



INTERNATIONAL BIOHERBICIDE GROUP

IBG NEWS

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THE CHAIRMAN'S COMMENTS

I am pleased and feel quite honored to serve as the Chair of the International Bioherbicide Group. My first and pleasant duty is to thank the outgoing Chair, Dr. Alan Watson, for his services to IBG. I must also thank, on behalf of the group, Dr. Maurizio Vurro, for his enthusiastic and dedicated work in keeping the newsletter lively and informative. I know it takes considerable effort to bring out the newsletters in a timely manner. We must doubly thank him for agreeing to continue as the editor of the newsletter.

I extend our special thanks to Dr. Robert Barreto for organizing and convening the recent V International Bioherbicide Workshop. The meeting was well organized and well attended and highlighted several important recent developments, projects, and issues facing our group.

I look forward to my interactions with you through IBG.

(R. Charudattan e-mail: rc@gnv.ifas.ufl.edu)

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MEETINGS



International Weed Science Congress, Foz Do Iguassu, Brazil, 6-11 June 2000

The third international Weed Science Congress held in early June in Brazil, attracted scientists from around the globe interested in a range of issues relating to weed science. Invited lectures and contributed papers as posters were presented on topics such as weed biology and ecology, herbicide resistance, modelling, transgenic crops, education and extension. The field of biological control of weeds was also represented in four sessions led by Louise Morin (CSIRO, Australia), John Hoffmann (University of Cape Town, South Africa), Bruce Auld (NSW Agriculture, Australia) and David Sands (University of Montana, USA). Current global issues in classical biological control of weeds with pathogens and insects were presented by various speakers with emphasis on tech-transfer, integrated management, ecological and economic benefits of agents, and assessment of negative ecological impact. Two sessions focussed on the inundative approach, or bioherbicide tactic, with talks on constraints and challenges in this field of research, latest developments in bioherbicide projects such as striga, phytotoxins, risk analysis of using wide host-range pathogens as bioherbicides, novel approach to enhance efficacy and delivery of bioherbicides, and new development in using bacteria as bioherbicides. Well-presented posters were also discussed during sessions. To wrap up the topic of biocontrol a workshop-type session on synergy and integration of biocontrol agents with other methods was led by P.C. Quimby (USDA-ARS, France). Papers of invited lectures will be published this year in a CD-Rom Proceedings of the Congress.

(Louise Morin – email: louise.morin@ento.csiro.au)

The V International Bioherbicide Workshop

The V International Bioherbicide Workshop was recently held at Foz do Iguassu, Brazil (5-6 June). Thirty people attended the meeting. The program included fourteen oral presentations and two posters. With the exception of one oral contribution, all of the presentations were given. At the end of the presentations (Tuesday afternoon) an additional unscheduled presentation was given by A. L. Pilgeram and D. C. Sands and a very exciting open discussion about several topics related to bioherbicides ensued. Following the V IBW and at the same venue there was the Third International Weed Science Congress (June 6 to 11) which had a considerable proportion of weed biocontrol and related matters in its program. As a whole there was a general consensus among attendants that the two meetings were very successful and a valuable opportunity for learning from the experience of other colleagues, sharing ideas, planning new projects and last, but not least, having a good time.

(Robert Barreto – email: rbarreto@mail.ufv.br)

V International Bioherbicide Workshop Programme

(abstracts are available as word files:
in you are interested, please send an e-mail to the newsletter editor)

Mon 5/6/2000

- 10:00 Registration
12:00 Lunch
13:40 Welcome and announcements: **R.W. Barreto**
13:50 Opening speech: **A. Watson**

Session 1: Project reports and regional updates

Chairperson: R. Charudattan

- 14:00 **B. A. Auld, H. M. Trung, N. V. Tuat, D. V. Chin and S. D. Hetherington**
Progress in development of a bioherbicide for *Echinochloa crus-galli* in Vietnam
- 14:25 **S.M. Boyetchko, G. Peng, K. Sawchyn, K. Byer, T. Nelson, L. Gibson, and S. Leung**
Evaluation of pre-emergent and post-emergent bioherbicides for control of green foxtail
- 14:50 **R. F. Masangkay, T. C. Paulitz, and A. K. Watson**
The efficacy of *Alternaria alternata* f.sp. *sphenocleae*, a potential bioherbicide for *Sphenoclea zeylanica*
- 15:15 **R. Prasad**
Influence of a bioherbicide agent (*Chondrostereum porpureum*) on conifer release of lodgepole pine (*Pinus contorta*) in British Columbia, Canada
- 15:40 **R. Charudattan, G.S. Wyss, S. Chandramohan, E.N. Roskopf, J.B. Kadir, J.T. DeValerio, C. Yandoc, A.C. Vincent, D.J. Tessmann, M.S. Pettersen, and M.S. Elliott**
Bioherbicides for *Amaranthus* spp., *Cyperus rotundus*, grass weeds, *Solanum viarum*, and *Eichhornia crassipes*: a status report
- 16:05 Coffee and poster viewing
- 16:50 **G. Peng, K. N. Byer and K. L. Bailey**
Potential for control of *Matricaria perforata* using fungal pathogens plus herbicides
- 17:15 **R.W. Barreto, A.W.V. Pomella, R. Charudattan and M. P. do Nascimento**
Studies on *Nimbya alternantherae*, a potential biocontrol agent for *Alternanthera Philoxeroides* (alligatorweed)
- 20:30 Cocktail

Tue 6/6/2000

Session 1: Project reports and regional updates (continuation)

Chairperson: R. Charudattan

- 8:45 **C. L. Lennox**
The use of fungi for the biological control of invasive *Prosopis* species in South Africa
- 9:10 **H. C. Evans and R. H. Reeder**
Assessment of fungal pathogens as mycoherbicides against water hyacinth (*Eichhornia crassipes*) in Africa: a new encounter or a classical agent?
- 9:35 **Alan Watson and A. Eusebio**
The biological weed control in rice-based cropping systems, a report on the workshop held at the International Rice Research Institute in May 2000
- 9:50 Coffee

Session 2: Formulation, technology and market

Chairperson: B. Auld

- 10:35 **J. Gressel, D. Michaeli, A. Warshawsky, and V. Kampel**
Enhancing infectivity of a *Colletotrichum* mycoherbicide by chemically inhibiting callose biosynthesis
- 11:00 **M. Vurro, M. C. Zonno, A. Evidente, A. Andolfi and P. Montemurro**
Ascochyta caulina phytotoxins: a story with a happy ending?
- 11:25 **J. Gressel, Z. Amsellem and B. Cohen**
Failsafes for transgenic mycoherbicides
- 11:50 **J. Fröhlich**
A new partnership for the commercialisation of *Fusarium tumidum* as a bioherbicide against gorse and broom in New Zealand.
- 12:15 Lunch
- 14:00 Discussion (lead by A. Watson) and general meeting of the International Bioherbicide Group

Posters:

A. Elzein, J. Kroschel, D. Mueller-Stoever and J. Sauerborn

Efficacy of chlamydospore-rich biomass of *Fusarium oxysporum* encapsulated into a granular formulation 'Pesta' for *Striga hermonthica* control

O. A. Chacon and N. G. Colmenares

Inhibitory activity of organic extracts of *Commelina diffusa* from coffee plantations of Tachira state, Venezuela

S-268 meeting

The annual meeting of the S-268 "Evaluation and Development of Plant Pathogens for Biological Control of Weeds" was held in Saskatoon, May 2-5, 2000. The meeting was co-chaired by Sue Boyetchko, Karen Bailey and Gary Peng. Participants from the U.S. included Tom Bewick (Univ. of Massachusetts), R. Charudattan (Univ. of Florida), Tony Caesar (USDA-ARS, Montana), Bill Connick (USDA-ARS, New Orleans), Don Daigle (USDA-ARS, New Orleans), Bob Kremer (USDA-ARS, Missouri), David TeBeest (Univ. of Arkansas), and Tim Widmer (USDA-ARS, EBCL, France). Two high school students, Jeremy Sibley and Tyler Dagenais, presented their science fair project on CGM for control of round-leaved mallow and small-flowered mallow at the S-268 meeting. They had won the regional science fair project and were travelling to the national science fair later in May. Prior to the S-268 meeting, Dr. David TeBeest visited with the staff in the Weed Biocontrol group at Saskatoon and presented a seminar on bioherbicides. (Susan Boyetchko, Gary Peng, Karen Bailey)

PEOPLE & PLACES



On March 1, 2000, Yasser Shabana has started an "Alexander von Humboldt" Research Fellowship to conduct research entitled "Development of a mycoherbicide for a safe, nonpolluting management of the parasitic weed, *Orobanche cumana* in the laboratory of Professor J. Sauerborn at the University of Hohenheim, Stuttgart, Germany.

(Yasser Shabana e-mail: shabana@Uni-Hohenheim.DE)

Dr. Amit Shukla has joined the Weed Biocontrol in April, 2000 as a term-scientist. Amit has expertise in plant physiology and biochemistry working on mode of action of chemical herbicides. He worked previously at the University of Saskatchewan on a 3-year project with Sue Boyetchko on mode of action of bacterial agents for control of wild oat and green foxtail and will be continuing this research at the Saskatoon Research Centre looking at various physiological and biochemical interactions between specific bacterial agents and/or their secondary metabolites and these grass weeds.

Dr. Sarah Green is currently working with scientists in the weed biocontrol group on formulation research for development of foliar fungal bioherbicides on green foxtail. The project will focus on the influence of formulations on the biology of the fungal agent and host (weed) morphology with the view to improve agent delivery, retention, distribution, and establishment of infection on the target weed. (Susan Boyetchko – email: boyetchkos@EM.AGR.CA, Gary Peng, Karen Bailey)

BIOHERBICIDE RESEARCH - STATUS REPORTS



This is by no means a complete account of all research projects on bioherbicides.

ANNUAL REPORT OF COOPERATIVE REGIONAL RESEARCH PROJECTS

S-268

Evaluation and Development of Plant Pathogens for Biological Control of Weeds

By clicking on the title of the Annual Report you will open the full document, kindly sent by Prof. Charudattan.

For those not able to manage this kind of hypertext, they can simply open the attached document.

University of Florida, Gainesville

A review of the status of the bioherbicide program at the University of Florida, Gainesville, was presented at the V International Bioherbicide Workshop. Dr. Gabriela Wyss is completing her two-year postdoctoral work in Gainesville and returning to Switzerland to take a position with the Research Institute of Organic Agriculture (FiBL) in Frick. Her research on *Dactylaria higginsii* and *Phomopsis amaranthicola* has helped to move these two agents closer to commercial development. Mr. Longa Chibesakunda, an M.S. student at the University of Applied Sciences, Mannheim, completed a research internship in Gainesville and returned to Germany to complete his program. The following personnel are continuing on their respective projects: Dr. S. Chandramohan (hydrilla pathogens), Camilla Yandoc (cogongrass bioherbicide), Angela Vincent (waterhyacinth bioherbicide), Matt Pettersen and Mark Elliott (characterization of a hypersensitive reaction in tropical soda apple), and Jim DeValerio (*Ralstonia solanacearum* on tropical soda apple). In February, 2000, R. Charudattan was elected a Fellow of the Weed Science Society of America.

(R. Charudattan)

University of Hohenheim, Stuttgart, Germany

Development of a mycoherbicide for a safe, nonpolluting management of the parasitic weed, *Orobanche cumana*

A substantial damage is imposed on food and fodder plants by mass incident of the parasitic weed plants, *Orobanche* spp. The broomrape, *Orobanche* spp. threatens seriously the crop production on 16

million ha in the Mediterranean region and West Asia (Sauerborn 1991). *Orobanche cumana* probably causes the most widespread damage of all *Orobanche* species, as it affects about 7 million hectares of sunflower in eastern Europe and Near East (Linke et al 1989). Although a considerable number of herbicides have been tested as means for controlling broomrape, none of them had an effective control measure. In addition, high cost and toxicity of chemical herbicides also limit their application. As an alternative or adjunct to conventional weed control technology of chemical and mechanical controls, the bioherbicides offer excellent means of ecologically sound weed management. There is now a unique opportunity to develop a fungal pathogen of *Orobanche cumana* as bioherbicide in sunflower fields. A strain of *Fusarium oxysporum* f.sp. *orthoceras* has been shown to be an effective bioherbicide candidate for *Orobanche cumana*. Results from laboratory, greenhouse, and preliminary field trials have confirmed the high feasibility of using this fungus to control broomrape (Bedi and Donchev 1991). In an attempt to develop this bioherbicide, various formulations of the fungus and its impact on broomrape growth will be determined.

The overall objective of this research project is to develop a protocol for a practical usage of *F. oxysporum* f.sp. *orthoceras* as a mycoherbicide against broomrapes in greenhouse trials. The specific objectives are to: 1) determine the efficacy of five different formulations of the biocontrol agent (structurally and technically different) under greenhouse conditions in order to obtain a good, reliable, and cost-effective formula; 2) determine the inoculum threshold for the most effective bioherbicidal formulation; 3) decide the shelf-life for each bioherbicidal formulation; and 4) determine the best timing of application for maximum weed control.

The direct benefit from this research will be the development of a safe, nonpolluting, and cost-effective biocontrol for broomrape. This bioherbicide might be useful in many parts of the world where broomrape is a problem.

(Yasser Shabana: shabana@Uni-Hohenheim.DE)

Agriculture and Agri-Food Canada, Saskatoon Research Centre, Canada

New Projects

Gary Peng and Karen Bailey received a 2-year grant from Saskatchewan Agriculture Development Fund to evaluate naturally-occurring microorganisms for biological control of scentless chamomile (*Tripleurospermum perforata*). This weed has been observed in several major cropping regions, especially in the province of Saskatchewan and has been spreading rapidly in areas with higher rainfall during growing season. Extensive field surveys will be conducted across major infestation areas to identify diseases and pathogens on the weed. A series of bioassays will be developed to evaluate the efficacy of identified organisms and their feasibility for field application.

Sue Boyetchko and Gary Peng were awarded a 2-year grant by Manitoba Agri-Food Research & Development Initiative to investigate bacterial and fungal agents for control of herbicide-resistant wild oat (*Avena fatua* L.) and green foxtail (*Setaria viridis* [L.] Beauv.). Resistance to acetyl-CoA carboxylase (ACCase) inhibitors (Group 1) and dinitroaniline (group 3) in green foxtail populations, and to ACCase, acetolactate synthase (ALS) inhibitors (Group 2), and triallate and difenzoquat (Group 8) in wild oat has been observed at high incidence in the Canadian prairies. Exploration of biological control includes the evaluation of deleterious soil bacteria and foliar fungal pathogens as pre-emergent and post-emergent bioherbicides, respectively.

(Susan Boyetchko, Gary Peng, Karen Bailey)

CLASSICAL BIOLOGICAL CONTROL OF WEEDS WITH PATHOGENS



Release of a South African rust for the control of bridal creeper in Australia

CRC for Weed Management Systems, CSIRO Entomology, Canberra, Australia

Bridal creeper, *Asparagus asparagoides*, is an exotic weed that poses a major threat to biodiversity and conservation in Australia's temperate natural ecosystems. Control by intensive methods such as the use of herbicides or mechanical methods has proved uneconomical or inappropriate for most areas. Bridal creeper is a climber, whose seeds are dispersed by birds, and which establishes itself in relatively undisturbed vegetation producing dense mats of rhizomes and tubers.

In 1991, bridal creeper was approved as a target weed for biological control in Australia. Surveys for biological control agents in South Africa, the centre of origin of *A. asparagoides*, were undertaken soon after and four potential biological control agents (three insect species and a rust fungus) were selected for detailed host specificity testing. The leafhopper, *Zygina* sp. was the first agent to be released in Australia in June 1999. Following extensive host-specificity testing, permission to release the second biocontrol agent, the rust fungus *Puccinia myrsiphylli*, was granted in mid-June 2000.

Puccinia myrsiphylli is an autoecious, macrocyclic rust that infects cladodes (leaves) and stems of bridal creeper. Based on field observations in South Africa, *P. myrsiphylli* is likely to have a major impact on bridal creeper in Australia. Through continuous absorption or diversion of assimilates from the host plant and reduction of photosynthetic surface, the rust is detrimental to plant development and reproduction. Several isolates of *P. myrsiphylli* were collected in South Africa and imported into the CSIRO High Security Quarantine Facility in Canberra in 1998. The isolates were purified and the pathogenicity of the three most aggressive was compared on four accessions of bridal creeper from different regions of Australia. All accessions of bridal creeper were susceptible to the rust isolates. The most aggressive isolate was selected for host-specificity testing and is the candidate that is being release into Australia.

Puccinia myrsiphylli is highly host-specific towards bridal creeper. In South Africa, it has never been reported on cultivated asparagus, a closely related species to bridal creeper, or any of the other *Asparagus* species that are found in Australia. Experimental host-specificity testing, which involved 42 plant species, including 13 cultivars of cultivated asparagus, has confirmed the extremely narrow host-range of *P. myrsiphylli*.

Field trials are being set up to monitor the spread and epidemic development of the bridal creeper rust over the next two years. Permanent transects and quadrats in heavily infested areas of bridal creeper will be maintained to assess long-term impact of the rust on populations of bridal creeper.

(Louise Morin)

(the Internet version of the newsletter will contain some images kindly supplied by Louise Morin)

RECENT PUBLICATIONS



Preliminary studies on *Ramularia crupinae* sp. nov. as a potential biological control agent for common crupina (*Crupina vulgaris*) in the USA

By S. HASAN, R. SOBHIAN and L. KNUTSON

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Published in December 1999: *Ann.Appl. Biol.* (1999), **135**: 489-494

SUMMARY

Common crupina, *Crupina vulgaris* (Asteraceae), is an alien weed of pastures and disturbed noncrop lands in the western USA. Research is underway in Europe to search for the natural enemies to control the weed. Among various natural enemies attacking *C. vulgaris*, a new fungal species, *Ramularia crupinae*, has been found to cause serious damage to the weed. The fungus has been grown on various media and a modified V8 juice agar has proved to be suitable for both growth and sporulation. Greenhouse and field studies have shown that *R. crupinae* can kill infected leaves, thus reducing the plant growth, and in severe cases can kill the young plants. During preliminary host-range tests using various members of the Asteraceae, including artichoke and safflower, the fungus attacked only *C. vulgaris*.

ANNOUNCEMENTS



Dear Colleagues

BIOTECHNICA CONSULTANTS is the worldwide association of experts in biological and integrated management of plant pests, diseases and weeds in agroecosystems, control of invasive species and restoration of biodiversity. The objectives of the Association are briefly describes as follows:

- to create a professional link among biological control practitioners,
- to provide a clearing house for agrobiological consultants specializing in biological controls and integrated pest management.
- to promote sustainable biological controls,
- to assist members to promote their skills and apply them on the international scene,
- to integrate biological methods into pest management systems,
- to provide means of reducing environmental degradation species loss

The four executive members form the **executive committee** consisting of:

President/Treasurer – Dr. Hari K. Seth (U.K.)

Vice-President - Dr. Ron E. Wall (Canada)

Secretary – Dr. Siraj Hasan (France)

Vice-Secretary – Dr. Olivier Besnard (France)

We also invite regular members who are specialists in biological weed and pest management in agriculture, forestry and related disciplines to join the Association. Thus we are pleased to invite you to become a member by sending your CV to:

Dr. Olivier Besnard, Vice-Secretary Biotechnica Consultants, MYCOS, Parc Scientifique Agropolis II, 34397 MONTPELLIER Cedex 5, France - (Tel.: +33-(0)499-23 21 11; Fax: +33-499-61 18 47; E-mail : <mycos@mlrt.fr>).

The executive committee will examine your CV and, if found suitable, Dr. Besnard will send you the membership conditions. Once you are retained as a member you will be recommended for consultancy assignments in your field of expertise.

We look forward to hearing soon from you

S. Hasan, Secretary, Biotechnica Consultants
e-mail: shasan@cirad.fr

EDITOR'S CORNER



Dear Colleagues,

first of all, I would like to thank Dr Charudattan and all the IBG group for having confirmed me as editor of this newsletter.

Thank also to the people sent me contribution to prepare this issue, quite few this time, to tell the thruth. I hope next issue will be much richer. I believe the newsletter could really be a good opportunity to let the colleagues know any kind of news, new projects, visits, students, thesis, new publications and everything related to weed biocontrol. So, please don't hesitate to send also short notes that could be of interest for the others. Otherway, if you are not more interested to this list and newsletter, please unsubscribe it, just sending an e-mail to me. This will help us to know the real size of this group, that could be of interest for any kind of initiative we will take in the future.

Furthermore, as already announced in a my previous e-mail, the list could be used as a discussion list, that I believe could help in managing contacts. I would be grateful to have a short comment about this, to know if it could be of interest or not.

Finally, even if it appears to be very early, the next IBG workshop could be organized as a satellite of one of the two main events that will be hold in 2003: the International Congress of Plant Pathology (Christchurch, New Zealand, 2-8 February); the International Symposium of Biological Control of Weeds (Camberra, Australia, May-June). It should be of help to know which congress you would like to attend, just to have an idea where it could be better to organize the IBG workshop. So, please send a short mail to me, if possible.

Thank you for your attention.I wish you all the best

Maurizio Vurro