

# Why Has Insect Management Become More Difficult?

## Is Biological Control the Answer?

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Pest control has changed over the last two decades from the use of chemical insecticides with predictable results, to use of chemical insecticides with often erratic results. We now try to keep insect and mite populations at acceptable levels without totally relying on chemical insecticides. Fifty years ago, before the introduction of DDT, growers used inorganic compounds, soaps and oils to keep insect populations under control. With the introduction of DDT growers became very complacent. Insect and mite control was relatively easy as a single spray would eliminate most pest problems. Pest management was inexpensive and there was little concern over the impact of pests or the cost of their control on the profit margin. During this era there was little emphasis on pest resistance in selection of the species or cultivar of plants grown or in the selection of new genetic material for ornamental production.

Why have we changed from an era of easy pest management to one where chemical insecticides are no longer reliable? We have gone through a half century of development of chemical insecticides of several different chemical classes and activity. Many of these compounds have gone by the wayside as a result of concerns over toxicity or mutagenicity, especially carcinogenicity, to humans or hazards to the environment. Some have disappeared as a result of a lack of economic benefit. However, there are still many compounds on the market today. A major problem is that many of these compounds are no longer effective for insect and mite control. The pests are not as sensitive to the compounds as they once were and have developed resistance to the available chemicals on the market. The first real signs of trouble came in the mid 1970's when populations of *Liriomyza* leafminers started to show up on chrysanthemums. They had not been a pest before and they constantly became more difficult to control until complete control failure occurred about 1980. Then two new types of insecticides came on the market: abamectin (Avid<sup>®</sup>) and cyromazine (Citation<sup>®</sup>). Both products continue to provide effective control for leafminers. Similar stories can be told about thrips, whiteflies, aphids and other pests.

In light of the previously mentioned problems with chemical control, do we anticipate the continued use of chemicals in pest control programs in the future? Yes! We will continue to rely on chemical insecticides for management of pest populations. However, our reliance on chemicals will be reduced and we must turn to alternative practices to help manage pests. We have talked about insect pest management (IPM) for several years and the big question has always been: Can you give me a workable IPM plan for my operation? IPM concepts and general principles should be tailored to each individual situation.

One component of IPM is biological control. Is biological control in our future greenhouse management programs? Biological control will be part of our future management program. However, we must be patient and it is not going to be an easy program to implement. Biological control is the use of natural enemies to manage insect and mite populations. This involves the release of natural enemies in the environment occupied by the pest. Natural enemies include entomopathogens, nematodes, parasites, and predators. Entomopathogens are natural disease causing organisms such as bacteria, fungi, and viruses. We currently use bacteria in the form of *Bacillus thuringiensis* in the management of caterpillars and fungus gnats. There are fungi currently under development that will probably be a part of our future management program in ornamentals. Nematodes which parasitize insects are also being researched. One strain of nematode is currently marketed for control of fungus gnats in greenhouses. Parasitic insects seek out and lay eggs on their host insect. When the eggs hatch the larvae feed on the host insect resulting in death of the pest. Many parasites are tiny wasp-like insects. Predaceous insects, mites and spiders consume their hosts. The ladybird beetle is a well known predator but there are many other valuable arthropod predators.

With 50 years of experience in the use of chemical insecticides we still have problems managing their use. We have much less experience working with biological control and often lack the knowledge required to utilize natural enemies with the greatest efficiency and benefit. A major concern of scientists is that growers will use natural enemies and have a failure and judge them unreliable. Many people attempt to use biological control agents but they do not have the knowledge to apply them successfully. Their intent is to release them in a greenhouse without recognizing the influence of past insecticide use or present environmental conditions. Failure inevitable follows resulting in loss of confidence in the biological agent and the method. Biological control in a living system requires learning many things about effectively using natural enemies.

Growers need to become more familiar with biological control. Start on a small scale and try a biological agent in an isolated area of the greenhouse. Learn about the biology and behavior of the agent and determine how it can be best used in your individual operation. Growers should not become discouraged with biological control programs before the programs have been fully developed. Biological control is going to be in our future but it is not the instant answer to problems with pesticide resistance.