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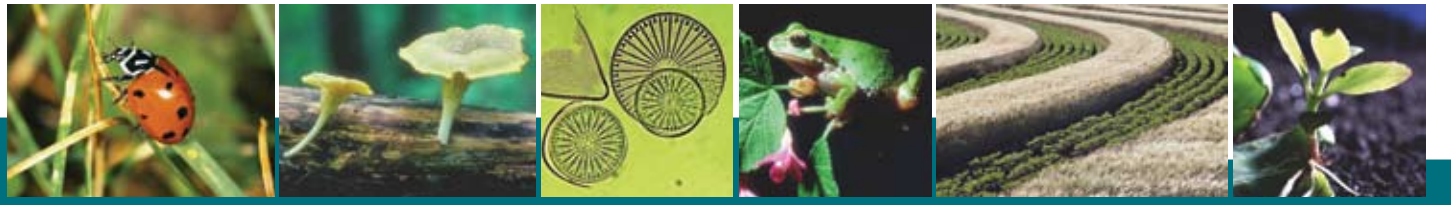

Biocontrol - a quick global tour: Interview with Karel Bolckmans, Koppert Biological Systems

Karel Bolckmans, Koppert Biological Systems

Biocontrol Files: I would like to get a sense of where the biocontrol industry is at in Europe and elsewhere. Can you give me a snapshot?

Karel Bolckmans: At the moment, the main market for our industry is the greenhouse vegetable growers. In both Northern Europe and North America, practically all greenhouse vegetable growers are using biological control. Between 2000 and 2005, the industry was not in good shape. The market for biological control agents was saturated; there were no real breakthrough new products. During that period, we tried very hard to open up the market in Southern Europe and in Latin America, but it didn't happen. Then, in 2005, we launched a new product called *Amblyseius swirskii*, a predatory mite[1], and this really created new possibilities in the Mediterranean. In Southern Europe, yields and therefore growers' incomes are lower but pest pressures are higher. The biocontrol programs of Northern Europe are not suitable for this area. *A. swirskii* is a way to solve this dilemma. We understand how much *A. swirskii* was needed to open these markets. I think we will see a lot happening in the greenhouse vegetable market in the Mediterranean. But swirskii is also helping us to further develop biological control in greenhouse ornamentals. Recently, in Spain, we see that suddenly everybody is moving to biocontrol.

BF: Driven by public pressure?

KB: By Greenpeace! In 2006 Greenpeace published a detailed report of the pesticide residues on fruits and vegetables in German supermarkets. This report created a real shock wave through the European supermarkets. Apart from excessive residue levels of legal pesticides, they also discovered high residues of an illegal pesticide which was imported from China. This food scandal caused a real turnaround in the mentality of the Spanish growers and authorities.

BF: Which other markets do you think will experience growth in the near future?

KB: I think the second area for growth is the development of biocontrol in ornamentals, which is growing step-by-step now. We don't eat ornamentals, so there are different drivers there. Pesticide resistance is a driver and also worker safety. And I think the third step is field crops.

BF: What about the economics for open field crops?

KB: This will indeed require a different approach. Biological control in open field crops is based on both the management of existing populations of beneficials by manipulating the agroecosystem - what we call conservation biocontrol - and in certain cases also by augmentative biocontrol - releasing beneficials. This will require smart production systems for beneficials, and will probably require different beneficials.

BF: What about the future of biocontrol in North America?

KB: North America, especially California, has a long history of biocontrol, much longer even than Europe. Biocontrol in Californian strawberries has been very successful for many years. I expect this model to expand into other berries like raspberries, blackberries, and blueberries, but also into fresh vegetables and fruit trees. There's some biocontrol happening in herbs in Oregon and Washington. But I think biocontrol will mostly happen in states where's there's lots of fresh production – California and the East Coast.

BF: I understand that biocontrol is growing in Korea and Japan. Are the Korean and Japanese markets similar to Northern Europe?

KB: The growers are somewhat smaller; plots are small, with high-value crops. Pesticide-free production is very important, especially in Japan. But there are serious entry regulatory barriers, and barriers with regard to uptake of new technologies. In Korea, there are a few local producers of beneficials.

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[1] *Amblyseius swirskii* is an effective predator of thrips and white flies.

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Managing editor: Vijay Cuddeford

Editorial Committee: Julia Langer, Leslie Cass, Jean-Louis Schwartz, Mark Goettel

Additional writing: Vijay Cuddeford

Scientific review committee: Mark Goettel, Dave Gillespie, Richard Bélanger, Jacques Brodeur

Designed and produced by: Design HQ

French translation by: Alain Cavenne

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Note: In an effort to limit the length and retain the non-academic tone of articles, citations are not provided. However, references are available upon request from the editor at biocontrol-network@umontreal.ca

Appreciation is owed to NSERC for its support to the Biocontrol Network, including for public awareness regarding bio-pesticides.

Interview with Karel Bolckmans (continued)

The government offers incentives to greenhouse growers to use biological control during the first two or three years of use. The market for biological control is growing mostly in peppers, which is an export product for Korea. In vegetables for the domestic market, such as tomatoes, the uptake of biocontrol is much slower. The main hurdle is knowledge about practical biological control programs. In Japan, it's the same except there are no government subsidies. There's also a lot of excellent government research going on in biological control in Japan. But there are also constraints in Japan.

BF: Constraints on introducing new species of beneficials?

KB: Yes. And then China. At the moment, there are about 350,000-400,000 hectares of greenhouses worldwide, outside of China. In China, there are 2.5 million hectares of protected crops. If you look at the evolution of the area of protected crops in China over the last 5 years, it's more than exponential. The Chinese government is step-by-step starting to understand the serious environmental issues it is facing – water erosion, wind erosion, pollution, and pesticides. China has a long research tradition in biocontrol. But again, without the right socio-economic drivers and economic possibilities for the farmers, uptake of biological control will be slow. World-wide, it is mainly export farmers who are motivated to use biological control.

BF: What about Africa?

KB: Koppert is active in Kenya with ornamentals. A lot of Dutch and Israeli groups go to Kenya and Ethiopia, and they're big on biocontrol. The main driver in Africa is pesticide resistance. There is quite a lot of interest now from South Africa and surrounding countries. The Middle East is the same. Every time you speak to people in Arab countries about biocontrol and bumblebees, the first thing they say is that it fits with their culture and religion. There's big interest in Latin America as well, but in these countries the regulatory barriers are very great. Growth there will probably occur through local production. It is very difficult to get into Latin American countries as an exporter.

BF: I understand that you believe that GlobalGAP , the new name for EUREPGAP, might drive wider adoption of biocontrol. Can you explain?

KB: If you want to be GlobalGAP certified, you have to produce according to Good Agricultural Practices. IPM is in the GAP guidelines, but not really strongly. And there are not very strong initiatives to reduce pesticide usage beyond the official Maximum Residue Limits. However, there have been some serious issues with farmers that were GlobalGAP certified but still produced vegetables with residues above the MRL. This is what Greenpeace revealed. The majority of the Spanish vegetables on which Greenpeace found high residue levels were either GlobalGAP-certified or certified under some other quality scheme. This was a shock to European supermarkets. As a result, GlobalGAP convened a working group to develop stronger IPM guidelines. It will probably be 2009 before they are fully functional, but I'm sure this will have a big impact.

BF: What kind of uptake do you expect outside of Europe by chain supermarkets?

KB: Big, I think. There are 76 countries who are members - it's all over the world. These IPM guidelines are not just about greenhouse crops, they're about all fruit and vegetable crops – papayas, mangoes, you name it. We want now to be able to eat, for example, mangoes all year round. So supermarkets are sourcing them from all over the world. In some countries, there is not a lot of knowledge about IPM; they're heavily reliant on pesticides. In GlobalGAP you have two groups and they're equally represented; the supermarkets with 50% of the votes and the farmers with 50% of the votes. The farmers understand the issues with pesticides very well but they're afraid that they won't be able to produce anymore if pesticide use is overly restricted. The supermarkets, on the other hand, do not want any food safety issues, which can cost them a lot of money. This sometimes leads to big discussions between farmers and supermarkets and that's what makes the whole process slow. Unfortunately, in Europe, while we're quite good at reviewing pesticides and banning some of the nasty ones, there's no real policy to promote the development of alternatives. That's the problem. Then growers start to use illegal chemicals. If you take something away, you have to develop alternatives. It would also help a lot if supermarkets would be willing to financially reward those farmers who make a real effort to develop safe and healthy produce instead of continuously squeezing the price while at the same time increasing quality standards. You cannot hold the stick on both sides. ■

[2] GlobalGAP is a global partnership of producers/suppliers, retailers and associates with a vision of harmonizing Good Agricultural Practice world-wide. GlobalGAP is involved in promoting Farm Assurance Schemes, a Good Agricultural Practice framework, and various other initiatives. For more information, see http://www.globalgap.org/cms/front_content.php?idart=3&idcat=9&lang=1

Global biocontrol highlights

South Africa[1]:

Sugar cane farmers are underwriting biocontrol efforts to control the stalk borer *Eldana saccharina* and white grubs in South Africa's 420,000 hectares of sugar cane. For the stalk borer, natural enemies and habitat management are the main options; for white grubs, entomopathogens such as nematodes, fungi and bacteria are being researched. Similar efforts are underway in sugar cane attacked by these pests in other Southern African countries. The South African citrus and deciduous fruit industry have strong biocontrol programs, which are now integrated with sterile insect technology, while tobacco, roiboos tea and banana producers are in the early stages of designing biocontrol programs. More generally in Africa, habitat management strategies such as "push-pull" strategies have successfully controlled maize stalk borers in East and Southern Africa. It is expected that the future will bring an increasing focus on entomopathogens for soil-borne pests in Africa, locally-produced because of quarantine constraints.

Pakistan[2]:

Nineteen of the 83 sugar mills in Pakistan are encouraging their contract growers to use biocontrol; there are currently half a million acres of sugar cane under biocontrol. *Trichogramma* is used to manage stalk borers, while predators such as *Chrysoperla carnea* are used to control cane leaf hopper (*Pyrilla perpusilla*). Farmer field schools and other training efforts, including children's ecological clubs, have raised awareness of biological control. Public concern about food safety is expected to be a growing driver of alternatives to pesticide use, including biological control, in Pakistan's future.

Damage of the African Sugarcane Borer, *Eldana saccharina* in the stalk

Image courtesy of CIMMYT

Rwanda[3]:

In the 1980s, Dr Hans R. Herren, an entomologist then working with IITA (International Institute of Tropical Agriculture) in Benin found that the parasitoid *Epidinocarsis lopezi* successfully controlled the cassava mealy bug (*Phenacoccus manihoti*), a pest that caused crop yield losses of up to 80%. The parasitoid was then released throughout Rwanda, East Africa and elsewhere in Africa in cassava fields where the pest was prevalent, and was successful in reducing populations of this serious pest introduced from South America in the 1970s.

Cotesia flavipes

ICIPE (International Centre of Insect Physiology and Ecology) based in Nairobi, Kenya, has had good results with the fungus *Metarhizium* for control of tsetse fly. ICIPE has also released the parasitoid *Cotesia flavipes* for biocontrol of the corn stem borer (*Busseola fusca*), with encouraging results. Funding for African biological control efforts typically derive from external donors such as the World Bank, the United Nations' Food and Agriculture Organization (FAO), and IITA. Each country in East Africa has a national agricultural institute involved in biocontrol research and implementation. Some universities are also involved, also using donor money. In Rwanda, farmer field schools and the government extension services have been successful mechanisms for transferring biocontrol research results to farmers.

(continued, page 4)

[1] From a conversation with Desmond Conlong, October 30th, 2007. Desmond Conlong has been involved in biocontrol and habitat management of sugarcane pests for 26 years, firstly in South Africa, and then also in other African sugarcane producing countries. He has also branched out into biocontrol of weeds using natural enemies, and insect rearing.

[2] From a conversation with Mohammed Istiaq, ONCAD Insectaries, October 30th, 2007.

[3] From a conversation with Thaddée Musabyimana, Compagnie de Recherche Phytodata, October 30th, 2007.

Global biocontrol highlights (continued)

***Eldana saccharina* larva**

Central and South America[4]:

In Brazil, a very large program has been operating for forty years to control the sugar cane borer (*Diatraea saccharalis*) with the parasitoid *Cotesia flavipes* on about one million hectares of sugar cane. In soybean, the AgNPvirus is being used to control soybean caterpillar (*Anticarsia gemmatalis*) on about 1.6 million hectares. Also in soybean, the parasitoid *Trissolcus basalis* is being released to control the heteropteran *Nezara viridula* on about 20,000 hectares. There are approximately 50 facilities for mass-rearing of natural enemies in

Brazil, almost all of which are rearing *C. flavipes*. Chile has a large biological control project to control the pine shoot moth (*Rhyacionia buoliana*) with the parasitoid *Orgilus obscurator* on about 50,000 hectares of pine plantations. Colombia uses *Trichogramma* to control caterpillars on cotton, soybean, cassava, tomato, and sugar cane, on about 200,000 hectares. Colombia is very active in the production of entomopathogens, mainly the fungi *Beauveria bassiana* and *Metarhizium anisopliae*. These are being sprayed on 550,000 hectares of coffee against the coffee berry borer, *Hypothenemus hampei*.

Fall armyworm, *Spodoptera frugiperda*

Venezuela has a biological pest control program for corn, sugar cane and citrus, on about 55,000 hectares. On corn, they are using the egg parasitoid *Telenomus remus* against the fall armyworm, *Spodoptera frugiperda*. An important program in Mexico is using mainly *Trichogramma* on about 1.5 million hectares to control caterpillar in several crops – cotton, sugar cane, coffee, soybean, and citrus.

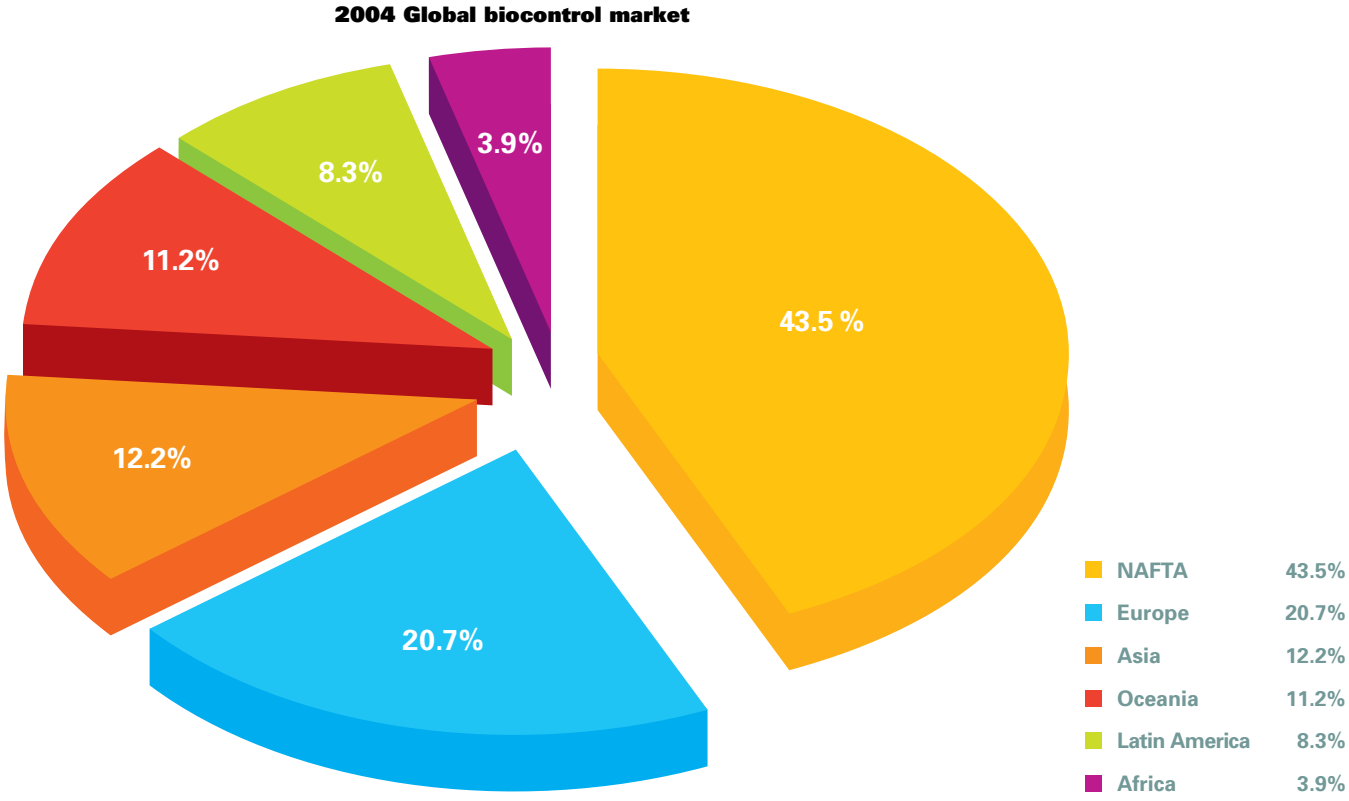
Mexico has about 60 laboratories for rearing of biological control agents. Peru currently has 82 mass-rearing facilities for parasitoids and predators and 27 laboratories for production of entomopathogens, and aims to apply biological control on about 240,000 hectares. There are about 700,000 hectares under biological control in Cuba, which is using parasitoids, predators and entomopathogenic organisms for biocontrol. Some other Latin American countries - Argentina, Bolivia, Uruguay, Honduras and Nicaragua - are very enthusiastic about biological control, and there is some research, but no applied use of biological control at this time.

There are about 33,000 hectares of greenhouses in Latin America. Biological control programs are beginning in greenhouses in Mexico, Colombia, Ecuador, Brazil and Chile. Mexico is the only country in Latin America that permits the entrance of foreign biocontrol companies. The rules for introducing natural enemies in Mexico are very open, and the country imports many kinds of natural enemies. In other countries, rules for introducing natural enemies are very restrictive, and the policy is to use local natural enemies.

Biocontrol has several limiting factors in Latin America: the lack of commercial availability of natural enemies, excessive pesticide use, the wide variety of ornamental crops (for example, in greenhouses there are more than 300 species), the complicated procedures for importation of biocontrol agents, and strict quarantine regulations. Also, while the quality of the greenhouse technology in Colombia and Brazil is good, most greenhouse technology is of poorer quality.

[5] Sources for these statistics are available on request by e-mailing the editor at biocontrol-network@umontreal.ca

[4] From a conversation with Vanda Bueno, University of Lavras, Brazil, and President, IOBC, Neotropical Regional Section, December 19th, 2007.



Some stats on global biocontrol[5]

- In 2004, the global market for biocontrol was valued at about $588 million with 43.5% of sales in NAFTA countries (including Mexico), 20.7% in Europe, 12.2% in Asia, 11.2% in Oceania (including Australia), 8.3% in Latin America (excluding Mexico), and 3.9% in Africa. Macrobials made up one third of that total, microbials 40%, with the rest being "natural" pesticides and semiochemicals.
- Between 1985 and 2004, the biocontrol market in the EU doubled, and Bt's percentage of the market fell from 95% to 25%. In 2004, invertebrate BCAs accounted for 55% of the EU market.
- The fastest growing sectors of the EU market have been nematodes and entomopathogenic viruses; in the US, fastest growth is from mosquito control agents and *Bacillus subtilis* products. Future growth in biopesticide sales is expected to be strongly tied to growth in organic production.
- Globally, long term growth in biocontrol is expected to be spurred by attract and kill technologies for banana and sweet potato weevil, mass trapping of potato tuber moth, and plant systemic acquired resistance enhancers (SARs).
- In 2003, biopesticides made up 1.7% of the global pesticide market. That percentage rose to 2.1% and 2.6% in 2004 and 2005, respectively. A 4.4% share is predicted by 2010. The current annual growth rate of 9–10% in biopesticide sales is expected to stabilize at about 5%.
- Currently, North America accounts for 40% of global biopesticide production (75% of the North American market is sprayed Bt), with European and Oceanic countries at 20% each. The US biopesticides market is valued at $205 million with an expected increase to $300 million by 2010. The European market is estimated at $135 million, with an expected doubling to $270 million by 2010. The Asian market is expected to see healthy growth in the near future, especially for rice insects in China. ■

A stream of their own

Proposed PMRA registration scheme should boost registration of low-risk pest control products in Canada

Introduction

The Pest Management Regulatory Agency (PMRA) has released a Regulatory Proposal which outlines a new registration stream for low-risk products. The development of the proposed roadmap was triggered by a number of factors, including:

- **Market demand:** PMRA is receiving an increasing number of registration applications and pre-submission consultation requests for lower risk and non-conventional products;
- **Legislative push:** the Pest Control Products Act (PCPA) requires PMRA to "expedite evaluations with respect to a pest control product that may reasonably be expected to pose lower health or environmental risk";
- **Niche markets:** the organic sector and the residential domestic market badly need registered products for which neither the conventional nor other registration streams provide a good fit;
- **The future of pest management:** global forecasts predict strong growth in "natural" or biorational pest management products.

What kinds of products are covered by the Regulatory Proposal?

The proposed framework covers two broad types of products: low-risk biochemicals and "non-conventional" pesticides.

Biochemical pesticides are defined as: naturally-occurring substances (or their functionally identical synthetic analogues) with a non-toxic mode of action and a history of exposure which demonstrates minimal toxicity. Product types include, but are not limited to: natural plant and insect regulators, naturally occurring repellents and attractants, enzymes, and semiochemicals (semiochemicals are currently handled under a separate regulatory proposal).

There are four types of "*non-conventional*" pesticides:

1. substances that are naturally present or developed by simple processing (including food items, animal products derived by simple processing, certain mechanically processed natural minerals, and non-food plant parts);
2. certain types of plant extracts and essential oils;
3. some commodity chemicals (for example, widely available chemicals that often have a range of non-pesticidal uses. These may be food grade or non-food grade, and are generally processed or refined substances); and
4. certain devices (for example, devices for trapping, destroying, repelling or mitigating a pest).

To qualify for the low-risk registration stream, products and actives should possess some or all of the following characteristics:

- low inherent toxicity to non-targets;
- low environmental persistence;
- use does not result in significant exposure;
- widely available to public for other uses and with a long history of equivalent exposure to humans and the environment;
- a non-toxic mode of action; and
- unlikely to cause pest resistance.

All formulants in low-risk products are required to be on List 4A or 4B.

Data requirements

Under the proposed framework, applicants for registration must scientifically justify the claim that their product is eligible for review in the low-risk stream, referencing the characteristics of low-risk products listed above.

Other required data for a registration application would include: a draft label, chemistry data, toxicological data, information on occupational exposure, food residue data, environmental chemistry and fate and ecotoxicological data, and information relating to the value of the product, including efficacy. Full data requirements are listed in Appendix I of the Regulatory Proposal at: www.pmra-arla.gc.ca/english/pdf/pro/pro2007-02-e.pdf.

Data requirements can be satisfied by providing:

1. information on the test substance;
2. published information (e.g., foreign reviews or published research articles);
3. surrogate information or bridging information to another substance, if both substances belong to a well-known group of substances; or
4. a sound scientific rationale for waiving the data requirement. Waiver rationales may argue that data is either impractical to obtain or unnecessary to address the concern addressed by the data requirement.

A central principle in the proposed directive is that the level of information required for registration should be commensurate with the anticipated level of risk. Thus, data requirements for low-risk products should be less onerous than for conventional or reduced-risk products. However, if submitted data shows evidence of toxicity, further tiers of data may be required.

PMRA strongly encourages applicants to request a pre-submission consultation prior to seeking registration. The consultation is an opportunity to establish whether the proposed product is eligible for review under the low-risk registration scheme, and to clarify the specific data requirements for registration.

Proposed review times for complete submissions are set at 12-15 months for new active ingredients and products, and joint reviews or workshares with other countries will be considered and are encouraged. The PMRA anticipates that, for some products, fees will be exempted or reduced (see Guidance Document on Pest Control Product Cost Recovery Fees).

Brief profiles of low-risk products[2]

The following section offers three brief profiles of actives and their associated products which, though they were registered before the low-risk scheme was proposed, would be eligible if submitted today.

Kaolin[1]

- **Registration status:** Active and associated end-use product were registered on March 23rd, 2004.
- **Type of product:** Barrier film.
- **Pests:** Insect pests, sunburn and heat stress on various fruits, vegetables and tree nuts.
- **Description of active:** Kaolin is an aluminosilicate clay mineral found in some U.S. and tropical soils.
- **Application:** Product is a wettable powder which, when applied as a foliar spray using conventional ground application equipment, forms a barrier on the surface of treated plants.
- **Waivers:**
  - o For crop residue data, as kaolin is a mineral found in soil and is not absorbed by the plants.
  - o For subchronic, chronic, reproductive, developmental and neurological toxicity, based on a long history of use without indications of deleterious effects.
- **Toxicity:** Nuisance dust - may cause respiratory irritation.
- **In other products:** Antiperspirants, toothpaste, cosmetics, anti-diarrhoea medications, in some food products as an anti-caking agent.
- **Efficacy:** Trials in Ontario and the U.S. found that multiple applications may decrease damage to pome fruits caused by pear psylla, tarnished plant bug, leafrollers, leafhoppers, apple maggot and plum curculio. No phytotoxic effects observed, no evidence of resistance. May be applied up to day of harvest.

Corn Gluten Meal[3]

- **Registration status:** Temporary registration, September 5, 2003.
- **Type of product:** Pre-emergence weed seed germination inhibitor.
- **Pest:** Dandelion and smooth crabgrass seed.
- **Description of active:** By-product of the wet milling process of corn for starch; by-product during conversion of starch from dry-milled corn to corn syrup.
- **Waivers:** Published literature provided to support requests to waive all toxicological data requirements. Waivers also provided to support data requirements for environmental fate and toxicity to non-target organisms.
- **Toxicity:** Contamination with aflatoxins is main concern; aflatoxins should not exceed levels established by CFIA under the Feeds Act.
- **In other products:** Sold in Canada as a natural fertilizer since 1998; used historically in the manufacturing of foods for animals, birds and fish.
- **Efficacy:** Submitted data supports the claim that the product may inhibit seed germination of dandelions and smooth crabgrass; additional efficacy data are required for full registration.

Sodium Chloride

- **Registration status:** Active and associated end-use product were registered on August 3, 2006.
- **Type of product:** Post-emergent contact herbicide.
- **Pest:** Control of common ragweed on roadsides, highways, walkways, vacant lots and other non-cropland sites.
- **Description of active:** Table salt, with the addition to the final product of an anti-caking agent at 0.2%.
- **Application:** Applied as a foliar spray directly to the plant.
- **Waivers:** Existing information was reviewed in the evaluation of environmental chemistry and fate, and for impacts on non-target organisms.

(continued, page 8)

[1] http://www.pmra-arla.gc.ca/english/pdf/prdd/prdd2003-08-e.pdf; http://www.pmra-arla.gc.ca/english/pdf/rdd/rdd2004-01-e.pdf

[2] http://www.pmra-arla.gc.ca/english/pdf/reg/reg2003-09-e.pdf

[3] http://www.pmra-arla.gc.ca/english/pdf/prdd/prdd2006-01-e.pdf; http://www.pmra-arla.gc.ca/english/pdf/rdd/rdd2006-06-e.pdf

A stream of their own (continued)

- **Toxicity:** Evaluation limited to acute toxicity and irritative effects, as the active is listed as a 4A formulant and is food grade.
- **Efficacy:** Trials conducted in Quebec between 1996 and 2002 support a directed application of the product to areas of high common ragweed density on roadsides, highways, walkways, vacant lots and other non-cropland sites.

Conclusion

It has been argued that the lack of a systematic regime for registering lower risk products has been a strong disincentive to commercialization, a situation which exposes the Canadian consumer and the Canadian environment to unnecessary risk. Thus, facilitating the registration of low-risk products (which have historically fallen through the cracks of the registration system) is expected to, above all, benefit consumers and the environment. Registrants – historically, many registrants of low-risk products are small Canadian companies – should receive benefits as well: reduced timelines, data requirements, and fees. Perhaps most importantly, registrants will benefit from the expectation of a reliable, predictable and relatively painless registration process, tailor-made for low-risk products.

PMRA is currently considering public comments received on the proposed directive. When the proposal is finalized, the agency plans to combine it with the proposal for pheromones and semiochemicals. Thus, one regulatory directive will address all types of low-risk biochemical pesticides. ■

Information Sources

Regulatory Proposal PRO2007-02: Guidelines for the Registration of Low-Risk Biochemicals and Other Non-Conventional Pesticides www.pmra-arla.gc.ca/english/pdf/pro/pro2007-02-e.pdf

The Canadian Forum for Biological Control Report

by Bruce Broadbent, President of CFBC

The Canadian Forum for Biological Control (CFBC) is a national non-profit organization established in 1994 with a mandate "to study, advance, and promote/advocate biological control in Canada." So the CFBC was very pleased to be a sponsor at last October's (October 28-November 1) excellent meeting entitled *Maintaining Worldwide Connections for Quality Assurance in Arthropod and Nematode Rearing*, hosted by the Biocontrol Network of Canada in Montreal.

The meeting was a collaboration between the Association of Natural Bio-control Producers, ASTM International Standards, the International Organization of Biological Control Working Group on Arthropod Mass Rearing and Quality Control, the International Biocontrol Manufacturers Association, and the Biocontrol Network of Canada, and featured more than 65 participants from 18 countries. The Conference Proceedings were published in the Bulletin Global IOBC, No.3, 2007 and are available from the IOBC Secretariat. The meeting was unique in bringing all biological control partners together in one room - industry, researchers, extension personnel and regulators, so that all voices and perspectives could be heard, especially on the important issue of "quality control of beneficial species." For the conference program, check the ANBP website at anbp.org.

The CFBC was proud to sponsor a morning symposium entitled *Microorganisms, Genomics and Insect Quality*. In this session, past CFBC President, Dr. Kevin Floate (AAFC, Lethbridge) presented his work on "The relevance of Wolbachia bacteria in biocontrol programs," while Dr. Susan Bjornson (Saint Mary's University, Halifax) presented her research on "Microsporidia of phytoseiid mites used for biological pest control." Kevin recommended that all arthropod species being reared as biocontrol agents be screened for Wolbachia bacteria, which are estimated to infect 20-70% of all insect species, and which have the potential to either enhance or reduce the reproductive success of their arthropod hosts. Susan's work demonstrated the detrimental impacts of microsporidia on their host species, and she offered to screen any mass-reared arthropods for microsporidia in her lab.

For more information, contact CFBC Secretary James Coupland couplandj@hotmail.com

Biocontrol News Digest

DETROIT FREE PRESS, NOVEMBER 15, 2007: War of the species: Scientists try natural enemies in fight against harmful pests
By Tina Lam

Consider the weevil...

The sesame seed-sized milfoil weevil has its own fan club. At Paradise Lake in northern Michigan, residents hold an annual Weevil Festival in July, dressing up in weevil costumes and holding street and boat parades to honour the critter. An Ohio company that raises and releases the weevils, including in 50 Michigan lakes, sells a popular weevil plush toy.

Why the love? When planted by the thousands in lakes infested by invasive Eurasian milfoil, the weevil larvae burrow into the plants' stems, chewing away until weakened plants collapse.

"The weevils have been very successful for us here for 10 years," said Marilyn Smith, president of the Paradise Lake Association near Mackinaw City. When the group first planted weevils, 340 of the lake's 1,900 acres were packed with dense green mats of lacy milfoil weeds. Boats had trouble getting through and fish were disturbed. Once the weevils arrived, the milfoil retreated.

Marty Hilovsky calls his weevil program "bugs without borders." He's president of EnviroScience Inc. in Ohio, which raises *Euhrychiopsis lecontei* weevils and has planted them in 120 lakes in 10 states and Canada to tackle milfoil.

The weevils are native to the United States and Canada, but lakes usually have too few to damage milfoil. It takes huge numbers, raised in a lab, to do the trick. Because weevils aren't cheap, their use can divide lakefront homeowners who often pay for the controls.

Kendra Cheruvelil, a Michigan State University freshwater ecologist, hopes to determine scientifically, not just anecdotally, whether they're working.

Wasps vs. emerald ash borers

Leah Bauer doesn't know yet whether the Asian stingless wasps she and other researchers released from August to October in Michigan forests will kill off the emerald ash borer, but she's optimistic. Bauer, a U.S. Forest Service entomologist at Michigan State University, has raised thousands of the tiny wasps that are natural enemies of ash borers in their native China.

The ash borer, first found in Wayne County in 2002, has no natural enemies here. Since its arrival, the borer has spread and killed more than 20 million ash trees, mostly in Michigan. In China, the tiny wasps keep the borer beetles in check.

The three types of wasps being tested in Michigan bore into the beetle eggs or larvae, killing them. More releases will occur next year, and a lab may be built to raise the wasps.

UNIVERSITY OF MELBOURNE, DECEMBER 5, 2007: Helpful bugs boost wine yield

Researchers at the University of Melbourne have shown that by minimizing chemical use, populations of a pest's natural enemies can be maintained, increasing biodiversity and vineyard productivity.

Dr. Linda Thomson and Prof. Ary Hoffmann developed a method to predict the likely effect of a season-long chemical spray regime on a full range of potential natural enemies in a crop.

Season-long chemical applications are used to calculate a relative score for a vineyard based on published toxicity rankings as well as knowledge of chemical impacts on local fauna, based on field assessments. Incorporation of a "softness score" (the effect of the chemical on the pest's natural enemies) in relation to beneficial biodiversity, will give a clearer indication of likely economic and environmental impacts. This method enables growers to maximize the abundance and diversity of natural enemies which contribute to pest control in the vineyard.

Dr. Thomson collaborated with Fosters Wine Estates, which, through its Footprint project, aims to measure and compare factors linked to sustainability.

PHYSORG.COM, DECEMBER 6, 2007: Tiny pest-eating insect fights fruit flies

Farmers and vineyard owners in South Africa have a new weapon in their pest management arsenal. A commonly used parasitoid has proven to be quite effective in the control of fruit flies in vineyards.

Jean Pierre Kapongo, Ph.D., an entomologist specializing in environmental health at the University of Guelph in Ontario, recently published the results of a research study conducted in the wine country near Cape Town that will aid vintners and fruit farmers in their ability to produce healthier crops. According to Kapongo, vineyard owners and farmers can now control fruit flies (*Ceratitis capitata*) with *Muscidifurax raptor*, an insect currently used in the control of other types of pests.

The study investigated the use of *M. raptor* to control fruit flies in vineyards. Until recently, fruit flies were usually controlled with chemical insecticides and selected natural enemies. Kapongo explained that such control methods were not popular with farmers because of the adverse effects of chemicals and the unreliability of using living parasites.

"Now we have discovered a parasitoid that is easily produced and effective in controlling fruit flies," Kapongo commented. He added that insectaries, where parasitic insects are commercially produced and sold, are ready to increase production of the insects in response to market demands from vineyard owners.

Researchers believe that the study results will have additional applications for controlling flies that threaten animals in confined environments such as poultry houses, dairies and horse stables. ■

Resources:

Books

A 2007 monograph – *Genetically Engineered Crops – Interim Policies, Uncertain Legislation* - examines current issues surrounding the topic, and is said by a noted scientist reviewer to dig "beneath the usual hyperbole of the enthusiasts and the apocalyptical doom of the pessimists." Plant cell specialist and ethicist I.E.P. Taylor edited the contributed work of 22 experts into 17 chapters, most of which include conclusions and, in some cases, recommendations. The softbound, 404-page volume presents a series of essays on the topic, compares attitudes and interests among key nations (accepting or rejecting GM crops), and is said to provide a reasoned analysis of both the "promises and perils" inherent in the new technology and what some believe is its uncertain long-term impact.

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Binghampton, NY 13904-1580, USA.
www.HaworthPress.com
E-mail: orders@HaworthPress.com
Phone: 1-607-722-5857
Fax: 1-607-722-6362

This highly anticipated original work by three leading plant disease epidemiologists has been published as *The Study of Plant Disease Epidemics*, a comprehensive manual that introduces and profiles essential principles and concepts. The hardbound work provides a detailed exposition on how to describe, compare, analyze and predict plant disease epidemics for the purpose of conceiving and testing management and control strategies. Among the 437-page manual's key elements are factors for determining decision thresholds for activating management and control options, as well as methods and principles explaining how to translate data and utilize it to devise informed and effective disease management decisions.

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