Dr. Randy T. Kane, Turfgrass Advisor (312) 954-2753
University of Illinois & CDGA

Nematode Populations on Chicagoland Putting Greens

by R. T. Kane
U of I/CDGA Turfgrass Advisor

As you probably know by now, I have been monitoring nematode populations on Chicago area putting greens for the past two seasons (1987 and 1988). Interest in plant parasitic nematodes and possible damage to turf is increasing, and I have had many requests from superintendents for information, or to perform actual analysis of soil samples. Two reasons for the recent interest are: 1)increased awareness by today's superintendent of the health and activities of roots and the rootzone; and 2)a number of diagnoses of nematode incited turf loss made by the U of I plant clinic, other labs, and myself in 1986 and 1987.

The plant parasitic nematodes most commonly found in high numbers in central and northern Illinois are the stunt (*Tylenchorhynchus*), spiral (*Helicotylenchus*), and ring (*Criconemoides*), all of which are ectoparasites. Ectoparasites feed on the root surface by piercing digestive enzymes, and then sucking up the leaking nutrients. In some cases, the endoparasitic root-knot nematode (*Meloidogyne*) has been observed. Endoparasites physically penetrate and move through the root and feed on inner cell layers.

Below ground symptoms of heavy nematode feeding include stunted, thinned, or shallow roots, lack of root hairs, and in some cases root swellings or galls. Above ground symptoms include chronic yellowing and thinning, or rapid wilting of foliage when under water stress. Symptoms may be scattered and patchy or widespread and general on a green or area of a green.

Diagnosis of a nematode problem is difficult for several reasons. First, a representative soil/rootzone sample must be acquired, handled properly, and the nematodes extracted; then the nematodes must be accurately identified and counted. Second, we don't have well established "action thresholds" in the midwest, since most of the nematode research has been done in the south. Third, root decline is often caused by a complex interaction that may involve many factors including fungi, nematodes and other inhabitants of the rootzone. Also, management variables such as irrigation, fertility, aeration/soil compaction, etc. have to be factored into the disease equation.

In April of 1987, I began a survey of area putting greens to determine the prevalence of different genera of parasitic nematodes, in an attempt to relate populations to turf injury. Soil samples were taken from a total of 23 greens from eight different golf courses in the Chicago area. Greens were sampled five times through the season (April-October) in both 1987 and 1988. Soil samples consisted of 3/4" cores taken randomly from each green, approximately 6 to 8 cores per green. Nematodes were extracted and counted from the soil mix (only to the depth of rooting) using the sugar flotation-centrifugation technique.

While conducting the survey, I identified several greens with high nematode populations, and these were subsequently treated with Nemacur to see what effects treatment would have on nematode counts and turf health. In June of 1987, an entire green was treated with Nemacur, and populations were monitored on that green for the rest of '87 and all of '88. Also, the front half of two other greens were treated with Nemacur in May of '88. Also, the front half of two other greens were treated with Nemacur in May of '88, and populations were then monitored for the remainder of 1988. The later study permitted direct comparisons of treated vs. untreated areas on the same green. I would like to specially thank Dennis Wilson, Superintendent at Sunset Ridge CC for cooperating in this part of the study.

Some general results of the survey are presented in **Table 1.** Of the 23 greens sampled, about 25% (6 greens) had elevated counts of one or more species. This meant stunt or spiral counts in the range of 500 to 1500 per 100cc soil, or ring counts in the 300+ range. **Table 2** shows the average counts for these selected greens. Since 3/4 or more of the greens had fairly low counts (less than 250), the overall averages in Table 1 are lower, in the 150-300 range. Note, however, that the **average counts** for the stunt nematode at all sampling dates in 1988 exceeded 300 per 100cc of soil. Up until now, a count of 300 for stunt has been considered an important threshold which could lead to turf damage. In Illinois, perhaps this threshold should be higher in the future.

Nemacur treatments were quite effective in reducing nematode populations in putting green rootzones (**Tables 3 and 4**). Note that the reduction in counts was fairly slow to occur, but the effect was long lived. Table 3 shows the residual effect of an '87 Nemacur treatment on the 88 populations, and also shows a possible "rebound" effect in the stunt population in September 1988.

The comparison of treated vs. untreated areas on the same green in Table 4 further shows the effect of Nemacur. Nematode counts were reduced by 85 to 90% by the end of the season. Visible improvements in heat stress tolerance and root depth were observed on treated areas during the rough weather in mid-August. The primary effect of Nemacur was on the color and vigor of **Poa annua**, which was greatly improved in areas that received the nematicide.

After seeing the results of these studies, I am even more convinced of the importance of nematodes in heat stress and decline of **Poa annua** on certain putting greens. Bentgrasses are also affected, but the deeper root system and greater heat tolerance of bents makes them more resistant to the effects of high nematode counts. What we need to know is — how high is high? What is an appropriate action threshold for stunt or other nematodes in Illinois? Hopefully we will be able to answer these and other questions with upcoming research at the U of I. Funding for a graduate student to look at some of these questions is being provided by the Illinois Turfgrass Foundation, the MAGCS, and the CDGA.

(cont'd. page 4)

(Nematodes cont'd.)

Table 1. Average counts at each date for all greens sampled in the survey. Numbers are counts of each species per 100 cc soil.

	1987			1988		
	stunt	spiral	ring	stunt	spiral	ring
Apr.	160	62	91	339	110	86
May	148	132	111	323	134	105
June	210	183	252	332	85	129
Aug.	325	208	143	474	202	155
Sep.	515	301	328	582	372	194

Table 2. Average counts for selected greens with abnormally high populations of one or more nematodes (count per 100cc soil).

	1987			1988		
	stunt	spiral	ring	stunt	spiral	ring
Apr.	333	167	141	895	170	121
May	270	248	172	670	239	156
June	517	303	421	688	129	208
Aug.	809	345	207	945	344	233
Sep.	975	575	454	944	653	288

Table 3. Effect of Nemacur treatment on nematode populations over two seasons (numbers are counts per 100cc soil).

	1987*			1988		
	stunt	spiral	ring	stunt	spiral	ring
Apr.	180	320	30	85	25	10
May	300	910	96	52	10	42
June	150	510	90	172	15	60
Aug.	125	375	100	180	100	60
Sep.	30	304	90	340	60	50

*one nemacur treatment applied to entire green following May '87 sampling; no treatment applied in '88.

Table 4. Comparison of nemacur treated vs. untreated areas of two putting greens (counts per 100cc soil).

	Untreated Half			Treated Half		
	stunt	spiral	ring	stunt	spiral	ring
Apr '88	975	200	30	--	--	--
May	721	86	104	414	110	158
June	825	100	220	113	95	200
Aug.	1150	107	179	112	17	114
Sep.	1160	655	225	172	8	47

counts are average of 7 greens sampled; half of each green treated with Nemacur at the May sampling date.

"Nutrient functions...soil/fertilizer chemistry coverage was great!"
"The information is important...planned and programmed very well."
"This seminar will help me save on my fertilizer costs."

PLANT NUTRITION AND FERTILIZERS

Presented by

Wisconsin Golf Course Superintendents Association
and
Golf Course Superintendents Association of America

Dr. Paul Rieke of Michigan State University and Dr. Robert Carrow of the University of Georgia will present an overview of the soil and plant factors that influence turfgrass nutrition. Covered in depth will be soil chemical, physical and biological properties that influence nutrient uptake by the plant and nutrient reactions in the soil. Turfgrass nutritional requirements, fertilizer responses and the development of fertilizer programs will be covered. This "brush up" course will help you evaluate your fertilizer program based on the most current scientific knowledge of the soil, plant and fertilizer carriers.

MILWAUKEE, WISCONSIN

March 23-24, 1989
Holiday Inn West

This two-day educational seminar earns two Continuing Education Units (CEUs) for those who pass the exam at the end of the course. In addition, GCSAA awards certificates of achievements to successful participants.

Luncheons on both days of the seminar are included in the registration fee. Registrants are responsible for making their own hotel reservations; the Holiday Inn West offers special rates of $52 for a single or double to seminar participants. Hotel reservation forms will be sent upon receipt of your registration in PLANT NUTRITION AND FERTILIZERS.

Register now!!

Complete the form enclosed.
include your check or credit card information
and return to:

GCSAA Regional Seminars
1617 St. Andrews Drive
Lawrence, Kansas 66046

Refunds will be allowed only for WRITTEN cancellations received at GCSAA Headquarters two weeks in advance of the seminar.

CALL 1-800-472-7878 FOR MORE INFORMATION

Telephone registrations by credit card welcome!