



The Pest Management

Newsletter

*News from the Agriculture and Agri-Food Canada Pest Management Centre
Number 12*

Biopesticides Gaining Greater Momentum in Agriculture

The landscape of the biopesticide market has undergone major changes in the past 10 years.

Back in the early 2000's, only a few biological pest control products, mainly targeted to niche markets, were available for Canadian growers looking to reduce their chemical inputs.

Their search for alternatives to conventional pesticides was noticed.

In 2005, the Pest Management Centre (PMC) began taking an active role in encouraging and assisting companies to register biopesticides in Canada. The PMC also supported the transfer of promising biopesticide research from scientists at Agriculture and Agri-Food Canada and in universities to growers.

Fast forward to 2015, and the biopesticide picture looks very different, both globally and in Canada.



Summerland, British Columbia

Here in Canada, the Pesticide Risk Reduction Program (PRRP) has established a process to provide regulatory support to biopesticide products chosen by growers and has facilitated the registration of 25 products comprising 250 uses since 2005. The biopesticide “technology gap”—the difference in registrations in this country and in the US—is becoming narrower with the steady increase in the number of biopesticide registrations in Canada.

Meanwhile, rapid global evolution in biological pest control has been driven by several factors, chief of which are that older, conventional pesticides are being discontinued or restricted by regulatory bodies and that integrated pest management, of which biocontrol products are a key component, is becoming the new normal in some parts of agriculture.

Biopesticide development and manufacturing has matured into a high-tech industry that produces reliable, cost-effective products, just as consumer demand for sustainable food is increasing. Mainstream agriculture's interest in these tools is increasing rapidly, with highly trained growers who want to increase sustainability in a competitive world by integrating biopesticides and other products that have a reduced ecological footprint into finely calibrated modern agricultural systems.

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Many of the world's leading agrochemical corporations have entered the arena of biological pest control, acquiring once-small companies and innovative technology with billion-dollar investments. The worldwide value of the biopesticide market is now growing at rates in the double digits every year and is projected to almost double between 2014 and 2019.

PMC's biopesticides work has evolved with these developments. To maximize the value to growers, PRRP is focusing on regulatory support for the Canadian registration of innovative biopesticide technology on products that will benefit the most from the program's assistance. It is also conducting field projects to demonstrate the integration of these products into farming practice.

As fast as the biopesticide industry has grown since 2000, the future promises even more expansion. PRRP is proud to support Canadian growers in this exciting time in agriculture.

Canadian Company Reaches License Agreement on Agriculture and Agri-Food Canada Fusarium Biocontrol Research

In August 2014, an Ontario company, Adjuvants Plus Incorporated (Inc.), reached a licensing agreement with Agriculture and Agri-Food Canada's (AAFC) Office of Intellectual Property and Commercialization (OIPC) for the

use of an AAFC patented technology – *Clonostachys rosea* strain ACM941. *C. rosea* strain ACM941 has proven to be effective in controlling Fusarium in wheat and has potential for use in other crops as well.

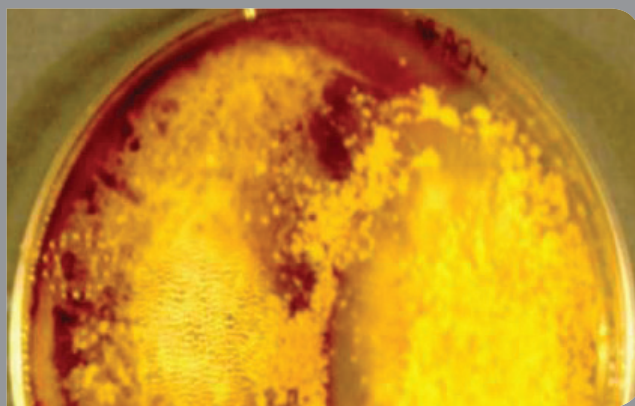
Dr. Allen Xue of AAFC's Eastern Cereal and Oilseed Research Centre patented this specific fungal strain of *C. rosea* in 1999 after positive results in the lab and in field trials on wheat showed ACM941 inhibits soil-borne and seed-borne fungal pathogens.

"I am pleased to learn that our years of hard work have finally come to fruition. I look forward to seeing the commercial production of this new bio-fungicide and the positive impact it will have," said Dr. Xue.

C. rosea ACM941, isolated from the lower leaf of a field pea plant in Manitoba, is a fungal microbe that infects and kills Fusarium and other disease pathogens. This natural behaviour can be used to control the devastating Fusarium Head Blight in cereals and may find applications in many field and horticultural crops, including those in the greenhouse industry.

Adjuvants Plus Inc. is a Canadian-based, agri-business that develops innovative solutions to improve field and horticultural crop yields. It will be up to Adjuvants Plus Inc. to determine how to develop the technology to deliver the product, possibly as a seed treatment or foliar spray.

AAFC's Pesticide Risk Reduction Program (PRRP) has worked closely with OIPC and will assist Adjuvants Plus Inc. in the regulatory submission to Health Canada's Pest Management Regulatory Agency to seek approval for the use of the ACM941 patented organism. One of the roles of PRRP is to provide assistance with the registration of biological pest control products that have been prioritized by growers. Expanding the pest management tool box to include reduced risk



Culture plate of *Clonostachys rosea* strain ACM941, dual-cultures of *Gibberella zeae* (left) and ACM941 (right)

To Everything a Season: The Day-to-Day Work of a Biopesticide Research Coordinator

Pathologist Jinxiu Zhang is one of two biopesticide coordinators for the Pest Management Centre's (PMC) Pesticide Risk Reduction Program (PRRP). He oversees the field and greenhouse trials that determine efficacy and crop tolerance, and he helps registrants prepare and submit the data packages required by the Pest Management Regulatory Agency (PMRA) so that high-priority biopesticide products get registered for first-time or expanded use by growers in Canada.

The day begins first thing in the morning when I arrive at the office and check my telephone messages and emails.

These usually come from the principal investigators (PIs) who lead the various trials and the registrants who provide the biopesticide products. PIs usually want advice about the trials or information about how best to meet the PMRA's obligation to assess the value of the biopesticide.

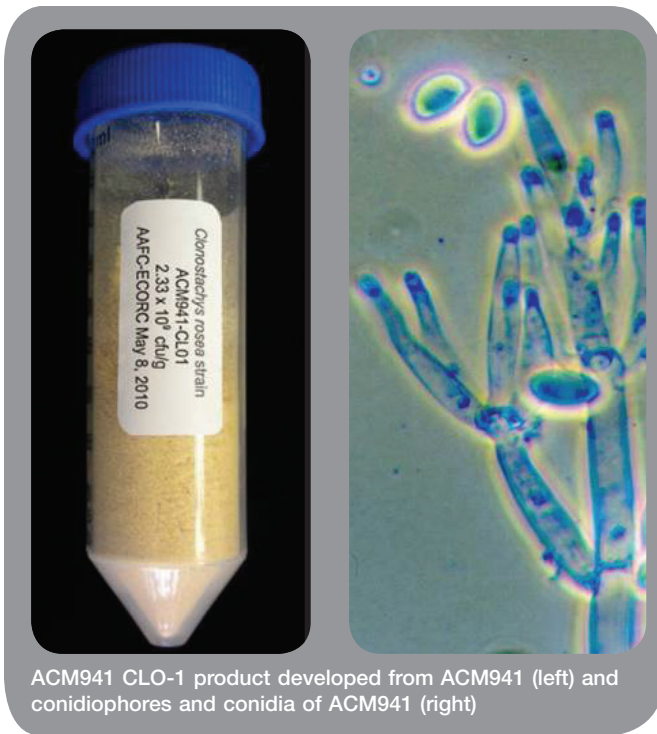
In addition to my work as a biopesticide project coordinator, I am also responsible for the project database for PRRP; so I keep an eye on the database, frequently updating the information. I check on any recently added data and ensure the database is functioning properly at least once a week. If an issue comes up, my aim is to fix it within a day to ensure the database continues to run smoothly.

Seasonal Tasks

A number of the day-to-day tasks on my to-do list show up throughout the year, but my priorities change with the seasons.

Looking Ahead and Behind— From October to March

During the fall and winter months, I spend a lot of time mining data from published sources in support of the biopesticide projects that had been selected at the previous year's priority-setting workshop. I review the historical literature, request data generated by registrants and ask for information collected by growers and provincial minor use coordinators (PMUCs). The data are then compiled into tables that describe the data types and their corresponding data numbering codes (DACO),



ACM941 CLO-1 product developed from ACM941 (left) and conidiophores and conidia of ACM941 (right)

biopesticide options contributes to the goal of achieving more sustainable pest management overall. Finding new or alternative ways to control crop-damaging pests is a priority for the crop protection industry and a biocontrol product fills that need.

"We are delighted to see this novel biopesticide come closer to being available to Canadian growers with this licencing agreement," said Leslie Cass, Manager of PRRP. "C. rosea ACM941 is a prominent element of the Reduced-risk Strategy for Fusarium Head Blight Management, which our program has supported for several years."

The 10-year agreement between AAFC and Adjuvants Plus Inc. is a royalty-based license whereby AAFC receives a percentage of sales following commercialization of the biocontrol product.

AAFC is pleased that its research efforts have resulted in providing the agricultural industry with a new and effective control. "We wanted the science out there. We wanted Dr. Xue recognized for the work he did," said Commercialization Officer Christina Stewart in Charlottetown, Prince Edward Island, who piloted the agreement through a series of technology-testing evaluations and a formal request for proposals from industry.

as required for a PMRA submission. I then analyze and summarize the efficacy and tolerance information.

Based on that, I determine the number of trials and requirements needed for the upcoming season and I prepare new trial plans. These plans are sent to the registrants, growers and PMUCs for review.

I also help to prepare a trial list with the requirements for the trial selection by Agriculture and Agri-Food Canada (AAFC) research sites and independent research contractors. For those trials not selected by AAFC researchers, independent research contractors bid to conduct field trials through a competitive process.

In addition, I review the final reports and data from all the trials completed in the previous year. I am looking whether the data generated is sufficient to support the registration of evaluated products or whether we need to schedule the trials to be rerun in the next growing season.

Getting Ready to Go to Trial— From April to May

Spring is the busiest time of the year for me because we're setting up new trials in the fields and greenhouses.

Once the bidding process winds up in early April, I review the contractors' proposals and trials are awarded to qualified bidders. After the trials are successfully placed with AAFC researchers or contracts are in place, I focus on setting up new trials together with the PIs. Major work activities include optimizing final trial plans, reviewing work plans developed by PIs, confirming trial requirements following extensive discussion with PIs, providing advice on the trials and coordinating the shipment of test items from registrants, within or outside of Canada, to the trial sites.

Spring is also when I am most deeply involved in the biopesticide regulatory support work.

Once new priorities have been selected at the annual priority-setting workshop in March, I help to prepare, request and follow up on confidentiality agreements and letters of support from registrants. These documents establish the PMC's working relationship with the registrants.

When the documents are signed, I send out a questionnaire to the registrants, growers and PMUCs to collect information on target biopesticide products, pests and crops. The information helps me determine the number of trials and their requirements.

Finally, I also ensure all new project information is entered into our database.

The Trials are Carried Out— From May to October

I'm responsible for monitoring the progress of the trials, which are conducted at the research sites from May to October. In the case of greenhouse trials, they can carry on through the winter. This involves consulting with the PIs and providing advice on issues such as pest pressures, making adjustments to the timing and rate of application and finding ways to mitigate the effects of environmental conditions. It also involves reviewing raw data and trial status reports and checking and approving payment invoices in accordance with the schedules for submissions.

I also periodically visit trial sites.

Recently, I toured the biggest cranberry grower operator in Ontario: the Iroquois Cranberry Growers' farm, which is located in Wahta Mohawk territory in the heart of Muskoka in Ontario. It was the site of a bio-herbicide trial we had conducted on cranberry.

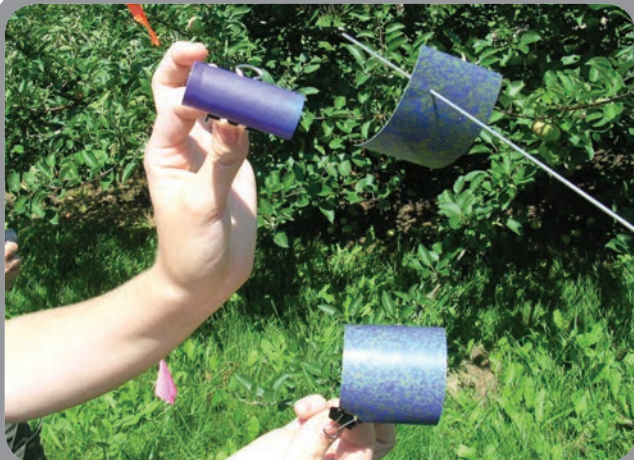
While touring the cranberry bog, and in discussion with the farm manager and PI, we decided to modify the weed evaluation indexes and assessment timing to better fit the trial plan to the actual conditions at the bog.

The visit gave me the chance to learn more about cranberry production, major crop pests and growers' demand for control products.

That's why I believe it's important to visit trial sites. It's the best way to observe the performance of the trial plan and the progress of the trial in the field, as well as



The trial for evaluation of biopesticide *Clonostachys rosea* strain ACM 941 for the management of *Fusarium* head blight in wheat and barley. Agriculture and Agri-Food Canada staff from left to right: Ms. Yuanhong Chen, Project Technician; Dr. Jinxiu Zhang, Research Coordinator; Dr. Cezarina Kora, Senior Strategy Coordinator.



Agriculture and Agri-Food Canada project that optimizes spray volume on apple trees using water-sensitive paper to test the appropriate coverage on the canopy.

to expand your knowledge of different crop production techniques, especially for local crops.

In addition to all the face-to-face work the trials require, I update the database as information comes in from the field and greenhouse studies. I develop abstracts for ongoing projects and summaries for completed projects for dissemination on the PMC website. At the end of each quarter, I prepare a research report on the status of each project in our program.

As you can see, my work is cyclical. But whatever the season, I always enjoy working with the friendly and collaborative PRRP team.

New Legislation Mandates Integrated Pest Management Adoption in European Union Countries

Pesticide legislation approved in 2009 by the European Parliament has changed the way plant protection products are registered and used in European Union (EU) countries.

Directive 2009/128/EC, or, as it is more commonly known, the Sustainable Use of Pesticides Directive, established a legal framework for joint efforts by member countries to achieve safer pesticide use in European agriculture.

This Directive is one of four pieces of legislation that was published as part of the EU's broad-based thematic strategy on the safer use of pesticides. Another essential legal instrument of this strategy is the plant protection product regulation ([Regulation 1107/2009](#)) which calls for a European-wide, harmonized approach to regulating pesticides and includes provisions for phasing out toxic substances. The other two instruments include a directive that sets out standards for new pesticide application equipment and a regulation that provides for the collection of data on pesticide sales and use.

The Directive emphasizes, among other measures, the importance of adopting integrated pest management (IPM) practices to reduce the risks and impacts of pesticide use on human health and the environment while mitigating the impact of the removal of pesticide uses. This stems from the view that IPM is a system which supports the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.

Implementing the Directive

The Directive outlines provisions and guidelines for IPM implementation. It makes mandatory the implementation of all eight general IPM principles (see Table 1) for EU member countries as of January 1, 2014. This means that growers must reduce their use of chemicals to the necessary minimum and use non-chemical alternative practices as their primary pest management approach. At the same time, the Directive makes adoption of crop-specific and more advanced IPM systems over and above the eight principles voluntary.

What it Means on the Ground

The Directive requires all member countries to develop [national action plans](#) which outline the mechanisms, measures and timelines individual countries will put in place to support IPM and pesticide use reduction. While the EU countries have submitted their national plans to the European Commission, implementation of measures to make IPM a reality is an ongoing process. To further enable implementation, several countries have already initiated the development of crop-specific IPM guidelines and IPM training programs and have committed to further support research and development of IPM solutions.

In addition, the European Commission also launched several initiatives to help European growers meet the challenges of complying with the new regulatory framework, including the following programs:

Table 1: Summary of the Eight IPM Principles

Prevent and/or suppress harmful organisms.
Monitor harmful organisms by adequate methods and tools, such as field observation, scientifically sound warning, forecasting and early diagnosis systems, where available.
Based on monitoring results and scientifically sound threshold values, decide whether and when to apply plant protection measures.
If they provide satisfactory pest control, choose sustainable biological, physical and other non-chemical methods over chemical methods.
Apply pesticides that are as target-specific as possible and have the least side effects on human health, non-target organisms and the environment.
Keep the use of pesticides and other forms of intervention to necessary levels.
Apply available anti-resistance strategies to maintain the effectiveness of the products.
Based on pesticide-use records and monitoring of harmful organisms, check the success of the applied plant protection measures.

- The [ENDURE network](#) which brings together some of Europe's leading agricultural research, teaching and extension institutions concerned with IPM. As such, ENDURE is a major source of IPM information, training, tools and services and provides a platform for knowledge exchange regarding all aspects of IPM.
- The [Coordinated IPM \(C-IPM\)](#) which links many independent European research funding agencies and organizations operating in EU countries with other existing programs and networks concerned with IPM. It aims to better coordinate IPM research funds and encourage cooperation among stakeholders such as grower organizations, policy-makers, industries and non-governmental organizations with the goal of increasing growers' adoption of IPM across Europe.

Together with the efforts by member countries to support farmers in the transition to even higher levels of IPM adoption, these cross-European resources and networks demonstrate the EU's commitment to making IPM the "new normal" for crop protection in Europe.

New Website a Hub for Worldwide Information on Integrated Pest Management

The Organisation for Economic Co-operation and Development (OECD) recently launched a new website that will serve as a platform for sharing information about integrated pest management (IPM) among OECD member countries. Called the [IPM HUB](#), the new site aims to facilitate stakeholder cooperation and to serve as a repository for country-specific IPM information.

The site, which went live in the spring of 2014, is the result of a recommendation that came out of the OECD's [2nd Workshop on IPM](#) held in Berlin in 2011. Following the workshop, an international expert group on IPM was given the task of developing the online repository.

While work in populating the website remains an ongoing process, the site already includes existing IPM-related policies, regulatory frameworks, government programs, guidelines and successful IPM case studies. New information is added as it becomes available.



Countries are invited to contribute their own IPM-related information and showcase their successes in implementing IPM programs. Already, two made-in-Canada success stories are profiled on the new website.

The Pesticide Risk Reduction Program, in collaboration with Health Canada's Pest Management Regulatory Agency, submitted the story of how knowledge on the integrated management of European Corn Borer was relayed to growers in Quebec, and how that knowledge transfer resulted in a higher adoption rate of IPM practices.

The Okanagan-Kootenay Sterile Insect Release Program also published the story of successfully implementing an area-wide, integrated management system for codling moth control in Canadian apple and pear orchards.

You can visit the [IPM HUB](#) website and see for yourself these and other successful IPM case studies. And if you wish to showcase your own success story of implementing an IPM program, see the [Contact Us](#) page to access the template for submitting information, as well as the email address for whom to send it to. You can also contact the [Pest Management Centre](#) to obtain a template form.

Program Update: Minor Use Pesticides

The Minor Use Pesticides Program (MUPP) completed and submitted 67 projects to Health Canada's Pest Management Regulatory Agency or directly to the registrants for use in future submissions by March 31, 2015, the end of our fiscal year. Since then, we have completed and submitted two more projects. These projects cover pest issues in all three disciplines (insects, diseases and weeds).

For a complete list of submissions and registrations by year, see the MUPP's [Submissions](#) web page. The reports on MUPP's submissions and the status of projects by crop are updated about every two months. More recent information is available by contacting pmc.cla.info@agr.gc.ca.

Since being established in 2003, MUPP has initiated 1,111 projects and made 606 submissions. The result has been 439 registrations and over 1,710 new labelled uses for growers.

MUPP Priority Setting Workshop

Another successful Priority Setting Workshop was held in March 2015 with over 200 participants representing growers, manufacturers, provincial and federal government departments and the American Inter-Regional Research Project Number 4 (IR-4). Grower representatives selected [42 new research pest control priorities](#) while at the workshop.

Program Update: Pesticide Risk Reduction

Crop Profiles

Since January 2015, eight fruit crop profiles have been updated and are being published on the [Government of Canada Publications website](#). The PRRP is working to have each of the more than 30 crop profiles updated on a three-year cycle, and with previous versions of all published profiles available on the Publications website, a user can readily identify changes in pest management issues and practices in the intervening years. Entering "crop profile" in the search field on this page will return a list of all national crop profiles published.

Biopesticides

The PRRP completed and submitted to the registrant or to the PMRA five data packages addressing more than 20 crop/pest combinations during the 12-month period ending March 31, 2015.

At the Priority Setting Workshop in March 2015, nine priority biopesticide products were identified by stakeholders as candidates for regulatory support by the PRRP. A subsequent analysis for impact will result in four new biopesticide projects for regulatory support

being taken on by the PRRP. Integrated Pest Management (IPM) projects to assist with the incorporation of these new tools into existing management systems are being planned to ensure growers have the information they need to be successful with these reduced risk options. The first of these IPM projects, beginning spring 2015, will look at the use of Quassia Extract DM in integrated insect management in orchards.

Strategies

The Pesticide Risk Reduction Program (PRRP) is actively implementing six pesticide risk reduction strategies through the facilitation of working group discussions and with project funding, including four new projects initiated in April 2015. Information regarding the [status and outputs of all risk reduction strategies](#) is published online. Four new IPM tools resulted from this strategy work during the 12-month period ending March 2015, and information for growers is published online in the technical factsheet series “[Sustainable Crop Protection: Results from the Pesticide Risk Reduction Program](#)”.

Message from Executive Director of the Pest Management Centre

Measuring the effectiveness of a program is vital to any results-based organization, especially programs delivered by governments using taxpayers' dollars. Is the program accomplishing its intended outcome? Are there more cost-effective ways to achieve or exceed results greater than those originally intended? Has the program adjusted to meet the ever-changing requirements of the clients? All of this information is critical to give decision-makers hard information they require to determine if the program should grow, remain stable or be eliminated.

Since the establishment of the Pest Management Centre (PMC) in 2003, two independent evaluations have been conducted to assess PMC's performance management. PMC was rated high but we continue to develop methods to demonstrate the specific economic benefits of our work. This is a difficult task because of the size and scope of Canada's horticultural sector. PMC has achieved over 1,530 new uses of minor use products but no two horticultural operations are identical, not every producer has every crop/pest combination and Canada has many crop zones, climatic conditions, hundreds of different commodities and regions of different pest pressures.



The PMC is currently working closely with our colleagues in Agriculture and Agri-Food Canada's Research and Analysis Directorate to determine as best it can the economic benefits the Minor Use Pesticides Program has had on the sector by using the best information available applied to economic modelling. The task is not an easy one or one we take lightly.

But we hope to be able to determine the economic benefits of increasing the availability of crop protection tools and technologies so that we can have a benchmark of where we can improve even more the services we offer to the Canadian horticultural sector. Stay tuned.

Until next time...

Manjeet

About the Pest Management Centre

In 2003, Agriculture and Agri-Food Canada (AAFC) established the Pest Management Centre (PMC) as a unique partnership between growers, grower associations, federal and provincial governments and the crop protection industry to deliver two national programs:

- Pesticide Risk Reduction Program (PRRP) — A joint initiative of AAFC and Health Canada's Pest Management Regulatory Agency (PMRA) that focuses on the development of risk reduction strategies for the Canadian agriculture and agri-food sector; and
- Minor Use Pesticides Program (MUPP) — A joint initiative of AAFC and PMRA that responds to the needs of Canadian growers for increased access to new minor uses of pesticides.

PMC operates from its headquarters in Ottawa and conducts field, greenhouse and growth chamber trials at seven research sites located in Kentville, Nova Scotia; Saint-Jean-sur-Richelieu, Quebec; Vineland, Ontario; Harrow, Ontario; Scott, Saskatchewan; Summerland, British Columbia and Agassiz, British Columbia.

For additional information about PMC, please visit our website at www.agr.gc.ca/pmc.

Contact Information

For more information about any of the items in this issue of the newsletter, please contact PMC via email at pmc.cla.info@agr.gc.ca or call 613-694-2457.

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