Subsurface Placement of Pesticides

By Patricia J. Vittum

Sometimes when turf managers use a pesticide and it does not come up to expectations, they think the material has "failed." In fact, there are many circumstances when the material was not used appropriately—for any number of reasons.

The actual cause(s) of poor results could be the wrong rate, the wrong time of year or even the wrong time of day, the wrong use of water before or after the application, the wrong material for the pest, or the wrong formulation for the conditions.

For example, one insect pest that causes headaches to turf managers is the white grub. In the damaging stage, the white grub is active at or below the soil-thatch interface. For the insecticide to be effective, grubs must come in contact with it. To accomplish this, insecticides that are applied to the turf surface must be moved down into the thatch or the grubs must be drawn higher into the thatch. In most cases, post-application irrigation (or rain) is used to initiate that movement. Often, the water is not put on quickly enough after application or it is not put on in sufficient quantity to accomplish the job.

High Pressure Liquid Injection

The challenge faced by northern pesticide applicators regarding white grubs is virtually identical to that faced by southern pesticide applicators dealing with mole crickets.

Several years ago, engineers in the Southeast came up with a concept of using very high pressure and small nozzle tips to drive materials deeper into the thatch than a conventional surface application. They built a prototype "high pressure liquid injection" (HPLI) unit that was used to make applications on small research plots.

This unit's delivery system included two independent two-foot-long booms with nozzles spaced three-inches apart. The booms rode directly on the ground with the nozzles projecting a few degrees forward of vertical. The nozzle tips were no more than 0.5 inches off the ground. The technology used in the research units is available on commercial units with up to 1,000-gallon tanks with 16-foot booms.

This unit was used to apply field trials testing control of mole crickets. Many of those trials were conducted under the direction of Dr. Pat Cobb at Auburn University in Alabama.

Preliminary indications were that the technique had tremendous potential and had many advantages over a conventional surface application. Environmentally, the surface exposure to pesticides was reduced considerably. One study on warm-season grasses showed that surface residues were reduced up to 90 percent. In addition, there was virtually no drift during the application because the nozzles rode so close to the ground. In certain circumstances, the rate of application could be reduced 50 percent using HPLI and still provide the same level of control as a conventional application at the full rate.

There is at least one other kind of high pressure liquid injection equipment currently available. Like the equipment used for our trials, it does not slice the turf. This unit, available on a contract basis in parts of the Northeast, uses a computer-driven micro-plus system. The depth of penetration into the turf can be set by adjusting the length of each micro-pulse, the pressure, and/or the ground speed. The unit seems to be the "second generation" of HPLI and has lots of application possibilities.

Some golf course superintendents may be thinking that the Toro HydroJect unit might be used to deliver liquid insecticides below the surface. In fact, the HydroJect was not built for the purpose of applying pesticides, so the seals and delivery systems are not designed to handle pesticides. In addition, the purpose of the HydroJect is to shatter the soil structure using even higher pressures than the systems so far described.

Studies conducted by Dr. Harry Niemczyk at Ohio State University indicate that placing insecticides *below* the point where grubs are active is just as ineffective as not moving them down from a surface application. Placing materials as little as an inch below the thatch-soil interface results in their failure to perform.

Turf Slicing Systems

Another approach to subsurface placement of pesticides involves slicing the turf in a manner similar to an overseeder, and dropping the material into the slice. There are several companies working on variations of this theme, including large tractor-driven units and smaller walk-behind units.

In each case, the concept is the same—slices are cut in the turf, tubes deliver pesticides (through gravity feed) into the slice, and a plate "tucks in" the turf around the slice.

There are at least two obvious advantages to such a system. First, there is no high pressure system with the inherent dangers of blown lines. Perhaps even more importantly, you can set the application depth very accurately—often within 1/8-inch. As a result, you can adjust the unit to handle the conditions of each given turf area.

Slicing units can deliver pesticides to areas with thick (more than one inch) thatch just as effectively as to areas with less thatch. The main drawback so far is that the slicing process does pull out a lot of thatch. In a large operation, this "hay" must be disposed of to prevent the machine from clogging. Some of these units have liquid adapters so that they can be used to apply liquid formulations into the slices.

The technology of sub-surface placement of pesticides has expanded tremendously in the past couple years. It appears that the technique reduces surface exposure tremendously.

Environmental Concerns

Drift risk is reduced considerably with the HPLI technique. As a result, turf managers could make applications during mildly windy conditions when conventional applications would not be an option. In addition, subsurface application techniques *may* provide applicators with a longer window during which they can apply post-application water. Results of some of our trials suggest delays in post-application watering are less crucial in subsurface applications than in conventional.

Subsurface placement of pesticides is a technology whose time has come, particularly in areas of the country where environmental concerns are paramount. ❑

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ROOKIES

PRODUCT UPDATE

FERTILIZER COATING

Poly-S technology, developed by the O.M. Scott & Sons Company, was created combining a proprietary polymer coating and a sulfur coating to provide controlled-released turf fertilizers with residual programmed from two to six months.

Technological advantages include: no dust and decreased build-up on equipment; increased slow-release values and resistance to environmental/temperature stress; uniform release, reduced surge growth, and low phytotoxicity; and a source of nutrients for turf with extended release.

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The Greensmaster 3100 riding mower has a hydraulic oil leak detector to safeguard against spills. The "Turf Guardian" detects leaks as small as five ounces and alerts the operator to move the mower off the course in the event of a leak.

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