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Extension Plant Pathology Update

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Plant Disease Clinic Report for July and August 2013

By Ansuya Jogi and Jean Williams-Woodward

Sorry to have missed a month! The following tables consist of the commercial and homeowner samples submitted to the UGA plant disease clinics in Athens and Tifton for the past two months, July and August 2013 (Table 1), and from one year ago in September and October 2012 (Table 2). The wetter, cooler weather in July and August was good for plant disease, but not so much for crops. Leaf spot diseases, such as those caused by *Cercospora* and related species were common on many plants. This trend will continue through the fall months. Wet weather also contributed to an increase in root diseases, particularly those caused by the water-molds, *Pythium* and *Phytophthora*. *Rhizoctonia* diseases also were common in July and August. See page 10 for information on large patch disease, caused by *Rhizoctonia solani*, and its management. Now is the best time to manage turfgrass diseases. See page 12 for Spring Dead Spot disease management recommendations.

Table 1: Plant disease clinic sample diagnoses made in July 2013 and August 2013

Host Plant	Sample Diagnosis: Commercial Sample	Sample Diagnosis: Homeowner Sample
Agapanthus (Lily-of-the-nile)	Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp./spp.)	
Alfalfa	Alfalfa Anthracnose (*Colletotrichum trifolii*) Spring Black Stem (*Phoma medicaginis* var. *medicaginis*) *Rhizoctonia* sp./spp.	
Almond		Insect damage
Apple		Bitter Rot [*Glomerella* (*Colletotrichum*) *cingulata* (*gloeosporioides*)] Unknown Abiotic Disorder
Arabidopsis	Damping Off (*Fusarium* sp./spp.)	
Arizona Cypress		Environmental Stress; Abiotic
Azalea	Insect Damage, Unidentified Insect Pythium Root and/or Crown Rot (*Pythium* sp.)	
Begonia	Pythium Root and/or Crown Rot (*Pythium* sp.) Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.)	
Bentgrass	Brown Patch (*Rhizoctonia* sp./spp.) Pythium Root and/or Crown Rot (*Pythium* sp.) Anthracnose (*Colletotrichum cereale*) *Colletotrichum* sp./spp. Cultural/Environmental Problem, Abiotic Problem	

Bermudagrass	*Bipolaris* sp./spp. Melting Out (*Drechslera* sp./spp.) Large Patch (*Rhizoctonia solani*) Rhizoctonia Leaf Spot and/or Leaf Blight (*Rhizoctonia* sp.) Root Decline of Warm Season Grasses (*Gaeumannomyces graminis* var. *graminis*) Fairy Ring, Various fungi Cultural/Environmental Problem; Abiotic Insect Damage, Unidentified Insect	Rhizoctonia Blight (*Rhizoctonia solani*) Anthracnose (*Colletotrichum graminicola*) Take-all (*Gaeumannomyces* sp.) Environmental Stress; Problem, Abiotic disorder Cultural/Environmental Problem, Abiotic disorder
Blackberry	Cercospora Leaf Spot (*Cercospora* sp./spp.) Cane Blight; Canker [*Leptosphaeria* (*Coniothyrium*) *coniothyrium* (*fuckelli*)]	
Blueberry	Leaf Spot (*Pestalotiopsis* (*Pestalotia*) sp./spp.) Phyllosticta Leaf Spot (*Phyllosticta* sp./spp.) Septoria Leaf Spot (*Septoria* sp./spp.) Leaf Rust [*Naohidemyces* (*Pucciniastrum*) *vacciniorum* (*vaccinii*)] Mummy Berry (*Monilinia vaccinii-corymbosi*) Blueberry Red Ringspot Virus (BRRV) Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.) Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.) Canker, Dieback; Leaf Blight (*Fusicoccum* sp.) *Cladosporium* sp./spp. Sooty Mold, Unidentified Fungus Insect Damage, Unidentified Insect Oedema; Edema, Abiotic disorder Nutrient Imbalance, Abiotic disorder Environmental Stresses; Abiotic disorder	Cultural/Environmental Problem, Abiotic disorder
Boxwood		Root Problems, Abiotic disorder
Camellia	Canker and Anthracnose (*Colletotrichum* sp.)	Glomerella Canker [*Glomerella* (*Colletotrichum*) *cingulata* (*gloeosporioides*)] Cultural/Environmental Problem
Cantaloupe	Downy Mildew (*Pseudoperonospora cubensis*)	
Centipedegrass	Large Patch (*Rhizoctonia solani*) *Rhizoctonia solani* Fairy Ring, Various fungi Cultural/Environmental Problem; Abiotic	Rhizoctonia Blight (*Rhizoctonia solani*) Cultural/Environmental Problem, Abiotic disorder
Cherry	No Pathogen Found	Root Problems, Abiotic disorder
Chrysanthemum	Bacterial Leaf Spot (*Pseudomonas* sp./spp.)	
Collards		Environmental Stress; Abiotic Problem
Corn	Southern Leaf Blight [*Cochliobolus* (ana. *Bipolaris*) *heterostrophus* (*maydis*)] Northern Corn Leaf Blight; Leaf Spot [*Setosphaeria* (*Exserohilum*) *turcica* (*turcicum*)] Southern Corn Rust (*Puccinia polysora*) Fusarium Ear Rot (*Fusarium* sp./spp.) Rhizoctonia Stem Rot (*Rhizoctonia* sp./spp.) Chemical Injury, Abiotic disorder	
Cotton	Rhizoctonia Leaf Spot and/or Leaf Blight (*Rhizoctonia* sp.) Corynespora Leaf Spot (*Corynespora* sp./spp.) Corynespora Leaf Spot (*Corynespora cassiicola*)	

	Alternaria Leaf Spot (*Alternaria* sp./spp.) Angular Leaf Spot (*Cercospora* sp./spp.) Cercospora Leaf Spot (*Cercospora* sp./spp.) Phomopsis Leaf Spot (*Phomopsis* sp./spp.) Stemphylium Leaf Spot (*Stemphylium* sp.) Ascochyta Blight (*Ascochyta gossypii*) Fusarium Wilt (*Fusarium oxysporum*) Physiological Responses, Abiotic disorder Chemical Injury, Abiotic disorder	
Crape Myrtle		Insect Damage
Cucumber	Bacterial Leaf Spot, Unidentified Bacteria	
Daylily	Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp) Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.) Twospotted Spider Mite (*Tetranychus urticae*) No Pathogen Found	
Dogwood		Root Problems, Abiotic disorder
Eastern Hemlock		Unknown, General
Eggplant	Phomopsis Leaf Spot (*Phomopsis* sp./spp.)	
Euonymus		Insect Damage, Unidentified
Fescue	Brown Patch (*Rhizoctonia* sp./spp.)	Rhizoctonia Blight (*Rhizoctonia solani*) Environmental Stress; Abiotic
Fir	Mites, Order Acari	
Ginkgo		Scorch, Abiotic disorder
Gourd	Abiotic disorder	
Grain Sorghum	Anthracnose (*Colletotrichum graminicola*) *Fusarium* sp./spp.	
Grape	Ripe Rot (*Colletotrichum* sp./spp.) Sap Beetles, Family Nitidulidae	Downy Mildew (*Peronospora* sp.) Environmental Stress; Abiotic disorder
Green Bean		Rhizoctonia Blight (*Rhizoctonia solani*) Rust (*Uromyces* sp./spp.) Environmental Stress; Abiotic
Hemlock		Elongate Hemlock Scale Cultural/Environmental Problem
Hibiscus	*Fusarium* sp./spp. Bacterial Leaf Spot (*Xanthomonas* sp./spp.)	Root Problems, Abiotic disorder
Hinoki Falsecypress	Rhizoctonia Foliar/ Aerial/ Web Blight (*Rhizoctonia solani*)	
Holly	Abiotic disorder	
Hosta	Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp.)	Not Pathogen; Saprophyte, Secondary Agents; Saprophytes
Hydrangea	Botrytis Blight (*Botrytis* sp./spp.)	
Impatiens	Downy Mildew (*Plasmopara obducens*) Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.) Pythium Root and/or Crown Rot (*Pythium* sp.)	
Indian Hawthorne	Oedema; Edema, Abiotic disorder	
Japanese Cleyera	Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.) Pythium Root and/or Crown Rot (*Pythium* sp.)	
Juniper	Abiotic disorder	
Lemon		Insect Damage, Unidentified Insect
Leyland Cypress	No Pathogen Found	

Lilyturf	Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp)	
Longleaf Pine	Lophodermium Leaf Spot; Needle Cast (*Lophodermium* sp) Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.)	
Maple		Scorch, Abiotic disorder
Mondo Grass		Root Problems, Abiotic disorder
Oak		Oak Leaf Blister(*Taphrina caerulescens*) Wood Rot Fungus (*Fomes* sp.) Bacterial Wetwood; Slime Flux Anthracnose (*Apiognomonia* sp.) Environmental Stress; Abiotic
Okra		Bacterial Leaf Spot (*Xanthomonas* sp.) Environmental Stress; Abiotic Problem
Osteospermum	Bacterial Leaf Spot (*Pseudomonas* sp./spp.) Pythium Root and/or Crown Rot (*Pythium* sp.)	
Peanut	Pythium Pod Rot (*Pythium* sp./spp.) Rhizoctonia Root Rot (*Rhizoctonia* sp./spp.) Rhizoctonia Root and Stem Rot [*Thanatephorus* (*Rhizoctonia*) *cucumeris* (*solani*)] *Aspergillus flavus* Tomato Spotted Wilt Virus (TSWV) Chemical Injury, Abiotic disorder No Pathogen Found	Southern Blight (*Sclerotium rolfsii*) Environmental Stress; Problem, Abiotic disorder
Pear		Wood Rot Fungus (*Inonotus* sp.)
Pecan	Anthracnose [*Glomerella* (*Colletotrichum*) *cingulata* (*gloeosporioides*)] Anthracnose (*Glomerella* sp./spp.) Brown Leaf Spot [*Sirosporium* (*Cercospora*) *diffusum* (*fusca*)] Phomopsis Leaf Spot (*Phomopsis* sp./spp.) Pecan Leaf Scorch Mite (*Eotetranychus hicoriae*) Fertilizer Injury, Abiotic disorder Unknown cause; No pathogen found	Pecan; Hickory Scab (*Fusicladium fusca*)
Pepper	Pythium Damping Off (*Pythium* sp./spp.) Tomato Spotted Wilt Virus (TSWV) Abiotic disorder No Pathogen Found	
Plum Tree		Unknown Abiotic Disorder
Raspberry	Mites, Order Acari	
Red Cedar	Phomopsis Tip Blight; Needle Blight (*Phomopsis juniperovora*)	
Rose	Crown Gall (*Agrobacterium tumefaciens*) Rose Rosette Disease, Rose rosette-associated virus (RRaV) Root Girdling, Abiotic disorder	Environmental Stress; Problem, Abiotic disorder
Rose-of-sharon		Hibiscus Rust (*Kuehneola malvicola*)
Rudbeckia		Downy Mildew (*Plasmopara* sp.)
Sesame (Oriental)	*Rhizoctonia* sp./spp.	
Seashore Paspalum	Slime Mold, Class myxomycetes; myxomycota	
Siberian Bugloss	Foliar nematode *(Aphelenchoides fragariae)*	

Soybean	Australasian soybean rust (*Phakopsora pachyrhizi*) Soybean Downy Mildew (*Peronospora manshurica*) Corynespora Leaf Spot (*Corynespora* sp./spp.) Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp) Downy Mildew (*Peronospora* sp./spp.) Physiological Responses, Abiotic disorder	
Squash	Pythium Fruit Rot; Cottony Leak (*Pythium* sp.)	
St. Augustinegrass		Rhizoctonia Blight (*Rhizoctonia solani*) Take-all (*Gaeumannomyces* sp.) Gray Leaf Spot [*Magnaporthe* (ana. *Pyricularia*) *grisea*] Environmental Stress; Abiotic Problem
Sugar Maple	No Pathogen Found	
Sweet potato	No Pathogen Found	
Tall Fescue	*Rhizoctonia* sp./spp.	
Tobacco	Bacterial Soft Rot (*Erwinia* sp./spp.)	
Tomato	Southern Stem Rot (*Sclerotium rolfsii*) Fusarium Wilt (*Fusarium oxysporum*) No Pathogen Found	Septoria Leaf Blight (*Septoria lycopersici*) Septoria Leaf Spot (*Septoria* sp.) Early Blight (*Alternaria solani*) Alternaria Leaf Spot (*Alternaria* sp.) Bacterial Leaf Spot (*Xanthomonas* sp.) Southern Blight (*Sclerotium rolfsii*) Mealybugs, Family Pseudococcidae
Trifoliate orange	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.)	
Vegetables		Early Blight (*Alternaria solani*) Root Problems, Abiotic disorder
Verbena	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.) *Colletotrichum* sp./spp. Bacterial Leaf Spot, Unidentified Bacteria	
Vinca	Fusarium Root; Crown Rot (*Fusarium* sp.)	
Watermelon	Gummy Stem Blight [*Didymella* (ana. *Phoma*) *bryonae* (*cucurbitacearum*)] Watermelon Fruit Blotch (*Acidovorax avenae citrulli*) Downy Mildew (*Peronospora* sp./spp.) No Pathogen Found	Gummy Stem Blight [*Didymella* (ana. *Phoma*) *bryonae* (*cucurbitacearum*)]
Willow		Unknown, General
Zoysiagrass	*Rhizoctonia solani* Dollar Spot (*Sclerotinia homeocarpa*) *Bipolaris* sp./spp. Leaf Rust; rust (*Puccinia* sp./spp.) Melting Out (Turfgrass) (*Drechslera* sp./spp.) Cultural/Environmental Problem, Abiotic disorder	Rhizoctonia Blight (*Rhizoctonia solani*) Take-all (*Gaeumannomyces* sp.) Dollar Spot (*Sclerotinia homeocarpa*) Environmental Stress; Abiotic Cultural/Environmental Problem, Abiotic disorder
Zucchini	No Pathogen Found, Identification Analysis	

Table 2: Plant disease samples diagnoses from A YEAR AGO – September and October 2012

Host Plant	Sample Diagnosis	
	Commercial Sample	**Homeowner Sample**
Arborvitae	*Fusarium* sp./spp.	
Azalea	Azalea Leaf Spot (*Cercospora handelii*) Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.) Cercospora Leaf Spot (*Cercospora* sp./spp.) Pythium Root and/or Crown Rot (*Pythium* sp.) No Pathogen Found	
Banana shrub		No Pathogen Found
Bean	Rhizoctonia Root Rot (*Rhizoctonia* sp./spp.) Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp) Anthracnose Fruit Rot (*Colletotrichum* sp.)	
Bermudagrass	*Bipolaris* sp./spp. Large Patch [*Thanatephorus* (*Rhizoctonia*) *cucumeris* (*solani*)] Root Decline of Warm Season Grasses (*Gaeumannomyces graminis* var. *graminis*) Take-all (*Gaeumannomyces* sp./spp.) Plant Parasitic Nematodes, Unspecified Genera Cultural/Environmental Problem, Abiotic disorder	Spring Dead Spot (*Ophiosphaerella* sp.) Cultural/Environmental Problem, Abiotic disorder
Blackberry	*Botryosphaeria* sp./spp. Unknown, General	Cercospora Leaf Spot (*Cercospora* sp.) Raspberry Cane Borer
Blueberry		Cultural/Environmental Problem
Boxwood	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.)	
Broccoli	Alternaria Leaf Spot (*Alternaria* sp./spp.)	
Cabbage	Bacterial Leaf Spot (*Xanthomonas* sp./spp.)	
Camellia	Anthracnose [*Glomerella* (*Colletotrichum*) *cingulata* (*gloeosporioides*)] Camellia Yellow Mottle Virus	
Cantaloupe	Bacterial Leaf Spot (*Pseudomonas syringae*)	
Centipede	Root Decline of Warm Season Grasses (*Gaeumannomyces graminis* var. *graminis*) Not Pathogen; Secondary Agents; Saprophytes	
Centipede & St. Augustine		Take-all (*Gaeumannomyces* sp./spp.) Cultural/Environmental Problem
Cherry-laurel	Insufficient Sample, Identification Analysis	
Corn	Northern Corn Leaf Blight; [*Setosphaeria* (*Exserohilum*) *turcica* (*turcicum*)] Southern Leaf Blight [*Cochliobolus* (ana. *Bipolaris*) *heterostrophus* (*maydis*)] Fusarium Stem Rot, (*Fusarium* sp./spp.) Southern Corn Rust, (*Puccinia polysora*) Smut, (*Ustilago* sp./spp.)	

Cotton	Cotton Boll Rot [*Botryosphaeria* (*Diplodia*) *rhodina* (*natalensis*)] Cotton Boll Rot (*Colletotrichum* indicum) Stemphylium Leaf Spot (*Stemphylium* sp.) Corynespora Leaf Spot (*Corynespora cassiicola*) Cercospora Leaf Spot (*Cercospora* sp./spp.) No Pathogen Found	
Crape Myrtle	Leaf Spot, Unknown cause	Insect Damage Unidentified Insect Unknown, General
Eucalyptus		Unknown cause
Euphorbia		Root Problems, Abiotic disorder
Fig		*Gibberella* (*Fusarium*) sp./spp. Root Problems, Abiotic disorder Environmental Abiotic Problem
Gardenia	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.) Rhizoctonia Crown and Stem Rot (*Rhizoctonia* sp.) No Pathogen Found	
Geranium	No Virus Found, No Virus Found No Pathogen Found	
Ginger	Phyllosticta Leaf Spot (*Phyllosticta* sp./spp.) Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp)	
Grape	Angular Leaf Spot (*Cercospora brachypus*) Grape Downy Mildew (*Plasmopara viticola*) Spider Mite Injury, Unidentified Spider Mite	Black Rot [*Guignardia* (*Phyllosticta*) *bidwellii* (*ampelicida*)] Macrophoma Rot (*Botryosphaeria dothidea*)
Holly	No Pathogen Found	
Hydrangea	Granulate Ambrosia Beetle (*Xylosandrus crassiusculus*) Mites, Order Acari	Cercospora Leaf Spot (*Cercospora* sp.)
Impatiens	Downy Mildew (*Plasmopara obducens*)	
Juniper	Spider Mites, Family Tetranychidae Environmental Stress; , Abiotic Problem	Cultural/Environmental Problem, Abiotic disorder
Leyland Cypress	Pythium Root and/or Crown Rot (*Pythium* sp.) No Pathogen Found	
Lily-of-the-nile	Bacterial Soft Rot, Unidentified Bacterium Fusarium Crown Rot (*Fusarium* sp./spp.)	
Mondograss	Pythium Root and/or Crown Rot (*Pythium* sp.)	
Oak		Insect Damage, Unidentified Insect
Okra	Charcoal Rot (*Macrophomina* sp./spp.)	
Peanut	Neocosmospora Root or Fruit Rot (*Neocosmospora vasinfecta*) Rhizoctonia Root/Stem Rot (*Rhizoctonia solani*) Rhizoctonia limb rot (*Rhizoctonia solani*) Early Leaf Spot (*Cercospora arachidicola*) Cylindrocladium Black Rot (*Cylindrocladium parasiticum*) Tomato Spotted Wilt Virus (TSWV) Collar Rot (*Diplodia* sp./spp.) *Lasiodiplodia* (*Botryodiplodia*) *theobromae* Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp) Anthracnose (*Glomerella* sp./spp.) Southern Stem Rot (*Sclerotium rolfsii*)	

Pecan	Pecan; Hickory Scab (*Fusicladium fusca*) Anthracnose [*Glomerella* (*Colletotrichum*) *cingulata* (*gloeosporioides*)] Phomopsis Blight (*Phomopsis* sp./spp.) *Lasiodiplodia* (*Botryodiplodia*) *theobromae* Black Pecan Aphid (*Melanocallis caryaefoliae*) Mites, Order Acari Chemical Injury, Abiotic disorder Nutritional Deficiency, Abiotic disorder Physiological Responses, Abiotic disorder	Unknown, General
Pepper	Southern Stem Blight (*Sclerotium rolfsii*) No Pathogen Found	
Pomegranate	Anthracnose Fruit Rot (*Colletotrichum* sp./spp.) Complex of Biotic; Abiotic Factors	
Privet		Environmental Stress; Abiotic
Pumpkin	Downy mildew *(Pseudoperonospora cubensis)* Unidentified Virus, Unidentified Virus	
Rhododendron	Broad Mite (*Polyphagotarsonemus latus*)	
Rose	Rhizoctonia Root; Crown Rot (*Rhizoctonia* sp.) No Pathogen Found	
Rubus (Ornamental)	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.)	
Soybean	Soybean Downy Mildew (*Peronospora manshurica*) Downy Mildew (*Peronospora* sp./spp.) Southern Stem Blight (*Sclerotium rolfsii*) Soybean Bacterial Pustule (*Xanthomonas campestris* pv. *glycines*) Australasian Soybean Rust (Phakopsora pachyrhizi)	
Squash	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.) Downy Mildew (*Pseudoperonospora cubensis*) Silverleaf Whitefly (*Bemisia argentifolii*)	
St. Augustinegrass	Insect Damage, Unidentified Insect Root Decline of Warm Season Grasses, (*Gaeumannomyces graminis* var. *graminis*)	Take-all (*Gaeumannomyces* sp.) Cultural/Environmental Problem, Abiotic disorder
Stevia	Not Pathogen; Secondary Agents; Saprophytes	
Thyme	Pythium Root and/or Crown Rot (*Pythium* sp.)	
Tobacco	Black Shank (*Phytophthora nicotianae*) *Alternaria* sp./spp.	
Tomato	Insufficient Sample, Identification Analysis	Chemical Injury, Abiotic disorder
Viburnum	Pythium Root and/or Crown Rot (*Pythium* sp.)	
Watermelon	Anthracnose; Colletotrichum Leaf Spot (*Colletotrichum* sp)	
Yew	Phytophthora Crown, Root and/or Stem Rot (*Phytophthora* sp./spp.)	
Zoysiagrass	*Rhizoctonia* sp./spp. Fairy Ring, Various fungi Leaf Rust; rust (*Puccinia* sp./spp.) Root Decline of Warm Season Grasses, (*Gaeumannomyces graminis* var. *graminis*) Large Patch (*Rhizoctonia solani*) Environmental Stress; Abiotic Problem	Take-all (*Gaeumannomyces* sp.) Anthracnose (*Gloeosporium* sp.) Cultural/Environmental Problem, Abiotic disorder

Update: Commercial Turfgrass

Turfgrass Disease Control: Emphasis on fall activities

By Alfredo Martinez

Severe leaf and crown rot, caused by *Bipolaris* sp. (see images below) can occur in bermudagrass lawns, sport fields, or golf fairways. Initial symptoms of this disease include brown to tan lesions on leaves. The lesions usually develop in late September or early October. Older leaves are most seriously affected. Under wet, overcast conditions, the fungus will begin to attack leaf sheaths, stolons and roots resulting in a dramatic loss of turf. Shade, poor drainage, reduced air circulation; high nitrogen fertility and low potassium levels favor the disease. To achieve acceptable control of leaf and crown rot, early detection (during the leaf spot stage) is a crucial.

Above left and center: Turf and leaf symptoms of Bipolaris leaf and crown rot on bermudagrass. Above right: Spores of Bipolaris sp. on leaf tissue. Images by Alfredo Martinez.

Large Patch

Large patch disease of turfgrass is most common in the fall and in the spring as warm season grasses are entering or leaving dormancy. Large patch is caused by the fungus *Rhizoctonia solani*. It can affect zoysia grass, centipedegrass, St. Augustinegrass and occasionally bermudagrass.

Symptoms of this lawn disease include irregularly-shaped weak or dead patches that are from 2 feet to up to 10 feet in diameter. Inside the patch, you can easily see brown sunken areas. On the edge of the patch, a bright yellow to orange halo is frequently associated with recently affected leaves and crowns. The fungus attacks the leaf sheaths near the thatch layer of the turfgrass.

Large patch disease is favored by:

- Thick thatch.
- Excess soil moisture and poor drainage.
- Too much shade, which stresses turfgrass and increases moisture on turfgrass leaves and soil.
- Early spring and late fall fertilization.

If large patch was diagnosed earlier, <u>fall is the time to control it</u>. There are a myriad of fungicides that can help to control the disease. Preventative or curative rates of fungicides (depending on the particular situation) in late September or early October and repeating the application 28 days later are effective for control of large patch during fall. Fall applications may make treating in the spring unnecessary. Always follow label instructions, recommendations, restrictions and proper handling.

Cultural practices are very important in control. Without improving cultural practices, you may not achieve long term control.

- Use low to moderate amounts of nitrogen, moderate amounts of phosphorous and moderate to high amounts of potash. Avoid applying nitrogen when the disease is active.
- Avoid applying N fertilizer before May in Georgia. Early nitrogen applications (March-April) can encourage large patch.
- Water timely and deeply (after midnight and before 10 AM). Avoid frequent light irrigation. Allow time during the day for the turf to dry before watering again.
- Prune, thin or remove shrub and tree barriers that contribute to shade and poor air circulation. These can contribute to disease.
- Reduce thatch if it is more than 1 inch thick.
- Increase the height of cut.
- Improve the soil drainage of the turf.

See the current Georgia Pest Management Handbook for more information. Check fungicide labels for specific instructions, restrictions, special rates, recommendations and proper follow up and handling.



Above left and center: Large, circular, dead patches in turf caused by large patch disease caused by Rhizoctonia solani. Above right: Hyphae of Rhizoctonia solani showing right-angled diagnostic hyphae. Images by Alfredo Martinez.

Spring Dead Spot of Bermudagrass

Fall cultural practices and fungicide applications are key for Spring Dead Spot management. The disease is caused by fungi in the genus *Ophiosphaerella* (*O. korrae*, *O. herpotricha* and *O. narmari*). These fungi infect root in the fall predisposing the turf to winter kill. As indicated by its name, initial symptoms of spring dead spot are noticeable in the spring, when turf resumes growth from its normal winter dormancy. As the turf 'greens-up,' circular patches of turf appear to remain dormant, roots, rhizomes and stolons are sparse and dark-colored (necrotic). No growth is observed within the patches. Recovery from the disease is very slow. The turf in affected patches is often dead; therefore recovery occurs by spread of stolons inward into the patch.

The causal agents of SDS are most active during cool and moist conditions in autumn and spring. Appearance of symptoms is correlated to freezing temperatures and periods of pathogen activity. Additionally, grass mortality can occur quickly after entering dormancy or may increase gradually during the course of the winter. Spring dead spot is typically more damaging on intensively managed turfgrass swards (such as bermudagrass greens) compared to low maintenance areas.

Management of Spring Dead Spot:

- Practices that increase the cold hardiness of bermudagrass generally reduce the incidence of spring dead spot. Severity of the disease is increased by late-season applications of nitrogen during the previous fall.
- Management strategies that increase bermudagrass cold tolerance such as applications of potassium in the fall prior to dormancy are thought to aid in the management of the disease. However, researchers have found that fall applications of potassium at high rates actually increased spring dead spot incidence. Therefore, application of excessive amounts of potassium or other nutrients, beyond what is required for optimal bermudagrass growth, is not recommended.
- Excessive thatch favors the development of the disease. Therefore thatch management is important for disease control,
- Implement regular dethatching and aerification activities.
- There are several fungicide labeled for spring dead spot control.
- Fall application of fungicides is essential for an effective control.

Identification and Control of Spring Dead Spot
http://www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=7983&pg=dl&ak=Plant%20Pathology

Additional information can be found at:

- Turfgrass Diseases in Georgia - http://pubs.caes.uga.edu/caespubs/pubcd/B1233.htm
- www.georgiaturf.com
- *Pest Management Handbook* (Follow all label recommendations when using any pesticide) - www.ent.uga.edu/pmh/

Inquires about fairy ring, mushrooms and puffballs in turfgrass settings continue to be common

By Alfredo Martinez

Fairy ring is caused by over fifty species of basidiomycete fungi, many of which produce mushrooms or puffballs after heavy rains usually during late summer and early fall. The symptoms include patches, rings, or arcs that enlarge and can cause severe damage or death to turfgrass. There are three types of fairy rings based on the symptoms they produce.

- Type I. Grass is badly damaged or killed.
- Type II. Grass growth is stimulated.
- Type III. Grass growth is not influenced by the fairy ring.

The only evidence of the fairy ring is the presence of fungal fruiting bodies. The type III fairy ring symptoms are more predominant during prolonged periods of wet weather, while Type I and Type II fairy ring symptoms are common during hot, dry weather in the summer. The most effective means for fairy ring control is to prevent the causal fungi from becoming established in the turf. It's advisable to remove large pieces of woody material such as stumps, dead tree roots and other organic/woody debris before turf is planted to prevent the establishment of fairy rings. Fairy rings thrive on organic matter; therefore, changing the organic content in the soil by spike/core aeration and thatch reduction can help to control fairy ring. Water and fertilize declining area inside ring appropriately to stimulate new turfgrass growth. In golf course settings, the use of fungicides is an option to control fairy ring while corrective cultural measures are taken.

More information on fairy ring can be found at:
http://www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=7149&pg=dl&ak=Plant%20Pathology#FairyRings

http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/PCRP2013/Turf%20Disease%20Control.pdf

Fairy ring symptoms and basidiocarps on a bermudagrass golf green (above and above right), close-up of puffball fungus (right) (Photos Alfredo Martinez)

Methods to Maximize Efficacy of Turfgrass Fungicides

By Alfredo Martinez

Weather conditions have been conducive for turfgrass diseases. We have received numerous calls and emails about proper control strategies, especially on the appropriate selection of turfgrass fungicides and their efficacy. Some ways to maximize the efficacy of turfgrass fungicides include:

- Read carefully and follow the label directions before applying fungicide.
- Apply fungicides at the rate specified on the label.
- Always follow instructions for re-entry to the area.
- Fungicides are not equally effective on all diseases. Proper fungicide selection is very important for disease management.
- The best control is achieved by applying fungicides preventively (before disease is present).
- Use compatible tank mixes at recommended label rates.
- Use proper sprayer, nozzles and pressure to deliver appropriate coverage of fungicides. Flat fan or swirl chamber (raindrop) nozzles are recommended for turfgrass fungicide applications.
- Avoid turfgrass stress (drought or temperature) before or at the time of application. This could interfere with maximum fungicide uptake, activity and efficacy.
- Fungicides should be sprayed when air temperatures are between 60°F and 85°F (15°C and 29°C) for best results.
- Fungicides should stay on the turfgrass foliage for at least 6 hours for most effective control. Delay mowing and other cultural practices as much as possible to give the fungicide a chance to work (for proper mowing frequency follow the one-third rule).
- Use enough water when applying fungicides for adequate coverage. Usually 2.0 gal water/1000 sq. ft. should give adequate coverage and deposition. Some fungicides have to be watered-in for proper placement to ensure adequate activity.
- Do not apply fungicides when conditions are windy to avoid drift and poor coverage. Wind velocity tends to be the lowest early in the morning and late in the afternoon.
- Be patient if an application appears to have produced no results. Some fungicide application results can be seen months later.
- Use fungicides judiciously and sparingly.

Some notes on Fungicide Resistance

Fungi sometimes develop resistance to particular fungicides, especially when a product is used repeatedly without alternating with chemically unrelated fungicides. When fungicide resistance develops, there is no value in increasing rates, shortening intervals between sprays, or using other fungicides with similar modes of action. Fungicide resistance has been confirmed in a few instances for each of the following turfgrass diseases and fungicide groups:

- Dollar spot against benzimidazole fungicides (thiophanate methyl) and DMI fungicides (propiconazole)
- Gray leaf spot against strobilurin (QoI) fungicides (e.g. azoxystrobin, etc.)
- Anthracnose against benzimidazoles (thiophanate methyl) and strobirulins (QoI) (azoxystrobin, etc.)
- Pythium blight against phenylamide fungicides (mefenoxam)

Benzimidazoles (e.g. thiophanate methyl) and phenylamides (e.g., mefenoxam) have the highest risk of resistance. Strobilurins have a moderately high risk of resistance; DMIs and the dicarboximides (e.g. iprodione) have a moderate risk; and the nitriles (e.g. chlorothalonil), aromatic hydrocarbons (e.g. PCNB), and dithiocarbamates (e.g. mancozeb) have a low risk of resistance.

Several general strategies are recommended to minimize the risk of fungicide resistance. First, don't rely on fungicides alone for disease control. Avoid using turfgrass varieties that are highly susceptible to common diseases and follow good disease management practices. Also, limit the number of times at-risk fungicides are used during a growing season and alternate at-risk fungicides with fungicides in a different chemical group (those with a different FRAC numeric code). When using an at-risk fungicide, tank-mixing it with another fungicide from another chemical group (different mode of action) can also reduce the risk of resistance. These are general principles that can help to reduce, but not eliminate risk. A fungicide-resistant pathogen population can still develop when these principles are practiced. Refer to product labels before tank-mixing products to ensure compatibility and to avoid phytotoxicity. For major chemical group description, see 2013 Georgia Pest management handbook –turf disease control section: http://www.ent.uga.edu/pmh/Com_Turf.pdf .

Additional information on turfgrass fungicides:

- A Practical Guide to Turfgrass Fungicides. 2011. R. Latin. APS Press
- http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/PCRP2013/Turf%20Disease%20Control.pdf
- http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/PCRP2013/Major%20Chemical%20Groups.pdf
- www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=7643&pg=dl&ak=Plant%20Pathology#Efficacy
- www.turffiles.ncsu.edu/Diseases/Default.aspx (info sheets)
- http://www.ca.uky.edu/agc/pubs/ppa/ppa1/ppa1.pdf

Update: Commercial Ornamentals

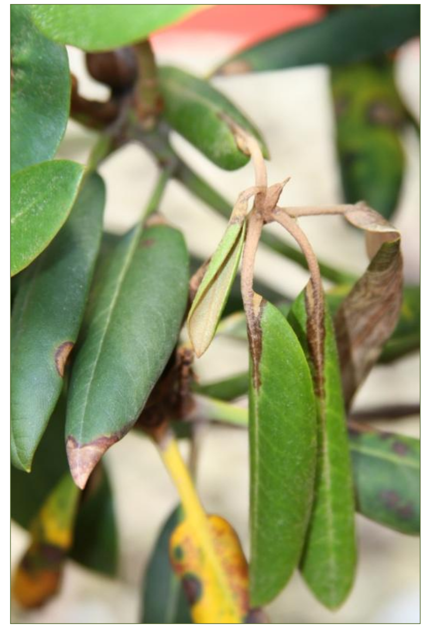
Update on Sudden Oak Death, Thousand Canker Disease of black walnut, and Boxwood Blight: Where are they now?

By Jean Williams-Woodward

Over the past few years, I have been telling about and alerting agents, growers, and landscapers to different diseases that could have a significant impact to forests, nurseries and landscapes in Georgia and the eastern USA. These included Sudden Oak Death, Thousand Canker Disease of black walnut, and Boxwood Blight. The impact of these diseases has fluctuated, some more than others, but they are still of major concern.

Sudden Oak Death: In 2004, the water-mold pathogen, *Phytophthora ramorum*, cause of Sudden Oak Death in CA, was introduced into the eastern USA on infected camellia plants from a CA nursery. From 2004 to 2009, *Phytophthora ramorum* was recovered from numerous plants including *Camellia, Rhododendron, Viburnum, Pieris,* and *Kalmia* from 27 retail nurseries in GA, most of which primarily sell to commercial landscapers. In comparison, this number was more than double the number of nurseries identified in NC who detected it in the second highest number of nurseries (a total of 12). In addition, *P. ramorum* was recovered from soil and water sources (a pond and streams) from three of these nurseries. This period was when intense surveys of ornamental plants within retail garden centers and re-wholesale nurseries of plants originating from CA, OR, and WA was being conducted by the GA Department of Agriculture. There was also significant federal funding of survey efforts during this time. In 2009, funding of survey programs was cut significantly and it continued to decrease in subsequent years.

Sudden Oak Death has killed thousands of trees in CA. It is also killing Japanese larch within timber plantations in the UK. It also has killed more beech trees than oak trees in the UK and Europe. I am more concerned about beech trees in the eastern USA than I am about oak trees because of their thin bark and they retain leaves through the winter.



Leaf tip blighting and death of the petioles on rhododendron due to Phytophthora ramorum infection. (Image by Jean Williams-Woodward)

As part of an early detection program and given that *P. ramorum* produces spores that can swim in water(zoospores), streams adjacent to retail and re-wholesale nurseries that were known to have *P. ramorum*-infected plants at some time since 2004 were being monitored by deploying rhododendron leaf baits to detect *Phytophthora* infection. Since 2009, *P. ramorum* has been recovered from two streams in Forsyth County, GA. Several other southern states also have *P. ramorum*-positive streams, including AL, FL, LA, MS, NC, and TX. *Phytophthora ramorum* has been repeatedly recovered from these streams in multiple months during multiple years, even when no *P. ramorum*-infected plants were found within the nearby nurseries. So, what does this mean? Well, we really don't know for sure, but it suggests that the pathogen has established itself somewhere on some plant and that it is from this source that the pathogen is releasing zoospores into the streams. To date, the GA Forestry Commission in their surveys of stream vegetation has not identified the source plant(s). In reality, we may not know the source until a tree dies, *P. ramorum* is recovered from it, and vegetation surrounding the dead tree is tested. For one thing, until a tree dies, the concern over *P. ramorum* and "sudden oak death" in the eastern USA is a non-issue to the general public. *Phytophthora ramorum* is still is a federally regulated pathogen and as such its movement interstate is restricted. However, if funding for pathogen-free certification programs in the western states diminishes, then nurseries may not be surveyed and the pathogen will continue to be shipped across the country furthering the introduction and disease potential. As of this month, *P. ramorum* has been recovered from 18 nurseries in four states CA(1), OR (10), WA (6) and NY (1) in 2013. Of these, 12 ship plants interstate. For current information and research on *P. ramorum* worldwide go to www.suddenoakdeath.org.

Thousand Cankers Disease: Thousand cankers disease primarily affects black walnut (*Juglans nigra*). The disease was first known to kill trees in CO since about 2001. However, the association of the causal agent, the fungus *Geosmithia morbida*, and its vector, the walnut twig beetle (*Pityphthorous juglandis*) was not described until 2008. The beetle introduces the fungus into the wood where it causes overlapping and coalescing cankers within the phloem just under the bark; hence, the name "thousand cankers disease" (see image at right). Beetle strikes are numerous on the tree, often with more than 35 beetles per inch of wood. The fungus does not move systemically through the tree like other tree diseases, such as Dutch elm disease. The branches and eventually the whole tree dies because the local, coalescing branch and trunk cankers interfere with nutrient transport through the tree.

Dark brown coalescing cankers beneath the bark of black walnut due to Thousand cankers disease. (Image from http://www.tn.gov/agriculture/regulatory/tcd.shtml)

In 2010, the disease was identified for the first time in the eastern USA in Knoxville, TN. Since then, the disease was discovered killing walnuts in VA (Richmond area in 2011), PA (Bucks County in 2011), and NC (Haywood County in the Great Smokey National Park in 2012). The disease could be a threat to black walnuts throughout its native range, which includes GA. To date, we have not seen this disease in GA.

To prevent its introduction, do not move black walnut logs or firewood into GA. The beetles can survive within wood containing bark and emerge from this wood by the thousands to infest nearby black walnut trees. If you see black walnuts declining and suspect Thousand Cankers Disease, let the GA Forestry Commission or me know and we can help direct in sample collection. Do not transport potentially infested wood off-site as this could spread the disease to new locations. See http://www.fs.fed.us/r8/foresthealth/forestpests/tcd/index.shtml for more information.

Branch dieback in black walnut is an early symptom of Thousand cankers disease. (Image from website listed in text)

Boxwood Blight: Boxwood Blight is caused by the fungus, *Cylindrocladium pseudonaviculatum*, which causes leaf spotting, stem dieback, and death of almost all cultivars and species of boxwood. The disease moves quickly through infected plants, gardens, and nurseries. It has been identified in 12 states (CT, DE, MA, MD, NC, NJ, NY, OH, OR, PA, RI, VA) and three Canadian provinces, and it is causing significant damage to boxwoods in those states, some in landscapes while others are restricted to nurseries. The pathogen also infects pachysandra (ground spurge) and causes similar leaf spots and stem dieback.

To date, Boxwood Blight has not been found in Georgia. However, introductions are possible on infected plants or on boxwood tip cuttings originating from out-of-state nurseries and suppliers. Tan, circular leaf spots with a dark brown border develop within two days of inoculation. This is followed rapidly by the entire leaf turning brown, black lesions developing on the stems, and plant defoliation (see images). In some cases, time between leaf spot symptoms to plant death was two weeks. This is a very damaging disease that you do not want in your nursery or landscape. The fungus produces white tufts of spores on the leaves and stems. The spores are very sticky and they will stick to pruning or digging tools, worker’s pants and hands, and dogs or other animals that may walk next to infected plants. In NC, wild turkeys were suspected of spreading the disease within field-grown boxwoods.

Boxwood showing leaf death and defoliation (far left), black stem lesions (left), and round tan leaf spots (above) due to Boxwood Blight disease. (Images by Jean Williams-Woodward)

There is no control for this disease once it is present. The only control is preventing its introduction and preventive fungicide applications to protect non-infected plants. *Cylindrocladium* diseases are difficult to manage with fungicides. Dr. Kelly Ivors at NCSU has conducted some fungicide trials against boxwood blight and has found that fungicides containing chlorothalonil (Daconil, Spectro, Disarm C, Concert II), fludioxonil (Medallion, Palladium) or tebuconazole (Torque) provided the best control when applied preventively. However, most of these products are either not labeled for control of *Cylindrocladium* or for use on boxwood or both. Pageant (pyraclostrobin and boscalid) is labeled for both boxwood and *Cylindrocladium* disease and provided fair to good preventive control. There is a great need for fungicide labeling changes and additions for this disease. Currently, fungicides are only needed in high risk areas where Boxwood Blight is known to occur. Spraying plants after the disease is present will NOT control this disease. Curative applications are ineffective.

If the disease is detected, the infected plants and all of its fallen leaf debris needs to be bagged on-site and removed from the area to be burned or buried to prevent its spread. In nurseries, propane torches have been used to burn any remaining leaf debris to rid the area of the pathogen; however, this may not completely control this disease. The fungus also produces microscelrotia within roots and leaf debris of infected plants. Microsclerotia may allow the pathogen to remain viable at the site for years. Not to sound like an alarmist (but I have to here!), if I was in charge of a boxwood planting (box garden, topiary garden, historic plantation garden, nursery production, etc.), I would not bring in any boxwoods from anywhere. I would do all propagation in-house. You may think you are buying plants originating from a "safe" nursery, but in reality it could be a brokered plant that originated from an area where boxwood blight is present. I also would not allow anyone to prune, shear, take tip cuttings, or touch my boxwoods if they have worked on boxwood somewhere else previously without first disinfesting their tools and changing their clothes. I'd rather make someone angry today, then for me to cry later because all my boxwoods are dead. Bottom line: You won't get this disease if you don't bring in any boxwoods. The spores are not wind-borne; they are water-splashed and carried on plants, people, tools, and animals. If you do bring in boxwood plants, make sure they come from a nursery certified to be free of Boxwood Blight.

Dr. Ivors has also conducted a *Buxus* cultivar susceptibility trial. *Buxus sempervirens* cultivars (English, American, Justin Brouwers, etc.) tend to be more susceptible. *Buxus microphylla* cultivars tend to be more tolerant of the disease; however, all cultivars can be infected. In fact, more tolerant cultivars could look asymptomatic, yet carry the pathogen (i.e. be a ' Typhoid Mary'), and spread the disease to surrounding susceptible plants. The value of cultivar susceptibility testing is in the establishment of new boxwood hedges. If planting a new area, use a more tolerant cultivar to lessen your disease pressure in subsequent years. See http://plantpath.cals.ncsu.edu/ornamentals for more information Boxwood Blight and links to Dr. Ivors' research trials.

Update: Row Crops

Disease management for row crops nears end for 2013: What's next?

By Bob Kemerait

With the arrival of September, harvest of row crops begins in earnest. Much of Georgia's field corn has been picked (sometimes with disastrous results due to Diplodia ear rot) and many peanuts will be dug over the next few weeks. Cotton and soybean harvest may be delayed as planting was frequently affected by wet weather. As has been discussed throughout the season, weather has played a significant role in the types of diseases that have been observed. For example, Pythium pod rot of peanut has been identified in a number of fields where it was not known before. Fusarium wilt of cotton has also appeared in an unusual number of fields;

again likely due to the abundance of rainfall early in the season. Many diseases of corn, including rusts, blights, leaf spots and especially ear rots were tremendously important in 2013. Other diseases, like white mold (southern stem rot) and Cylindrocladium black rot (CBR) of peanut were less common than expected, at least early in the season. Cooler-than-normal temperatures may have slowed the development of white mold; we are still scratching our heads to explain the very low severity of CBR this season. There is still much to learn about plant diseases.

Below are five important points that I believe we should take away from the 2013 field season:

1. Climate (e.g. warmer winter, cooler spring, wetter and cooler summer) can have a tremendous impact on the types and severity of diseases important to our farmers during a season. Weather patterns associated with climate may be more or less favorable for the development and spread of diseases. These same weather patterns may keep growers out of the field and from making timely fungicide applications.
2. Climate (and hurricanes) can be difficult to predict. Despite the highly unusual weather we have experienced in 2013, I don't know that it could have been predicted. Also, it seems that the prediction for "named storms" in 2013 continues to fall as we move to the heart of hurricane season. This does not in any way diminish the importance of attention to climate predictive models for planning prior to a field season; however it clearly shows that Mother Nature is very complicated.
3. Use of fungicides continues to become more the norm on corn and soybeans rather than the exception. Farmers have respect for preventative fungicide applications coupled with an appreciation for the damage that diseases like southern corn rust, northern corn leaf blight and Asian soybean rust cause. However, "best management practices" for diseases like northern corn leaf blight remain uncertain.
4. Target spot, caused by *Corynespora cassiicola*, remains very common where cotton is grown in Georgia and can cause significant premature defoliation. However, effective management of this disease, including if and when to spray, still requires much additional study.
5. Management of nematodes will become an ever-increasingly important consideration for row-crop growers. Not only are farmers becoming more aware of the impact of nematodes (e.g. the stubby-root nematode on corn), but they will also have access to new tools. Whether the promise of new nematicides from companies like Bayer CropScience and MANA, new nematode-resistant varieties, or site-specific applications of Telone II, growers should learn all they can about the impact of nematodes on their crops and tactics that can be deployed to protect their crop.

I believe that the five <u>most important steps that growers can take now</u> in preparation for the 2014 season are:

1. Assess performance of varieties planted this year with regards to disease and begin to consider ways to improve disease control for next year.
2. Consider steps to take to improve crop rotation in the new season.
3. Take nematodes samples from your fields to identify problem areas.
4. Assess diseases that were of particular importance in 2013 and consider options for improving management in 2014.
5. Educate yourself on new resistant varieties, fungicides, and nematicides that are available to determine how you might use them effectively in the new season.

Who to contact in Extension Plant Pathology?

Alfredo Martinez, Extension Coordinator	Turfgrass (commercial, professional lawncare, sod, golf, sports fields); Small grains and non-legume forages	amartine@uga.edu	770-228-7375
Phil Brannen	Commercial fruit	pbrannen@uga.edu	706-542-2685
Jason Brock	Commercial pecans	jbrock@uga.edu	229-386-7495
Bob Kemerait	Row crops – corn, cotton, soybean, peanut	kemerait@uga.edu	229-386-3511
David Langston	Commercial vegetables	dlangsto@uga.edu	229-386-7495
Elizabeth Little	Home turfgrass, landscapes, and gardens, small farm and organic production	elittle@uga.edu	706-542-4774
Jean Williams-Woodward	Commercial ornamentals in greenhouses, nurseries, and landscapes, Christmas trees, forestry, urban forestry, wood rots, legume forages	jwoodwar@uga.edu	706-542-9140
John Sherwood	Department Head	sherwood@uga.edu	706-542-1246

Clinic Sample Type	Contact Name & Number	Shipping Address
Christmas trees, fruit, ornamentals, forestry, all homeowner samples, legume forages, mushrooms, turf and small grains, urban ornamental landscapes, wood rots	**Ansuya Jogi** Office Phone: 706-542-8987 Clinic phone: 706-542-9157 ansuya@uga.edu Fax: 706-542-4102	UGA - Plant Pathology Athens Plant Disease Clinic 2106 Miller Plant Sciences Bldg. Athens, GA 30602-7274
Tobacco, pecan, cotton, soybean, peanut, corn, kenaf, commercial vegetables	**Jason Brock** Phone: 229-386-7495 jbrock@uga.edu Fax: 229-386-7415	Tifton Plant Disease Clinic Room 116 4604 Research Way Tifton, GA 31793
All samples for nematode analysis	**Ganpati Jagdale** Phone: 706-542-9144 gbjagdal@uga.edu Fax: 706-542-5957	UGA - Plant Pathology Nematode Laboratory 2350 College Station Road Athens, GA 30602-4356