

A Note from Applied Bio-Nomics

In the 1970's two greenhouse pests, whitefly and spider mite, became resistant to pesticides and caused serious losses to greenhouse tomato and cucumber crops in Canada. Research conducted at the Agriculture Canada Saanich Research and Plant Quarantine Station indicated that there was great promise in using natural biological control agents such as parasites and predators to control these pests. It was found that some biological controls could also be effectively mass-produced and attacked only the host pest. The British Columbia Ministry of Agriculture was also interested in this approach to pest control, and set up a demonstration biological control program for commercial greenhouse growers. Under this program, entomologist Don Elliott was hired as production manager to mass-produce a spider mite predator and a whitefly parasite. These biological control agents were then provided to growers to replace the pesticides that were no longer effective. Growers soon found that if the biological control agents were released at the correct rate and at the first sign of the pest, they would then search out and control the pest, often for the entire growing season. This program was very successful during the first year, reducing the use of pesticides as well as providing growers with better pest control and higher crop yields. In 1980, Don Elliott formed a commercial company, Applied Bio-Nomics Ltd., to continue to research, develop and market live biological control agents for pest control and was presented with the Professional Pest Management Association of B.C. Award of Excellence for outstanding contributions in promoting the concepts and use of biological control in pest management.

Following these biological pest control strategies, most commercial cucumber, pepper and tomato growers have greatly reduced or eliminated the use of pesticides. Over 99% of all commercial cucumber, pepper and tomato greenhouses in B.C. now use some form of biological control. Applied Bio-Nomics was also instrumental in developing the first Canadian commercial use of biological control in plantscapes and conservatories. A co-operative program was also conducted to develop greenhouse biocontrol in New Zealand, Australia and South Korea and with the International Development Research Centre to develop programs for the biological control of aphids and whiteflies in China.

The demand for biological control agents has expanded each year. A new biological control production facility is now in operation on a five-acre site near the Victoria airport. Expanded facilities will increase the production of spider mite predators, whitefly parasites, thrips predators, aphid predators, and fungus gnat predators. The list of pests keeps increasing, but the continuing research program at Applied Bio-Nomics ensures that new biological products are under development. Research is also underway for regular commercial application of biological controls to orchard and field crops. In 1990, Applied Bio-Nomics formed a commercial joint venture with Plant Products Co., Ltd. and Westgro Sales, Inc. to distribute biological control agents in Canada. In 1992, Mr. Brian Spencer was hired as General Manager of Applied Bio-Nomics. We all hope that this technical manual will provide growers and researchers with the information they need for continuing use and development of biological control.

A special Note of Thanks...

Throughout this growth process, Applied Bio-Nomics has had the continuing support of our local greenhouse growers and agencies; including Agriculture Canada, the B.C. Ministry of Agriculture, the Canada Agricultural & Rural Development Subsidiary Agreement (ARDSA), the B.C. Greenhouse Vegetable Research Council, University of Victoria Biology co-operative, the National Research Council (NSERC), Canada Western Diversification, National Agricultural Biotechnology Initiative (NABI) and the Science Council of British Columbia. We have also had the technical and scientific support of many people: Dave Gillespie and Norm Tonks (Agriculture & Agri-Foods Canada), Bob Costello and Jack Arrand (B.C. Ministry of Agriculture & Food), Marilyn Steiner (Alberta Environment Centre), Linda Gilkeson (B.C. Ministry of Environment, Lands and Parks), and Jim Matteoni (Kwantlen College).

Don Elliott, President, Applied Bio-Nomics

Biological Control: A Brief Introduction

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The term *biological control* refers to the use of living organisms to control other, less desirable, living organisms. By this definition, even the house cat can be considered a biological control of field mice! Here, we are primarily concerned with biological control of plant pests.

Biological control of plant pests is a very active and growing area of research, although it is not a new concept. Over 50 years ago, a minute parasitic wasp, *Encarsia formosa*, was used to control an insect pest called whitefly. Also, a small predaceous mite, *Phytoseiulus persimilis*, was used to control the two-spotted spider mite. When chemical pesticides were thought to be the cure for all of our pest problems, attention was diverted away from biological controls. For many years, homeowners and growers relied solely on chemicals to protect their crops from pests.

Several problems developed with the continuous use of chemical control methods. These problems include decreased effectiveness due to the development of pesticide resistance, increasing costs and legislated restrictions on pesticide availability, and phytotoxicity-induced yield reductions. These, coupled with increased worker and consumer health concerns, and possibilities of environmental contamination, have resulted in increased awareness and interest in biological control methods.

There are now reports of successful biological control programs in commercial crops such as orchards, forests, field crops, and greenhouse vegetables and ornamentals. Use of biological control extends from commercial field uses to interior landscapes and conservatories. Biological controls are readily available to control spider mite, whiteflies, aphids, mealybug, soft and hard scales, fungus gnats, cutworms, weevils, tent caterpillars, leaf rollers, cranberry girdlers, and other agricultural pests. We are now developing biological controls for the fungi and bacteria that cause plant disease.

We must now expand our knowledge of pest control to include all available control methods. This includes cultural controls, choice of resistant or tolerant varieties, environmental controls, biological controls, and even chemical controls. This approach is known as **integrated pest management**, and is designed to limit damage from pests to tolerable levels. It involves a whole new way of thinking, and is a challenge for us all.

Applied Bio-Nomics Biological Control Program: Commercial Grower Plan

Please complete the following questions so we can suggest guidelines according to your needs. Use a separate form for each crop grown.

Grower's name:

Company name address:

Delivery address if different:

Best shipping method for biological supplies:

Telephone #: _____ Facsimile #: _____ Pager #:

Crop: _____ Cultivars:

Number of plants: _____ Area planted:

Seeding date: _____ Planting date: _____ Source:

Plant propagator:

Greenhouse layout:

Greenhouse covering: _____ Age: _____ Flooring: _____ Age:

Growing media:

Average greenhouse temperature (day): _____ (night):

Lighting intensity and photoperiod:

Climate control: _____ Avg. R.H. %:

Watering system:

Previous crop: _____ Date removed:

Clean-up procedure between crops:

Other crops in/and adjacent to greenhouse (field):

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Pest History

Month (usually) first detected and current level of infestation.

XX Pests:

Two-spotted spider mites

Greenhouse whitefly

Sweet potato whitefly _____

Thrips (western flower thrips?)

Aphids (melon aphid?)

Fungus gnats

Other pests

Disease History

Month (usually) first detected and current level of infestation

XX Diseases:

Black vine rot

Pythium root rot _____

Powdery mildew

Tomato spotted wilt

Other diseases

Pesticide use:

Some chemicals leave harmful residues or continue to be released from the ground or plastic, killing biological control agents over a long period of time. List any chemicals that were applied for clean-up, or within the last 6 month.

Product

Date last applied

Thank you for your time! Please return this form to our local distributor. We'll work out guidelines for your biological control program.

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