INTERNATIONAL BIOHERBICIDE GROUP

IBG NEWS

December 2005

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THE CHAIRMAN'S COMMENTS

In my recent analysis of publications in the field of bioherbicide research (in December 2003), I showed that our field of research got off to a slow start in the mid 1970s, followed by a rapid increase in research activity from late 1980s until the mid 1990s. Since then our research activity seems to have reached a plateau, as far as can be gauged by publication output. This perhaps reflects the difficult challenges we have come up against such as those around the needs to improve the virulence of our pathogens, to successfully scale-up of their production, to select the most appropriate weed target and pathogen combination, and to determine how best to formulate these pathogens. For me, these challenges are what make bioherbicide research such a stimulating field in which to be involved. And it's clear that you share this enthusiasm judging from the great representation from around the world (Russia, Norway, France Australia, Canada, USA, Italy and New Zealand) at our 7th IBG meeting in Bari, Italy, on 18 June this year. By the time of our next meeting in April 2007 in Montpellier, France, associated with the12th International Symposium on Biological Control of Weeds (and I thank Dr Jane Barton for agreeing to organise this 8th IBG meeting for us), we will have made further inroads into these challenges. I look forward to meeting you all again then. In the meantime, I wish you all a happy Christmas and a prosperous New Year.

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MEETINGS

International Symposium Intractable Weeds and Plant Invaders ISIW&PI

17-21 July 2006, Ponta Delgada, Azores, Portugal

First Circular

Agricultural weeds and plant invaders are research subjects generally studied in isolation. However, intractable weeds and plant invaders also raise similar questions regarding their understanding and control. This symposium aims to gather researchers from the fields of weed biology and plant invasions in the same meeting, allowing a broader discussion and a transfer of knowledge between these two complementary fields.

Symposium topics

Biology and genetics, Ecology, Toxicology, Environmental Impact, Economic Impact, Modelling, Surveys, Data Bases, Regulations, Management, Mechanical Control, Physical Control, Chemical Control, Biological Control

Organisers
EWRS - European Weed Research Society - Working Groups:
Invasive Plants, Biological Control of Weeds and
Optimisation of Herbicide Dose
IBG - International Bracken Group
Local organisers
Serviço de Desenvolvimento Agrário de São Miguel
CCPA - Departamento de Biologia - Universidade dos Açores
EWRS IBG

Preliminary Programme

16.07.06 Arrival of participants to Ponta Delgada
Documentation
Welcome Reception at the University of the Azores
17.07.06 Conferences and open sessions
Documentation
Opening session
Agricultural weeds and plant invaders: bridging the gap
Biology and ecology of weeds and plant invaders
18.07.06 Conferences and open sessions
IBG Meeting
Surveys, data bases, regulations
Conference dinner
19.07.06 Field trip and dinner
20.07.06 Conferences and open sessions
Biological control of weeds and plant invaders
21.07.06 Conferences and open sessions
Control of weeds and plant invaders
Optimisation of herbicide dose
Closing session

22.07.06 Post-symposium tours
23.07.06 Departure of participants from Ponta Delgada

Intention to participate – 31 January 2006
Send an e-mail with your personal data and a title for your presentation to ccpa@notes.uac.pt
Deadline for application and submission of abstracts – 30 April 2005
The application form will be available at http://www.db.uac.pt

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European Weed Research Society (http://www.ewrs.org)
Paul Hatcher (p.e.hatcher@reading.ac.uk) - Biological Control of Weeds
Per Kudsk (per.kudsk@agrsci.dk) - Optimisation of Herbicide Dose
Christian Bohren (christian.bohren@rac.admin.ch) – Invasive Plants
International Bracken Group
Rob Marrs (calluna@liverpool.ac.uk)

International Conference
"Novel And Sustainable Weed Management In Arid And Semi-Arid Agro-Ecosystems"

Faculty of Agricultural, Food and Environmental Quality Sciences,
Hebrew University of Jerusalem, Rehovot, ISRAEL

15 - 21 October 2006

For more information on the conference please contact the Organizing Committee at: wgarid@agri.huji.ac.il

or visit: http://www.agri.huji.ac.il/aridconference

The aim of the conference is to gather a forum for weed scientists involved in research on all special aspects of weed management in arid and semi-arid agriculture, especially in the Mediterranean region.

A tentative list of topics
All topics will be related to the specific climate conditions prevailing in the arid and semi-arid zones.
Weed management in irrigated crops
Weed management in dry land farming
Bio-control of weeds
Chemical and non-chemical alternatives for methyl bromide
Allelopathy as component in weed management
Precision agriculture, remote sensing and modeling
Parasitic weeds: biology and control
Herbicide resistant weeds and crops
Herbicide behavior in soils of the semi arid and arid habitats
Invasive weeds: biology, control and quarantine regulations
Weed biology and ecology
Biotechnology and molecular biology in weed science

Application methods and formulations
Weed management in organic farming, theory and practice

Important dates and deadlines
15 February 2006
Second Circular – will be sent to those expressing interest
Final titles for oral/poster presentations
Provisional list of participants
15 July 2006
Deadline for submission of final abstracts and full papers (optionally) for the proceedings (to session's chairs/B. Rubin)

Local Organizing Committee:
Baruch Rubin
Hanan Eizenberg
Joseph Hershenhorn
Moshe Fish
Moshe Sibony
Tuvia Yaacoby
Yaakov Goldwasser
Yoel Drishpoun
Local Scientific Committee:
Baruch Rubin
Hanan Eizenberg
Hisham Yunes
Jonathan Gressel
Joseph Hershenhorn
Moshe Sibony
Pua Kutiel-Bar
Tuvia Yaacoby
Yaakov Goldwasser
Yuval Benyamini

XII International Symposium on Biological Control of Weeds

Montpellier, France, 22-27 April 2007

http://www.cilba.agropolis.fr/weeds2007.html

The ISBCW Symposium provides an international, quadrennial forum for research related to biological control of weeds and the logistics surrounding its implementation.

Important dates
6 October 2006 - *Abstracts due*
17 November 2006 - *Notification of accepted papers/posters*
15 December 2006 - *Close of registration*

Proposed Program Topics
Strategic Ecology and Modelling
Evolutionary Theory and Applications

Cost-benefit/Risk Analysis
Regulations and Public Awareness
Biological Control Opportunities in Europe
Target and Agent Selection
Pre-release Specificity & Effi cacy Testing
Post-Release Evaluation/Monitoring
Retrospective Studies/Assessment of Predictions
Novel Approaches & Technologies
Release Practices & Strategies

PEOPLE & PLACES

In the April 2005, Dr. Gary Peng was invited to visit the Weed Laboratory at Nanjing Agricultural University, China headed by a weed scientist Dr. S. Qiang who also has a strong interest in bioherbicides. While there, Dr. Peng gave a seminar entitled "Strategies for enhancement of mycoherbicide performances" in the department of Plant Science, toured Dr. Qiang's research program, and held discussions with graduate students in the weed biocontrol projects. Dr. Qiang's efforts in bioherbicide research were evidenced by well equipped facilities and a large group of enthusiastic staff and graduate students. Invasive species are high on their research priorities. An introduced species from north America (goldenrod, *olidago canadensis* L) is spreading rapidly and is being monitored closely in several eastern provinces.

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Dr Raj Prasad of Pacific Forestry Centre, Victoria, B.C. was honored at a local Ecostar Award Ceremony, Nov. 9,2005 for his contribution to management of exotic-invasive weeds using biological and other control methods. Many exotic-invasive weeds such as *Cytisus scoparius*, *Ulex europaeus*, *Hedera helix*, *Daphne laureola* and *Rubus discolor* have made rapid excursion into the coastal landscapes and are threatening the biodiversity and local native species.

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BIOHERBICIDE RESEARCH - STATUS REPORTS

Mycoherbicide research project update - New Zealand

By Graeme Bourdôt
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1. *Sclerotinia sclerotiorum* for pasture weed control. Project team: Graeme Bourdôt, Geoff Hurrell, Michelle Verkaaik and Shona Lamoureaux (AgResearch, Lincoln, New Zealand). Field trials in

The giant buttercup weed problem in NZ dairy pasture

2004-05 with a dry granule formulation of *S. sclerotiorum* applied to giant buttercup (*Ranunculus acris*) in early spring on 23 dairy farms in the Golden Bay region of New Zealand, revealed dramatic effects of both location and time-of-application on efficacy. Early spring applications (to12 farms) gave an average 51% reduction in cover of the buttercup (later applications where less effective). This compared favourably with 59% reduction with MCPA in 29 historical trials and was a substantial improvement over MCPB which in 14 historical trials gave an average reduction of only 23%. Unfortunately the waste product used as a fermentation medium/food source/carrier has proven too expensive for commercialisation. The project is now concentrating on developing a new simpler and less costly formulation which incorporates mycelium directly from a liquid fermentation into a polymer. EnCoate limited has licensed the concept, is co-funding ongoing formulation research with Dairy Insight, and is committed to developing a cost-effective commercial mycoherbicide product.

Base of a giant buttercup plant showing mycoherbicide remains and rotting petioles

Giant buttercup plant killed by the a granule formulation of Sclerotinia

2. *Sclerotinia sclerotiorum* for environmental weeds. Project team: Dr Nick Waipara (Landcare Research, Auckland, New Zealand) and Graeme Bourdôt and Geoff Hurrell (AgResearch, Lincoln, New Zealand). The responses of several weeds of damp places to *S. sclerotiorum* have been investigated in a pilot study funded by the Regional Councils of New Zealand. To date an internationally significant water weed, and a locally important environmental weed that impedes native forest regeneration, have proven highly susceptible to the dry granule formulation of the fungus. This project is on hold until further funds can be secured.

3. Insect vectors of plant pathogens in weed control. Project team: Emmanual Yamoah (PhD student, National Centre for Advanced Bio-protection Technologies, Lincoln, NZ), Alvin Hee (Post Doc, National Centre for Advanced Bio-protection Technologies), Dr Nick Waipara (Landcare Research, Auckland, NZ), Graeme Bourdôt (AgResearch, Lincoln, NZ), Max Suckling (Hort Research, NZ),

Erian Jones and Alison Stewart (National Centre for Advanced Bio-protection Technologies, Lincoln, NZ). This projects aims to explore the potential of insects as possible vectors for pathogens that attack weeds. The model system being used in proof-of-concept is the weed gorse (*Ulex europaeus*), the fungal pathogen *Fusarium tumdium* and several insects know to regularly visit gorse. Pheromones are also being explored as lures to attract the insects to bait stations.

4. Survey of pathogens of Californian thistle (*Cirsium arvense*). Project team: Graeme Bourdôt and Geoff Hurrell (AgResearch, Lincoln, NZ), Dr Bob Skipp (AgResearch, Palmerston North, NZ), Derrick Wilson (AgResearch, Hamilton, NZ). This new project began in November 2005 with funding from Meat and Wool New Zealand. Samples are being collected from throughout New Zealand of shoots of the thistle showing signs of disease. The causative agent(s) will be identified. We are hoping to find a pathogen that attacks the roots since this weed spreads in established pastures entirely by adventitious shoots from buds on its creeping roots. The bio-control/mycoherbicide potential of identified pathogens will be explored in the second year of the project. To date more than 30 farmers have sent in samples of diseased Californian thistle shoots collected from populations showing a wide range of disease symptoms and population decline in the field.

Bioherbicides: All in a Day's Work…For a Superhero!

"Pick me! Pick me!" begged Jane Barton when she was told that someone from Landcare Research should attend the International Bioherbicide Group (IBG) meeting in Italy in June this year. And Jane wasn't the only one with her hand in the air, as in the end six Kiwis, plus hangers-on, attended the meeting (see photo).

The purpose of IBG workshops is to encourage co-operation between researchers involved in developing bioherbicides to control weeds. The term "bioherbicides" is used for herbicides where the active ingredient is a living micro-organism, and incorporates mycoherbicides (which use fungi). The focus of this particular workshop (the seventh to date) was current and future prospects in bioherbicide research and product development. Papers presented described work underway in a wide range of countries including Australia, Canada, Egypt, Italy, Korea, France, New Zealand, Norway, Russia, and the USA, with participants representing other countries as well. A wide variety of weeds are being targeted including quite a few parasitic weeds, such as *Orobanche* species. We have one *Orobanche* species in New Zealand (broomrape, *O. minor*). It doesn't seem problematic at present, but given its wide host range, and its status as a "species of agronomic importance" in the USA, we should perhaps keep an eye on it.

There are many steps to developing a bioherbicide and the talks highlighted some of the hurdles to be overcome at each stage. "A bioherbicide is usually based on a pathogen that already occurs in the country where it will be used," explained Jane. That means the weed and the proposed agent are already interacting in the field, but something is limiting disease development and often it is these "limiting factors" that researchers must overcome. Challenges that were discussed included getting the taxonomy right for an organism with bioherbicide potential; applying the pathogen where it can do the most damage (this is particularly difficult for parasitic weeds, which need to be attacked in the soil before they damage the host plant underground); producing inoculum in large quantities without compromising the ability of the microbe to cause disease; and convincing regulators that a product will be safe. Happily, speakers reported progress had been made in areas such as identifying plant toxins produced by some fungi (in the hope of producing toxin-based products that might be more stable than whole-organism-based ones); finding weed targets that suit this approach and markets that would best benefit from it, developing better production systems; improving application methods; and demonstrating that risks of environmental damage are low.

Three of the workshop talks focused on projects currently underway in New Zealand. Graeme Bourdôt (AgResearch) talked about progress towards commercialising white soft rot (*Sclerotinia sclerotiorum*) as a mycoherbicide against giant buttercup (*Ranunculus acris*) in dairy pastures in New Zealand. There are several chemical herbicides that can be used against buttercup, but all but one of these are problematic due to either evolved herbicide resistance or pasture damage. Research done by Graeme and his team showed that their mycoherbicide would on average control giant buttercup to a level acceptable to dairy farmers (60% reduction) at a realistic application rate of 50 kg/ha. This is as good as or better than can be achieved by some chemicals and without the pasture damage. "Registration and commercialisation of a *Sclerotinia*-based product is currently under consideration by a leading New Zealand fertiliser company," said Graeme. Their product will be called "Bioshield EN64", and if all goes to plan it should be available in New Zealand in 2 years time.

Geoff Hurrell (AgResearch) presented a paper, co-authored with Graeme and Jane, on the potential of the silver leaf fungus (*Chondrostereum purpureum*) and fusarium blight (*Fusarium tumidum*) as mycoherbicides for gorse (see *Field Trials and Tribulations*, Issue 24). Results from their latest field trials suggest that while both fungi are capable of reducing gorse growth and killing its tissues, they aren't "synergistic" and work independently. Also, disappointingly, neither managed to penetrate very far into the treated plants. "To kill plants with silver leaf fungus it looks like we would have to cut them off near the ground and apply the fungus to the stumps," explained Geoff.

Emmanuel Yamoah (Lincoln University) spoke about his PhD project on potential methods to increase the efficacy of fusarium blight on gorse. Emmanuel is exploring whether insects could be used to transport spores of the fungus to the target weed, and also whether insect damage (wounding) might help the fungus infect the plants. He shared experiments where he looked at whether making wounds on gorse plants increased damage caused by the fungus in a glasshouse situation. "Results were promising," said Emmanuel. "While young gorse plants can readily be killed by the fungus, even without wounding, once plants are several months old the fungus has greater impacts on plant growth and mortality when plants are wounded prior to application."

If there had been an award at the workshop for the "most promising up and coming bioherbicide" it would have gone to Professor Raghavan Charudattan (University of Florida, USA) for "Solvinix". Solvinix is unique in that it is based on a virus, tobacco mild green mosaic virus (TMGMV), which is highly effective against tropical soda apple (*Solanum viarum*) (see *A Virus Worth Sharing?* Issue 24). The main stumbling block has been the virus's ability to damage other plants in the Solanaceae family (e.g. capsicum species and tobacco), but extensive experimentation has now been done to alleviate any fears of non-target damage. "The risk to these plants is negligible and manageable because the virus has no natural vectors and does not spread except through physical contact," concluded Professor Charudattan. This product is also unusual in that the Professor is creating his own company (in collaboration with the University of Florida) to get it through registration and commercialisation. This is to avoid the risk of having the rug pulled out from under them by an organisation that is after a quick profit – the sad fate of many bioherbicides (see below).

While it was reassuring to see so much work underway on new bioherbicides worldwide, little was said of the current status of products that have made it through the registration process and/or to the market place. Therefore, on returning to New Zealand, Jane did a bit of research (with assistance from Professor Charudattan) to see what had happened to the trailblazers like Collego™ and DeVine® (see table). To date, 15 mycoherbicides have been registered and/or used outside of a research situation. Eight of these are still available, either commercially, or on request. For example, Stumpout™ and Hakatak are produced on a small scale to order by the researchers who developed them. These brave souls decided to produce the bioherbicides themselves, in order to ensure their long-term availability.

The five products that are definitely not available at present (Collego™, CASST™, Dr Biosedge, BioMal® and BioChon™) have all suffered from financial problems, not efficacy problems (although Dr Biosedge may have suffered from both, due to very high host specificity). Interestingly at least 11 of the 15 products are not currently being actively marketed (the possible exceptions are Lubao, Camperico™, Ecoclear™ and Myco-tech™ paste). It is very disappointing that after all the hard work that goes into developing a bioherbicide, and getting it registered, so little effort is apparently spent on promoting the final product. It is doubly unfair that the product is often then shelved due to lack of profits.

Perhaps the only way forward in the immediate future is for researchers to have the courage to create companies and market their products themselves as Professor Charudattan is doing with Solvinix, although this is perhaps asking them to go "beyond the call of duty". Indeed, a single researcher would need to master microbe taxonomy, plant pathology, mass production, risk assessment, formulation and application technology, battling bureaucracy (for registration), fund raising, and marketing and promotion as well. It's a job for a Superhero! Perhaps it needs to be recognised that developing a bioherbicide should be a team effort that includes someone with business and marketing skills, and that resources for advertising are also needed.

On the bright side, there are eight bioherbicide products that seem likely to remain available, or to become available in the near future. At least two of these are being considered for use in large-scale projects: Wageningen University and Research (the Netherlands) are collaborating with land managers in Berlin on a project to use BioChon™ to control black cherry (*Prunus serotina*) in Berlin forests; and in South Africa, the world-famous "Working For Water" programme is planning to use Stumpout™ to prevent acacias re-sprouting after they have been cut down in watercourses. Other products are being rescued by new financial backers (e.g. BioMal®) and/or renewed interest from farmers (e.g. Collego™).

Jane Barton is a subcontractor to Landcare Research. Her attendance at this workshop was funded by the Foundation for Research, Science and Technology. Thanks to the following people for providing information for this article: Karen Bailey (Agriculture and Agri-food, Canada), Raghavan Charudattan (University of Florida, USA), Meindert de Jong (Wageningen University, The Netherlands), David Te Beest (University of Arkansas, USA), Sherman Thomson (Utah State University, USA), Gary Walker (Sylvan Bioproducts, USA), Ron Wall (retired, Canada), and Alan Wood (ARC-PPRI, South Africa).

Caption: The Kiwi contingent at Bari. From left to right: Jane Barton, Graeme Bourdôt, Nick Waipara, Brenda Pottinger (Lincoln University) and Emmanuel Yamoah. Geoff Hurrell was "missing in action" when this photo was taken. (IBG attendees.jpg)

CLASSICAL BIOLOGICAL CONTROL OF WEEDS WITH PATHOGENS

CABI Bioscience UK Centre, Ascot

Classical Biological Control of Giant Hogweed (*Heracleum mantegazzianum*)

At the end of April 2005 the project "Giant Alien" funded by the European Commission under the 5th Framework Programme: "Energy, Environment and Sustainable Development (EESD)" drew to a close. This multidisciplinary research programme (first reported in IGB newsletter June 03) had been running for a total of 40 months under the leadership of the Danish Forest and Landscape Research Institute, involving altogether eight partners from six European countries (Czech Republic, Denmark, Germany, Switzerland, UK, Latvia) as well as one Russian subcontractor (for more details see http://www.giant-alien.dk). Aiming to develop a management strategy for the exotic species Giant Hogweed (*Heracleum mantegazzianum*) in its introduced European range the assessment of biological control, evaluating both fungal pathogen and arthropod agents as one component of an integrated approach, constituted an important part of the project.

With Giant Hogweed (Apiaceae) being native to the north-western part of the Caucasus (Ciscausasus), altogether four pathogen surveys were undertaken jointly with entomology surveys in this Russian part of the mountain range, stretching from the Black Sea to the Caspian Sea, during the summer months of 2002-2004. In order to record and compare also the mycobiota of other closely related *Heracleum* species, one additional survey was carried out in the Armenian southern part of the Caucasus (Transcaucasus), where *H. mantegazzianum* is not native. Surveys were also undertaken in Europe to assess the mycobiota and herbivore complex present on the weed and close relatives in its introduced range. Surveys revealed the pathogen species complex associated with *H. mantegazzianum* and closely-related *Heracleum* species in the Caucasus to be similar overall, although host-specific strains may exist. Based on field observations of abundance, impact on the host and apparent host specificity, four potentially co-evolved pathogens, *Phloeospora heraclei, Septoria heracleicola, Ramulariopsis* sp. nov. (the first record of the genus *Ramulariopsis* for the family Apiaceae) and *Phomopsis* sp., were selected for further evaluation as classical agents under quarantine conditions at CABI Bioscience in Ascot, UK. Likewise, the potential of insect agents collected during these surveys was investigated by other partners involved with this collaborative project.

Initial host range testing revealed that neither of the natural enemies assessed, insects or fungal pathogens, exhibited sufficient specificity to be considered safe for introduction into Europe, where classical biological control of weeds has never been implemented before. Non-target plant species shown to come under attack by the four selected fungal pathogens were parsnip (*Pastinaca sativa;* genera *Pastinaca* and *Heracleum* belonging to the same tribe) and to a lesser extent coriander (*Coriandrum sativum;* genera *Coriandrum* and *Heracleum* belonging to the same subfamily). Interestingly though, the native, western European hogweed *Heracleum sphondylium,* while a recorded field host of both *P. heraclei* as well as a *Ramulariopsis* sp. nov. species, did not prove to be susceptible to the strains of these two pathogens collected from *H. mantegazzianum* in the Caucasus under quarantine conditions, supporting the idea of pathogen strains adapted to individual hosts. Equally neither of theses pathogens has so far been detected on *H. mantegazzianum* in its introduced western European range, although in eastern Europe *P. heraclei* and *Ramulariopsis* sp. nov. have been recorded in Latvia on the closely related *Heracleum sosnowskyi,* native to the Caucasus and an invasive alien species in countries formerly belonging to the Soviet Union.

Although the potential of one or two arthropod agents had not been fully evaluated during the course of the project, and survey work could not be conducted in the Georgian region of the Caucasus due to safety reasons, the overall prospects for classical biological control of Giant Hogweed do not look

promising. However, as one project output a "Best Practise Manual" for Giant Hogweed has been compiled and printed and is available in several European languages (http://www.giant-alien.dk/manual.html). A monograph synthesis of the research on this project will be published by CAB International in 2006.

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RECENT PUBLICATIONS

Andolfi A., A. Boari, A. Evidente, M. Vurro, 2005. Metabolites inhibiting germination of *Orobanche ramosa* seeds produced by *Myrothecium verrucaria* and *Fusarium compactum*. *Journal of Agricultural and Food Chemistry*, 53,1598-1603.

Evidente A., A. Andolfi, M. Fiore, A. Boari, M. Vurro, 2005. Stimulation of *Orobanche ramosa* seed germination by fusicoccin derivatives: a structure-activity relationship study. *Phytochemistry* (in press).

Evidente A., A. Andolfi, M. Vurro, M. Frachiolla, M.C. Zonno, A. Motta, 2005. Drazepinone, a trisubstituted tetraidronaphthofuroazepinone with herbicidal activity produced by *Drechslera siccans*. *Phytochemistry* 66 (6), 715-721.

Peng G., K.L. Bailey, H.L. Hinz, and K.N. Byer. 2005. *Colletotrichum* sp: a potential candidate for biocontrol of scentless chamomile (*Matricaria perforata*) in western Canada. *Biocontrol Science & Technol.* : 297-511.

Peng, G. and K. N. Byer. 2005. Interactions of *Pyricularia setariae* with herbicides for control of green foxtail (*Setaria viridis*). *Weed Technol*. 19:589-598.

Peng, G., T.M. Wolf, K.N. Byer, and B. Caldwell. 2005. Spray retention on green foxtail (*Setaria viridis*) and its impact on weed control efficacy by *Pyricularia setariae*. *Weed Technol.* 19: 86-93.

Vurro M., A. Boari, A. L. Pilgeram, D.C. Sands, 2005. Exogenous amino acids inhibit seed germination and tubercle formation by *Orobanche ramosa* (broomrape): Potential application for management of parasitic weeds. *Biological control* (in press).

EDITOR'S CORNER

Dear All,

Many thanks to all the people who have sent information and pictures that made possible to prepare this issue of the IBG newsletter, after a long time. I hope this will be encouraging for the future issues.

Please remind that this bulletin is prepared on a voluntary basis and it contains only the information sent by the newsletter subscribers, so it cannot be considered exhaustive. Please remind that the mailing list can also be used as a moderated list for distributing information related to weed biocontrol at any time during the year.

I wish you Merry Christmas and Happy New Year

Maurizio