

Turf Nematicides: AN UPDATE

By Robert A. Dunn

Turf grasses do not generally lend themselves to many of the nematode control practices that are so useful for farmers who grow annual crops. Crop rotation and physical manipulation of the soil before planting are not often feasible for permanent sod. Nematode resistant varieties of warm-season grasses are not yet available and are never likely to cover the broad range of nematodes of turf in Florida. Biological control is a realistic dream for the future, but is not yet practical. The principal means of managing turf nematode populations, beyond manipulating the few cultural factors that are mentioned below, is application of a chemical nematicide that is registered for the purpose. With a few provisos, then, this article sets forth the current state of nematicides for established turf grasses in Florida.

Effect of turf management practices on nematode populations and sensitivity of turf to nematodes. Turf can often survive well despite the presence of moderate levels of several nematodes. In fact, there is less likely to be serious damage to turf when the population is composed of a few individuals of many different kinds of nematodes than when only a few kinds are very numerous. A moderate level of turf management, rather than extreme neglect or overuse of water and fertilizer, seems to give turf the best chance to strike a reasonable balance with the nematodes that live at its roots.

Deep, less frequent watering encourages roots to grow deep, so they can draw water and nutrients from a much greater volume of soil than could the short roots that develop with brief daily watering cycles. When the roots have access to a greater volume of soil, the turf is less susceptible to brief dry spells and the grass can recover more of the fertilizer nutrients that have been applied.

Overuse of nitrogen encourages excessively tender, lush root growth, which in turn supports maximum nematode reproduction. Under such conditions, nematode populations often become unnaturally high. The high populations may destroy roots faster than they can be replaced under the best of cultural conditions, and they will certainly wreak havoc if the artificially high level of maintenance is interrupted for any reason. Do not neglect the complete nutritional needs of turf; for instance, strong root growth depends on having adequate potassium levels.

A given level of nematodes will cause less apparent damage to turf if other sources of stress, often easier to manage, are kept to a minimum. Plant diseases, especially root rots, are often associated with nematode popu-

lations. A serious insect outbreak may dramatically reduce the reserves that turf needs to withstand nematodes. Nutrient deficiencies and soil compaction or water-logging can make turf more sensitive to nematode damage to roots. When turf is mowed too short, it is unable to manufacture enough carbohydrates to support normal root growth and replacement. Turf that is planted in too much shade will also have more trouble providing for adequate root growth.

In short, if you want to maximize your chances of developing major turf nematode problems, scalp the grass regularly, water it daily and lightly, push it with high nitrogen fertilizers but with little or no other nutrients, and ignore insect and disease problems.

Nematicides. As noted above, there are many good reasons for the importance of chemical nematicides in turf nematode management. Before discussing individual products, we should discuss some general points about turf nematicides.

Environmental hazard is a real risk that goes with use of any turf nematicide. These products are all highly toxic, water-soluble organophosphate pesticides. All can be hazardous to wildlife and fish as well as people. All will (must!) leach through the soil profile and thus present some risk of groundwater contamination. Pesticide regulations and labelling restrictions are rapidly being changed to address those problems more directly. For instance, labels of all nematicides will soon reflect potential risks to endangered wildlife species. Some nematicide labels have specific warnings concerning the risk of groundwater contamination. Failure to fully meet the requirements of any such labelling could result in civil or criminal penalties, so they must be taken very seriously. Some of these new restrictions may make it impossible to apply some or all nematicides to locations where the manager is certain that nematodes are causing serious damage to turf. Nevertheless, if the label forbids the use, the turf manager has no legal alternative but to forgo the use of the nematicide and to try to manage the nematodes by cultural manipulations.

The effects of nematicides are only *temporary*. The products that may be applied to established turf must remain in the root zone (upper soil level, usually 4-10 inches, where most roots grow) for several weeks to have maximum effect. If they are lost from that zone too early, many nematodes that were temporarily inactivated may quickly resume feeding, reproducing, and damaging turf roots. Even if nematode kill is complete in

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that zone, no treatment can reach all nematodes at all depths of the treated area. Therefore, nematodes will reinfest the turf root zone quickly after the concentration of nematicide drops below that needed to inhibit their activity. How long the chemical remains above that level is determined by a combination of many factors: physical and chemical characteristics of the nematicide, rate applied, how much water has passed through the soil profile, and soil texture, organic matter, and pH. Hence, no nematicide provides more than a limited period of relief from nematode stress. Applying a nematicide does not guarantee that turf will grow better. A nematicide can only improve turf health if:

1. nematodes that it can control were causing the problem to start with;
2. the material is used correctly;
3. other major (growth-limiting) pest and disease problems are under control;
4. all normal nutritional and environmental needs for turf growth are provided during the protected period.

Uniform penetration of soil by the dissolved active ingredient is critical for effectiveness of any nematicide. Physical soil treatments that will improve uniformity of soil penetration by water will enhance nematicide performance: aeration, vertical mowing, thatch removal, etc. should be done before applying any of these products. Soil should be moist but not saturated when the nematicide is applied, and foliage must be dry if a granular formulation is used. Follow application with 1/4 to 1/2 inch of water, as directed on the product label, to incorporate the active ingredient into the root zone.

Comments about specific nematicides beyond the notations in the table follow in this section. Note these care-

fully, and pay close attention to new labels, information released by the registrants (manufacturers), and news from regulatory agencies to be sure you are not accidentally guilty of pesticide misuse.

MOCAP® 10G will soon appear with some important label changes. New product package labels will refer to commercial turf use, but not to home lawn applications. A separate label being issued to cover only the home lawn application will identify the product as a Restricted Use Pesticide for that specific use. Therefore, Mocap 10G will not be a Restricted Use Pesticide for commercial turf or other crop uses. However, the label on the bag will not permit use on home lawns or "domestic turf," and the separate label which the applicator must have with him when using the product for home lawns will make it mandatory that anyone using it there must be a Certified Applicator.

NEMACUR® 3 is registered specifically for golf courses, with a notation that it is "not recommended for tees or greens." It is not registered for any other turf use. Its label limits it to no more than 2 applications per year, as is also the limit for NEMACUR® 10G. Application more frequently or to turf in other sites than are specifically allowed on the label is a serious violation of FIFRA. Birds are very susceptible to this chemical; every effort must be made to water it into the soil quickly after application. If the spray rig or granule spreader can cover ground much more rapidly than the irrigation system can move, slow the rate at which fairways are treated to keep close to the watering cycle, rather than risking a prolonged period of bird exposure.

NEMATICIDES FOR ESTABLISHED TURF IN FLORIDA

| Product | Legal sites, methods | Amount |
|-----------------|---|---|
| Mocap 10G | Commercial turf, such as golf courses, sod farms, and cemeteries; may be applied to many grass species. See note in text about application to home lawns. | 4.6-6.9 lb/1000 sq ft, or 200 to 300 lb/acre. |
| Nemacur 10G | Golf courses, cemeteries, sod farms, industrial grounds, parkways, roadways; <i>do not use</i> on residential lawns or public recreational areas other than golf courses. Restricted Use Pesticide. | 2-1/3 to 4-2/3 lb/1000 sq ft or 100 to 200 lb/acre. |
| Nemacur 3 | Golf courses; not recommended for tees or greens. <i>Do not use</i> on residential lawns or public recreational areas other than golf courses. Do not use more than twice per year. Restricted Use Pesticide. | 9-12 fl oz/1000 sq ft or 3-4 gal/acre. |
| Sarolex | Turf and lawns. | 1.5-2.5 pt/1000 sq ft or 8.2-13.6 gal/acre. |
| Scotts Pro-Turf | Contains ethoprop, the same active ingredient as Mocap. For use only by professionals; <i>do not use</i> or store in or around the home. | 9.2 lb/1000 sq ft or 400 lb/acre. |