Rutgers New Jersey Agricultural Experiment Station - Cooperative Extension

PLANT & PEST ADVISORY

Landscape, Nursery & Turf Edition $1.50 July 10, 2008

Azalea leaf with a tiny lesion marking early infection by a foliar nematode
Source: University of Florida Extension

INSIDE

Foliar Nematodes

Ann B. Gould, Ph.D., Specialist in Plant Pathology

Foliar nematodes (*Aphelenchoides* spp.) are microscopic round worms (appx. 1 mm long x 20 µm in diameter) that live in leaf tissues and can cause significant injury to many ornamental plants. *Aphelenchoides* is one of several hundred nematodes species that attack plants. All plant pathogenic nematodes, including this one, have a special feeding structure called a stylet. Stylets help the animal penetrate plant tissues and are used to excrete enzymes and ingest the contents of plant cells. Nematodes reproduce by laying eggs; the juveniles go through several molts before they mature to adults. As a group, nematodes cause some extremely important diseases world wide; annual losses on crops such as grains, legumes, banana, cassava, coconut, potato, sugar beet, sugarcane, and sweet potato are approximately 11%.

Foliar nematodes are widespread in the United States and in Europe. Two common species of foliar nematode that attack ornamentals are *A. ritzemabosi* (the chrysanthemum foliar nematode) and *A. fragariae* (the strawberry nematode). Between them, these animals parasitize almost 500 different species of woody and herbaceous perennials, many of which are in the families Compositae, Liliaceae, Primulaceae, and Ranunculaceae. In addition, the strawberry nematode attacks many ferns. The host list of these nematodes is increasing, and occasionally, severe losses occur in some locations. Species affected by foliar nematodes include African violet, ageratum, amaranthus, azalea, begonia, coleus, coral bells, cyclamen, ficus, geranium, *Hepatica* sp., hibiscus, hosta, hypericum, impatiens, ipomoea, iris, *Lilium* sp., narcissus, peony, peperomia, phlox, and Rhododendron.

Symptoms

In contrast to many plant parasitic nematodes that reside in the soil and feed on roots, foliar nematodes attack aerial plant parts. On young stems, leaves, and buds, external nematode feeding (ectoparasitic feeding) causes the new growth to curl, twist, and stunt. This abnormal growth is due to compounds secreted by the animals through the stylet into developing tissues. Foliar nematodes can also penetrate plant tissue through open stomates and feed on the cells of the spongy mesophyll (endoparasitic feeding). As the nematodes feed and reproduce, affected tissue turns pale green, then yellow, and eventually brown. In some cases, affected tissue may drop away, resulting in a "shot-hole" appearance.

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Nematodes from page 1

Foliar nematodes do not move easily through tightly packed cells or across leaf veins, thus affected tissues are usually bound by leaf veins. In plants with net-like veins, blighted areas often appear in an angular, "patchwork" pattern. In monocots, which have parallel veins, injured tissue appears in "stripes." Leaves infected by foliar nematodes may collapse or simply senesce prematurely. Symptoms are expressed by early summer and intensify as the season progresses. Foliar nematodes rarely kill the host plant, but do contribute to an overall reduction in plant vigor. In some instances, nematodes can interact with bacteria and fungi, resulting in a serious foliar blight. Unfortunately, some plants can be symptomless carriers of foliar nematodes, and, in many cases, nematode populations can become quite high before symptoms are expressed.

Disease Development

Foliar nematodes overwinter as adults in dead leaves or between the scales of buds of infected tissues. Nematodes infest healthy plant tissues by swimming up the stem when it is covered by a thin film of water. Female nematodes lay eggs in the intercellular spaces of leaves during feeding. The eggs hatch and molt through four juvenile stages before becoming adults. This process takes about 2 weeks. Since foliar nematodes require a film of free moisture to move across tissue surfaces, wet conditions favor disease development. Foliar nematodes are very tolerant of desiccation, however, and can remain viable in dried plant material for years.

Foliar nematodes are spread by splashing water and in vegetatively propagated plant material. In some hosts, nematodes crawl into flowers and are disseminated on infested seed. Since some plants may act as symptomless hosts and symptoms in other plants are not apparent until nematode populations are very high, spread of this nematode can be a threat whenever new plant materials are introduced into a garden, landscape, greenhouse, or nursery.

Diagnosis

Although the symptoms of foliar nematode infestations are often quite diagnostic, confirmation of the nematode in plant material must be done by laboratory analysis. Foliar nematodes are easily extracted from plant material by incubating suspect tissues in water. In a short time, these colorless nematodes swim out of infected plant material and can be identified with a dissecting microscope. For positive diagnosis of foliar nematodes, send whole plants to the Rutgers Plant Diagnostic Laboratory and Nematode Detection Service or your local Extension office for analysis.

Management and Control

Once foliar nematodes are established in the field, control can be very difficult. The best management strategy, therefore, is to exclude infested plant material from growing areas. Use only nematode-free planting material obtained from a reputable source, and place new plants in an isolated area to monitor plants for symptom development. Clearly, plants used for propagation should remain free of nematodes and must be strictly monitored. If symptoms do develop, destroy affected plants and remove all plant debris to decrease nematode spread. Do not place infected plant material on a compost pile, since the nematode may persist and be reintroduced at a later date. In commercial operations, strict sanitation of propagation and growing areas is essential; in addition, minimizing the use of overhead irrigation helps to prevent dispersal of the animals by splashing water.

Foliar nematodes are easily killed by heat. Soaking seed or infected plant parts in hot water at a temperature of 130 to 140°F for 10 to 15 minutes should "clean up" infections. At the present time, nematicides are not readily available for foliar nematode control. Prevention and good sanitation remain the most reliable management tools. For current management recommendations, contact your local County Extension Office at: http://njaes.rutgers.edu/county. ❑

Rutgers Plant Diagnostic Laboratory Services

The Rutgers Plant Diagnostic Laboratory & Nematode Detection Service is a full-service plant health diagnostic facility sponsored by Rutgers New Jersey Agricultural Experiment Station. The Lab's mission is to provide accurate and timely diagnoses of plant health problems for the residents of New Jersey.

Located on the George H. Cook campus in New Brunswick, NJ, the Lab provides plant health diagnostic services in cooperation with Extension faculty, staff, and other university personnel. The Lab serves residential and commercial clientele.

The Rutgers Plant Diagnostic Laboratory provides the following services:

- ✔ Disease and Insect Pest Diagnosis
- ✔ Plant and Weed Identification
- ✔ Insect Identification
- ✔ Fungus and Mold Identification
- ✔ Nematode Assays
- ✔ Screening for Acremonium Endophytes
- ✔ Fungicide Resistance Screening
- ✔ Other Services Available by Contract

For fees and instructions on how to submit samples, go to the web at: http://njaes.rutgers.edu/services or call the lab at 732-932-9140, fax 732-932-1270 or e-mail clinic@njaes.rutgers.edu. ❑

Diseases of Turfgrass

Bruce B. Clarke, Ph.D., Specialist in Turfgrass Pathology

Anthracnose

This disease, caused by the fungus *Colletotrichum cereale*, is becoming increasingly active on annual bluegrass greens. The fungus typically attacks turf growing under stress (i.e., low soil fertility and/or heat and moisture stress). Low cutting height will also enhance symptom development. To identify anthracnose in the field, look for small black fruiting bodies with protruding black spines on leaves or stems. For best results, increase turf vigor with frequent (every 7–10 days) light applications of nitrogen, maintain adequate irrigation, reduce thatch, and raise the cutting height (whenever possible). Since increased mowing frequency does not appear to affect disease development and rolling can actually reduce anthracnose severity, these two management practices can be used by superintendents to maintain desired green **s**peed (i.e., acceptable ball roll distance) while raising the height of cut (at or above 0.125 in.) on golf course greens. In addition to good cultural management, apply Armada, Banner, chlorothalonil, Compass, ConSyst**,** Disarm, Eagle, Endorse, Headway, Heritage, Insignia, Spectro, Tartan, thiophanate-methyl, Tourney or Trinity per manufacturer's recommendations. Recent research has shown that Chipco Signature, Medallion, the phosphates and Chipco 26GT can also effectively suppress anthracnose when used in tank mixtures with the previously mentioned fungicides. In areas with a prior history of this disease, apply fungicides with different modes of action every 14 to 28 days when conditions are conducive for disease development to improve efficacy and to reduce the potential for fungicide resistance.

Brown Patch

This disease, caused by the fungus *Rhizoctonia solani,* is very active on tees, greens and home lawns due to the recent thunderstorms and continuing hot, humid weather. To reduce the incidence and severity of **brown patch,** avoid applying high rates of nitrogen (not greater than 0.25 lb N/1,000 sq ft) during hot weather, irrigate between midnight and 8 a.m. (to displace dew and reduce the period of leaf wetness) and spray turf with Armada, Banner, Chipco 26GT, chlorothalonil, Compass, ConSyst, Curalan, Disarm, Eagle, Endorse, Headway, Heritage, Insignia, mancozeb, Medallion, Prostar, Spectro, Tartan, thiophanate-methyl, or Trinity per manufacturer's recommendations

Pythium Blight

With the continuing hot, humid weather, **pythium blight** is very apparent on golf and landscape turf. **Pythium** thrives in low or poorly drained areas, especially when the night temperatures are above 68 to 70^{0}F. For best results, improve drainage, water in the early morning hours (midnight to 8 am), avoid over-fertilization, and apply Alude, Banol, Chipco Signature, Disarm, Headway, Heritage, Insignia, Koban, Magellan, mancozeb, Prodigy, Quell, Subdue MAXX, Terraneb SP, Terrazole or Vital Sign according to the manufacturer's recommendations. Caution: Koban and Terrazole can be phytotoxic during hot weather, so follow label directions carefully and experiment first on a small area if using either product at this time of year.

Turf Field Day

Mark your calendars now for this year's Rutgers Turfgrass Research Field Days which will be held on Tuesday, July 29, 2008 (Golf and Fine Turf Research Field Day at Horticultural Farm II, New Brunswick, NJ) and Wednesday, July 30, 2008 (Landscape Turf Research Field Day at the Adelphia Research Farm, Freehold, NJ). Registration information and directions to each location can be obtained in the near future at: http://www.njturfgrass.org/. ❑

Rutgers Soil Testing Laboratory Services

The Rutgers Soil Testing Laboratory is a part of Rutgers New Jersey Agricultural Experiment Station outreach component. Located on the George H. Cook campus, the Rutgers Soil Testing Laboratory is a service unit that performs chemical and mechanical analyses of soils for the residents of New Jersey and for University research personnel. The mission of the Laboratory is to provide accurate and timely soil and water test reports to meet the increasing agricultural and environmental needs of the state.

For testing and fees provided for landscape, greenhouse and sports turf, go to the web at: http://njaes.rutgers.edu/services or call the Lab at 732-932-7000, ext. 4231 or e-mail soiltest@rce.rutgers.edu. Soil test kits are available through your county Rutgers Cooperative Extension office. ❑

Plant Diagnostic Laboratory Highlights

Richard J. Buckley, Director, Soil Testing and Plant Diagnostic Services

Turf

Turfgrass submissions are gaining momentum with the steamy summer weather. High night temperatures, high relative humidity, overcast skies, and locally heavy rain are driving the fungus *Rhizoctonia solani* wild. *Rhizoctonia solani* is the cause of **brown patch**. **Brown patch** has been submitted from landscape turf statewide since the 4th of July. The disease is particularly fond of tall fescue and perennial ryegrass turf areas and would be most severe on heavily fertilized and irrigated sites. We may get a break from the disease as we move forward over the next couple weeks. It looks like we are going into a dry period and *Rhizoctonia* loves the moisture, but be aware that the next round of hazy, hot and humid will also bring along some more **brown patch**.

Summer patch continues to be a primary problem in both golf and landscape turfgrass. The disease has been showing up on both annual and Kentucky bluegrass since early June. This week the samples came from several locations in New Jersey – Monmouth, Morris, Somerset, Essex, Union Counties, as well as from Pennsylvania and New York. Along with the **summer patch** comes **anthracnose**. **Anthracnose** is often found on **summer patch** infected turfgrass. It is also found on its own and was diagnosed repeatedly as **"anthracnose basal crown rot"** on golf turf from New Jersey, New York, and Pennsylvania.

Ornamentals

Fire blight continues to be submitted to the laboratory this year from susceptible plant material. Apple and ornamental pears dominate the submissions, but the disease can be found on almost any plant in the Rosaceae. It only takes a minute to see the trees with fire blight as you drive around town. Streets lined with the infamous Callery pear are everywhere and in certain areas of Monmouth and Middlesex Counties you can see significant branch dieback in almost every tree along the street. Quite a spectacular site and one of the simple pleasures of the plant pathology profession!

Shade tree anthracnose is the other common submission. It seems oaks took the hardest hit this season – at least oak is what we are getting in the laboratory with the greatest abundance. The economic significance of anthracnose is low, so we generally do not recommend fungicides. It is too late for that now anyway. Unless of course, you can raise the dead, but then maybe you shouldn't be in the tree business after all….. ❑

Anthracnose basal crown rot on Poa annua

Brown patch on perennial ryegrass

New Jersey Christmas Tree Growers Summer Meeting

Saturday, July 19, 2008
8:30 am- 3:00 pm
Cole's Country Tree Farm, 478 County Road 579, Milford, Hunterdon County

Farm tour including tree health, insect and disease control. Core credits will be available. For more info go to www.njchristmastrees.org or call 609-397-0096.

Extreme Heat and Worker Health

Michael J. Fargione, Extension Educator, Cornell Cooperative Extension Hudson Valley Regional Fruit Program

Some days could be brutal for outside work with temperatures reaching the mid 90's and plenty of humidity. Be sure workers have access to ample water and take regular breaks in the shade to avoid heat stress. It is possible to lose > 5 liters of sweat per day in extremely hot and humid conditions, when doing strenuous work, and/or when wearing protective clothing.

Other hot-weather tips:

1. anticipate conditions that will increase the need for water.
2. "prehydrate" by drinking 8-16 fluid ounces of water before work begins.
3. drink 4-8 ounces every 15-20 minutes during work.
4. continue to drink water after work, but don't over-hydrate.
5. keep water within easy reach.
6. drink cool water - your body will absorb it more quickly.
7. don't let yourself get thirsty - thirst indicates a state of existing dehydration.
8. avoid alcohol and caffeinated beverages which dehydrate your body.

Submitted by Win Cowgill, Agricultural Agent. ❑

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged above normal, averaging 73 degrees north, 75 degrees central and 76 degrees south. Extremes were 93 degrees at Pomona on the 4th, and 57 degrees at Charlotteburg on the 4th. Weekly rainfall averaged 0.70 inches north, 0.42 inches central, and 0.97 inches south. The heaviest 24 hour total reported was 0.96 inches at Trenton on the 5th to 6th. Estimated soil moisture, in percent of field capacity, this past week averaged 73 percent north, 67 percent central and 63 percent south. Four inch soil temperatures averaged 73 degrees north, 76 degrees central and 77 degrees south.

Weather Summary for the Week Ending 8 am Monday 7/ 7/ 8

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.82	16.09	-.14	90	60	74.	3	1232	237	71
CANOE BROOK	.33	17.03	-.31	92	59	74.	2	1225	236	68
CHARLOTTEBURG	.84	16.90	-.64	86	57	71.	2	1049	264	74
FLEMINGTON	.47	16.39	-.24	92	59	74.	2	1219	197	72
NEWTON	1.02	15.90	.02	89	60	73.	3	1247	374	75
FREEHOLD	.15	12.61	-3.65	91	60	74.	1	1256	136	62
LONG BRANCH	.20	15.62	-.64	91	65	74.	1	1190	143	47
NEW BRUNSWICK	.37	17.52	1.56	91	63	76.	2	1288	96	85
TOMS RIVER	.28	14.16	-2.14	91	62	75.	1	1274	222	50
TRENTON	1.10	15.71	.72	92	65	76.	1	1374	132	77
CAPE MAY COURT HOUSE	1.31	12.45	-1.91	90	65	76.	2	1342	211	76
DOWNSTOWN	1.64	15.75	.97	91	64	75.	1	1391	133	100
GLASSBORO	.20	14.25	-1.65	91	67	77.	3	1513	276	45
HAMMONTON	1.05	12.51	-3.09	92	65	76.	2	1459	229	73
POMONA	.70	14.79	.68	93	66	78.	5	1422	289	56
SEABROOK	.94	14.97	.72	92	65	76.	2	1501	236	84
SOUTH HARRISON	.11	13.78	-2.18	91	66	77	NA	1487	NA	NA

WES KLINE -- GDD BASE 40 PINEY HOLLOW LAST WEEK 256 (Ending 6/30/08) THIS WEEK 250 (Ending 7/7/08)

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PLANT & PEST ADVISORY

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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is reponsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.
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