Integrated Pest Management — A Different Approach for the Same Old Problems

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Pythium

Grubs

Nematodes

It doesn't matter whether it's a disease, insect or weed problem, the end result is an unacceptable turf condition.

BEFORE the Second World War, chemical pest control in all aspects of agriculture was, by today's standards, virtually nonexistent. Man was fighting a losing battle against weeds, diseases, and insects because brute force could not win over sheer numbers. Then in 1944 it was discovered that the synthetic chemical 2, 4-D controlled dandelions, plantains, and other broadleaf weeds in bluegrass turf. A new era in pest control began shortly after the war with the tremendous success of synthetic organic insecticides, such as DDT and BHC.

According to United States Department of Agriculture records, by 1971 more than 900 pesticides had been registered, and American manufacturers were producing 1.1 billion pounds of pesticide material each year. While enormous economic gains such as increased crop production and reduced world health problems were being realized from using these pesticides, it also had become apparent that their uncontrolled use had negative effects on the environment. Rachel Carson's book *Silent Spring*, published in 1962, focused attention on the negative aspects of pesticides, and public awareness on this subject has continued to increase. It is a fact, though, that present standards of life could not be maintained without them.

While most research on pest control has focused on chemical approaches, alternative pest control methods have also been pursued. The concept of integrated pest management (IPM) began to be popularized in 1971 for commercial crop production. In the May issue of *Agri-Chemical Age*, it was reported that today, 50 USDA-sponsored IPM projects covering 23 crops and two livestock pests are in effect. Over the past decade, the popularity of the IPM approach has continued to grow in urban horticulture and turf management.

Integrated pest management would best be described as a total management system of combined pest control alternatives to most effectively and efficiently limit pest damage.

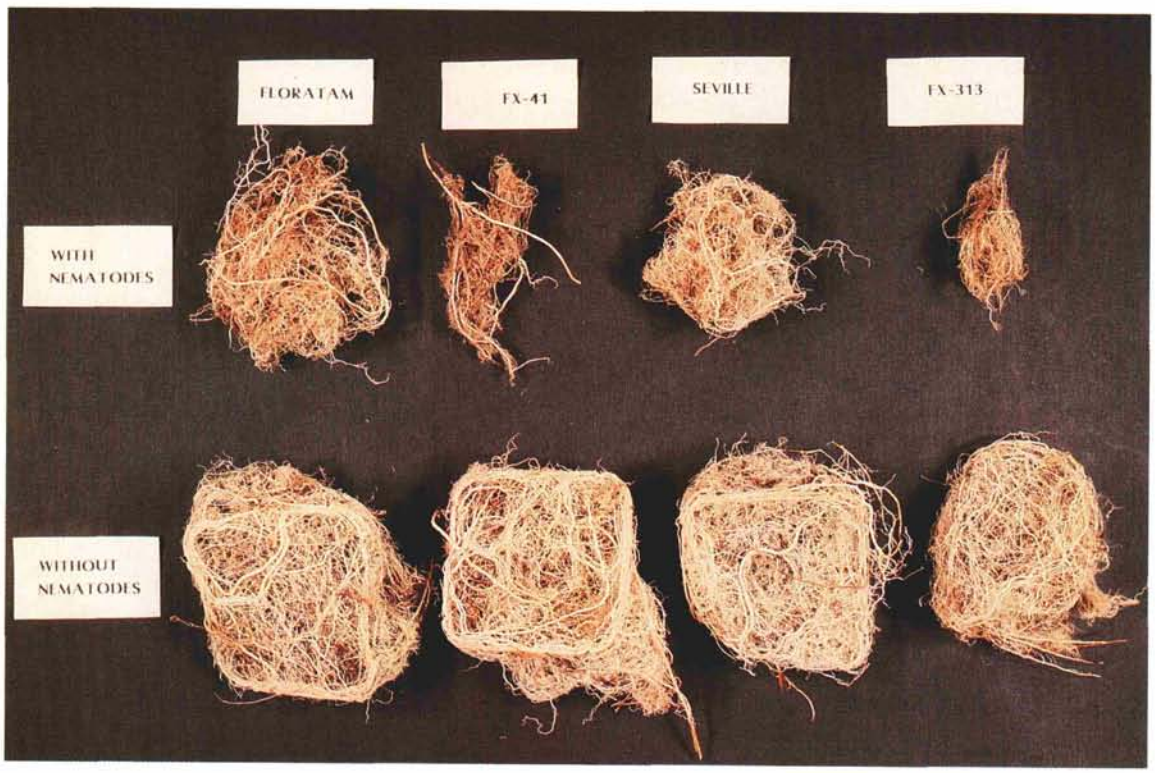
It must be realized and accepted, however, that totally eradicating any pest organism is economically and environmentally impossible. Thus, an integral part of an IPM system is establishment of an economic or unacceptable aesthetic injury threshold. Once this threshold is determined, multi-disciplinary tactics are incorporated into a total management system that prevents pest populations from reaching sufficient numbers to cause damage. To achieve this objective, management strategies utilizing regulatory, genetic, cultural, biological, physical, and chemical tactics are all incorporated into a total program.

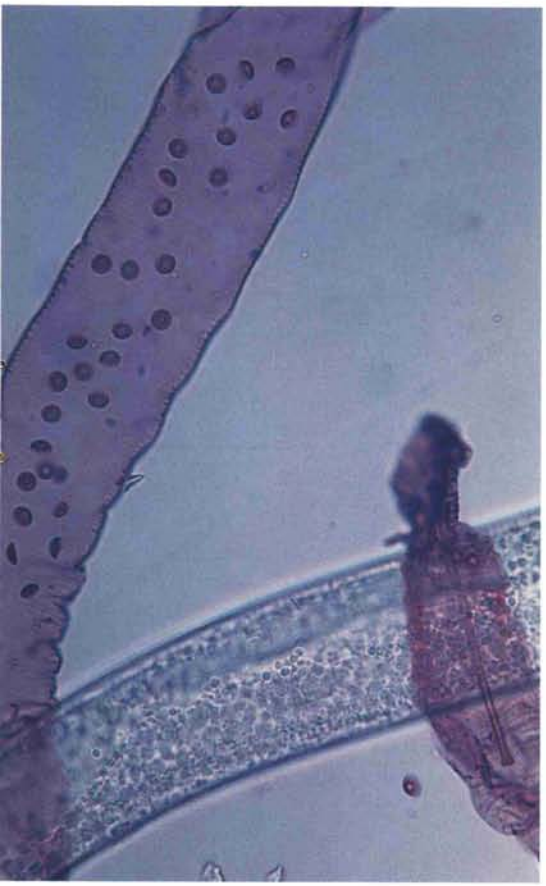
Examples of these tactics can be seen in basic course management programs.

(Above) Correcting situations which limit turf growth and quality, such as poor drainage, are as integral to successful pest control as knowing the correct rate of a particular pesticide to apply.

(Right) Nematode populations on St. Augustinegrass.

(Opposite page) The control of sting nematodes with a bacterial organism.





Regulatory — Typically this involves governmental or industry practices such as inspection and/or certification of seed or vegetative planting material.

Genetic — Without a doubt the oldest and most widely used pest control measure of all. The use of naturally occurring resistant varieties of turfgrass, or the development of resistance through breeding programs has and will continue to provide a defense against pest activity. The rapidly growing science of genetic engineering should lead to further advances in this area.

Cultural — It is well known that a healthy, dense, and actively growing stand of turf will compete against weed invasion. Also, a healthy turf will tolerate and recover more rapidly from attacks of insects and diseases. Thus, the practices of proper fertilization, irrigation, and mowing frequency, along with other basic cultural management practices such as aerification and verticutting for thatch control can be considered as pest control measures.

Biological — This is one area that has received increased attention for quite a few years. Biological control is the use of natural enemies such as diseases, parasites, or predators against a target pest organism. In Florida, mole crickets annually damage a tremendous amount of golf course turf. Research efforts are underway to develop biological control of mole crickets by using all of its known natural enemies. Another example of biological control is milky spore disease *(Bacillus popilliae)* of Japanese beetle grubs, which has had some commercial success. However, the practicality of biological control tactics on golf courses may be limited because of the lag time between implementation and control, which results in a potential for unacceptable damage. Also, the regular use of pesticides typically has a negative impact on control organisms.

Physical — The simple act of cutting a goose grass crown out of a putting green would be classified as a form of physical pest control. This and other activities such as trapping June beetles or even correcting a drainage problem are useful tactics that definitely should be incorporated into the total pest management program.

Chemical — When IPM systems were first initiated, environmentalists thought all agricultural endeavors could be handled on a purely organic level, while at the same time, pesticide manufacturers opposed IPM because of the presumption that they would be put out of business. In reality, both groups were wrong, because it is a fact that pest problems are not going to disappear. On a golf course where acceptable thresholds are quite low (and actually zero in the putting green area), the selective use of chemicals will continue. As for pesticides in an IPM program, the objective is intelligent use. Frequent observation, accurate record keeping, and evaluations for alternative control methods or adjustments to basic management practices precede the application of a pesticide. The pest organism must be accurately identified so that the most effective control material can be used.

In reality, IPM is not a totally new technology or method of pest control. Without a doubt, at one time or another, every golf course in the country has applied IPM tactics. For the most part, however, they were probably not done with the conscious thought of developing a total program. But in a few cases, IPM programs have been developed specifically for courses.

Brunswick, Georgia, located on the lower coast, has been an active seaport since the late 1700s, when cotton was king. In 1897, mole crickets were introduced into the United States at Brunswick in ships' ballasts. Because it had no natural enemies, and the long hot summers, mild winters, and sandy soils of the area were an ideal environment, the mole cricket easily became established. The lush turf of the golf courses that were developed later on the Barrier Islands near Brunswick also proved to be an excellent host for mole crickets. But as long as long-residual insecticides were available, mole crickets really were not a problem. That was true until federal and state laws removed these materials from the marketplace.

Since their initial introduction, mole crickets have gradually spread through the coastal areas of the Southeast from the Carolinas to Texas. They have developed into a major turfgrass pest, with damage and control efforts estimated to exceed $44 million annually in Florida alone.

Even though state and federal agencies conduct active research on mole crickets, the problem had become so severe in the Brunswick area that Tom Burton, golf course superintendent of the Sea Island Golf Club, spearheaded a private, cooperative mole cricket management and research program in 1987. The project has been funded by the Sea Island Golf Club, the Jekyll Island Authority, and Sea Palms Golf and Tennis Resort.

Dr. Leon Stacey, an entomologist and consultant, was hired to head the project, and through the incorporation of various IPM strategies, a very successful mole cricket control program was developed.

The key to success of this program has been proper timing of insecticide applications. Linear pitfall traps were installed on the golf courses to monitor mole cricket activity. The traps were checked once or twice a week, and females were dissected to observe the stages of egg development. It was then possible to predict when peak egg hatch would occur and the most appropriate timing of control applications. Besides tremendously improving control results, insecticide usage and control cost has been significantly reduced. It should also be noted that work was conducted to determine the most effective control materials.

A great deal of research and work is still necessary in the development of total golf course IPM programs that encompass both turf life cycles and pest control strategies. There is certainly no reason not to take advantage of existing technology. Hopefully, after a review of the IPM mentality, a different perspective on the management of pest problems can be put to beneficial use at your course in the control of the spectrum of pest problems that are an inevitable part of course management.