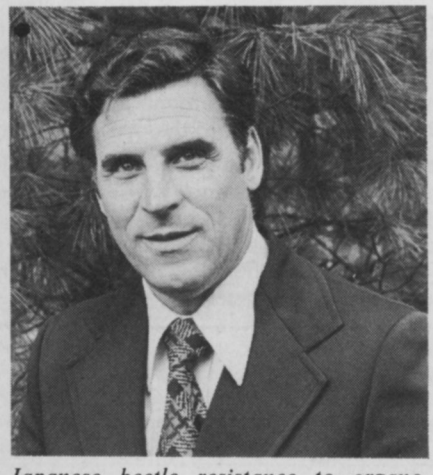
A Chemical Resistant Grub . . . A New Control Approach

"JAPANESE BEETLE resistance to chlorinated hydrocarbons is a documented fact," says Dr. Richard Miller, Ohio State University extension entomologist.

"That's not to say that all Japanese beetle populations are showing resistance, but the incidence seems to be increasing. Controlling resistant populations means turf managers must switch to their only chemical alternative — organophosphate compounds," he explains.

That's precisely what Tom Buehner, Fox Chapel Country Club greens superintendent, Fox Chapel, Pa., did when the golf course had a severe infestation of Japanese beetle grubs a year ago. "We'd been using chlordane for so long that the grubs seemed to get fat on it," recalls Buehner. "We had to apply Diazinon to get good control."



Japanese beetle resistance to organophosphates hasn't occurred, but if they're applied indiscriminately, there's trouble ahead, predicts Dr. Richard L. Miller, extension entomologist, Ohio State University.

Milky spore disease, a biological control method is another alternative to chlorinated hydrocarbons, reports John L. Hellman, University of Maryland, extension entomologist.

"Several years ago, Maryland had a statewide milky spore application program designed to control Japanese beetles. A dramatic decline in the population was attributable to the program," relates Hellman.

A combination of milky spore and organophosphates might be the best answer to controlling resistant Japanese beetle grubs, suggest Hellman.

"Organophosphates will give quick, short term control of the grubs and should be used only when grubs become too numerous. Milky spore, three to four years after application, can give long term control. They're much more compatible than chlordane or aldrin," explains Hellman.

Insecticides are generally not compatible with milky spore because they kill off the grubs necessary for spreading and multiplying the spores. "Insecticides are needed when counts exceed three Japanese beetle grubs per square foot," says Hellman.

When the situation demands using an insecticide, turf managers are cautioned not to use chlorinated hydrocarbons. Instead use organophosphates in conjunction with milky spore, Hellman advises. "Organophosphates are active for a brief period compared to chlorinated hydrocarbons which can persist for three to four years. A few grubs are better than none when using milky spore disease," explains Hellman. "Short residual chemicals allow more flexibility in years when grub counts are naturally low.

"As strange as this might seem, it's not good to totally eradicate a population. When that happens, the milky spore remains inactive until grubs are reintroduced into the soil. Because beetles are very mobile, they can reinfest turf in a short time. Then milky spore will again continue to multiply," explains Hellman.

Organophosphates give fast and effective grub control and work very well with a milky spore program to give both long and short term Japanese beetle control, says John L. Hellman, extension entomologist, University of Maryland.

"Turf managers are very familiar with the properties, limitations and application techniques of chlorinated hydrocarbons," notes Miller. "But organophosphates have different characteristics that must be taken into consideration," he reports.

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"There's not a wide margin of error when using short residual organophosphates. Product labels have very specific directions regarding application and post-application procedures," explains Miller.

"Watering the treated area immediately after application is important for many insecticides, but even more so for organophosphates," says Miller. "If it's not watered in immediately, the compound will dry on the grass or get tied up in the thatch and not penetrate the soil deeply enough with sufficient toxicity to control the grubs."

Ultraviolet rays of sunlight will rapidly decompose most organophosphates if they are allowed to remain on the surface of the ground. That's another reason for watering in, he adds.

"Using short residual insecticides requires more management input on the part of turf managers," notes Hellman. "Timing of application to synchronize with the migration of grubs to the soil surface is critical, because organophosphates are effective for only three to four weeks.

To be certain that grubs will be contacted by insecticide, it's vital to inspect before application, says Hellman.

Miller and Hellman agree that turf managers should abandon high rate, preventative programs.

"One of the reasons resistance has developed agains chlorinated hydrocarbons is because applications have been routinely scheduled," claims Hellman. "Instead, insecticides should be applied only when needed and then only apply as much as is required to get control.

"Chemical insecticides are tools with time limitations," states Hellman. "The more of one insecticide that's used, the sooner it could become ineffective."

Japanese beetle resistance to organophosphates hasn't occurred, but it could, reports Miller. "If they're applied indiscriminately, and this has often been the case with chlorinated hydrocarbons, resistance is certain to develop. Should that occur, there's trouble ahead. We're not overly blessed with a multitude of chemical insecticides," concludes Miller. □

Short residual insecticides require more management expertise, says Miller. "Frequent inspections for grubs and other insects means getting down on your hands and knees to diagnose the problem correctly," he said.