# The Biocontrol Roller Coaster Ride

BY KARL DANNEBERGER

Biocontrols are the use of living organisms to control pest populations. By definition, biological control agents of insect pests are known as predators, parasitoids and pathogens, while those of weeds include insects and pathogens. Biological control agents of pathogens are often referred to as antagonists.

In turf we have observed both successes and failures that mimic the history of biocontrol agents in various other cropping systems. Although biocontrol agents for turf are rather limited, considerable research interest is building for developing these types of control products.

It's relevant at this time to look at biocontrol agents in a historical perspective and examine the challenges facing the development of these pest controls. Biocontrol agents date back to 200 A.D., when the Chinese were the first to use natural enemies to control pests, specifically those on citrus. Ants and the usefulness of ladybird beetles for controlling date palm pests and aphids respectively were identified in 1200 A.D. These early attempts of releasing natural enemies were rather haphazard with no scientific approach that continued for hundreds of years.

In the United States, interest arose in biocontrols when large crop plantings or farming began to occur in 1850. Initially these larger farms were pest free, but within a few years farmers saw their crops destroyed by massive hordes of alien pests. Given that classical synthetic pesticides were not invented yet, considerable effort was spent on finding natural enemies. Biocontrol interest peaked from 1930 to 1940 when 57 different natural enemies were established in various places around the world.

After World War II, biocontrols fell in popularity because of the development of relatively cheap and effective synthetic chemicals for the control of pests. However, attitudes began to shift in the 1950s. The development of pest resistance changed how researchers looked at controlling pests. In 1959, Dr. Vern Stern at the University of California Riverside conceived the idea of economic injury levels and economic threshold, which led to integrated control practices and away from scheduled pesticide applications. This idea became the basis for Integrated Pest Management (IPM). A second catalyst for change was Rachel Carson's book, "Silent Spring," which attacked the presence of synthetic pesticides in the environment. As an alternative pest control strategy and as a component of IPM, biocontrol development interest increased substantially through the 1970s and early 1980s.

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In 1983, Frank Howarth published a landmark paper, "Classical Biological Control: Panacea or Pandora's Box?" which changed the government's perception of biocontrol agents. In his paper based on work in Hawaii, Howarth laid out the non-target effects that biocontrol agents could have. He concluded that classical biocontrol of insect pests significantly contributed to the extinction of desirable species.

Although some of Howarth's claims of species extinction were unjustified, the impact of biocontrols on non-target pests became a concern. Several studies including those published recently in *Science* pointed to the need to look at the risks biocontrols have on non-target native species and what long-term effect they may have on the ecological system. The concern exists that long-term or permanent changes in ecosystems occur through the introduction of foreign agents.

Optimism remains high for discovering biocontrol agents that will help reduce pest pressure in turfgrass systems. In this current environment of heightened enthusiasm for the discovery of biocontrol agents. we need to be reminded that success depends on understanding the complexity of the turfgrass system and the ramifications outside of simply controlling a pest.

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