

useful for mole cricket control. With chlordane, managers did not worry about trying to manage the turf to withstand higher pest populations or use treatments during the most susceptible point in the insect's life cycle. However, since the loss of these chemicals, nematodes and mole crickets have become Florida's most serious turf pests. Researchers are now trying to find alternative methods of management and control of these and other pests.

Another method of manipulating grass for better pest resistance is through plant breeding. In the past, turf breeders basically tried to satisfy the golfer by developing grasses which had finer texture, greater density, and the ability to survive at an lower mowing height. Today, turf breeders will have to redirect their efforts by including pest resistance in turf species lines. More time and research will be necessary to solve the problems basically ignored for the last 40 years.

Previous Turf IMP uses

As noted, IPM practices have not been widely used in the turfgrass profession. One reason for this is the lack of adequate federal and state money available for turf researchers wishing to explore IPM approaches. Traditionally grown crops such as cotton, soybeans, and corn have enjoyed the majority of available grants for this type of research and subsequently have made the greatest strides in IPM strategies. Hopefully, turf researchers will soon receive similar considerations from agencies when money is available.

Only a few reports are available dealing with turf IPM programs. One experimental IPM program in selected urban areas in Florida has resulted in an approximately 90 percent reduction in pesticide application without sacrificing visual quality. Differences were not noted between lawns sprayed only when pests reached aesthetic thresholds compared to lawns sprayed preventively. Results from a similar IPM scouting program in Maryland suggested that 40 to 80 percent of the pest problems could be eliminated by simply substituting resistant ornamental varieties or eliminating pest-susceptible plants in residential lawns. The most significant lawn problems in Maryland were low soil pH, low soil fertility, and weed invasion.

A country club in Massachusetts has used IPM practices to control Japanese beetle grubs. It used sex tabs and floral lures instead of the traditional pesticide treatment approach to attract insects into

traps. For example, during August, 47 traps were placed in the rough and 160 gallons of beetles were collected. The number of grubs were reduced from 50 to 75 per square foot to only one or two. Pioneering IPM strategies for insect management also are being practiced on other golf courses, such as Pine Ridge in Baltimore, and those along the Georgia coast.

A pilot project dealing with incorporating traditional IPM strategies into managing golf turf was recently completed in South Carolina. Turfgrass Information and Pest Scouting (TIPS) was administered on seven golf courses. Scouting was performed and recommendations made to the superintendents about their agronomic practices and their judicious use of pesticides. Among the accomplishments of this project was a 30 percent use reduction in fungicides by monitoring weather parameters and not applying chemicals until conditions were favorable for disease development. Nitrogen use also was reduced 35 percent without sacrificing the quality of the golf courses by using judicious amounts timed to produce maximum benefits in relation to the plant's growth cycle and environment.

Strategies of integrated pest management

Developing a strategy of using IPM requires reliable information about the following:

1. The total ecological situation involved with the particular pest. Turf maintenance where the ecological factors affecting the pest can be altered to reduce its population, or the turf can be managed to overcome or tolerate the pest.
2. The use of a monitoring system to carefully follow pest trends. This determines if a pesticide will be necessary, and if so, when it would be most effectively applied.
3. Maintain careful records to measure IPM effectiveness.
4. Inform the public these practices are being implemented because golf course managers are just as environmentally aware and sensitive as they are.

Tactics involved with these IPM control strategies can be subdivided into **chemical** and **non-chemical** strategies. Both are equally important in implementing a successful program.