Biopesticides: Strategies for Discovery, Development, and Adoption

What are Biopesticides?
Biopesticides are living organisms and/or their natural products that control or suppress pest populations such as insects, weeds, and plant diseases. Greater awareness and demand for safer foods and the environment have spurred interest by the public for reduced risk pest control products. Recently, Agriculture and Agri-Food Canada (AAFC) has invested in a National Biopesticide Programme for discovery and development of new biopesticide products for registration in Canada and worldwide.

Objectives
- identify, evaluate, and develop biopesticides for control of insect pests, weeds, and plant diseases
- develop platform technologies relevant to all facets of biopesticide research including fermentation, formulation, application technology, and molecular biology
- develop reduced-risk pest control products that address public demand for safer foods and environmental health
- develop strategies to increase adoption of Integrated Pest Management (IPM) technologies

National Biopesticide Study:
Team of 20 scientists / 8 research centres

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SPCS (E. Cadieux)
AAFC Investment in Biopesticide Research

AAFC has developed expertise, infrastructure, and a R&D model for delivery of biopesticide products that will transform the way crop pests are controlled in the agriculture and agri-food sector.

The Canadian biopesticide programme has matured to include multiple projects at different stages in the product development pipeline.

This comprehensive approach is unique in Canada and can be achieved within the federal public service where there is long-term commitment for public good research and through partnerships with universities and the private sector.

We plan to build a strong research environment and facilitate the building of a biopesticide industry in order to promote Canadian innovations and make Canada competitive in a global marketplace.

Biopesticide Innovation Chain – The AAFC Strategy

- Biopesticide discovery and development follows a process of steps that are unique for each target pest biopesticide system. This is called the “innovation chain”.
- The innovation chain progresses from early discovery and development, commercial scale-up, and technology transfer to industry and finally into the hands of the farmer and consumer.
- Successful development of a biopesticide is a combination of science, art, and entrepreneurship that can take place over a 10–15 year period.

Solution for Delivery of Biopesticides – AAFC Biopesticide Science Innovation Chain

- Discovery & RICA selection
- Basic science and concept design
- Proof of concept
- Technology development
- Market identification
- Technology transfer
- Application development
- Commercial scale-up
- Registration
- Technology adoption
- Build in Go vs. No-Go decisions and create smooth transition through stages of innovation chain

National Expertise - Bioherbicides

- National Expertise - Biofungicides/Biobactericides/Bioviricides

- National Expertise - Bioinsecticides

- National Expertise - Bioinsecticides/Biofungicides/Biobactericides/Bioviricides

What is the rationale for a national biopesticide strategy?

- reduce reliance on synthetic pesticide use and develop strategies for resistance management
- control of invasive alien species
- develop reduced risk pest control products (new active ingredients and new modes of action)
- provide products where control measures (e.g., chemicals) are inadequate/unavailable/deregistered
- IPM in crop production systems (e.g., conventional, organic, no/low pesticide use)
- expand label registration of existing biopesticide products
- provide products where control measures (e.g., chemicals) are inadequate/unavailable/deregistered

The AAFC Biopesticide Team

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