

## INTERNATIONAL BIOHERBICIDE GROUP

# *IBG NEWS*

December 2008

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## **MEETINGS**

### **IX IBG Workshop - Sunday, 8 February 2009**

The **IXth International Bioherbicide Group (IBG) Workshop** is fast approaching. The workshop will be 8 February 2009 with a field trip on 9 February and a special symposium on 10 February. If you have not already made plans to attend, please do so right away. Details are available at the IBG conference web site <http://www4.ncsu.edu/~jcneal/IBG%20Workshop/index.html>

#### **Schedule:**

February 8            IBG Oral sessions 8:30 AM to 5:00 PM  
 February 9            Field trip, details to be announced (separate registration required)  
                               WSSA Kick-off reception. All full registrants are invited.

February 10          WSSA / SWSS sessions begin  
                               Symposium: Plant Pathogens and Biological Control of Weeds:  
                               A Symposium in Honor of Dr. R. Charudattan

February 11 - February 13    WSSA and Southern Weed Science Society sessions

#### **Missed the title submission deadline but still wish to participate?**

Although title deadlines have past, requests to participate have continued to come in. In order to accommodate any delegates who wish to participate but missed the title submission deadlines we have made arrangements to have poster presentations. If you wish to submit a title for presentation as a poster, please contact **Joe Neal** ([joe\\_neal@ncsu.edu](mailto:joe_neal@ncsu.edu)) before 1 January 2009.

#### **Poster Presentations Available**

Even if you are planning an oral presentation, if you have additional information you would like to include in a poster presentation, please contact **Joe Neal** ([joe\\_neal@ncsu.edu](mailto:joe_neal@ncsu.edu))

#### **Deadlines for Abstracts and Papers**

IBG papers are due 1 January 2009. Instructions to authors are available at the IBG conference web site <http://www4.ncsu.edu/~jcneal/IBG%20Workshop/index.html>

Also, if your title was submitted through the WSSA on-line submission process, please submit a brief abstract through the WSSA abstract web site ([www.wssa.net](http://www.wssa.net)). This will ensure the IBG abstracts are included in the WSSA proceedings. Deadline for these brief abstracts is 9 January 2009.

(Joe Neal - [joe\\_neal@ncsu.edu](mailto:joe_neal@ncsu.edu))

## IX IBG Workshop - Sunday, 8 February 2009 - Draft Program

8:00	Registration	
8:45	Welcome and Introductions	
9:00	Efficacy of biological control of grassy weeds using <i>Curvularia eragrostidis</i> in the field trials	Y. Zhu, T. Gao, J. Wang, Y. Lu, S. Qiang*; Nanjing Agricultural University, Nanjing, China
9:15	Evaluation of bioherbicide control of tropical signalgrass, <i>Urochloa subquadriflora</i>	Y. M. Shabana*, C. Stiles, R. Charudattan A. Abou Tabl, J. White, University of Florida, Gainesville, FL, Valdosta State University, Valdosta, GA
9:30	Screening fungal pathogens of <i>Microstegium vimineum</i> as potential biocontrol agents.	L. C. Walker*, J. C. Neal, L. P. Tredway; North Carolina State University, Raleigh, NC
9:45	The Model of Conidia Production in <i>Helminthosporium</i> spp., Biological Agents for Grassy Weeds Control.	K. Yamaguchi*; Minami Kyushu University, Takanahe-cho, Japan
10:00 - 10:30	Discussion and Break	
10:30	A search for a root-pathogen of <i>Cirsium arvense</i> in New Zealand	G. W. Bourdot* B. Skipp, G. Hurrell, D. Saville; AgResearch Limited, Christchurch, New Zealand, AgResearch Limited, Palmerston North, New Zealand, Saville Statistical Consulting Limited, Christchurch, New Zealand
10:45	Root Colonization and Environmental Fate of the Bioherbicide <i>Pseudomonas fluorescens</i> BRG100	S. M. Boyetchko*, C. Hanson, R. K. Hynes, D. Korber; Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, University of Saskatchewan, Saskatoon, SK, Canada
	The dual effect of plant growth-suppressing rhizobacteria and a tuber pathogenic fungus on <i>Cyperus rotundus</i>	Leena Singh and P. Sreerama Kumar
11:00	Herbicide- deleterious rhizobacterial interactions in Velvetleaf weed control.	R. Zdor*; Andrews University, Berrien Springs, MI
11:15	Using Gene Fusions to Study Cyanogenesis in a Weed Deleterious Rhizobacterium	M. M. Biswas*, R. Zdor, C. Miller; Andrews University, Berrien Springs, MI
11:30	Discussion	
11:45 - 1:00	LUNCH BREAK	
1:15	Bioherbicide potential of volatile oil from redstem wormwood ( <i>Artemisia scoparia</i> ) against coffee weed ( <i>Cassia occidentalis</i> ) and slender amaranth ( <i>Amaranthus viridis</i> ).	S. Mittal*, H. P. Singh, R. K. Kohli, D. R. Batish; Panjab Univ., Chandigarh, India
1:30	Fungal toxins and other natural metabolites for management of parasitic weeds	M. Vurro*, A. Boari; National Research Council, Bari, Italy

1:45	Pathogenic Mechanisms of Vulcubic Acid Produced by <i>Nimbya alternantherae</i>	M. Xiang*, L. Fan, Z. Jiang, Y. Zeng; Zhongkai University of Agriculture and Engineering, Guangzhou, China, South China Agricultural University, Guangzhou, China
2:00	Discussion	
2:15	Surfactants affect the efficacy of <i>Alternaria cassiae</i> controlling sicklepod seedlings	R. A. Pitelli*, C. F. Franco, F. M. Claudia; University of State of Sao Paulo, Jaboticabal, Brazil
2:30	Effects of <i>Phomopsis amaranthicola</i> on the Above- and Below-ground Interference of Pigweeds with Bell Pepper.	J. Morales-Payan*, R. Charudattan, W. M. Stall; University of Puerto Rico-Mayaguez Campus, Mayaguez, PR, University of Florida, Gainesville, FL
2:45	Ecology, Biology and Control of Alien-Invasive Forestry Weeds by Integrating with Bioherbicides	R. R. PRASAD*; Pacific Forestry Centre, Canadian Forestry Service, Victoria, BC V8Z 1M5, Victoria, BC, Canada
3:00	Native Phytopathogens as Biocontrol Agents: Problems and Potential in the Management of Invasive Exotic Species	K. Jayachandran*, K. G. Shetty; Florida International University, Miami, FL
3:15	Media Studies on <i>Myrothecium roridum</i> Tode (IMI 394934); a Potential Biocontrol Agent for Water Hyacinth.	Okunowa Wahab Oluwanisola, G.O. Gbenle, A. A. Osuntoki, and A. A. Adekunle, University of Lagos, Nigeria
3:30	Bioherbicide development against water hyacinth: the story so far and the hopes for the future	R. W. Barreto*, D. J. Soares, E. M. Inokuti; Universidade Federal de Viçosa, Viçosa, MG, Brazil
3:45	Discussion and Break	
4:00	Status of <i>Phoma macrostoma</i> , a bioherbicide for broadleaved weed control in turfgrass.	K. L. Bailey*, S. Falk, S. Lombardo; Agriculture & Agri-Food Canada, Saskatoon, SK, Canada, The Scotts Company, Marysville, OH
4:15	Innovations for Scaling-up of <i>Striga</i> Mycoherbicide Applications in Africa	A. Elzein*, J. Kroschel, P. Marley, B. Fen, G. Cadisch; University of Hohenheim, Stuttgart, Germany
4:30	Discussion	
5:00	Business Meeting	

## International Workshop on Bioherbicide in China


The International Workshop on Bioherbicide was held at Nanjing Agricultural University, Nanjing, China during September 7-8, 2008. The workshop was sponsored by Weed Research Laboratory, Nanjing Agricultural University, and was the first of its kind in China. More than 80 participants from Canada, South Korea, Switzerland, Singapore, and China attended the workshop.

During the workshop, scientists and graduate students presented their research in the following areas: progress and development in bioherbicide research, screening for bioherbicide candidates, mass-production processes and technologies, novel techniques and methodologies, and action targets/mechanisms of bioherbicides. The workshop provided participants an excellent opportunity to share information and ideas. A total of 28 papers/abstracts were received and 23 oral presentations were given. It was extremely encouraging to see a large number of graduate students at the workshop.

Several internationally known scientists were invited to the workshop as keynote speakers, including Dr. **Alan Watson**, McGill University, Canada – “Registration of SARRITOR, a Granular Bioherbicide”; Dr. **Gary Peng**, Agriculture and Agri-Food Canada, Saskatoon Research Center – “Aspects of Application Technology Important to Delivery of Foliar Bioherbicides”; Dr. **Jae Su Kim**, AgroLife Research Institute, Dongbu HiTek, Co. Ltd., Republic of Korea – “An Industry Perspective on Registration and Commercialization of Bioherbicides in Korea”, Dr. **Reto J. Strasser**, University of Geneva – “Detection of Functions of Bioherbicides on the Photosynthetic Activities” and **Jin Suk Hong**, Syngenta Company - “Global Trend of Market and Research in Herbicides and Regulatory Aspects of Biopesticides: Syngenta’s perspective”.

In 2006, the Chinese Ministry of Science and Technology approved, for the first time, to establish an independent biological herbicide research program under the national 863 Hi-Tech Projects - "Bioherbicide Research and Creation". More than 30 scientists from more than 11 institutions joined the program, with more than seven major projects at different stages of research and development. As the program leader, Dr. **Sheng Qiang**, Nanjing Agriculture University, summarized research progress on bioherbicides and emphasized R&D goals on the following priority weed targets: barnyard grass (*Echinochloa crusgalli*), large crabgrass (*Digitaria sanguinalis*), Crofton weed (*Eupatorium adenophorum*), water hyacinth (*Eichhornia crassipes*) and alligator weed (*Alternanthera philoxeroides*).

(Sheng Qiang, Weed Research Laboratory, Nanjing Agricultural University and Gary Peng, Agriculture and Agri-Food Canada, Saskatoon Research Center)



## **First Asian PGPR Congress on Sustainable Agriculture**

June 21-24, 2009

Hyderabad, India

Contact: **Dr. M. S. Reddy**

Chairman, First Asian PGPR Congress

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## **PEOPLE & PLACES**

After completing his tenure as the department chair, in January 2009 **Raghavan Charudattan** will return to his research program. His group is currently engaged in two projects: **Charudattan, Yasser Shabana, Waldemar Klassen** (University of Florida), **Erin Roskopf** (USDA-ARS), and **Jose Pablo Morales-Payan** (University of Puerto Rico-Mayaguez) are examining the prospects for using microbial infested hay as a means for weed suppression in organic and conventional horticultural crops. **Charudattan**, along with **Ernest Hiebert, Mark Elliott, and Gabriella Maia** have successfully field-tested *SolviNix* LC, a plant virus-based bioherbicide, in large-scale trials under an EPA Experimental Use Permit. *BioProdex, Inc.*, the company headed by Charu is seeking a Section 3 registration (i.e., full registration) for *SolviNix* LC.

(Dr. Raghavan Charudattan - rcharu@ufl.edu)

A research agreement has been signed between Cabi European Switzerland (CABI-CH), The Biotechnology and Biological Control Agency in Rome (BBCA) in Italy and Ferdowsi University of Mashhad - Iran, to have collaboration for working on biological control of various weeds including *Acroptilon repens*, *Elaeagnus angustifolia*, *Lepidium latifolium*, *Chondrilla juncea* and *Salsola tragus*.

Dr. **Massimo Cristofaro**, a biocontrol scientist from BBCA, travelled to Mashhad three times in one year. During his stay in addition to establish a field experiment, he travelled around the all province of Khorasan looking for biocontrol agents together with people in my group. We realized that Mashhad area is very rich and divers for weed natural enemies and biocontrol agents. In the preliminary screening studies we found many potential biocontrol agents (insect) for different mentioned weeds. The first year of this biocontrol studies I believe was completed with wonderful results. The research collaborations is going to continue in the next years. Biocontrol research group in Ferdowsi University of Mashhad, is very happy to collaborate with other scientists and research projects around the worlds. In addition I personally would be very happy to host any suggested international biocontrol conference in Mashhad to show the potential of the area for biological control agents.

Weed biological control is an important objective in Ferdowsi University now. All PhD students in weed science have to pass a course called "weed biological control" before starting their thesis.

A PhD student, Mr. **G.A. Asad**, is working with me for his thesis on biological control of *Cirsium arvensis* by *Cassida rubiginosa*. He is in the final year of his studies and found promising effect of *Cassida*. In his safty tests *C. rubiginosa* did not caused any damage on the tested crops except about 20% damage on *Carthamus tinctorius*. It seems this insect has very good potential for further researches.

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Dr **Raj Prasad** (now a retired scientist, Victoria, BC, Canada) recently attended and presented a paper "Ecology, Biology and Control of Exotic-Invasive Weeds in Forestry - management of gorse (*Ulex europaeus* L) on federal lands in Victoria, BC" at the Weeds Across Borders Conference, held (May 27 to 30, 2008) at the scenic Banff, Alberta. About 175 people mostly from USA, Canada and Mexico and few others from other countries, participated and discussed the various aspects of control measures of weeds/unwanted plants crossing borders, hitchhiking on trucks, cars or other vehicles or by other modes and causing problems to the native vegetation. Weeds Across Border (WAB) is an international conference held every two years between these three countries on the North American continent, covering the interests of professionals and organizations involved in weed management and regulation. Because weeds do not obey human imposed laws or boundaries, the three countries try to develop partnerships, share information, coordinate programs and projects that cross these boundaries. The goal of the WAB Conference is to provide a forum for educating, sharing, and disseminating knowledge about weed management, regulatory issues, and concerns about weed dispersal across and between all jurisdictional boundaries in Mexico, Canada and United States. The conference held 8 Sessions (Status Reports; Cooperation and Partnerships; Applied Research Reports; New Issues; Early Detection and Rapid Response; Best Management Tools; Economic and Ecological Concerns; Public Policy and Awareness) and conducted a Field Tour; as shown here in the photographs. The Proceedings, edited by Stephen Darbyshire and Raj Prasad will be published soon; each paper has an abstract in English and Spanish and if you are interested in this, please contact me at [spprasad@hotmail.com](mailto:spprasad@hotmail.com).

(Dr. Raj Prasad - [spprasad@hotmail.com](mailto:spprasad@hotmail.com))





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## Request of collaboration

Fungal pathogens of plants are able to produce a large number of secondary metabolites with different chemical structure and biological properties, e.g.: phytotoxic, antibiotic, insecticidal activities. In particular weed pathogens can be an extraordinary and still mostly unexplored source of novel bioactive metabolites.

Thanks to a historical and friendly collaboration, the group of plant pathologists/mycologists at the CNR, Bari, Italy (led by **Maurizio Vurro**) and the group of chemists of the University of Naples (led by Prof. **Antonio Evidente**), in the last years have purified and chemically and biologically characterized many novel bioactive metabolites from solid and liquid cultures of fungal weed pathogens.

Now, we are looking for new pathogens of weeds to be studied for the production of novel natural compounds with herbicidal properties.

If you are studying potential mycoherbicides, and if you are interested in evaluate their eventual production of active metabolites, you could start a collaboration with us, by supplying us with those strains.

For further information please e-mail to Maurizio Vurro at [maurizio.vurro@ispa.cnr.it](mailto:maurizio.vurro@ispa.cnr.it)

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## **ABSTRACTS**

**Gary Peng, Thomas M. Wolf (Canada).** 2008. Spray Retention and its Potential Impact on Bioherbicide Efficacy. *Pest Technology* , Vol. 1&2 70-80

### **ABSTRACT**

**Invited Mini-Review:** Hydraulic spray systems are widely used for application of agrochemicals due to ease of operation and consistent performance, despite relative inefficiency in delivering pest-control products to intended targets. Frequently, spray parameters are optimized for maximum product deposition and retention, although success of this strategy is case dependant. There is limited information on application improvements for microbial pesticides (biopesticides). Biopesticides, especially those that employ a fungus as the active ingredient, are generally applied with a liquid carrier but their deposition or retention has rarely been characterized. Depending on the size of microbe and plant morphology or architecture, interactions among spray parameters can be complex in terms of the impact on retention, distribution and performance of the biopesticide agent. Extrapolation of information from chemical pesticide applications may not always be appropriate. This review, based primarily on authors' experience in spray retention involving three bioherbicide-weed systems, is aimed to highlight the impact of spray parameters and additives (adjuvants) on deposition, retention, and efficacy of bioherbicide agents. Information from additional bioherbicide agents is also considered for different sizes of fungal inoculum or characteristics of target plants. Although the focus is on potential bioherbicides, the information may also be useful to application of other microbe-based biopesticide agents. Strategies for maximizing biocontrol efficacy through optimization of spray parameters as well as other application technologies are discussed.

(Gary Peng - [Gary.Peng@agr.gc.ca](mailto:Gary.Peng@agr.gc.ca))

## Phyllostictine A, a potential natural herbicide produced by *Phyllosticta cirsii*: *In vitro* production and toxicity

Maria Chiara Zonno <sup>a,\*</sup>, Maurizio Vurro <sup>a</sup>, Sergio Lucretti <sup>b</sup>, Anna Andolfi <sup>c</sup>,  
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### ARTICLE INFO

#### Article history:

Received 7 May 2008

Received in revised form 31 July 2008

Accepted 5 August 2008

Available online 19 August 2008

#### Keywords:

Phyllostictine A

Flow cytometry

*Cirsium arvense*

*Nicotiana tabacum*

HPLC analytical method

Protoplasts

### ABSTRACT

Phyllostictine A is a powerful toxin produced by *Phyllosticta cirsii*, a potential mycoherbicide of *Cirsium arvense*. To support its potential use as a natural herbicide, toxin production has been studied using different media and cultural conditions. The toxin content in the crude extracts has been determined by using a HPLC method set up for this purpose. Furthermore, its phytotoxicity has been evaluated on tobacco protoplasts by flow cytometric analysis, and on *C. arvense* protoplasts, by fluorescence microscopy. The best cultural conditions found allowed to produce more than 28 mg ml<sup>-1</sup> of toxin in culture filtrate. The pure metabolite proved to have rapid dose-dependant toxic effects on host and non-host plant protoplasts.

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# *Phomopsis cirsii*: a potential biocontrol agent of *Cirsium arvense*

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\*Department of Agricultural Sciences, Faculty of Life Sciences, University of Copenhagen, Taastrup, Denmark, and †Plant Health and Plant Protection Division, Bioforsk, Ås, Norway

Received 5 March 2008

Revised version accepted 22 July 2008

## Summary

*Cirsium arvense* is a noxious perennial weed which has become an increasing problem in north European countries. Biological control by natural antagonists is of increasing interest to supplement mechanical and chemical control. Several attempts to use fungi such as *Alternaria cirsinoxia*, *Puccinia punctiformis* and *Sclerotinia sclerotiorum* as biocontrol agents have been initiated. No mycoherbicides against *C. arvense* have been developed and the search for aggressive pathogens continues. In a Danish survey, several fungi were isolated from *C. arvense*. Four are new records in Denmark: the white rust fungus *Pustula andropogonis*, the leaf spot fungi

*Ramularia cirsii*, *Septoria cirsii* and *Phomopsis cirsii*. Our study shows that *P. cirsii* is pathogenic to *C. arvense*, causing stem canker and die back, and that it may have potential as a mycoherbicide against its host. Growth characteristics of *P. cirsii* on artificial media are described, as well as a scale measuring severity of visible symptoms of *P. cirsii* on *C. arvense*. The taxonomic characteristics of *Phomopsis* spp. are compared and discussed in relation to other records of *Phomopsis* spp. found on *Cirsium* spp. and *C. arvense*.

**Keywords:** California thistle, Canada thistle, creeping thistle, biological control, fungi, mycoherbicide, non-chemical weed control, perennial weed.

LETH V, NETLAND J & ANDREASEN C (2008). *Phomopsis cirsii*: a potential biocontrol agent of *Cirsium arvense*. *Weed Research* 48, 533–541.

## RECENT PUBLICATIONS

*Pest Management Science* is publishing a special issue on Parasitic Weeds in early 2009. This issue consists of peer-reviewed research papers and reviews arising from the September 2008 OECD and EWRS-sponsored conference '**Managing parasitic weeds: integrating science and practice**'. Parasitic plants severely constrain agriculture, affecting major crops and leading to serious food shortages for the world's poorest peoples, yet the efficacy of available means to control has been minimal. This issue aims to address this pressing problem, with cutting-edge papers on all aspects of parasitic weed biology and control.

Papers will cover the current global status of infestation, molecular biology of plant-weed interactions and control methods, breeding and engineering resistance into crops, and the latest agronomic, chemical and biological control methods and their integration. The issue is edited by **Jonathan Gressel** at the Weizmann Institute of Science in Israel, and **Maurizio Vurro** at the National Research Council in Italy. For more information on the issue, please email [tom.hopkinson@wiley.com](mailto:tom.hopkinson@wiley.com).

The Table of Contents is available from [maurizio.vurro@ispa.cnr.it](mailto:maurizio.vurro@ispa.cnr.it)

Single print copies of this exciting issue are available for sale to readers for 85 US\$ + p&p – a 50% discount on the standard issue price. There will be a limited print run, so please order by Monday, 16 February to avoid disappointment. To order, email [cs-journals@wiley.co.uk](mailto:cs-journals@wiley.co.uk) or phone +44 1243 843335.

(Maurizio Vurro - [maurizio.vurro@ispa.cnr.it](mailto:maurizio.vurro@ispa.cnr.it))

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The following is a list of 2008 publications from Charudattan's group:

1. Ferrell, J., Charudattan, R., Elliott, M., and Hiebert, E. 2008. Effects of selected herbicides on the efficacy of tobacco mild green mosaic virus to control tropical soda apple (*Solanum viarum*). *Weed Sci.* 56:128-132.
  2. Tessmann, D.J., Charudattan, R., and Preston, J.F. 2008. Variability in aggressiveness, cultural characteristics, cercosporin production and fatty acid profile of *Cercospora piaropi*, a biocontrol agent of waterhyacinth. *Plant Pathology*, 57:957-966.
  3. Shabana, Y., Roskopf, E., Morales-Payan J.P., Abou Tabl, A.H., Klassen, W., and Charudattan, R. 2008. Use of hay, green, and plastic mulches to suppress nutsedge in horticultural crops. Caribbean Food Crops Society Meeting, Miami, FL, July 13-17, 2008 (Abstract).
  4. Morales-Payan, J.P., Marquez-Mendez, P.E., Charudattan, R., Roskopf, E. Shabana, Y., Klassen, W. 2008. Organic and plastic mulches for suppression of purple nutsedge in watermelon. *Amer. Soc. Hort. Sci. Annu. Conf.*, July 21-24, 2008, Orlando, FL.
  5. Shabana, Y., Charudattan, R., Abou Tabl, A.H., Klassen, W., Roskopf, E., and Morales-Payan J.P. 2008. Use of organic mulch as an alternative to the plastic mulch-methyl bromide system for suppressing purple and yellow nutsedges in tomato production. Abstract, 5<sup>th</sup> Int. Weed Sci. Congress, Vancouver, BC, Canada, June 23-27, 2008.
  6. Charudattan, R., Hiebert, E., Elliott, M.S., DeValerio, J.T., and Maia, G.S. 2008. *SolviNix*, A bioherbicide for tropical soda apple (*Solanum viarum*). Abstract, 5<sup>th</sup> Int. Weed Sci. Congress, Vancouver, BC, Canada, June 23-27, 2008.
  7. Cuda, J.P., Charudattan, R., Grodowitz, M.J., Newman, R.M., Shearer, J.F., Tamayo, M.L., and Villegas, B. 2008. Recent advances in biological control of submerged aquatic weeds. *J. Aquat. Plant Manage.* 46:15-32.
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## **EDITOR'S CORNER**

Dear IBG members,

This time the material received was not as abundant as hoped, but anyway I have decided to prepare the newsletter, both for keeping this tradition alive, and for pushing you to send more news for the future issues of the bulletin.

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

**I wish you Happy New Year**

Maurizio