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Genomics in Agricultural Pest Management

Status	Approved
Competition	Applied Genomics in Bioproducts or Crops
Sector	Environment
Genome Centre	Ontario Genomics Institute
Project Leader	Miodrag Grbic, University of Western Ontario

Project Description

Greenhouse vegetable production is a growing industry in Canada, with Ontario alone home to more than 1700 acres of greenhouse vegetables – the largest concentration in North America. These crops make a significant contribution to the province's economy, with greenhouse tomatoes, cucumbers and pepper crops bringing in a combined gate of more than \$550 million in 2006-2007. But a tiny mite that can reproduce every seven days during the hot summer months is poised to wreak havoc on this industry. Already, insects and mites destroy 13 percent of all potential crops.

Spider mites feed on more than 1000 different plant species, causing yellow flecks on the surfaces of leaves that can reduce the yield from those plants. Currently, many growers use chemical pesticides to try to eradicate the pests – a major source of environmental pollution that contributes to the destruction of wildlife. These pesticides are also becoming less effective, as the spider mites' resistance to major pesticides is growing. As global warming intensifies, researchers expect spider mites to pose a serious threat to crops grown in the fields, as well as those housed under glass.

This project will create tools and technologies to control spider mites, based on our success in mapping the entire genome of this mite. Our team combines expertise in genomics, bioinformatics, genetics, biochemistry, population biology, plant biotechnology and plant breeding. We will use high-throughput genomic technologies to analyze plant resistance to spider mites, and we will evaluate the consequences to the pests of eating resistant and susceptible plants. By studying the interaction between plant genes and pest genes, our goal is to combine pest and plant genomics, inserting pest-resistant genes in plants so that they can resist spider mites. We will also develop tools to turn off pest-specific genes, opening up a new tool for pest control, and will develop new strategies to reduce the ability of these pests to reproduce.

Creating this new, environmentally sound approach will negate the use of chemical pesticides and decrease energy consumption in agriculture, by employing this sustainable pest-control strategy. Our project will increase Canada's competitiveness in this vital aspect of our

knowledge-based economy.