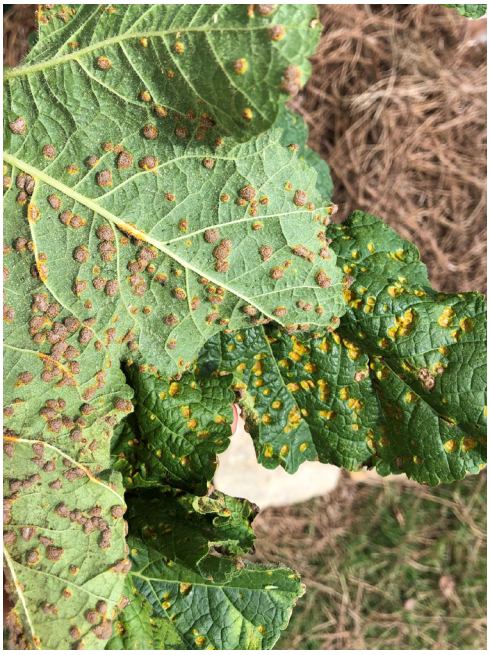

2018 GEORGIA PLANT DISEASE LOSS ESTIMATES

Compiled by Elizabeth L. Little

University of Georgia Extension Plant Pathologist

UNIVERSITY OF GEORGIA
EXTENSION

2018 GEORGIA PLANT DISEASE LOSS ESTIMATES

2018 plant disease losses, including control costs, amounted to an estimated $844 million. The value of the crops used in this estimate was approximately $6,268 million, resulting in a 13.5% relative disease loss across all crops included in this summary.

The estimated values for most crops used to compute these disease losses are summarized in the UGA Center for Agribusiness & Economic Development, 2018 Georgia Farm Gate Value Report (AR-19-01). Some estimates for fruits, ornamentals, and turf rely on specialist's knowledge of the industry and industry sources for information.

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2018 PLANT DISEASE CLINICS ANNUAL SUMMARY

UGA Cooperative Extension's plant pathology department maintains plant disease clinics in Athens, Georgia, and Tifton, Georgia, to aid county Extension faculty in diagnosing and correcting disease-related plant problems. The Plant Disease Clinic in Athens, operated by Ansuya Jogi, is located in room 2405 Miller Plant Sciences Building. Samples analyzed in this clinic include commercial fruit, ornamentals, turf, Christmas trees and forestry; all homeowner samples; legume forages, small grains, grain forages, and wood rots. The Plant Disease Clinic in Tifton, operated by Jason Brock, is located in room 116 of the Horticulture Building. Crops analyzed in this clinic include pecans, field crops, and commercial vegetables. The Extension Nematology Lab, operated by Ganpati Jagdale, is located at 2350 College Station Road in Athens. This clinic processes soil and plant samples for nematode analysis.

In 2016, 2331 physical commercial and homeowner samples were processed for plant disease diagnosis. A total of 5948 samples were submitted for nematode analysis.

Diagnoses and educational recommendations are returned to county faculty. All clinic samples are stored in Distance Diagnostics Through Digital Imaging (DDDI), a web-based database administered and supported by Henry Williams and Isaac Kriser.

2018 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PHYSICAL and DIGITAL SAMPLES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	158	0	158
Fruits and Nuts	167	41	208
Miscellaneous	5	4	9
Ornamentals and Trees	328	247	575
Turf	218	109	327
Vegetables	390	47	437
Total	**1,266**	**448**	**1,714**
NEMATODE SAMPLES (Prepared by the Extension Nematology Lab)			
Crop	**Grower Samples**	**Research Samples**	**Total**
Field Crops	345	2701	3046
Fruits and Nuts	35	987	1022
Miscellaneous	288	240	528
None	1	0	1
Turf	358	326	684
Unknown	57	241	298
Vegetables	26	248	274
Total	**1,110**	**4,743**	**5,853**

APPLE

Summer rots and fire blight are the major diseases consistently associated with economic losses to apple production in Georgia. Although other diseases are generally controlled with good agricultural practices and fungicides, the cost of production is increased substantially in order to provide control of these less-aggressive diseases. Fire blight, a bacterial disease, was observed in 2018, but it did not exceed average levels during bloom. Bitter rot, one of our primary summer rot diseases, caused significantly more losses than on average. Disease losses and expenditures for controlling rot diseases were above average in 2018 as rainfall was prevalent throughout the growing season, allowing for significant disease establishment. There is still a strong need for more efficacious fungicides, especially for control of bitter rot. Cost of control included pesticide usage for fire blight, pruning costs, and summer rot control measures.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Fire Blight	3.00	267.2	90.0	357.2
Bitter Rot	6.00	534.5	150.0	684.5
Bot Rot	0.02	1.8	52.0	53.8
Black Rot	0.01	0.9	33.0	33.9
Alternaria Leaf Spot	0.01	0.9	0.0	0.9
Powdery Mildew	0.01	0.9	11.5	12.4
Sooty Blotch*	0.01	0.9	0.0	0.9
Fly Speck*	0.10	8.9	0.0	8.9
Cedar Apple Rust*	0.01	0.9	0.0	0.9
Scab*	0.01	0.9	0.0	0.9
Other Diseases	0.01	0.9	1.0	1.9
Total	**9.2**	**818.6**	**337.5**	**1,156.1**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

BLACKBERRY

Diseases are a major reason for losses observed in blackberry production; however, as blackberries are still a relatively new crop for Georgia, there is limited research information available for this expanding market. In 2018, diseases were moderately low; however, some locations did note significant issues with Phytophthora root rot, cane blight and Botryosphaeria. Fungicidal applications generally decreased losses. Viruses, many of which cannot be readily detected, continue to cause significant losses in blackberry production in Georgia. The most frequently observed diseases in 2018 were orange cane blotch and cane dieback (cane blight and Botryosphaeria).

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	0.10	4.5	267.0	271.4
Orange Rust	0.01	0.4	33.4	33.8
Cane and Leaf Rust	0.01	0.4	133.5	133.9
Double Blossom	0.01	0.4	66.7	67.2
Viruses	2.00	89.7	33.4	123.1
Phytophthora Root Rot	0.20	9.0	6.7	15.6
Cane Blight	0.50	22.4	66.7	89.2
Leaf Spots	0.05	2.2	26.7	28.9
Botryosphaeria	0.30	13.5	33.4	46.8
Total	**3.2**	**142.6**	**667.4**	**810.0**

Estimate by Jonathan Oliver, Extension Plant Pathologist

BLUEBERRY

A significant late freeze event and several diseases had a significant impact on blueberry production in 2018. As frequently seen following late freezes, increased damage from Botrytis was prevalent in some locations in 2018. In addition, Phomopsis dieback was observed. Although mummy berry was present, losses were generally low where good fungicide programs were implemented. Phytophthora and other root rots caused increased mortality in some plantings due to significant rainfall and tropical weather events in 2018. Blueberry virus diseases, including Blueberry necrotic ring blotch virus, were generally spotty in prevalence. Although some unsprayed sites were severely impacted by Exobasidium leaf and fruit spot, this disease was generally well controlled by most producers where fungicide applications during the late dormant period were utilized. Bacterial leaf scorch continued to cause damage to numerous plantings in 2018. Significant damage from anthracnose ripe rot was also noted.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Mummy Berry	0.10	320.6	6,067.9	6,388.4
Botrytis Blight	1.00	3,205.5	2,292.3	5,497.8
Foliar Disease	1.00	3,205.5	1,752.9	4,958.5
Rots	3.00	9,616.6	1,752.9	11,369.6
Bacterial Leaf Scorch	0.40	1,282.2	539.4	1,821.6
Dieback	0.10	320.6	539.4	859.9
Phytophthora Root Rot	0.70	2,243.9	539.4	2,783.2
Total	**6.3**	**20,194.9**	**13,484.2**	**33,679.1**

Estimate by Jonathan Oliver, Extension Plant Pathologist

BUNCH GRAPE

Excessive rainfall provided for ideal fungal disease development in bunch grapes, and disease losses were substantial in many vineyards. Downy mildew was observed early on fruit where spray programs were not well administered. Virtually all vineyards lost some production to downy mildew and various fruit rots and cane diseases, especially Botrytis, powdery mildew and downy mildew. Sour rot was also prevalent at the end of the season. Fungicide resistance is also a major issue in multiple pathogens of wine grapes. North Georgia is on the southern edge of the region where one can grow Vinifera (European) wine grapes. The limiting factor is Pierce's disease, a bacterial disease that is vectored by sharpshooter insects. Cold winter temperatures kill the insect that transmits the disease, and low temperatures may actually prevent the bacteria from surviving from year to year in the plant. Therefore, cold temperatures allow for production of Vinifera wine grapes, whereas warm winters result in increased disease. Pierce's disease losses continued to increase in 2018, due in part to warmer temperatures the previous few winters.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	3.0	369.3	85.0	454.3
Downy Mildew	9.0	1,107.9	200.0	1,307.9
Black Rot	3.0	369.3	90.0	459.3
Powdery Mildew	1.0	123.1	30.0	153.1
Phomopsis Cane Blight	2.0	246.2	40.0	2,86.2
Crown Gall	0.01	1.2	1.0	2.2
Pierce's Disease	1.75	215.4	20.0	235.4
Leaf Roll Virus	0.10	12.3	5.0	17.3
Total	**19.9**	**2,444.7**	**471.0**	**2,915.7**

Estimate by Phil Brannen, Extension Plant Pathologist

CORN

In 2018, corn for grain was harvested from 353,033 acres in Georgia with an average yield of 185.8 bu/A. The 2018 crop was valued at $288.2 million. Much of the early 2018 field season in Georgia was wet; however, throughout much of the remainder of the season the weather was relatively hot and dry making conditions generally unfavorable for aggressive spread of southern corn rust (*Puccina polysora*) or northern corn leaf blight (*Exserohilum turcicum*). Losses associated with these diseases were generally low. However, these same hot and dry conditions were very favorable for aflatoxin, especially in non-irrigated fields.

The importance of damage from nematodes, including sting, stubby root and southern root-knot nematodes, continues to become more apparent as growers, consultants, and Extension agents are better able to diagnose symptoms in the field. Abundant moisture early in the season helped to alleviate some damage from nematodes, as did increased use of nematicides by growers. Still, losses to nematodes are largely the result of 1) lack of nematode-resistant hybrids and 2) lack of use of nematicides in affected fields.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Root & Stalk Rot	trace	---	---	---
Nematodes	6.0	17.3	1.0**	18.3
Mycotoxins	0.5	1.4	---	1.4
Southern Corn Rust	1.0	2.9	0.8***	3.7
Northern Corn Leaf Blight	0.2	0.6	***	0.6
Other Leaf Diseases*	trace	trace	***	---
Diplodia Ear Rot	---	---	---	---
Total	**7.7**	**22.2**	**1.8**	**24.0**

* Primarily includes southern corn leaf blight (*Bipolaris maydis*) but may include diseases such as gray leaf spot as well.

** An estimated 15% of harvested acres of corn were treated with 5 lb/A Counter insecticide-nematicide or a seed-treatment nematicide (AVICTA Complete Corn and Poncho VOTiVO) for control of nematodes.

*** An estimated 15% of the corn acreage was sprayed with fungicide once during the 2018 season at a cost of $5/A for application and $10/A for cost of fungicide.

Estimate by Robert Kemerait, Extension Plant Pathologist

COTTON

In 2018, cotton was planted to an estimated 1,400,924 acres. The average lint yield was 706.2 lb/A. The crop was valued at $792.7 million. Very wet weather at planting and early in the season increased seedling disease from that reported in 2017. Very wet weather at harvest increased losses to boll rot and also some foliar diseases. Foliar diseases in 2018 were primarily target spot, areolate mildew and Stemphylium leaf spot. As in 2017, areolate mildew continued to cause losses. While both bacterial blight and the Cotton leafroll dwarf virus were found in Georgia in 2018, very little, if any, loss could be attributed to these diseases.

Losses to nematodes (down slightly with increasing use of nematicides and resistant varieties), primarily southern root-knot nematodes, continue to be one of the most important problems for cotton growers in Georgia. Heat and drought stress exacerbates damage from nematodes. Until growers are able to practice effective crop rotation and increase the number of years between cotton crops in a field, the losses and damage from parasitic nematodes will continue to increase unless growers plant root-knot nematode-resistant varieties or use nematicides effectively.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Boll Rot (lint)	7.0	55.5	---	55.5
Nematodes	8.0	63.4	24.3*	87.7
Southern Root-Knot	7.0	55.5	---	
Reniform	0.5	4.0	---	
Columbia Lance	trace	---	---	
Sting	0.5	4.0		
Seedling Disease	1.0	7.9	1.4**	9.3
Fusarium Wilt	0.2	1.6	---	1.6
Ascochyta Blight	trace	---	---	---
Stemphylium Leaf Spot	1.5	11.9	---	11.9
Target Spot	0.2	1.6	5.0***	6.6
Areolate Mildew (Ramularia leaf spot)	0.1	0.8	---***	0.8
Bacterial Blight	trace	---	---	---
Cotton Leafroll Dwarf	trace	---	---	---
Total	**18.0**	**142.7**	**30.7**	**173.4**

* Based upon an estimation that approximately 30% of the cotton acreage in the state is treated with a nematicide seed treatment (e.g., AVICTA Complete Cotton, BioST, etc.), 25% with AgLogic or Velum Total, and 5% with Telone II. COPeO Prime seed treatment was also used, but was included in the cost of FiberMax seed.

** Estimate of the cost of additional fungicide seed treatments used to manage seedling diseases. Approximately 10% of the cotton acreage in Georgia is treated with a fungicide in addition to the base seed treatment (or seed-treatment nematicide) to manage seedling disease.

*** Based upon estimate that 20% of the cotton acreage was sprayed with a fungicide in 2018 to manage foliar diseases.

Estimate by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially from fruit rots, was above average in 2018. Good fungicidal spray programs generally result in minimal losses, but ripe rot, Macrophoma rot and other diseases were severe in some vineyards. This may have been a result of poor spray programs, but fungicide resistance, combined with conducive weather conditions, may have been involved. As a native grape, muscadines generally have less disease pressure than European bunch (Vinifera) grapes, so fungicides are more effective when applied to muscadines. An active fungicide program is required, and where producers are unable to spray effectively, diseases can be significant.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Bitter Rot	1.5	158.6	70.0	228.6
Macrophoma Rot	1.5	158.6	50.0	208.6
Ripe Rot	2.0	211.5	35.0	246.5
Angular Leaf Spot	0.6	63.4	10.0	73.4
Black Rot*	0.6	63.4	0.0	63.4
Phomopsis Dead Arm	0.5	52.9	1.0	53.9
Total	**6.7**	**708.4**	**166.0**	**874.4**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

ORNAMENTAL HORTICULTURE

The farm gate value for ornamental horticulture (container nurseries, field nurseries, and greenhouses and excluding turf) increased by $37.92 million over the 2017 value for a total of $758.12 million in 2018. Floriculture (greenhouse) and field (mostly tree) nursery production increased by $43.72 million and $10.28 million, respectively, from 2017. Container nursery production decreased by $16.09 million for the year, representing a loss of 10% of the 2017 value. The ornamental disease loss estimate includes only commercial plant production and excludes the value-added service industries because the value, disease loss, and cost of control are not documented and vary greatly within the industry.

Root diseases still account for the largest percentage of disease loss in commercial ornamental production. Rose rosette-associated virus, causing rose rosette disease, remains a concern for both the nursery and landscape industries. The virus has resulted in a 20-40% reduction in rose production because effective control measures are unavailable. Boxwood blight also continues to be of concern for growers and landscapers. Although the disease has not been identified in production nurseries, growers must preventively treat boxwoods to lessen their disease introduction risk. Leaf spots, such as *Tubakia* sp., are also becoming more common on deciduous trees.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Bacterial Diseases (fire blight, leaf spots)	0.2	1.52	0.90	2.42
Fungal Leaf Spots, Stem Cankers, Needle Blights	3.2	24.26	9.10	33.36
Root and Crown Rots	3.6	27.29	8.95	36.24
Powdery Mildew	0.6	4.55	2.10	6.65
Downy Mildew	0.3	2.27	3.20	5.47
Botrytis Blight	0.2	1.52	1.21	2.73
Viruses (TSWV, INSV, rose rosette, hosta virus X)	1.0	7.58	0.30	7.88
Minor diseases (rusts, nematodes)	0.1	0.76	1.05	1.81
Total	**9.2**	**69.75**	**26.81**	**96.56**

Production Category (2018 Farm Gate Value)	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Field Nursery ($125.70 M)	2.61	3.28	1.95	5.23
Container Nursery ($144.73 M)	11.39	16.48	12.21	28.69
Floriculture (Greenhouse) ($487.69 M)	10.25	49.99	12.65	62.64
Total	**9.2**	**69.75**	**26.81**	**96.56**

* Column is not additive because disease losses are weighted according to production category.

Estimate by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Peach production was reduced in 2018 due to cold damage during bloom. Due to adequate fungicide programs, brown rot and scab diseases were of minimal consequence on peaches that remained. However, many orchards were not sprayed due to lack of sufficient fruit, which resulted in increased carryover fungal inoculum for 2019. Recommended fungicides worked remarkably well. Extensive surveys have indicated that brown rot fungicide resistance is prevalent in many locations, but field surveys allowed for prescription fungicide management (selection of fungicide classes for which resistance was not observed). Bacterial spot was more prevalent than normal, and this could indicate resistance development to antibiotics and/or copper bactericides used to control this disease. Armillaria continued to be a major, expanding problem in replant peach production. Of concern, phony peach, caused by the bacterium *Xylella fastidiosa*, continued to increase in production orchards, likely as a result of overall warming temperatures. Both Armillaria and phony peach diseases take trees out of production, so an increase in prevalence is particularly troubling and potentially devastating for the future of the peach industry. Hurricane Michael also caused some damage to peach trees in 2018.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Brown Rot	0.1	48.8	2080.0	2128.8
Scab	0.01	4.9	1555.0	1559.9
Bacterial Spot	0.01	4.9	30.0	34.9
Phony Peach	0.3	146.3	250.0	396.3
Gummosis	0.1	48.8	20.0	68.8
Armillaria Root Rot	1.0	487.8	50.0	537.8
Phomopsis Constriction Canker	0.01	4.9	10.0	14.9
Total	**2.2**	**1,097.1**	**3,995.0**	**5,092.1**

Estimate by Phil Brannen, Extension Plant Pathologist

PEANUT

In 2018 peanut was harvested from 673,938 acres. Yields in 2018 averaged 4,531 lb/A for a total production valued at $624.6 million. Disease and nematode losses in Georgia were affected largely by the environmental conditions during the 2018 season. Very wet weather at planting and early in the season decreased the severity of Aspergillus crown rot from that reported in 2017. Hot and dry conditions later in the season increased losses to white mold (southern stem rot) in some fields, especially those without irrigation. Very wet weather as harvest approached continued to increase losses to white mold and, to some degree, leaf spot. Losses to tomato spotted wilt in 2018 were estimated to be 3.5%, down slightly from 2017.

The peanut root-knot nematode remained a problem in the south-central and southwestern regions of the state. However, availability of Velum Total and AgLogic 15G for management of nematodes helped to reduce this problem. Development and spread of Cylindrocladium black rot (CBR) was slight in 2018.

Disease	% Reduction in Crop Value[a]	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf spots	2.0	12.5	30.2[b]	42.7
White mold (Sclerotium)	10.0	62.5	23.9[c]	86.4
Limb Rot (Rhizoctonia)	0.1	0.6	---d	0.6
Pod Rot	trace	---	---e	---
Nematodes	4.0	25.0	7.1[f]	32.1
Cylindrocladium Black Rot	trace	---	---	---
Seedling Disease	0.5	3.1	---[g]	3.1
Tomato Spotted Wilt Virus	3.5	21.9	---	21.9
Diplodia Collar Rot	trace	---	---	---
Total	**16.1**	**100.3**	**60.4**	**160.7**

[a] The total value of the crop was $624.6 million according the Georgia Farm Gate Value report.

[b] An estimated 55% of peanut acreage in Georgia receives some irrigation and most of this acreage was sprayed with fungicides 6.5 times during the season. Fungicide treatments for leaf spot control alone are about $8/acre per application. Growers usually sprayed non-irrigated fields less often, perhaps four to five times per season. This figure is based upon the cost to growers if they ONLY used fungicides (e.g., chlorothalonil) for leaf spot control. Only the approximate cost of the fungicide is factored into this figure.

[c] This figure reflects the additional cost BEYOND control of leaf spot if growers chose to use products such as azoxystrobin, prothioconazole, tebuconazole, solatenol, flutolanil or other to control soilborne diseases at some point during the season. For non-irrigated fields, four applications were calculated at $5.00/A. For irrigated fields, four applications at $12.00/A were calculated.

[d] Cost of control for limb rot is included in treatments for white mold.

[e] The cost of gypsum treatments applied to reduce pod rot has not been estimated.

[f] For the cost of nematode management, an estimated 5.0% of the acreage in Georgia is treated at a cost of $85/A and 20% at $36/A (Velum Total or AgLogic).

[g] The cost of the fungicide seed treatment is absorbed in the cost of the seed.

Estimate by Robert Kemerait, Extension Plant Pathologist

PECAN

The growing season started out relatively dry, resulting in lower leaf scab potential early in the year. However, frequent rains in June resulted in high levels of nut scab. Overall, the 2018 season had moderate to high scab pressure.

Most commercial growers in the southern part of the state made ten or more fungicide applications to control scab successfully. In University of Georgia fungicide trials in Tift County, non-treated controls of the cultivar 'Desirable' had nut scab severity ratings of 99.6 and 95.1% in late August. This level of scab on the fruit would result in a near 100% loss.

In 2018 the estimated pecan acreage in Georgia was 187,712 acres with a total farm gate value of $218.5 million.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Scab	12.0	26.2	30.4	56.6
Anthracnose	0	0	0	0
Brown Spot	0	0	0	0
Downy Spot	0	0	0	0
Powdery Mildew	0	0	0	0
Zonate Leaf Spot	0	0	0	0
Phytophthora Shuck and Kernel Rot	0	0	0	0
Total	**12.0**	**26.2**	**30.4**	**56.6**

* Nine treatments per acre @ $18.00/A; scab fungicide programs are also effective against anthracnose, downy spot, brown spot, and powdery mildew in most cases; number of sprays varied by location.

Estimate by Jason Brock and Tim Brenneman, Extension Plant Pathologists

SOYBEAN

In 2018, soybeans were planted to a reported 166,105 acres with an average yield of 41.8 bu/A. The total soybean production for Georgia in 2018 was valued at $66.9 million. The success of the Asian soybean rust sentinel plot program was especially pronounced in the 2018 season. Weather conditions (extended periods of rain) early in the season appeared to be extremely favorable for development of soybean rust and other diseases; however, the re-introduction of the disease was long delayed and spread of rust was quite slow. Without the sentinel plot program, recommendations early in the season would have been to apply fungicides which would have increased production costs for the growers. With a sentinel plot program in place, recommendations to apply fungicides were not given until late in the 2018 field season.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soybean cyst nematode*	trace	---	0	---
Root-knot nematodes	2.0	1.3	0	1.3
Other nematodes**	0.1	0.1	0	0.1
Asian soybean rust	0.1	0.1	0.3	0.4
Anthracnose	0.5	0.3	0	0.3
Brown leaf spot	0	0	0	0.0
Charcoal rot	0.1	0.1	0	0.1
Diaporthe/Phomopsis complex	trace	---	---	0.0
Downy mildew	trace	---	---	0.0
Frogeye leaf spot	0.1	0.1	0	0.1
Red crown rot	trace	---	0	0.0
Cercospora leaf blight	0.5	0.3	0	0.3
Pod and stem blight	1.0	0.7	0	0.7
Purple stain	0.1	0.1	0	0.1
Seedling diseases (*Rhizoctonia/Pythium/Fusarium*)	trace	---	0.1	0.1
Southern blight (*Sclerotium*)	0.25	0.2	0	0.2
Stem canker	0	0	0	0
Fusarium wilt	trace	---	---	0
Virus diseases	0	0	0	0
Bacterial diseases	0	0	0	0
Total	**4.75**	**3.3**	**0.4**	**3.7**

* Resistant cultivars are used to manage most nematode and disease problems. Fungicides were applied to an estimated 20,000 acres for management of foliar diseases and were used as seed treatments to reduce seedling diseases on a small portion of the planted acreage. Each foliar fungicide application is estimated to cost growers $15.00/A.

** “Other nematodes” includes reniform, sting, and Columbia lance nematodes.

Estimate by Robert Kemerait, Extension Plant Pathologist

STRAWBERRY

Foliar and fruit disease pressures were severe in 2018. Botrytis (gray mold) increased in prevalence, and resistance to numerous fungicides was reported in multiple locations. Phytophthora, Pythium, and Rhizoctonia root rots were sometimes damaging. Significant anthracnose was observed in some locations, and resistance to fungicides was recorded in multiple locations throughout Georgia. Overall, it was a good year for strawberry production, although excessive rains were problematic to disease management on several farms. There is concern that the pathogens causing anthracnose (*Colletotrichum* spp.) and Botrytis rots will continue to develop resistance to other fungicides, which would make production more difficult. There is a strong need for fungicides with different modes of action if we are to continue strawberry production in Georgia.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Gray Mold	0.3	29.3	422.6	451.9
Fungal Leaf Spots	0.1	9.8	131.5	141.2
Anthracnose	1.0	97.7	140.9	238.6
Root Rots & Nematodes	2.0	195.4	234.8	430.2
Angular Leaf Spot	0.0	1.0	9.4	10.4
Total	**3.4**	**333.2**	**890.1**	**1,272.3**

Estimate by Phil Brannen, Extension Plant Pathologist

TURFGRASS

It was estimated that in 2018, there were 2.7 million acres of turf encompassing all turfgrass industries (golf courses, sport fields, sod production, lawn care, residential and commercial landscapes) with a maintenance value of $1.98 billion. There were 26,651 acres used for sod/stolon production in the state of Georgia, yielding a farm gate value of $118,321,229. Poor centipedegrass green-up was a prevalent complaint among clientele submitting samples to the Plant Disease Clinic. Erratic temperatures and precipitation during spring 2018 accounted for most of the poor-green up. Large patch of warm-season grasses caused by *Rhizoctonia solani* was by far the main problem in 2018; zoysiagrass was particularly affected. Additionally, outbreaks of dollar spot caused by *Clarireedia* spp. (formerly *Sclerotinia homoeocarpa*) and of Bipolaris leaf spot caused by *Bipolaris* and *Drechslera* spp. were persistent in 2018. These diseases were particularly problematic on bermudagrass during the spring and fall. Anthracnose (*Colletotrichum cereale*) and Pythium root and crown rot were ubiquitous in bentgrass. *Gaeumannomyces* spp. (causal agent of take all root rot/ root decline of warm season grasses/ bermudagrass decline) continued to be prevalent throughout the state. High summer temperatures exerted severe stress in bentgrass and tall fescue. Gray leaf spot (*Magnaporthe grisea*) was abundant on St. Augustinegrass in 2018. Plant parasitic nematodes sample submissions were abundant on bent and bermudagrass greens. Numerous abiotic problems including cultural and environmental issues, nutritional deficiencies, dense thatch layer problems, poor root systems and soil compaction were commonly diagnosed in all turf species. Minor infections of rust and fairy ring were also observed. *Ophiosphaerella* spp. (SDS-spring dead spot) affecting bermudagrass were minor on commercial sites in the northern areas of the state in 2018. SDS in golf courses was minimal due to preventative care in the fall. There were 464 turfgrass samples received at the UGA Plant Disease Clinic in Athens and the turfgrass pathology lab in Griffin during 2018, with the large majority of them made up of warm-season grasses; 360 nematode analyses were submitted to the UGA Extension Nematology Laboratory.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soil-borne and Crown Diseases	3.0	59.40	19.80	79.20
Foliar Diseases	1.0	19.80	9.90	29.70
Nematodes	0.5	9.90	9.90	19.80
Total	**4.5**	**89.10**	**39.60**	**128.70**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

VEGETABLES

About 150,000 acres of vegetables were grown in Georgia in 2018 worth a total of ca. $1.13 billion in farm gate value. Fusarium wilt of watermelon (*Fusarium oxysporum* f. sp. *niveum*) and Phytophthora fruit rot (*Phytophthora capsici*) caused greater losses than normal in spring and summer crops. Phytophthora blight and fruit rot also caused economic losses in other cucurbits (cucumber, squash, cantaloupe). Center rot (*Pantoea* sp.) and post-harvest rot (bacterial and fungal origin) in onion were observed resulting in economic losses. Alternaria leaf blight in brassicas was problematic (resistance to FRAC group 11 fungicides) resulting in considerable economic losses in headed and leafy brassicas. Losses due to whitefly-transmitted viral diseases were comparatively lower than losses incurred during 2016 and 2017. Southern blight (*Sclerotium rolfsii*) and root-knot nematodes continue to be a problem in tomato production and regularly cause economic losses.

Major Vegetable Crops	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Watermelon	12.0	14.8	6.5	21.3
Squash (yellow + zucchini)	15.0	9.8	7.5	17.3
Tomato	8.0	4.1	14.5	18.6

Other Vegetable Crops	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Pepper (bell)	3.0	3.8	2.5	6.3
Cucumber	5.0	4.2	2.4	6.6
Snap Bean	10.0	2.4	1.5	3.9
Greens	20.0	7.3	5.5	12.8
Headed brassica (cabbage, broccoli)	15.0	9.3	12.5	21.8
Onion (field and storage)	3.5	5.2	6.2	11.4
Cantaloupe	3.0	0.4	1.2	1.6
Eggplant	0.8	0.2	0.6	0.8
Total	**5.5***	**61.5**	**60.9**	**122.4**

* This column is not additive due to the way losses for vegetables are tabulated. Total values for vegetable commodities are taken from the 2018 Farm Gate Value Report.

Estimate by Bhabesh Dutta, Extension Vegetable Pathologist

WHEAT

Wheat farm gate value in 2018 in Georgia was $21.7 million. Wheat was harvested from 95,057 acres with an average yield of 54.94 bu/acre. Georgia wheat acreage for grain production declined again (-29.0%) this year compared with 2017. The top five wheat-producing counties (by area) were Brooks, Dooly, Baker, Dodge, and Houston. Fall of 2017 was exceptionally wet and many production fields were planted late. No problems with seedling emergence were observed. Plantings in the state received adequate rainfall into December. In December the southern half of the state began receiving much less rainfall than the northern half. This trend continued through the winter and spring. Low temperatures late in the winter caused some cold damage to wheat. Late rains in May greatly hampered harvest and affected grain quality. Powdery mildew (*Blumeria graminis*) was observed throughout the state and found at high levels at Calhoun and Tifton CAES Research and Education Centers. Mildew was also observed at Plains and Midville. Fusarium head blight (FHB/scab) (*F. graminearum*) incidence was low across the state. Only one sample with confirmed FHB originated in Grady County in extreme south Georgia where the infection was minimal; the dry winter and spring prevented infections from starting. Leaf rust (*Puccinia triticina*) was observed at all research locations in the state; disease levels were low. Mild winter and spring temperatures as well as intermittent humidity did not provide conducive conditions for leaf rust epidemics. Higher infection levels were observed later in the season on susceptible varieties. Stripe rust (*Puccinia striiformis*) was observed at Plains in artificially inoculated plots and also in Tifton and Midville at low levels. Oat crown rust (*Puccinia coronata*) incidence and severity were high in commercial fields. Crown rust was observed at Plains and Tifton in the oat variety trial. Resistance to this disease in available production varieties is currently limited. Stagonospora spot blotch and tan spot were observed throughout the state at low levels in wheat. Tan spot was also reported on rye in the state. Barley yellow dwarf virus (BYDV) was observed at low levels across the state.

Diseases	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Rust/Stripe Rust	0.5	0.108	0.217	0.325
Glume Blotch	0.5	0.108	0.000	0.108
Powdery Mildew	0.5	0.108	0.108	0.216
Fusarium Head Blight	0.0	0.000	0.000	0.000
Barley Yellow Dwarf Virus	0.5	0.108	0.108	0.216
Soilborne Wheat Mosaic / Spindle Streak Mosaic Virus	0.0	0.000	0.000	0.000
Total	**2.0**	**0.432**	**0.433**	**0.865**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2018

Crop or Commodity	Estimated Crop Value *($ Millions)*	% Reduction in Crop Value[1]	Value of Damage *($ Millions)*	Cost of Control *($ Millions)*	Total Disease Loss *(Damage & Control) ($ Millions)*	Total % of Loss[1, 2]
Apple	8.09	9.2	0.82	0.34	1.16	14.3
Blackberry	4.34	3.2	0.14	0.67	0.81	18.7
Blueberry	300.36	6.3	20.19	13.48	33.67	11.2
Bunch Grape	9.87	19.9	2.44	0.47	2.91	29.5
Corn	288.23	7.7	22.20	1.80	24.00	8.3
Cotton	792.72	18.0	147.70	30.70	178.40	22.5
Muscadine Grape	9.87	6.7	0.71	0.17	0.88	8.9
Ornamentals	758.12	9.2	69.75	26.81	96.56	12.7
Peach	48.32	2.2	1.09	3.99	5.08	10.5
Peanut	624.57	20.1	125.60	61.20	186.80	29.9
Pecan	218.48	12.0	26.20	30.40	56.60	25.9
Soybean	66.86	4.8	3.30	0.40	3.70	5.5
Strawberry	9.89	3.4	0.33	0.94	1.27	12.8
Turfgrass	1,980.00	4.5	89.10	39.60	128.70	6.5
Vegetable	1,126.21	5.5	61.50	60.90	122.40	10.9
Wheat	21.71	2.0	0.43	0.43	0.86	4.0
TOTALS	**6,267.64**	**---**	**571.50**	**272.30**	**843.80**	**13.5**

[1] This column is not additive.

[2] Total percent loss for each crop and the grand total is figured on the basis of the value of damage + cost control/crop value

ATTENTION!

Pesticide Precautions

1. Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful and illegal to do otherwise.

2. Store all pesticides in original containers with labels intact and behind locked doors. ***Keep pesticides out of the reach of children.***

3. Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plants and animals.

4. Apply pesticides carefully to avoid drift or contamination of nontarget areas.

5. Surplus pesticides and containers should be disposed of in accordance with label instructions so that contamination of water and other hazards will not result.

6. Follow directions on the pesticide label regarding restrictions as required by state or federal laws and regulations.

7. Avoid any action that may threaten an endangered species or its habitat. Your county Extension agent can inform you of endangered species in your area, help you identify them, and through the Fish and Wildlife Service, identify actions that may threaten endangered species or their habitat.

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