# NEMATODES IN TURFGRASS RESEARCH 1993

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## INTRODUCTION

Many species of plant-parasitic nematodes attack the roots of turfgrasses. Nematode feeding generally results in the production of disease symptoms. This damage is often quite subtle or is often improperly diagnosed because feeding by nematodes doesn't always result in characteristic symptoms. Proper identification of the causal agent should be accomplished before implementation of any management strategies. Otherwise, treatment may not result in alleviation of disease symptoms.

The impact of plant-parasitic nematodes in Michigan turfgrasses is not very well understood. Nematodes are often found in samples collected from turf exhibiting disease symptoms. In an attempt to obtain additional information regarding nematodes associated with Michigan turfgrasses and their potential role in these situations, a survey was conducted in 1993.

## METHODS

Sixteen golf courses in Michigan were sampled for plant-parasitic nematodes in the fall of 1993. The golf courses sampled are listed by region: Forest Acres G.C.; Flint G.C. and Walnut Hills G.C. (Central); Elmbrook G.C.; Garland G.C. and Grand Traverse Resort (North); Ann Arbor C.C.; Detroit G.C.; Franklin Hills C.C.; Knollwood C.C.; Maple Lane G.C.; Oakland Hills C.C.; and Stoney Creek G.C. (Southeast); Blythefield C.C.; Cascade Hills C.C. and Crystal Springs C.C. (West). Ninety-five samples were collected in total from these locations. Twenty-three samples were taken from fairways, 68 from greens and 4 from tees.

Seven homelawns (12 samples) and one business (2 samples) were also sampled as part of the survey. These samples were collected from E. Lansing or Lansing. In total, 109 samples were gathered from all the locations. Samples were usually collected from turf displaying disease symptoms, however, at least one sample was taken at each location from apparently healthy turf. The samples were collected with a variety of soil probes to a depth of ca. 5 inches.

Samples were processed for plant-parasitic nematodes after they were returned to the laboratory. Nematodes were identified and counted. Thirty-eight samples were then taken to the soil testing lab at M.S.U. for fertility and soil particle analyses. Samples with low and high counts of nematodes were analyzed in an attempt to determine of one or more edaphic factors correlated with the presence of nematodes or the disease symptoms observed.

## RESULTS

Plant-parasitic nematodes were found in 106 of the 109 samples collected during the survey. A total of 32,292 plant-parasitic nematodes were counted with a mean count of 262.3 nematodes per sample.

Stunt, ring and spiral nematodes were the most commonly encountered nematodes. These nematodes were extracted from over 60% of the samples (Table 1). In total, 12 different types of nematodes were recovered during the survey and they are also listed in Table 1. At least 5 types of nematodes were found associated with the turf at every location sampled. In general, turfgrasses support a great diversity of nematodes.

The total numbers of plant-parasitic nematodes were summed for all 109 samples and grouped into 7 ranges. Roughly 20% of the samples collected had 500 or more nematodes in total (Table 2). Regardless of nematode species, samples with counts of 500 or more nematodes can be considered above damage thresholds for commonly grown turfgrass species.

Thirty-eight samples were saved for fertility analyses. Soil particle analyses were also performed on 18 of those samples. Of the 12 greens sampled, 7 were sands, 4 were loamy sands and one was a sandy loam. The average particle analysis for these 12 samples was 87.1% sand, 5.8% silt and 7.1% clay. The tees (2 samples) were 80.4% sand, 10.5% silt and 9.1% clay and the average analysis for the 3 fairways was 67.7% sand, 16.2% silt and 16.1% clay. The homelawn sample was a sandy clay loam. All the soil types supported nematodes, although nematodes are often more abundant in sandy soils.

Many of the greens sampled were deficient in potassium (Table 3). Potassium applications were recommended on 88% of the green tested. Disease symptoms due to nematode feeding are often more pronounced in soils low in potassium. Phosphorus applications were recommended for very few samples.

Most of the soils tested were alkaline. The lowest pH values (6.3) were associated with fairways. However, most of the samples were very close to neutral and there didn't seem to be any correlation between pH and nematode abundance. These results aren't surprising considering the rather narrow range of pH values encountered during this study.

## CONCLUSIONS

Three conclusions were drawn from this survey. 1) Plant-parasitic nematodes are often associated with turfgrasses exhibiting disease symptoms. Many of the samples (>20%) had nematode counts above damage threshold levels. 2) Nematode numbers were not correlated with any of the edaphic factors measured, however, 3) many greens sampled were deficient in potassium.

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**Table 1. List of plant-parasitic nematodes, frequencies of recoveries and maximum counts in 1993 turfgrass survey per 100 $cm^3$ soil (n=109).**

| NEMATODE | Frequency | Max. Count |
|---|---|---|
| Stunt | 76.1 | 880 |
| Ring | 69.7 | 1400 |
| Spiral | 61.5 | 2040 |
| Root-lesion | 49.5 | 140 |
| Lance | 22.0 | 399 |
| Pin | 17.4 | 99 |
| Root-knot | 16.5 | 55 |
| Cyst | 10.1 | 41 |
| Sheath | 6.4 | 60 |
| Dagger | 4.6 | 20 |
| Needle | 3.7 | 1 |
| Stubby-root | 0.9 | 1 |

**Table 2. Distribution of 1993 turfgrass samples by total numbers of plant-parasitic nematodes recovered in 100 $cm^3$ soil.**

| Nematodes/sample | no. samples | % in range |
|---|---|---|
| 0 | 3 | 2.7 |
| 1-49 | 23 | 21.1 |
| 50-99 | 16 | 14.7 |
| 100-249 | 19 | 17.4 |
| 250-499 | 27 | 24.8 |
| 500-999 | 18 | 16.5 |
| 1000-1999 | 2 | 1.8 |
| 2000+ | 1 | 0.9 |

**Table 3. Soil testing data, 1993 turfgrass survey**

| | pH Data | | % Fert. Recommendations | |
|---|---|---|---|---|
| LOCATIONS | mean | range | Phos. | Potash |
| GREENS (n=25) | 7.3 | 6.9-7.8 | 28 | 88 |
| FAIRWAYS (n=8) | 6.8 | 6.3-7.5 | 0 | 25 |
| TEES (n=2) | 6.95 | 6.7-7.2 | 0 | 50 |
| HOMELAWNS (n=3) | 7.0 | 6.5-7.5 | 0 | 100 |