

2002-2003 Final Report for Slosson Foundation

Management of plant parasitic nematodes on turf in the urban landscape

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Introduction

Plant parasitic nematodes are microscopic roundworms that can be a major problem in turfgrass maintenance (Figure 1). The University of California publication *Turfgrass Pests* (Radewald and Westerdahl, 1988) identifies the following nematodes as causing damage in California turf: root knot (*Meloidogyne* sp.) (Figure 2), ring (*Criconebella* sp.), dagger (*Xiphinema* sp.), lesion (*Pratylenchus* sp.), stubby root, (*Trichodorus* sp.), and pin (*Paratylenchus* sp.). The *UC Pest Management Guidelines for Turfgrass* (Westerdahl et al., 2000) add the seed and leaf gall (*Anguina pacificae*) (Cid del Prado Vera and Maggenti, 1984; Winterlin *et al.*, 1986) and sting nematode (*Belonolaimus longicaudatus*) to this list. In addition, we have recovered large numbers of spiral nematode (*Helicotylenchus* sp.) from problem turfgrass locations.

There are currently no control measures available to California homeowners. Over the past several years, a large variety of soil amendments have become available that have potential to reduce nematode damage to turf. We have tested a number of these on various crops and seen reductions in nematode populations, and/or increases in growth and yield (Westerdahl *et al.* 1992, 1995). As a result of these trials, the first biological nematicide DiTera (which is a toxin produced by a fungus in fermentation and marketed by Valent) has achieved California registration on a variety of crops (Westerdahl *et al.*, 1997).

Unlike many deep rooted agricultural crops, a significant portion of turf roots are within the top 5 cm (2 inches) of soil making them accessible by conventional application

methods such as drenching, or spraying followed by irrigation. Although our trials are planned for Northern California, the control measures developed should have statewide application.

During the past year, two trials were conducted to determine the nematode control obtained with a new biological nematicide DiTera (Valent), plus eight insecticides and seven fungicides available to homeowners compared to an untreated control, and the commercial nematicide NemaCur (not available to homeowners).

Materials and Methods

Two trials with 17 treatments each (including an untreated control and a standard chemical) were conducted in randomized complete block designs with 4 replicates per treatment. Each trial consisted of the same treatments but was conducted in a different urban turfgrass location. Metal rings 25 cm (10 inches) in diameter were inserted 2.5 cm (1 inch) deep into actively growing turf. Measurements to identify the location of each ring were taken from five reference locations. Rings were spaced at least 25 cm (10 inches) apart. Treatments were applied to the turf within each ring and drenched with 500 ml of water. Rings were removed after the water had penetrated the soil and standard cultural practices were followed.

Three weeks following treatment, treated areas were rated for turf quality, photographed, and a core 2.5 cm (1 inch) in diameter was taken from the center of each treated area. Nematodes were extracted from each core, identified, and counted. Nematodes present at the sites included root-knot (*Meloidogyne*), spiral (*Helicotylenchus* sp.), ring (*Criconebella* sp.), and seed and leaf gall (*Anguina pacifica*).

The treatments were DiTera, plus eight insecticides (Figure 3) and seven fungicides (Figure 4) purchased at a local hardware store. NemaCur (currently registered for nematode control on commercial turf) served as the standard nematicide treatment for comparison. Each treatment was repeated three times at the same location at three-week intervals.

Results and Discussion

The results obtained to date are preliminary and need to be repeated in further trials, because nematode populations show a great deal of variability in natural situations. In these trials, root-knot nematode demonstrated the most consistent populations. Samples taken three weeks following the last applications demonstrated reductions in root-knot nematode populations for DiTera, NemaCur, and several of the insecticides (Figure 3) and fungicides (Figure 4) tested.

If repeatable in future trials, it is encouraging to think that some products currently registered for use by homeowners against other pests could provide relief from plant-parasitic nematodes as well.

Conclusion

Every year, we hear from home gardeners who are devastated to learn that their once beautiful lawns have become infested with plant parasitic nematodes. At the present time, we have no solutions to offer. While eradication of plant parasitic nematodes is not feasible, it is very likely that one or more of the treatments we will develop will be able to reduce nematode numbers and provide improved growth. Since the treatments we are

using are classified as biological nematicides, natural products, or are currently registered for use on turf against other pests, they should be readily available to the home gardener.

Literature Cited

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Figure 1. Damage to lawn caused by root-knot nematode.

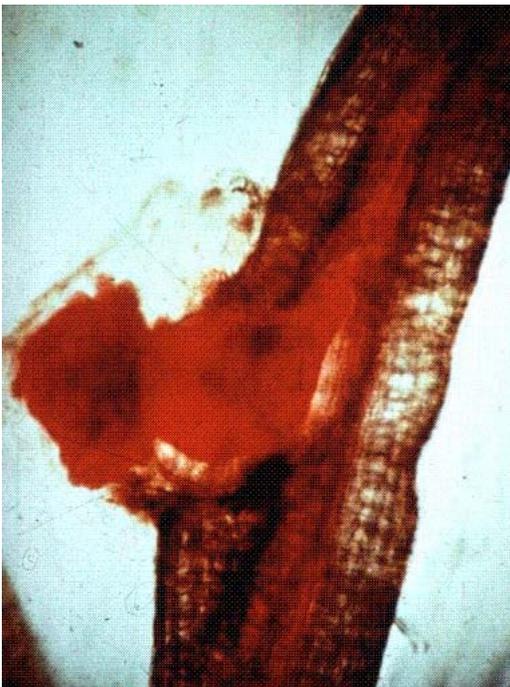


Figure 2. Adult female of root-knot nematode within root (right). The head of the nematode is within the root. At the left in the picture is the swollen body of the nematode and an egg mass containing several hundred eggs.

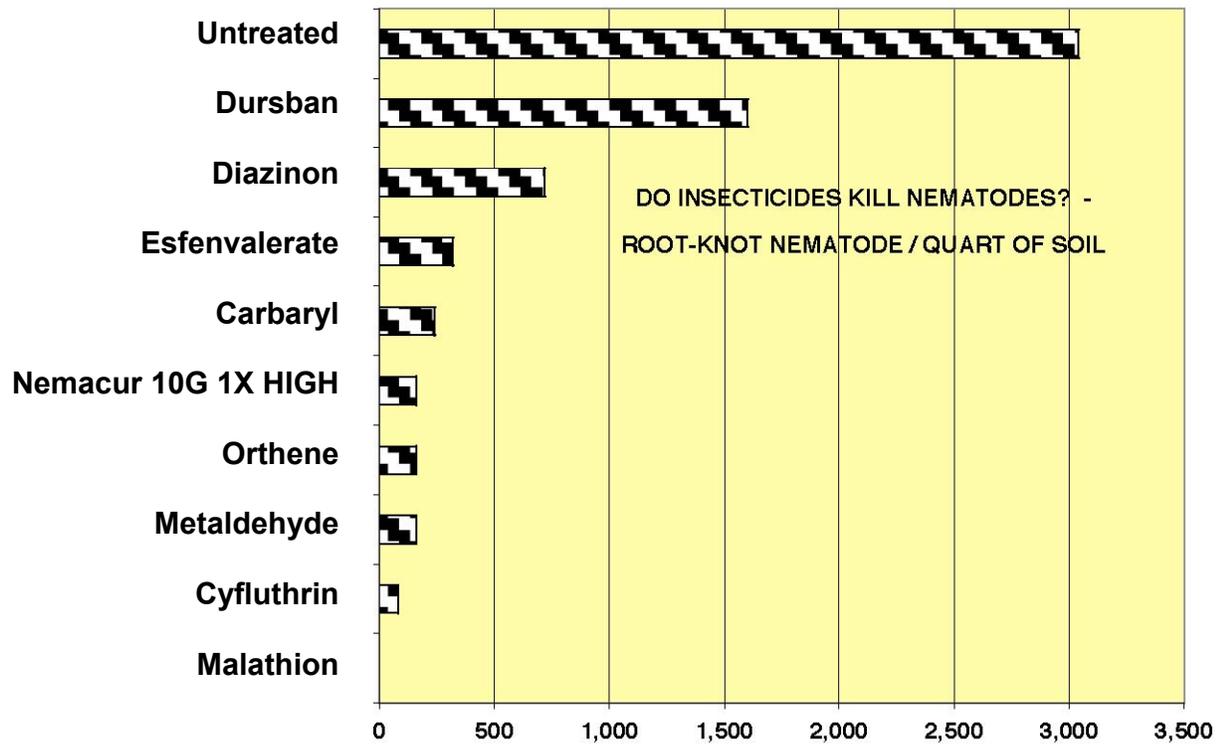


Figure 3. Results of a trial in which eight insecticides purchased at a local hardware store were compared to an untreated control and the commercial nematicide Nematicur.

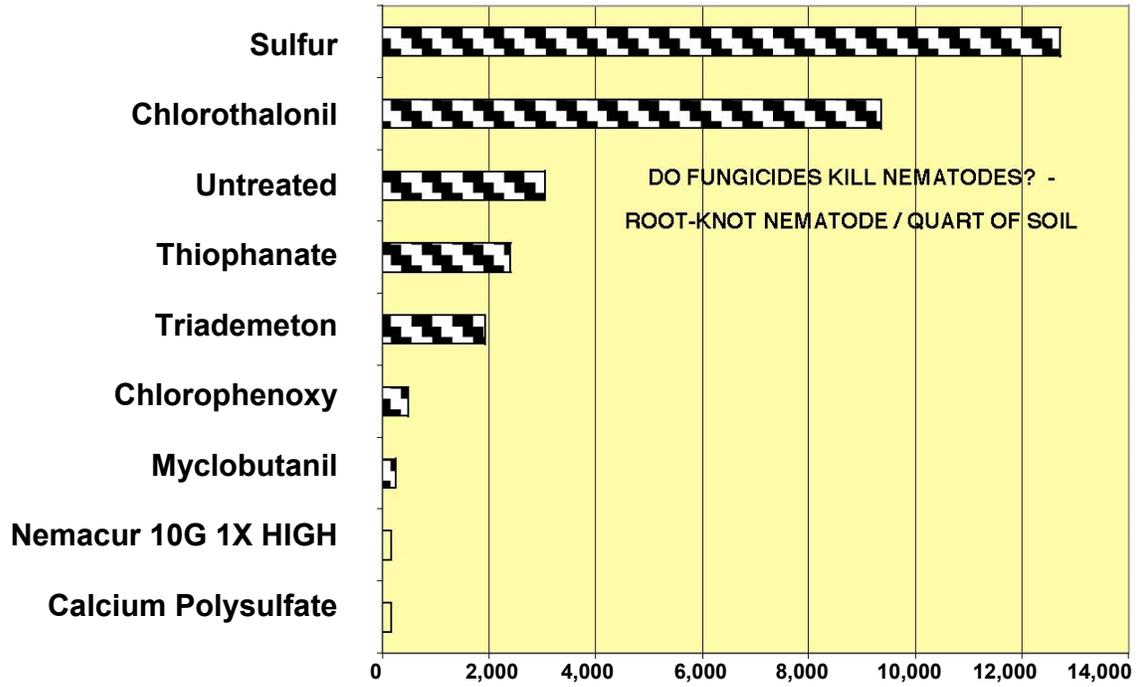


Figure 4. Results of a trial in which seven fungicides purchased at a local hardware store were compared to an untreated control and the commercial nematicide Nemacur.