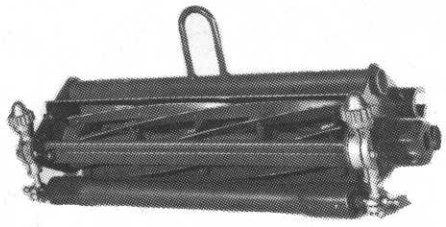
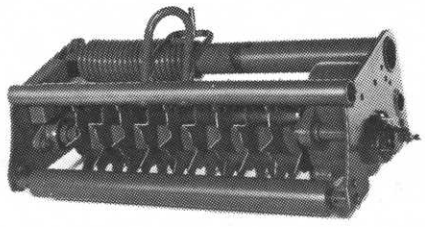


GREENSMOWER



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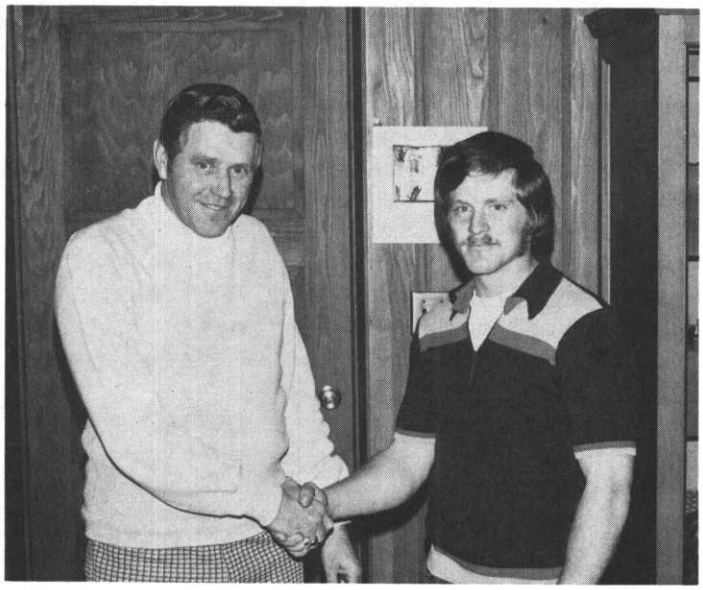
MARCH SEMINAR UPDATES MEMBERS



GLAD HAND. Jerry Bibbey, left, welcomes new member, Dick Hoffman of Minnesota Valley, assistant to Larry Mueller.

DUTCH UNCLE. No, the subject was Dutch Elm Disease with Mark Stennes making a point to appreciative audience.

Although the winter weather made weekend travel difficult, 40 plus members learned much and enjoyed immensely the Mini-Seminar at the Arboretum on Monday, March 5. We would like to thank all of the participants in that afternoon sesson, Dr. Ward Stienstra, Dr. Harvey Meredith, Dr. Francis Devos and Mark Stennes for enlightening us with their interesting talks. A special thank you to Dr. Devos for all of his help in coordinating the arrangements that made the Arboretum a perfect setting.

At the monthly business meeting that followed the seminar, Dick Hoffman, the assistant superintendent at the Minnesota Valley C.C. was elected into membership of M.G.C.S.A. as a Class BII Member. Also the following members were awarded classification changes: Boots Fuller to Class A, Dan Evavold to Class F, Kerry Glader to Class A, Mark Smith to Class A, Scott Ainsworth to Class A, Denny Owens to Class B and Fred Taylor to Class D.

RESEARCH COMMITTEE REPORT

At the March 5 Mini-Seminar Business Meeting suggestions were solicited for the Summer Research Program. The topics introduced were the Atenius pest, Nematodes, Fusarium, Pythium, Sand Top Dressing & Fertility, Slides for the indentification of Turf Pests and disease problems and a call-in service to aid superintendents with various turf problems.

On March 7 the Research Committee met at the New Hope Golf Course in an attempt to prioritize the suggestions. Dr. Stienstra joined the committee later in the morning and after two hours of discussion we developed tentative plans for the 1979 Summer Research Program.

Summer Program Outline:

I. Programs to be continued
   - A. Sand & Fertility Demo - Rochester Country Club
   - B. Dollar Spot & Fertility - U of M St. Paul Campus

II. New Programs
   - A. Pythium study & control - U of M St. Paul Campus
   - B. Fusarium study & control - U of M St. Paul Campus

III. Other Programs
   - A. Field sampling for Nematodes by Superintendents
     1. Sampling instructions
     2. Sample labeling
     3. Organization of results area wide
   - B. Atenius observation & counting
     1. Light attraction sampling
     2. Slides on identification
     3. Organization of results area wide
   - C. Call in problems - Dr. Ward Stienstra has made himself available. You may call 612/373-0937 - if out make sure you give info for return call: Name, Course Name, Course Address, Phone #, Best time to contact.
     1. Please don't abuse
     2. For out of town superintendents, every county agent has free telephone service to U of M.

Note: Dr. Acerno of the University of Minnesota isn't sure we have a severe enough problem with Nematodes or Atenius pests to be concerned. However, if our

Continued on Page 5

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Continued from Page 3

samples are labeled properly he can organize the results and determine their severity. Do not waste your time and money sampling non problem turf areas. Sample only the problem turf areas.

Sample labeling instructions:

Name: _____
Course Name: _____
Course Address: _____
Green/Tee/Fairway #: _____
Symptoms on Problem Area: ___
_____

Again, for out of town superintendents, take your samples to the county agent and he will forward to the university. IMPORTANT! The more we use the county agents the more aware they will become of the Turf Industry and our problems.

NOTE: Dr. Stienstra will have a full time research assistant this summer.

NOTE: Coming up next month, a research article by committee member, Dean Sime, Dr. Stienstra's summer research plot plans and material on identification and counting of the Atenius pest.

Dick DeSplinter
Chairman
Research Committee

HAPPY EASTER!

From the Staff of Hole Notes

Instructions For Soil Samples

D. H. MacDonald, Agricultural Extension Service
U of M Institute of Agriculture, St. Paul, Minn.

How to Collect Soil Samples Suitable for Analysis for Plant Parasitic Nematodes

The Department of Plant Pathology, University of Minnesota, is now operating a nematode identification laboratory. The numbers and kinds of plant parasitic nematodes present in a 100 cm^3 (one-fifth pint) sample of soil are determined using techniques most suitable for Minnesota soils and nematodes. The following information is presented so that soil samples collected will be suitable for analysis and the results will accurately reflect the true plant parasitic nematode population in the sampled area. Further information about plant parasitic nematodes in Minnesota may be obtained from Plant Pathology, Fact Sheet No. 31, "Plant Parasitic Nematodes", available in the Bulletin Room, University of Minnesota, St. Paul, Minnesota 55108.

Sampling Techniques - General Considerations

Many different species of plant parasitic nematodes are native to Minnesota and can live in any soil that will support plant growth. Although these nematodes may be found as deep in soils as plant roots penetrate, the largest populations are typically present in the root zone about 2-10 inches (5-25 cm) below the soil surface. Plant parasitic nematodes are usually not uniformly distributed across a field or even in an area as small as a home lawn or golf green. Instead they are often most numerous in specific locations of limited area. To obtain a true picture of plant parasitic nematode population in a lawn, green, greenhouse bed, orchard or farm field, individual samples should be taken from problem areas where plant growth and/or yields have not been satisfactory as well as from areas where growth and/or yields are "normal".

The size of plant parasitic nematode populations often is larger in late June or early July and in September or early October than at other times of the year. Since soil texture can also affect the size of the nematode population developing in or around the roots of any host plant, a soil sample ideally should be collected from an area that is essentially uniform with regard to soil type, elevation, and drainage. The root-knot nematode is difficult to detect in Minnesota soils while crops are actively growing. Soil samples may be collected whenever the soil is not frozen or excessively wet.

Sampling Techniques - Specific Recommendations

With a 1-inch diameter (2.5 cm.) soil tube, collect 10 soil subsamples and combine them as one sample in a sturdy plastic bag. Samples from grass areas should be taken where root development occurs, usually no deeper than 4-6 inches.

The total volume of soil, including any root fragments, obtained by combining the 10 subsamples should be between one pint and one quart (500-1000 cm^3). The plastic bag should be carefully sealed so that the soil does not dry out and identified, on the outside, with the sample number or location, sampling date, and collector's name and address.

The number of samples to be collected in a plant parasitic nematode survey of a field or other growing area will vary according to the number or problem areas. When a turf area must be certified as being free of a given plant parasitic nematode, a large number of samples must be collected. Specific instructions for the collection of such samples may be obtained by contacting the Plant Nematology Laboratory, Room 110, Stakman Hall, U of M, St. Paul, Minn. 55108. All soil samples should be protected from exposure to high temperatures or direct sunlight and should be delivered as quickly as possible after collection to the above address together with a check made out to the Dept. of Plant Pathology to cover the processing fee of $3.00/per sample. The results of the analysis, which will normally be available in 2 weeks, will be mailed to the individual who submitted the sample

RESEARCH FUND CONTRIBUTORS

FISCAL YEAR NOVEMBER 1, 1978 - OCTOBER 31, 1979

A very special thank you to the contributors for the continued support of the Superintendents' Research Programs!

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November	Cloquet Country Club	John Lightfoot, Superintendent
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March	Minikahda Club	Dan Hanson, Superintendent

IS YOUR NAME OR YOUR CLUB'S NAME ON THIS LIST? IF NOT, IT'S NOT TOO LATE!

For information contact Research Fund Chairman Dick DeSplinter or any of the committee members.

Dick DeSplinter	537-1149
Dean Sime	929-1661
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PLANT PATHOLOGY
FACT SHEET No. 31
D.H. MACDONALD

Plant Parasitic Nematodes

The true significance of plant parasitic nematodes in Minnesota and most of the Upper Midwest was largely undefined and overlooked until the early 1970's. About that time, as the result of carefully conducted tests, researchers began to show that these organisms were reducing corn and potato yields and were predisposing potatoes and other crops to the actions of other plant pathogenic microorganisms. Prior to the early 1970's, plant parasitic nematodes were known to be responsible for the failure of replanted fruit trees to grow normally in Michigan and for carrots and other root vegetables to fork or be otherwise distorted. Undoubtedly, as further research is completed and new types of plant parasitic nematodes unfortunately are introduced into this area, the recognized significance of these parasites and pathogens will continue to grow.

Characteristics of Plant Parasitic Nematodes

Plant parasitic nematodes are nearly microscopic, nonsegmented roundworms usually only 300 to 1500 microns (0.01 to 0.06 inch) long. The body diameter of most forms present in Minnesota generally does not exceed 30 to 40 microns. Because of their small size they have been and are easy to overlook. Even today, much of what we know about the body structure of the plant parasitic forms was derived by inference from studies on the larger, more conspicuous animal parasitic forms such as the hookworm.

Plant parasitic nematodes are obligate parasites that derive all of their required nutrients from the living cells of higher plants. All plant parasitic nematodes have a protrusible stylet or mouth spear, only a few microns in diameter, that is used by the organism to puncture plant cell walls and in feeding. The average plant parasitic nematode can complete its life cycle in about 30 days; less than 30 during the warmest part of summer and more during spring or late fall. Certain kinds of plant parasitic nematodes, especially the dagger nematode *(Xiphinema americanum)* may require 1 or more years to complete its cycle. The mature female can lay between 30 to 500 or more eggs. These eggs are the most resistant form of some nematodes, although others appear to survive Minnesota winters most readily as adult females or second stage juveniles.

Habitat

With the exception of organic soils present in recently drained former bogs or swamps, all Minnesota soils in which higher plants can grow contain at least a few plant parasitic nematodes. Although a certain kind of plant parasitic nematode can be found in the submerged roots of wild rice, the vast majority of plant nematodes will not survive a prolonged exposure in flooded soils. Lighter soils, sandy loams for example, because of their good drainage and aeration and their tendency to warm up rapidly in the spring, are particularly favorable for plant nematodes. Because of their wide distribution in Minnesota soils, all soils should be considered "suspect" and a garden soil, unless heat-treated or freed of plant parasitic nematodes in some other way, should not be used as a potting medium for house plants or other ornamentals.

Some nematodes, which may be present in the soil during only part of the year, must live within plant tissues to complete their development. Some of these remain wormlike, capable of moving between and through plant cells. Others find a specific feeding site, usually within the vascular tissue of the root, enlarge, and become immobile. Of these, the root-

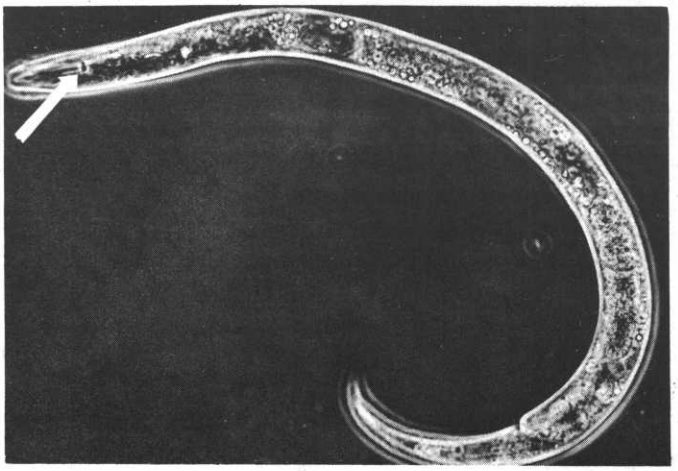
Continued on Page 10

knot nematode tends to cause a gall or "knot" of plant tissue to develop. Because of this host overgrowth, the nematode, although enlarged, remains within the plant tissue. The other type of sedentary nematode present in Minnesota, the cyst nematode, does not stimulate such an overgrowth and, as a result, eventually ruptures the host tissue as its body becomes enlarged and saccate in shape.

In addition to those nematodes that live in the soil and those that live within plant roots, foliar nematodes occasionally are found in Minnesota. These nematodes, which move up plant stems during wet periods and enter the leaves of plants like begonia and chrysanthemums, are different from the majority of plant parasitic nematodes because they can survive in dry, dead leaves. Dessication is usually fatal to most other types of plant parasitic nematodes, except while they are in the egg stage.

How Are Plant Parasitic Nematodes Spread?

Plant parasitic nematodes cannot move very far very fast. For example, the size of an infestation of a very damaging nematode was shown in Florida to enlarge horizontally through light, sandy soil at the rate of only about 21 cm (8½ inches) per month. Although nematodes can be carried passively by wind and waters, these methods of spread do not appear to be nearly as important in Minnesota as the movement of nematodes by humans. Nematodes can be readily carried in soil and on and in plant parts. Infected seed is not an important means by which nematodes are spread although seed lots may be contaminated, as in the case of the soybean cyst nematode, by small balls ("peds") of soil containing nematodes. Since only a few states have active programs for controlling the spread and introduction of plant parasitic nematodes, most nursery-grown plants are infested or infected with at least a few of these organisms. Since plant parasitic nematodes can survive



The female *Paratylenchus hamatus* is 0.35 to 0.40 mm (.014 to .016 inch) long. Nematodes belonging to this genus are probably the most common, although not the most damaging, of the 10 to 12 genera of plant parasitic nematodes present in Minnesota soils. The internal stylet or spear (see arrow) is used in feeding and can protrude to puncture plant roots.

for at least several months in soil without a plant host, used farm equipment should not be brought into Minnesota unless it previously has been thoroughly cleaned. Once a new nematode is introduced in this manner, there is a good possibility that, unless rather drastic measures are taken, the soil will remain infested with that organism indefinitely.

Continued on Page 11