

Rhododendron sp. Plant Diseases



Sample Collection, Diagnosis, Treatments

Henderson County Plant Diagnostics Clinic



Plant Disease Clinic



Plant Diagnostics



Customer collects field samples

Customers bring in samples

Customers email images

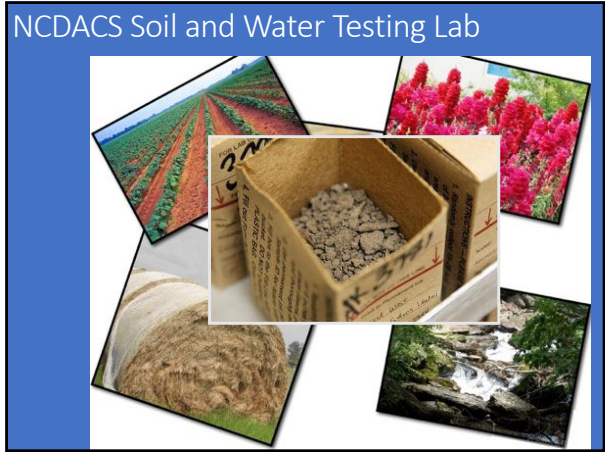


Distance Diagnostics through Digital Imaging

If the agent can't diagnose it, email is used to send samples electronically to the appropriate specialist


Plant Disease and Insect Clinic





Soil Tests Plant Tissue Analysis

Soil and plant tissue are analyzed by NCDACS
The reports give detailed information on pH and fertility levels.



NCDACS (NCDACS) Division 4100 Sandy Creek Road Raleigh, NC 27607-6401 (919) 733-2645 Report No. 82228

Division of Agricultural Experimentation & Extension Services
1500 South Street, Box 58
Raleigh, NC 27607

Soil Test Report

Form 1-15-10

Agreement Conditions: SEVERAL N.C. OFFICES PROVIDE SOIL TESTS

Sample No.		Land Use		Applied Label		Elemental Analysis															
1	2	1	2	1	2	Ammonia-N	Nitrate-N	Total N	Ammonia-P	Ortho-P	Total P	Calcium	Magnesium	Potassium	Sulfur	Copper	Zinc	Manganese	Boron	Selenium	
10	11	1	2	1	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Soil Profile Analysis

Weather Data

<https://climate.ncsu.edu/map/>

- Current
- Forecasts
- Historical

NC STATE UNIVERSITY

State Climate Office of North Carolina

Date and Products Aspects of NC Climate Educational Outreach About Our Office

Email: scos@climate.ncsu.edu Phone: 919-515-3095

CRONOS Database » Mtn Horticultural Crops Res Stn (FLET)

Station: FLET - Mtn Horticultural Crops Res Stn Date of first observation: June 18, 1982

Station type: ECONET - Tower what is this? Maintenance Logs

City, State: Mills River, NC County: Henderson County

Latitude: 35.42721° Longitude: -82.55888°

Elevation: 2067 feet above sea level


Climate division: NCD1 - Southern Mountains

River basin: Upper French Broad

Supported by: NC Agricultural Research Service

[show/hide list of nearby stations](#)

North Carolina Agricultural Chemicals Manual



Handbook provides recommendations for pest control around homes, on pets, for pests of home garden vegetables, fruits and ornamentals, and for pests of public health interest associated with our homes. Cultural, biological, physical and other types of control are recommended where appropriate.

Specialist Resources

Trained NCSU researchers and scientists are available to consult with agents.



Diagnosing Plant Problems



“Why is my plant dying?”




Diagnosis...

- REMEMBER!!! Always Identify the plant FIRST & know what is normal for that plant!
- 80% of plant diseases are caused by FUNGI
- Diagnosis involves:
 - Knowledge of the process of diagnosis
 - Field observations, collecting & mailing samples, lab diagnosis
 - Familiarity of testing procedures
 - Knowledge of common diseases in the area
 - Knowledge of common diseases of the particular plant
 - Familiarity of references

Plant Problems

Plant problems can be caused by many things

- Pests – insects, weeds and diseases
- Environmental stress – too much/too little water, nutrients, heat, cold, etc.
- Mechanical damage
- Chemicals

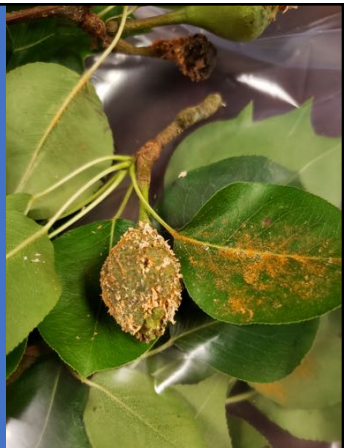


Chemical damage

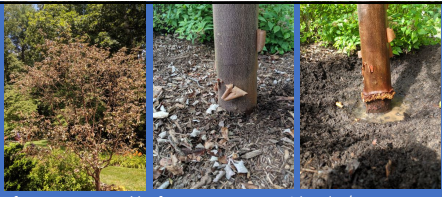
Diagnosing Plant Problems

Plant detective

- Define the problem.
- Look for patterns.
- Examine spread of problem..
- Determine likely cause of damage.



Is it a disease?



- A **fungus** pathogen often causes round leaf spots, stem rots with a dry/papery texture, concentric rings, discoloration, or wilt. Fruiting structures (sometimes microscopic) may form on affected tissue.
- A **bacterial** disease can take the form of galls (swollen areas), irregularly shaped leaf spots, wilting (then yellowing and dying), or rot (often a wet rot).
- A **viral** pathogen can inhibit chlorophyll formation, causing degrees of yellowing or mottling, stunting, distortion, or dieback of part of the plant. Viruses usually debilitate rather than kill, as they are parasitic.
- **Nematodes** are microscopic roundworms that cause disease-like symptoms. Stem nematodes feed on stems and cause shortening of internodes. Root nematodes feed underground, damaging the root system; this leads to moisture and nutrient stress which shows up as wilting and stunting. Foliar nematodes cause angular leaf spots.

- Buried too deep
- Bacteria
- Crown gall



Host Factors - Symptoms

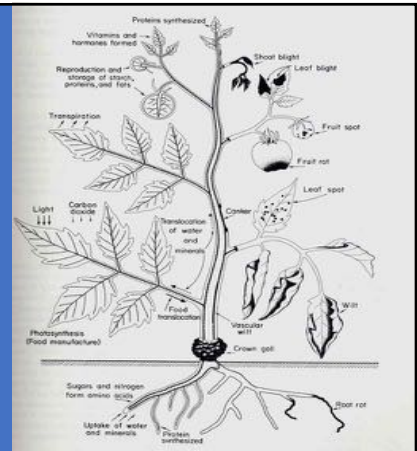
What's Your Temperature?

- **What is a symptom?**
 - ✓ The plants response to the disorder
- **Common Types of Symptoms**

✓ Stunting	✓ Hypotrophy	✓ Fruiting
✓ Chlorosis	✓ Galls	✓ Callus
✓ Necrosis	✓ Hypertrophy	✓ Sprouting
✓ Weeping	✓ Discoloration	✓ Witches Brooms
✓ Dieback	✓ Decay	✓ Flagging
✓ Wilting	✓ Lesions	✓ Cupping
✓ Defoliation		

Parasitic Plant Diseases

- Fungi**
- Bacteria**
- Viruses**
- Nematodes**

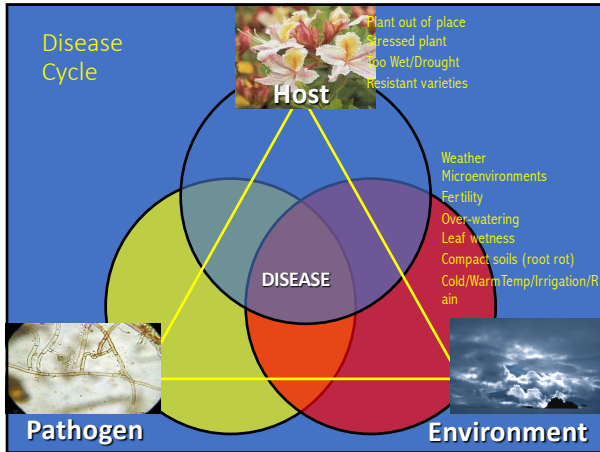



IPM
Integrated Pest Management,

IPM: Integrated Pest Management

- **IPM** – the use of all tactics (cultural, mechanical, biological and chemical) to control pests
- **Pesticides as last resort**
- **Goals -Reduce pesticide use; Protect beneficial organisms and the environment**






Steps to IPM

- **Prevention**- Keep plants healthy = happy plants
 - Soil, moisture, sunlight, ↓ stress, use 'resistant' plant material
- **Pest Identification**
- **Monitoring (Scouting)**

Scout for pests regularly


- Basis of good management
- Must be able to recognize good guys from bad guys

- **Set your thresholds for action**
 - Economic
 - Aesthetic
- Use less toxic or **biorational insecticides**



Biorational Pesticide

- pesticides of **natural origin** that have limited or no adverse effects on the environment or beneficial organisms
- Ex – Spinosad - is an insecticide based on chemical compounds found in the bacterial species *Saccharopolyspora spinosa*.



IPM first step: Scouting

- Perform **weekly** during growing season
- **Look for signs (lesions, leaf spots, cankers, oozes)**
- Look for symptoms (leaf drop, yellowing of leaves, dying branches, bark loss)



Inspect plants regularly

- Especially undersurface of leaves
 - Aphids, scale insects, lacebugs, whiteflies, spider mites
- Signs of damage
 - Yellowing
 - Chlorotic spots
 - Curled, distorted leaves
 - Wilting
 - Black sooty mold on upper surface of leaves




Why know your pest?

- The first step in **IPM or Integrated Pest Management** is correctly identifying the pest.
- Incorrect identification could result in chemical misapplications which cost money and are illegal.
- In-depth knowledge of pests can impress clients.
- Pest info makes for great cocktail party chit-chat.



When All Else Fails...Control Options

Mechanical

- Water hose
 - Aphids, lace bugs, spider mites
- Pick insects off by hand or prune out
 - Larger pests such as bagworms, tent caterpillars webworms

Chemical

- Biorational insecticides
 - Soaps
 - Oils (Dormant, Summer and Superior)
 - Botanicals (ex. Neem)
 - *Bacillus thuringiensis* (Bt, Dipel)
- Chemical insecticides
 - Use properly according to label
 - Wear proper PPE



Rhodie Stem Borer

Non-disease disorders

Voles





Rodent



Woodpecker



Evergreen Plant Leaf Drop



- Typically in spring
- Nitrogen mobile in plants
- Trees pull N out of older less productive leaves during periods of growth or flowering or fruiting




Older leaves start decomposing on evergreen tree before dropping; if new leaves look OK, do not worry



Leaf Curl

Rhododendron leaves begin to cup and curl at the edges when temperatures drop to below 35 °F.

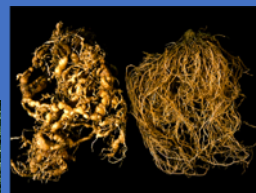
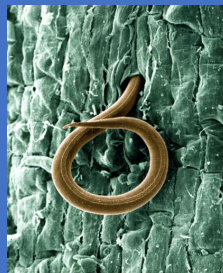
At 25 °F, the leaves will be curled very tight and begin to droop.

This problem is not caused by insects or disease but is a way the plant reduces water loss from its leaves during cold, dry, windy weather.

Plants should recover when the weather warms again.



Nematodes



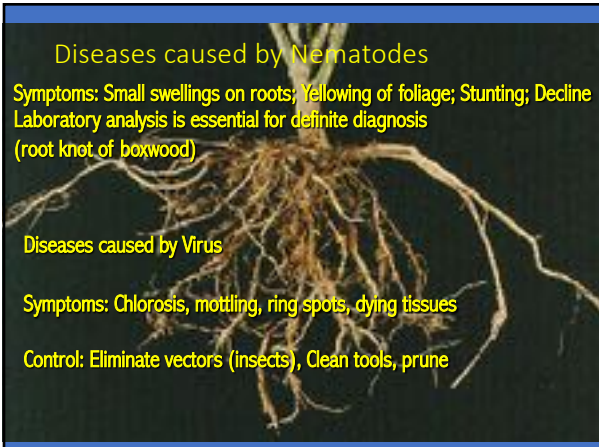
Diseases caused by Nematodes

Symptoms: Small swellings on roots; Yellowing of foliage; Stunting; Decline
Laboratory analysis is essential for definite diagnosis
(root knot of boxwood)

Diseases caused by Virus

Symptoms: Chlorosis, mottling, ring spots, dying tissues

Control: Eliminate vectors (insects), Clean tools, prune



Commonly Mistaken for Disease



lichens



Sooty Mold



Slime Molds


Root Rot Diseases

Too much H2O = Root rot



Root and Crown Rots

- Too much water
- Several causal agents:
- Pythium, rhizoctonia, phytophthora



Prevention & Treatment: Root Rot

- Prevention of disease is important, because chemical controls are ineffective once symptoms appear in the landscape.
- Begin by purchasing disease-free plants from a reputable nursery.
- Avoid plants that lack normal green color, appear wilted in the morning, or have dark, discolored roots.
- Select resistant varieties for planting from the Table next slide.
- Plant azaleas and rhododendrons in a well-drained and well-aerated soil.
- Plant above grade to allow drainage.
- Avoid planting in areas where water can collect around plant roots.



Disease resistant varieties

<p>Azaleas:</p> <ul style="list-style-type: none"> • Resistant: • <i>R. sanctum</i> • <i>R. simsii</i> (Indian azalea) • <i>R. yedoense</i> var. <i>poukhanense</i> (Korean azalea) • 'Carrine' • 'Fakir' • 'Fred Cochran' • 'Glacier' • 'Hampton Beauty' • 'Higasa' • 'Merlin' • 'Polar Sea' • 'Rose Greeley' 	<p>Rhododendrons:</p> <ul style="list-style-type: none"> • Resistant: • 'Caroline' • 'Martha Leacock' • 'Pink Trumpet' • 'Prof. Hugo de Vries' • 'Red Head' • <i>R. davidsonianum</i> • <i>R. delavayi</i> • <i>R. glomerulatum</i> • <i>R. hyperythrum</i> • <i>R. lapponicum</i> • <i>R. occidentale</i> • <i>R. poukhanense</i> • <i>R. pseudochrysanthum</i> • <i>R. quinquefolium</i> • <i>R. websterianum</i>
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Flower Diseases

Petal Blight



Small water-soaked spots on petals

- This fungal disease, caused by *Ovulinia azaleae*, primarily affects the flowers of azalea, but mountain laurel and rhododendron flowers can also be infected.
- Indian and kurume azaleas are especially susceptible.
- The disease starts on the flower petals as tiny, irregularly-shaped spots, giving a “freckled” appearance.
- On colored flowers the spots are white, and on white flowers the spots are brown.
- The spots quickly enlarge and become soft and watery. Flowers rot and stick to the leaves.
- Infection is easily spread from flower to flower by wind, rain and insects.
- The fungus survives the winter in the soil.

Azalea Petal Blight

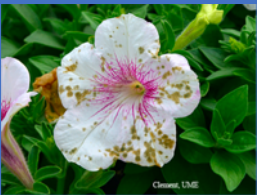


- *Small black resting structures called sclerotia will develop on the brown flower remains and will overwinter on the ground*

Control

- The use of a systemic fungicide such as triadimefon (Bayleton, Strike) when the flower buds first show color will give adequate control for about four weeks.
- Other fungicides such as chlorothalonil (Daconil 2787) and Mancozeb (Dithane F-45) will give protection for 7 to 14 days depending on weather conditions.
- Fungicide sprays are not effective on buds not showing color or flowers that are already open.
- It is a good practice to spot spray only the plants with flower buds showing the first bit of color, as opposed to spraying an entire planting of azaleas. This reduces unnecessary pesticide use.

Botrytis Flower Blight



The blight fungus *Botrytis* species attacks plants in landscapes, especially under cool, wet, overcast, or very humid conditions, which cause plant parts to remain wet for extended periods.

In all species of *Botrytis*, the first symptom is a small tan spot or spots that may rapidly enlarge. If the stem is infected, girdling the stem, the shoot will wilt. Botrytis is easily diagnosed by the fluffy gray mold produced on blighted plant parts under moist conditions.

Botrytis can rapidly blight flowers. Infected petals that fall onto foliage or stems can cause additional blighting and dieback.

Prevention of Botrytis diseases can be very difficult when the weather conditions are overcast, cool and very moist.

The basis for control is sanitation and prevention of extended periods of leaf wetness. Remove blighted plant parts from the garden.

Space plants to allow rapid drying after rains or irrigation.


The cornerstone for control of all blight diseases is sanitation both during the growing season and in the fall.

Wilted and blighted plants and plant parts should be promptly removed from the garden.

In the fall, all plant debris should routinely be cut at ground level and removed. This material may be composted.

Stem Diseases

Dieback



Dieback is an important disease of **hybrid rhododendrons** in the landscape and is caused by the fungus *Botryosphaeria dothidea*.

Azaleas with similar symptoms are more likely to be infected by the fungus *Phomopsis* species.

- Typically, dying branches (stem dieback) begin to appear on an otherwise healthy plant.
- The leaves die and can remain attached to the plant until late summer.
- Usually a single branch on an established plant is affected.
- Scraping away the bark with a knife reveals a reddish-brown discoloration under the bark on dying branches of rhododendron.
- On azaleas the discolored wood under the bark appears chocolate brown.

Dieback


- **Prevention & Treatment:** Dieback is difficult to control on rhododendrons and azaleas in the landscape.
- The azalea varieties that are the least susceptible include: ‘Delaware Valley White,’ ‘Hershey Red,’ ‘Pink Gumpo’ and ‘Snow.’ The following rhododendron varieties are considered resistant: ‘Boursalt,’ ‘Chionoides White,’ ‘Cunningham’s White,’ ‘English Roseum,’ ‘Le Barr’s Red,’ ‘Roseum Two’ and ‘Wissahickon.’
- Reduce stress to the plants by planting in partial shade and watering during dry periods.
- Drought stress and freeze injury may predispose azaleas to infection. Avoid wounding the plant.
- Prune infected branches well below all discolored wood and dispose of dead plant material.
- Clean pruning tools between cuts with a dilute solution of household bleach (1 part bleach to 9 parts water) or 70% rubbing alcohol.
- For azaleas, fungicide sprays containing either thiophanate-methyl or mancozeb can be used. For rhododendrons apply a product containing a copper-based fungicide or chlorothalonil. Apply all chemicals according to directions on the label.

Leaf Diseases

Powdery Mildew

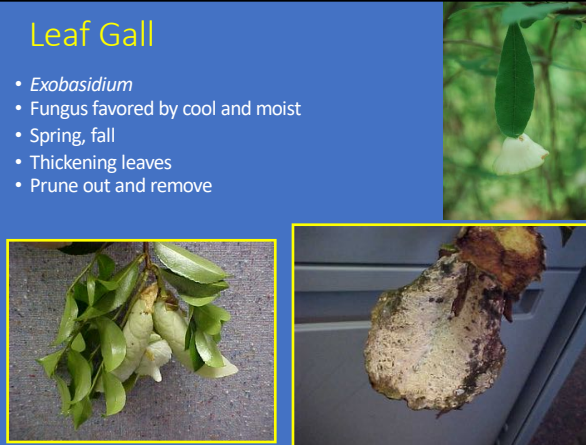
Erysiphe spp
Sphaerotheca spp
Uncinula spp
Oidium spp
 etc

- Attack 7000 plant species.
- In Landscape: Begonia, Chrysanthemum, Euonymus, Dogwood, Gardenia, Rose, Hawthorn, Hydrangea, Lilac, Phlox, Sycamore, Zinnia etc




Leaf Gall

- *Exobasidium*
- Fungus favored by cool and moist
- Spring, fall
- Thickening leaves
- Prune out and remove




Fungal Leaf Spot Diseases

- Warm days, cool nights, high humidity, prolonged leaf wetness favor leaf spot diseases caused by the fungi
- Typically have tan to gray centers surrounded by a darker border
- Fungal fruiting structures (pycnidia, spores) can be seen within the leaf spot
- Defoliation is common
- Fungi survive on fallen leaf debris



Fungal leaf spot	Bacterial leaf spot
Crosses veins	Bordered by veins

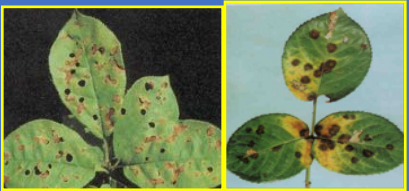


Fungal Leaf Spots

Leaf spots are produced by a number of fungi

Septoria
Cercospora
Entomosporium

Rose Black Spot



Leaf spots can be observed ALL year around
 Peaks on April-May and August-September

Leaf Spots



Cercospora leaf spot

- Throughout the year, fungal spots (*Cercospora* species, *Septoria* species, *Phyllosticta* species and *Colletotrichum* species) of various colors appear on azalea and rhododendron leaves.
- The diseases caused are usually minor, only affecting the aesthetic value of the plant. Cases of severe infection may result in early leaf drop, reducing the general health of the plant.
- **Prevention & Treatment:** Remove fallen leaves. Keep leaves dry when watering plants. Fungicide sprays during periods of high humidity will prevent serious foliage damage. Fungicide sprays recommended for azaleas include copper hydroxide, copper-based fungicides, thiophanate-methyl or chlorothalonil. For *Cercospora* leaf spot on rhododendron use propiconazole, thiophanate-methyl, chlorothalonil or mancozeb. Apply these fungicides according to directions on the label.

Rhizoctonia Aerial Blight



- Infected leaves develop brown lesions and eventually the entire leaf will brown and separate from the stem.

- The affected leaves often remain matted together by the fungus's web-like growth (hyphae) that holds the brown leaves within the canopy. As the temperature cools in the fall, the fungus stops growing and the matted leaves drop from the plant.
- The disease is only a problem in landscape azaleas that are sprinkler irrigated. Wet foliage and high humidity favor infection. Use drip irrigation or soaker hoses to irrigate landscape beds. Also, remove fallen leaf debris from beneath plants.

NC COOPERATIVE EXTENSION



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