



A rear view of the injection rig crossing a fairway. Tractor speed is set at six miles per hour. Note the cuts made by the machine.

#### FLORIDA APPLICATOR SAVES OWNER \$45/ACRE

# Injection System Keeps Nematodes In Check

**A** CUSTOM applicator in Orlando, Florida is injecting a nematicide in large turf areas at a cheaper cost than the price of the same chemical formerly used as a soil-drench.

Jack Russell, owner Soil Fumigants Inc., and his son John II, have applied Nemagon on 15 golf courses totalling approximately 500 acres this past summer in Florida with excellent results.

"On large turf areas we have been charging \$50 an acre for material and application," Russell says. "This is figured as \$25 for material, \$15-\$20 for overhead and 10-12% net profit."

Russell, who has been selling nematicides for many years, says that costs are variable. It's possible that costs in the future for treating may be cut even more.

"New and more efficient machinery could be a factor in reducing this cost. We are now developing a new

injection unit that if successful, should be much more efficient than the coulter and shank unit we are now using," Russell comments.

He said Nemagon applied with soil injection results in a deeper rooted and healthier turf which requires less irrigation and less fertilization. It suffers less from winter kill than infected turf.

"Also, a healthy turf free of nematodes will flourish to the point of crowding out most weeds, greatly reducing the need for herbicide application," Russell says.

In 1969, Dr. Vernon Perry and associates in cooperation with Shell Chemical Co. and the Gainesville Country Club, applied liquid Nemagon in fairway turf plots using a simplified two shank tractor drawn applicator with gravity feed.

The tool consisted of coulters set 12 inches apart to cut the sod fol-

lowed by thin shanks to further open the soil to an average depth of four inches.

A delivery tube was attached to the back of each shank to permit the metered Nemagon to dribble into the cut to the four inch depth. A packer wheel or a fairway mower followed to seal the cut. Sometimes both were used.

Afterwards, a light sprinkling of water from the irrigation system helped insure there would be practically no loss of chemicals.

"Results from these tests indicated not only that the injected fumigant was far more effective than the drench application, but also that a much lower dosage of active Nemagon could be used, thus lowering the cost of application," says this businessman.

Russell further explains that preliminary data from Dr. Perry's tests indicated that about 20-25 pounds of actual Nemagon would give adequate nematode control for 12 to 24 months for established turf on sandy soils.

Using results from Perry's plots as a guide for dosage and methods, Russell developed a larger commercial rig to inject the chemical.

The first injecting unit had eight coulters and shanks set 12 inches apart on a heavy tool bar. Behind each shank was a heavy packing wheel to seal the cut.

"We soon learned that with eight shanks we could not adequately penetrate the soil so we cut back to six shanks and added 1,000 pounds of weight to the rig, Russell says. "This gave us the turf penetration needed; but we had to go to a heavier tractor to handle the weight."

Large balloon tires replaced conventional bar treads. Russell found he could operate over soft fairways and even on slopes around greens and across tees with minor turf markings.

"We inject at a ground speed of six miles an hour. Pressure is set at 40 psi. Nozzle orifices of sufficient size are used to deliver 25 pounds of actual Nemagon per acre," he says.

"Calibration has been so accurate that we have been using material consumption as a method of determining acreage covered."

He says that chemical costs for nematicides applied as a drench often are \$60-\$80 an acre excluding cost of application. By injecting into the soil, cost of materials with excellent results has been reduced to \$25 an acre.

The high investment for equipment—\$10,000 to \$12,000 is usually prohibitive to the superintendent

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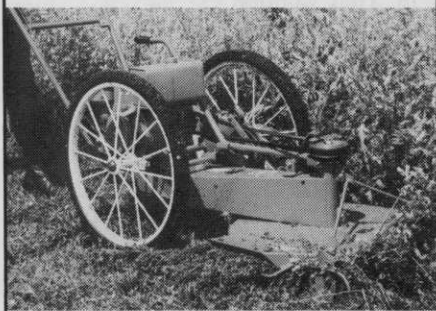
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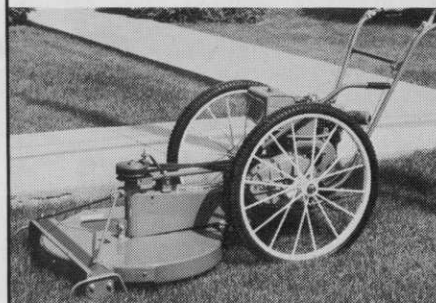
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Mounted on a 3-point hitch hydraulic system, the machine can be lifted out of the ground or set to any desired depth. Shown here are the coulter, the nematicide pipeline just behind it and the packing wheel. Just above the coulter is a 350 pound weight. A similar weight is on the opposite side.

## INJECTION (from page 20)

who desires to do the job himself. A custom applicator can pro-rate equipment investment costs over many jobs and charge less. Another plus for custom application is the supervision by technical and experienced personnel.

How do golf superintendents feel about nematicide injection?

"We applied a nematicide at the Ormond Beach course with excellent results," says Russell. "Then the superintendent moved to another course. He called me to apply nematicide on 80 acres of that course. He said he had saved many times over the cost of the application."

Russell formulated the first batch of Nemagon to be sold in Florida about 20 years ago. Pursley Sod Co., St. Petersburg, purchased a shipment and used it on newly established zoysia lawns in the area as a surface drench.

"At first we thought the problem of turf nematodes had been solved but as time went on it was rather apparent that surface drenches of Nemagon were inefficient," he notes.

"Though good results have been obtained by drenching small areas, there were many failures showing up because of insufficient drench, buffering action of organic matter present and insufficient vertical

penetration."

Other turfmen have tried injecting nematicides into irrigation lines for application to large areas with varying results. Russell points out that failures can usually be attributed to the high chemical loss by evaporation from the water droplets before they fall to the surface and penetrate the soil.

He said some tests have demonstrated as much as 50-75 percent nematicide loss from sprinkler irrigation systems.

As early as the late 40's, Drs. Perry and Christie, then with the USDA in Sanford, Fla. found that many turf problems in central Florida were caused by one or more species of plant parasitic nematodes.

Shortly after, but before Nemagon was registered, Dr. Perry experimented with injecting D-D soil fumigant into turf soil. There was some phytotoxicity at the point of injection but this disappeared and the turf responded favorably.

Russell said unfortunately this method of injecting nematicides into the soil was never tried commercially and was subsequently overlooked. The veteran nematicide expert says there is no reason why turf equipment can't be developed for home lawn injecting. "We are now working along these lines and hope to have equipment available soon."