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itive label for golf courses—be sure to heed label directions.

This area of pest management is in dire need of research attention. This research is moderately long-term because the focus needs to address cultural practices which inhibit colonization.

**I love earthworms, but they've just about eliminated morning mowing of our fairways. We don't want them to go away, just out of sight. Any help here?** (Racine County)

Nothing is labeled by the EPA for earthworm control. Although the benefits of earthworms have been summarized previously (see Delahaut and Koval, Grass Roots XVII:4 pp.14-15) even beneficial organisms in the wrong place or in high populations become pests. Unfortunately, the only legal recourse for golf course managers is to select insecticides used for control of the insect complex which will impact earthworms at the same time.

In laboratory studies last winter, earthworms confined to soil treated with trichlorfon, ethoprop or carbaryl were toxic at all rates tested. Cyfluthrin, chlorpyrifos and isazophos were toxic at the higher rates tested and *Bacillus thuringiensis* and isofenphos were relatively non-toxic.

In a limited trial several years ago, the liberal addition of a wetting agent to the tank mix coupled with a high water volume substantially reduced earthworm populations.

**Golfers on our course this summer (again!) drove me crazy because the mosquitoes drove them crazy. I have told them there isn't anything practical that I can do to control mosquitoes. Am I correct in telling them that or should I plan for something next year?** (Columbia County)

There is never an answer to mosquito control that will keep everyone happy. First, mosquito repellents should be utilized, particularly by those people mosquitoes seem to love (and there are some). Second, the problem species should be properly identified. There are many mosquito species that annoy people, some are very localized and others can migrate 20-30 miles.

The most common problem mosquito in Wisconsin is capable of travelling the 20-30 miles! If your golf course is in the down-wind direction of the breeding sites, you can expect fresh batches on a regular basis. Since this question came from an area in the Wisconsin River basin, the original statement holds—expect mosquitoes.

There are mosquito species that breed in culverts, old tires, discarded cans etc. If you find you are dealing with this type, clean-up, drainage and larviciding may help.

Adult mosquito control is not advised as a regular practice for reasons I'll not go into here. However, for specific major events and/or specific sites, temporary relief from adult mosquito activity is possible. Relatively low rates of low risk insecticides such as malathion or pyrethrins can be applied to turf and shrub areas to temporarily reduce mosquito numbers. Since adult mosquitoes prefer to stay where the humidity is highest, there is little need to treat areas above four to six feet. Refer to UWEX publication A1991, *Controlling Mosquitoes*, which is available from your county Extension office.

**What were the bugs in our honeylocust trees this summer? I wasn't watching closely enough and, suddenly, a number of them looked pretty bad. What should I have done?** (Iowa County)

The primary damage was caused by the honeylocust plant bug. The honeylocust plant bug is a member of a very large family of plant bugs that feed on many types of vegetation. Many in this group, including the honeylocust plant bug, inject a toxic saliva as they feed. The action of sap removal and saliva injection causes the collapse of cells surrounding each feeding puncture. As a result, the leaves become curled and distorted and may completely dry-up if plant bug populations are high.

By late June or early July the plant bugs mature and start to lay eggs for next year. Adult feeding injury is usually less severe and trees may partially or fully recover during late summer.

A leafhopper is also found on honeylocust at the same time the plant bug is causing injury. Generally, leafhopper injury is less severe.

Both insects overwinter in the egg stage. Eggs are deposited in the smaller twigs and branches. Egg-laying sites can be easily detected at this time if controls were not used earlier in the summer. Eggs hatch as leaves are starting to expand in the spring. Controls are most effective when the insects are very young. A single application of insecticidal soap made when the new leaves are approximately one-half of their fully expanded size works well. Apply in early morning or near sunset for best results. A number of other materials are effective as well if insecticidal soap is not used; acephate, bifenthrin, carbaryl or cyfluthrin are a few examples.

**At our May WGCSA meeting, Dr. Randy Kane spoke of increased disease problems normally associated with more southern locations cropping up here in the north. Do you see that as a possibility with turf insect pests?** (Rock County)

We may experience a few more pests extending their range northward after a series of mild winters and long growing seasons. However, these have always proven to be temporary with mother nature providing the correction.

Of greater concern are new pest introductions such as the gypsy moth and the Japanese beetle. Both could severely impact golf course operations because of their ability to damage virtually all plant species grown on the golf course. Both insects can, and are, expanding their range primarily through human assistance. Our energy and attention should be directed toward detection and elimination of these pests.

A number of insect pests migrate in each year. The severity of the problem is dependent upon winter conditions and spring plant growth in their overwintering sites rather than what happens in Wisconsin. Regular early season migrants of interest to golf courses include: potato leafhopper, aster leafhopper, greenbug and black cutworm.

**Very early last spring Phil Pelitteri predicted significant insect problems for the 1992 season. How accurate was Phil's crystal ball?** (Dane County)

Phil is always right!