, biocontrol (control by natural enemies) should be part of the strategy because the predator-parasite can more easily keep up in this arms race, one which humans have so palpably lost.



## World's worst pests

### Next steps

The above is at best a very partial list of serious agricultural pests. At any one time, because of weather conditions, mutation to a virulent form, or emergence of resistance to chemical control, a pest will surge into prominence unexpectedly.

What we need is better monitoring and recording of pests in order to alert authorities to take early action,

something we at CABI are very keen to promote through our Plantwise initiative.

Coffee wilt disease, mentioned above, is a case in point – regular monitoring and rapid action could have halted this disease at a cost of a few million dollars at the most.

Instead, we reckon it has now caused at least a billion dollars of lost earnings to African coffee farmers, and it is still spreading.

# Help wanted

## Have you seen tutsan?

Landcare Research will be carrying out a national survey to determine the distribution of tutsan for the Tutsan Action Group, which is exploring options for biocontrol of the plant in New Zealand. If you are a pest plant officer who is able to provide information about the presence or absence of tutsan in your area please register with Dave Alkers: [David.Alker@horizons.govt.nz](mailto:David.Alker@horizons.govt.nz). Dave will contact pest plant officers for the information.

*Right: A tutsan infestation.*



## New infestations – who sees them first?

**Darion Embling**, Waikato Regional Council

I am trying to get an understanding of how and who finds new infestations or incursions in their local areas so I can build a pest plant surveillance strategy for the Waikato. I thought the best place to ask are you folk who are working in this all the time.

It would be great if you could help me out and email me your answers to these questions:

- Who found the new weed infestations in your area? (e.g. a seed representative, farmer, council or DOC officer).

- How did they tell you? (e.g. random conversation, intentional contact by web or phone or other).
- How did they find the new site? (e.g. chance finding, intentional survey).
- Where were these infestations? (e.g. road or railway, farm races, cropping paddocks, bush margin, around buildings).

Please email me at:  
[darion.embling@waikatoregion.govt.nz](mailto:darion.embling@waikatoregion.govt.nz)

## Call goes out for paper wasp distribution info

**Darren Ward**, Landcare Research, Auckland

If you are out and about this summer I would be interested to get records of paper wasps, especially from the lower North Island, and top of the South Island. Please email me the following:

1. Locality (city/town, suburb, street, date) where found)
2. Which species it is (Asian paper wasp = yellow/



Not shown actual size

black OR Australian paper wasp = red/brown).

If you are unsure of the species please take a photo, even a low resolution image is okay, as the species have very different colours and markings on their body.

There is no need to send in the wasps.

Thanks for your help. My contact details are: ph 09 574 4223, Fax 09 574 4101, email: [wardda@landcareresearch.co.nz](mailto:wardda@landcareresearch.co.nz)

## News from MAF

## Agencies collaborate in fight against undaria

The marine environment in Fiordland is finely balanced and therefore vulnerable to the introduction and establishment of harmful marine pests and diseases.

Each year, hundreds of vessels from other regions of NZ and around the world enter the fiords for recreation or commercial purposes.

Each and every one of these vessels has the potential to bring in and deposit unwanted hitchhiking marine pests. Bio-fouling (where pests attach themselves to vessel hulls) is one of the most significant means of pest species spreading from location to location.

Once established, marine pests can quickly spread through the new location, can have serious effects on marine habitats, food chains, fish stocks, recreational activities and commercial fishing activities, and are extremely difficult and expensive to control or eradicate.

In April 2010, the marine pest seaweed, *Undaria pinnatifida* (undaria) was found in the remote Sunday Cove in Breaksea Sound, Fiordland. Since then, the Ministry of Agriculture and Forestry (MAF), Department of Conservation, and Environment Southland have joined forces as a response team to attempt to locally eliminate this marine pest. Soon after the initial detection, the three agencies undertook a comprehensive survey of high-risk sites. No marine pests were found at any of the other sites but more undaria plants were found in Sunday Cove itself.



***Undaria* Japanese kelp seaweed (*Undaria pinnatifida*) on a mooring rope in Sunday Cove, Breaksea Sound.**

Photo: K Blakemore DOC

Following this, monthly dive surveys of Sunday Cove and its immediate surrounds have continued. The main control method is hand removal of all plants detected. Unfortunately, earlier this year five mature undaria plants were again discovered. This has not deterred the response team from their efforts but has made them think carefully about alternative methods to assist in this elimination.

The result was that in winter 2011, about 30,000 kina (sea urchins) were introduced to Sunday Cove to act as a biological control agent. The kina were introduced mainly to graze on other macroalgae present in the area and so help divers see undaria more easily as well as to graze on any undaria they come across.

This response is a very time-consuming and resource-intensive programme but is worthwhile

to protect this wonderful marine area. The three agencies and the Fiordland Marine Guardians are working collaboratively to prevent the further introduction of marine pests to Fiordland and are urging users of the area to be very vigilant.

MAF's free reporting line for harmful marine pests and other exotic, unwanted organisms is: 0800 80 99 66.

For further information on Fiordland marine biosecurity and cleaning methods please visit [www.biosecurity.govt.nz/pests/surv-mgmt/mgmt-partnerships/fiordland](http://www.biosecurity.govt.nz/pests/surv-mgmt/mgmt-partnerships/fiordland)

## News from MAF

## Burnt pine beetles' flight closely monitored

When *Arhopalus ferus* smells burnt pine, it thinks "lunch!"

It's a large beetle – 25 to 30mm long, whose larvae initially feed on the layers just beneath the bark and then bore directly into the sapwood of dead pine trees and logs, especially those killed by fire. That's how it gets its common name – the burnt pine longhorn beetle.

Native to Europe, northern Asia (except Japan), and northern Africa, the beetle probably hitchhiked to New Zealand in the 1950s and was discovered in Northland in 1963. It is now established throughout both the North and South islands.

New Zealand timber processors need to take extra steps to ensure it's not present on logs and timber being sent to export markets such as Australia where the beetle is not established. The Ministry of Agriculture and Forestry and the forestry industry have developed a system based on monitoring of the beetle flight season to minimise the risk of beetles hitchhiking.

Ivan Veljkovic, a senior adviser for the MAF Plant Exports team, said that as part of an agreement with Australia, MAF commissions a surveillance programme each year to detect when the adult beetles start flying in spring and when they stop in late autumn. The surveillance is funded by exporters.

MAF puts out a contract for monitoring of traps at selected ports and some inland sites, usually sawmilling facilities, with inspections of traps starting in October and becoming progressively more frequent until daily checks occur from November. The traps used are UV-light traps, Lindgren funnel traps (with chemical attractants) and trap boards.

MAF notifies the Australian authorities of the numbers detected through the monitoring programme each week. When a combined total of 15 or more adult beetles are detected at a port or inland monitoring site, then the *Arhopalus* flight season is officially declared "as of dusk the day after". MAF notifies all relevant stakeholders.

From then on there are additional requirements to gain MAF certification for exported wood products. During the flight season, sawn and manufactured timber products must be fumigated and then covered until export to prevent re-infestation by adult beetles, which like to hide in crevices in sawn timber packaging.

At the Port of Auckland monitoring continues through the flight season to enable ships to be loaded during



***The flight season of the burnt pine longhorn beetle, Arhopalus ferus, is monitored to determine when timber exports are threatened, and thus when fumigation should take place.***

the hours of darkness. In all other New Zealand ports, night loading of timber and other forest produce to Australia is prohibited. Auckland is allowed the exemption as there are few pine forests in the immediate vicinity.

Also, during the flight season the monitoring organisation is required to inspect packets of export sawn or manufactured timber daily for presence of live beetles and also to conduct night inspections of light towers at ports on fine days.

In autumn – usually about the end of March – surveillance activities re-commence. The official *Arhopalus* flight season draws to a close when the number of beetles detected at each monitored port and the selected inland monitoring sites has been below 15 adults per inspection for five consecutive days and no live *Arhopalus ferus* have been found on packets of sawn and/or manufactured timber during inspections at the affected ports for five consecutive days. At that point the extra measures can stop.

However, further monitoring continues until May to ensure there are no further emergences of the beetle.

## News from MAF

## Wilding conifers co-ordination needed

In a strong wind, some introduced conifer species' seeds can spread up to 40km.

And they certainly don't recognise or respect property boundaries, easily spreading beyond the property where they were originally planted as erosion control, shelter belts or other such uses.

This is why a new report recommends more co-ordination between landowners and between relevant agencies to ensure effective long-term control.

Greater collaboration on pest issues is a central theme of the Government's National Plan of Action for Pest Management, said Sherman Smith, Senior Adviser National Coordination for the Pest Management group of the Ministry of Agriculture and Forestry (MAF).

"Wilding conifers are a good example of a pest problem where working together will achieve more than single agencies or land managers addressing it by themselves."

The ministry commissioned Pacific Eco-logic to develop a Current State Report for wilding conifers. Pacific Eco-logic has been working with the Wilding Conifer Management Group – a stakeholder forum which includes regional government agencies, Department of Conservation, Land Information New Zealand, forestry owners, Federated Farmers, community groups, landowners, New Zealand Defence Force, Scion and MAF.

The report outlines the current situation across the country and identifies ways to improve wilding conifer management.

Of the 11 conifer species that cause most wilding problems, *Pinus contorta* is considered to be the most invasive because it produces prolific seed and is able to live in a wide range of conditions.

Wilding conifers' ability to invade short-stature vegetation and shade out other species is threatening native plants in several areas and also the viability of some extensively grazed pastoral farming land. In some South Island catchments, wilding conifer populations may interrupt water flow by intercepting and retaining it.

Wilding conifers often establish in terrain that is difficult to access, which can make the cost of control high. There is currently a lack of well-proven techniques for cost-effective removal of dense stands of wilding conifers. This presents a resourcing challenge – for private landholders and Crown agencies alike.

Altogether, it is estimated wilding conifers affect about 800,000ha of the South Island and somewhere



**Wilding conifer spread on Molesworth.**

in the order of 100,000ha of the North Island.

A wide range of groups undertake wilding conifer control, including farmers, DOC, LINZ, regional councils, forestry companies, community groups and the Defence Force.

The wilding conifer picture is still incomplete, according to the report authors, who identified a need to develop a clear and consistent measure of their extent and density so that it is possible to get a better national perspective. Modelling potential future spread would also be useful for managers, they suggest.

The old saying "a stitch in time saves nine" was certainly true when it came to managing wilding conifer spread, Sherman Smith said. "Whether spread is occurring from areas of existing

wildings or from economically important plantations, people need to recognise the potential problem early and take action."

This also highlighted the complexity of the issues the report was canvassing, said Sherman, as well as the need for forestry industry involvement in developing future management solutions.

The Wilding Conifer Management Group members have pushed for the report to identify changes that will quickly make a tangible difference to wilding conifer management while longer term strategies are developed with key stakeholders.

The report will be available from MAF's website.

**A new report recommends more co-ordination between landowners and also between relevant agencies to ensure effective long-term control.**

## News from MAF

## Possession of snake brings 4 months jail

The Ministry of Agriculture and Forestry is welcoming the recent successful prosecution of a man for acquiring a snake.

New Zealand has no native snakes and snakes are prohibited organisms under New Zealand law, specifically the Biosecurity Act 1993 and the Hazardous Substances and New Organisms Act 1996.

Feilding man Nathan Bush, who pleaded guilty in the Palmerston North District Court to acquiring a snake, was sentenced in September to four months imprisonment.

In sentencing, Judge Callander stressed that New Zealand has a snake-free environment and it was important to keep snakes out.

He intended the sentence to denounce Mr Bush's behaviour and also act as a deterrent.

The case followed MAF's seizure of a live snake from a property in Feilding in March.

The snake was identified as a jungle carpet python, a subtropical species. It was less than one year old. The snake was euthanased after identification.

MAF believed the snake was illegally imported from Australia and investigations were continuing.



***Unwanted: a jungle carpet python***

By law anyone who becomes aware of a snake in New Zealand is required to notify MAF. MAF's biosecurity phonenumber is: 0800 80 99 66.

### Biosecurity brief

## 18th Australian Weeds Conference set for next October

The 18th Australian Weeds Conference is on in Melbourne next October 8-11. The theme of the conference is "Developing Solutions to Evolving

Weed Problems". Information is available from the conference website at: [www.18awc.com](http://www.18awc.com) or by emailing: [18awc@eventcorp.com.au](mailto:18awc@eventcorp.com.au)