

Green Alternatives to Traditional Pesticides

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Canadian scientists are developing safer, natural biopesticides such as soil fungus to control unwanted dandelions and other weeds. (photos.com)

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Scientists at Agriculture and Agri-Food Canada (AAFC) have taken a "national team" approach to the development of biopesticides.

A biopesticide is a biological agent, or microorganism such as bacteria, used to control pesky insects, weeds, and plant diseases in place of conventional chemical pesticides.

There are over 20 AAFC scientists from coast to coast coordinating steps from discovery of microbes through research and development, to the commercial product. Most are now collaborating on the National Biopesticide study. These researchers work with

environmentally friendly living organisms and/or their natural products to control important crop pests in agriculture and urban environments.

"The public is demanding safer foods and improved environmental health," explains Dr. Susan Boyetchko, one of two co-leaders of the study. "There are hidden costs to using certain chemical pesticides, both to human health and to the quality of our soil and water."

The team has some promising biopesticide technologies that use naturally occurring fungi, bacteria, and viruses. Coming down the pipeline is a product made of a soil fungus (*Phoma macrostoma*) to control dandelions and other broadleaved weeds. Dr. Karen Bailey (Saskatoon, SK) is working with The Scotts Company, which plans to register and commercialize this biopesticide for use on turf grass in urban centers.

Dr. James Traquair (London, ON) is working with the company AgraQuest Inc. in California to bring to market a bacterial agent to control leaf blight of blueberry and leaf curl of peach, diseases caused by a fungus. These efforts will result in registration of the product through a harmonized process with Canadian and American regulators.

Several well-known products use *Bacillus thuringiensis* (Bt) bacteria to control many moth and butterfly pests in agriculture, forestry, and even for household use. Dr. Jean-Charles Côté (Saint-Jean-sur-Richelieu, QC) has developed new formulations of Bt-based biopesticides to improve product strength.

Although still in the early stages, work is progressing on other projects. Scientists are developing a bacterium (*Pseudomonas fluorescens*) as a soil-applied bioherbicide for control of wild oats and green foxtail in the Canadian prairies.

They are also testing baculoviruses against the cabbage looper, a chronic insect pest in commercial greenhouses. The data looks promising. Baculoviruses can significantly reduce the damage to vegetable crops, and the greenhouse industry will likely use this biopesticide in the future.

One of the challenges to getting biopesticides into the marketplace is development of technologies that are both economical and appropriate for mass production and formulation.

“We are focusing on different platform technologies in these areas to make it easier for industry to partner with us,” explains Dr. Antonet Svircev, the other co-leader of the National Biopesticide Study. “Shelf life can often be problematic for biopesticides, but our team is conducting sound science to extend the shelf life of these products well beyond one year.”

Another challenge is finding the right industry partner to register and commercialize new biopesticides. It may take 10 to 15 years from discovery until a product is commercially available.

The companies that invest in biopesticides are mainly small- to medium-size enterprises. They often lack the resources and infrastructure to invest early on in the process. Creative solutions are needed to bridge funding gaps to the point where industry can partner earlier with AAFC scientists.

The demand for green products is growing rapidly. Canadians are ever more sensitive to damage being done to the environment. Many are looking to buy foods grown without synthetic pesticides. Organic farmers need new options to control crop pests, and biopesticides fit the bill.

“It takes a combination of science, art, and entrepreneurship to develop biopesticides,” says Dr. Boyetchko. “They are the next generation of pesticides.”

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