2019 GEORGIA PLANT DISEASE LOSS ESTIMATES

Compiled by Elizabeth L. Little

University of Georgia Extension Plant Pathologist

UNIVERSITY OF GEORGIA
EXTENSION

2019 GEORGIA PLANT DISEASE LOSS ESTIMATES

2019 plant disease losses, including control costs, amounted to an estimated $832 million. The value of the crops used in this estimate was approximately $6.64 billion, resulting in a 13.3% 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, 2019 Georgia Farm Gate Value Report (AR-20-01). Some estimates for fruits, ornamentals, and turf rely on specialist's knowledge of the industry and industry sources for information.

THE FOLLOWING MEMBERS OF THE UNIVERSITY OF GEORGIA DEPARTMENT OF PLANT PATHOLOGY MADE DIRECT CONTRIBUTION TO THIS PUBLICATION:

Phil Brannen » Athens, Georgia | 706-542-2685 | pbrannen@uga.edu

Jason Brock » Tifton, Georgia | 229-386-7495 | jbrock@uga.edu

Bhabesh Dutta » Tifton, Georgia | 229-386-7495 | bhabesh@uga.edu

Ganpati Jagdale » Athens, Georgia | 706-542-9144 | gbjagdal@uga.edu

Ansuya Jogi » Athens, Georgia | 706-542-4719 | ansuya@uga.edu

Bob Kemerait » Tifton, Georgia | 229-386-3511 | kemerait@uga.edu

Elizabeth Little » Athens, Georgia | 706-542-4774 | elittle@uga.edu

Alfredo Martinez-Espinoza » Griffin, Georgia | 770-228-7375 | amartine@uga.edu

Jonathan Oliver » Tifton, Georgia | 229-386-3036 | jonathanoliver@uga.edu

Jean Williams-Woodward » Athens, Georgia | 706-542-9140 | jwoodwar@uga.edu

2019 PLANT DISEASE CLINICS ANNUAL SUMMARY

Extension Plant Pathology maintains plant disease clinics in Athens and Tifton to aid county Extension faculty in diagnosing and correcting disease-related plant problems. Additionally, a laboratory for analysis for nematodes is maintained in Athens. The Plant Disease Clinic in Athens, operated by Ansuya Jogi, is in Room 2405 Miller Plant Science Building. Samples analyzed in this clinic include commercial fruit, ornamentals, forestry, turf; all homeowner samples, legume forages, small grains, and wood rots. The Plant Disease Clinic in Tifton, operated by Jason Brock, is in Room 116 of the Horticulture Building. Crops analyzed in this clinic include pecans, field crops, and commercial vegetables. Specialists associated with the clinics are Phillip Brannen, Jason Brock, Bhabesh Dutta, Bob Kemerait, Elizabeth Little, Alfredo Martinez-Espinoza, Jonathan Oliver and Jean Williams-Woodward. The Extension Nematology Lab, operated by Dr Ganpati Jagdale and Katherine Martin, processes soil and plant samples for nematode analysis.

In 2019, 1437 physical and digital commercial and home samples were processed for plant disease diagnosis, leading to an estimated 1882 diagnoses. A total of 5411 samples were processed for nematode analysis. Diagnoses and educational recommendations are returned to the county faculty by specialists. The information on clinic samples is currently stored in Distance Diagnostics through Digital Imaging (DDDI), a web-based database.

2019 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PHYSICAL and DIGITAL SAMPLES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	108	2	110
Fruits and Nuts	153	47	200
Miscellaneous	3	2	5
Ornamentals and Trees	284	229	513
Turf	104	92	196
Vegetables	369	44	413
Total	**1021**	**416**	**1437**
NEMATODE SAMPLES (Prepared by the Extension Nematology Lab)			
Crop	**Grower Samples**	**Research Samples**	**Total**
Field Crops	339	2158	2497
Fruits and Nuts	21	744	765
Miscellaneous	473	743	1216
None	6	0	6
Trees	9	0	9
Turf	262	190	452
Unknown	62	128	190
Vegetables	25	251	276
Total	**1197**	**4214**	**5411**

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 2019, 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 due to wet conditions. Glomerella leaf spot increased dramatically on susceptible varieties and is becoming one of our primary apple diseases. Disease losses and expenditures for controlling rot diseases were above average in 2019, 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 and Glomerella leaf spot. 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	1.00	121.0	91.0	212.0
Bitter Rot	5.00	604.8	145.0	749.8
Bot Rot	0.03	3.6	52.0	55.6
Black Rot	0.02	2.4	33.0	35.4
Alternaria Leaf Spot	0.01	1.2	0.0	1.2
Powdery Mildew	0.01	1.2	12.0	13.2
Sooty Blotch*	0.01	1.2	0.0	1.2
Fly Speck*	0.10	12.1	0.0	12.1
Cedar Apple Rust*	0.01	1.2	0.0	1.2
Scab*	0.01	1.2	0.0	1.2
Other Diseases	1.00	121.0	5.0	126.0
Total	**7.2**	**871.0**	**338.0**	**1209.0**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

BLACKBERRY

Blackberries are still a relatively new commodity for Georgia. Diseases are a major reason for losses observed in blackberry production; however, there is limited research information available for this expanding market. In 2019, diseases caused moderate losses with some locations noting significant issues with Phytophthora root rot and cane dieback (cane blight and Botryosphaeria). Fungicidal applications generally decreased losses. Viruses, many of which cannot be readily detected, caused significant losses. Production in multiple plantings statewide was a total loss in 2019 due to virus impacts – especially in plantings which had been formerly established without the use of tissue-culture derived plants. The most frequently observed diseases in 2019 were orange cane blotch, Phytophthora root rot, and Pseudocercospora leaf spot.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
	0.10	4.5	267.0	271.4
Botrytis	0.10	6.9	238.4	245.3
Orange Rust	0.01	0.7	29.8	30.5
Cane and Leaf Rust	0.01	0.7	119.2	119.9
Double Blossom	0.01	0.7	59.6	60.3
Viruses	3.50	243.2	29.8	273.0
Phytophthora Root Rot	0.20	13.9	6.0	19.9
Cane Blight	0.50	34.7	59.6	94.3
Leaf Spots	0.05	3.5	23.8	27.3
Botryosphaeria	0.20	13.9	29.8	43.7
Total	**4.6**	**318.2**	**596.0**	**914.2**

Estimate by Jonathan Oliver, Extension Plant Pathologist

BLUEBERRY

Several diseases had a significant impact on blueberry production in 2019. Some Phomopsis dieback was observed, as well as mummy berry. Generally, losses due to mummy berry were low to moderate where good fungicide programs were implemented. Phytophthora and other root rots continued to be a frequent issue on blueberries, although to a somewhat lesser degree than in the prior year. Likely as a result of the mild winter, a widespread early occurrence of blueberry leaf rust was noted in 2019; nonetheless, fungicide programs were effective for rust management. Significant issues with anthracnose fruit rot were noted, even by growers employing adequate spray programs. Viral problems were rarely observed on blueberry. Exobasidium leaf and fruit spot was present and generally well controlled by most producers through fungicide applications during the dormant period. Bacterial leaf scorch damaged numerous plantings in 2019, resulting in significant plant mortality in some plantings.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Mummy Berry	0.10	0.24	5.39	5.63
Botrytis Blight	0.00	0.0	2.04	2.04
Foliar Disease	1.50	3.54	1.56	5.10
Rots	4.00	9.45	1.56	11.01
Bacterial Leaf Scorch	0.40	0.95	0.48	1.43
Dieback	0.10	0.24	0.48	0.72
Phytophthora Root Rot	0.60	1.42	0.48	1.90
Total	**6.7**	**15.84**	**11.99**	**27.83**

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. 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, to include Botrytis, downy mildew, and powdery mildew. 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 2019, due in part to warmer temperatures the previous few winters. However, more aggressive vector (insect) management, combined with destroying infected plants, has helped to stem rapid vineyard demise.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	4.0	594.1	86.0	680.1
Downy Mildew	8.0	1188.3	200.0	1388.3
Black Rot	1.0	148.5	91.0	239.5
Powdery Mildew	1.0	148.5	31.0	179.5
Phomopsis Cane Blight	1.0	148.5	40.0	188.5
Crown Gall	0.01	1.5	1.0	2.5
Pierce's Disease	1.75	259.9	20.0	279.9
Leaf Roll Virus	0.10	14.9	5.0	19.9
Total	**16.9**	**2504.2**	**474.0**	**2978.2**

Estimate by Phil Brannen, Extension Plant Pathologist

CORN

In 2019, corn for grain was harvested from 394,830 acres in Georgia with an average yield of 180.9 bu/A. The 2019 crop was valued at $321.4 million. The winter of 2018-2019 was fairly mild which not only affected early activity of plant-parasitic nematodes, but also allowed for early re-introduction of southern corn rust. Conditions during much of the 2019 season were relatively hot and dry, and generally unfavorable for aggressive spread of diseases such as southern and northern corn leaf blights (*Bipolaris maydis* and *Exserohilum turcicum*, respectively). 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, e.g., sting, stubby root and southern root-knot nematodes, continues to be increasingly apparent as growers, consultants, and Extension agents are better able to diagnose symptoms in the field. A mild winter coupled with hot and dry conditions during the growing season increased losses to nematodes. Such 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	6.5	20.9	1.2**	22.1
Mycotoxins	1.5	4.8	---	4.8
Southern Corn Rust	1.0	3.2	1.5***	4.7
Northern Corn Leaf Blight	0.1	0.3	***	0.3
Other Leaf Diseases*	trace	trace	***	---
Diplodia Ear Rot	---	---	---	---
Total	**9.1**	**29.24**	**2.7**	**31.94**

* 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 2019 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 2019, cotton was planted on an estimated 1.5 million acres. The average lint yield was 922.3 lb/A. The crop was valued at $983.6 million. Much of the 2019 field season in Georgia, to include the early and mid-season, was very hot and dry thus decreasing losses to foliar diseases but maintaining losses to nematodes. Target spot was observed, as was areolate mildew. Hot and dry conditions late in the season reduced losses to boll rot as well. Very little, if any, loss could be attributed to bacterial blight or the Cotton leafroll dwarf virus.

Losses to nematodes (similar to 2018), primarily from southern root-knot nematodes, continue to be one of the most important problems for cotton growers in Georgia. Heat and drought stress on the cotton crop 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)	2.0	19.7	---	19.7
Nematodes	8.0	78.7	26.5*	105.2
Southern root-knot	7.0	68.8	---	
Reniform	0.5	4.9	---	
Columbia lance	trace	---	---	
Sting	0.5	4.9		
Seedling Disease	0.5	4.9	2.5**	7.4
Fusarium Wilt	0.2	2.0	---	2.0
Ascochyta Blight	Trace	---	---	---
Stemphylium Leaf Spot	2.0	19.7	---	19.7
Target Spot	0.1	1.0	2.3***	3.3
Areolate Mildew (Ramularia leaf spot)	0.1	1.0	---***	1.0
Bacterial Blight	trace	---	---	---
Cotton Leafroll Dwarf	trace	---	---	---
Total	**12.9**	**126.9**	**31.3**	**158.2**

* 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 33% 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 10% of the cotton acreage was sprayed with a fungicide in 2019 to manage foliar diseases.

Estimate by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially from fruit rots, was above average in 2019. 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	199.6	75.0	274.6
Macrophoma Rot	2.0	266.2	55.0	321.2
Ripe Rot	2.0	266.2	35.0	301.2
Angular Leaf Spot	0.6	79.8	10.0	89.8
Black Rot*	0.6	79.8	0.0	79.8
Phomopsis Dead Arm	0.5	66.5	1.0	67.5
Total	**7.2**	**958.1**	**176.0**	**1134.1**

* 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 $78.87 million over the 2018 value for a total value of $836.99 million in 2019. Floriculture (greenhouse), field (mostly tree) nursery, and container nursery production accounted for $476.53 million (2.3% reduction from 2018), $182.49 million (45.2% increase from 2018), and $177.97 million (23% increase from 2018) to the total farm gate value of ornamental plant production in 2019, respectively. 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 and crown rot diseases still account for a large 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. Rose rosette virus has resulted in a 20-40% reduction in rose production because effective control measures are unavailable. Boxwood blight continues to be of concern for growers and landscapers and preventive fungicides are used to lessen disease introduction risk. Fungal branch cankers, mostly Botryosphaeria canker on red maple, was common in 2019 and caused significant crop losses in field and container nurseries.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Bacterial Diseases (fire blight, leaf spots)	0.2	1.67	0.90	2.57
Fungal Leaf Spots, Stem Cankers, Needle Blights	3.6	30.13	9.50	39.63
Root and Crown Rots	3.5	29.29	8.95	38.24
Powdery Mildew	0.5	4.18	2.10	6.28
Downy Mildew	0.2	1.67	3.00	4.67
Botrytis Blight	0.1	0.84	1.21	2.05
Viruses (TSWV, INSV, rose rosette, hosta virus X)	1.0	8.37	0.30	8.67
Minor diseases (rusts, nematodes)	0.1	0.42	0.95	1.37
Total	**9.2**	**76.58**	**26.91**	**103.49**

Production Category (2019 Farm Gate Value)	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Field Nursery ($182.49 M)	4.50	8.21	2.16	10.37
Container Nursery ($177.97 M)	11.24	20.00	12.10	32.10
Floriculture (Greenhouse) ($476.53 M)	10.15	48.37	12.65	60.02
Total ($836.99 M)	**9.2**	**76.58**	**26.91**	**103.49**

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

Estimate by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Due to excellent and targeted fungicide programs, brown rot and scab diseases were of minimal consequence on peaches in 2019. However, many orchards were not sprayed in 2018, due to lack of sufficient fruit from late freezes during bloom, and this resulted in increased carryover fungal inoculum for 2019. As a result, blossom blight was extreme in 2019. Growers adjusted spray programs to account for this, and 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 root rot 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.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Brown Rot	0.1	73.8	2280.0	2353.8
Scab	0.01	7.4	1550.0	1557.4
Bacterial Spot	1.0	737.8	40.0	777.8
Phony Peach	0.5	368.9	250.0	618.9
Gummosis	0.1	73.8	5.0	78.8
Armillaria Root Rot	1.0	737.8	50.0	787.8
Phomopsis Constriction Canker	0.01	7.4	10.0	17.4
Total	**2.7**	**2006.9**	**4185.0**	**6191.9**

Estimate by Phil Brannen, Extension Plant Pathologist

PEANUT

In 2019 peanut was harvested from 760,851 acres. Yields in 2019 averaged 4397 lb/A for a total production valued at $663.0 million. Disease and nematode losses in Georgia were affected largely by environmental conditions during the 2019 season. A mild 2018-2019 winter likely increased problems with peanut root-knot nematodes. Hot and dry conditions later in the season increased losses to white mold (southern stem rot) in some fields. Extremely hot and dry conditions at harvest resulted in significant problems with aflatoxin. Aflatoxin contamination cost the Peanut Industry in Georgia well over $100 million because of conditions in 2019. Late-season white mold and problems with aflatoxin were especially pronounced in non-irrigated fields. Dry weather and improved fungicides reduced losses to leaf spot diseases. Loss to tomato spotted wilt in 2019 was estimated to be 7.0%, which is the largest estimated loss to this disease since 2005.

The peanut root-knot nematode remained a problem in the south-central and southwestern regions of the state. Availability of Velum Total and AgLogic 15G for management of nematodes helped to reduce this problem. Losses to the lesion nematode are still small, but growers are beginning to report increased damage to this pest. Development and spread of Cylindrocladium black rot (CBR) was slight in 2019.

Disease	% Reduction in Crop Value[a]	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Spots	1.5	9.95	34.1b	44.05
White Mold (Sclerotium)	11.5	76.25	26.9c	103.15
Limb Rot (Rhizoctonia)	trace	---	---d	---
Pod Rot	trace	---	---e	---
Nematodes	4.0	26.52	8.7f	35.22
Cylindrocladium Black Rot	trace	---	---	---
Seedling Disease	0.5	3.32	0.8g	4.12
Tomato Spotted Wilt Virus	7.0	46.41	---	46.41
Diplodia Collar Rot	trace	---	---	---
Total	**24.5**	**162.45**	**70.5**	**232.95**

[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, with ten rain events recorded in April and May at the UGA Ponder Farm. These conditions allowed for good management of leaf scab. However, more frequent rains occurred during June, July and August, with a total of 23 events. Nut scab potential was relatively high and growers needed frequent fungicide applications.

Many 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 90.3% and 82.1% in late August. This level of scab potential on the fruit would result in a moderate loss.

In 2019, the estimated pecan acreage was 215,135 acres in Georgia with a total farm gate value of $263.4 million.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Scab	10.0	26.34	30.9	57.1
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	**10.0**	**26.34**	**30.9**	**57.24**

* 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 2019, soybeans were planted to a reported 121,890 acres with an average yield of 33.8 bu/A. The total soybean production for Georgia in 2019 was valued at $37.5 million. The winter of 2019 was mild, especially in southern Georgia. Asian soybean rust was found (on kudzu) earlier in 2019 than at any time since 2005. There was concern of an early outbreak of Asian soybean rust, but because of the sentinel plot program, funded by the Georgia Commodity Commission for Soybeans, recommendations for fungicides were not made until later in the season. Growers with earlier-planted soybeans saved on the cost of fungicide applications. Yields of later soybeans were improved by more than 12 bu/A with timely fungicide applications. Conditions throughout much of the 2019 season were very hot and dry reducing the threat of foliar disease, but stress from heat and drought can increase losses from plant-parasitic nematodes and diseases such as charcoal rot.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soybean cyst nematode*	trace	---	0	---
Root-knot nematodes	2	0.75	0	0.8
Other nematodes**	0.1	0.04	0	0.04
Asian soybean rust	0.1	0.04	0.15	0.19
Anthracnose	0.5	0.19	0	0.2
Brown leaf spot	0	0	0	0.0
Charcoal rot	0.1	0.04	0	0.04
Diaporthe/Phomopsis complex	trace	---	---	0.0
Downy mildew	trace	---	---	0.0
Frogeye leaf spot	0.1	0.04	0	0.04
Red crown rot	trace	---	0	0.0
Cercospora leaf blight	0.5	0.19	0	0.2
Pod and stem blight	1	0.38	0	0.4
Purple stain	0.1	0.04	0	0.04
Seedling diseases (*Rhizoctonia/Pythium/Fusarium*)	trace	---	0.1	0.1
Southern blight (*Sclerotium*)	trace	---	0	0
Stem canker	0	0	0	0
Fusarium wilt	trace	---	---	0
Virus diseases	0	0	0	0
Bacterial diseases	0	0	0	0
Total	**4.5**	**1.71**	**0.25**	**2.05**

* 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 2019. Anthracnose, caused by *Colletotrichum* fungi, increased in prevalence, and resistance to QoI fungicides was confirmed in multiple locations. Phytophthora, Pythium and Rhizoctonia root rots were sometimes damaging. 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 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	1.0	106.8	422.6	529.4
Fungal Leaf Spots	0.1	10.7	131.5	142.2
Anthracnose	1.0	106.8	234.8	341.6
Root Rots & Nematodes	2.0	213.6	234.8	448.4
Angular Leaf Spot	0.0	1.1	9.4	10.5
Total	**4.1**	**439.0**	**1033.1**	**1472.1**

Estimate by Phil Brannen, Extension Plant Pathologist

TURFGRASS

In 2019, there were an estimated 2.7 million acres of turf encompassing all turfgrass industries (golf courses, sport fields, sod production, lawncare, residential and commercial landscapes) with a maintenance value of $1.98 billion. There were 27,866 acres used for sod/stolon production in the state, yielding a farm gate value of $125.9 million. Erratic temperatures and precipitation during spring 2019 accounted for most of the poor green-up factors in warm season grasses. Large patch of warm season grasses caused by *Rhizoctonia solani* was one of the most common problems. Zoysiagrass was particularly affected. Additionally, outbreaks of dollar spot caused by *Clarireedia montheithiana*, Bipolaris leaf spot caused by *Bipolaris* spp. and *Drechslera* spp were persistent in 2019. These diseases were particularly problematic on bermudagrass during the spring and fall. *Gaeumannomyces* spp. (causal agent of take all root rot/root decline of warm season grasses/ bermudagrass decline) continued to be prevalent throughout the state. Gray leaf spot (*Magnaporthe grisea*) was abundant on St. Augustinegrass in 2019. High summer temperatures exerted severe stress in bentgrass and tall fescue. Anthracnose (*Colletotrichum cereale*) and Pythium root and crown rot (*Pythium* spp.) were ubiquitous in bentgrass. 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 system 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) infections affecting *Cynodon* spp. (bermudagrass) were minor on commercial sites in the northern areas of the state. SDS in golf courses was minimal due to preventative care in the fall. There were 327 turfgrass samples received at the UGA Plant Disease Clinic in Athens and the turfgrass pathology lab in Griffin during 2019, with the large majority of them made up of warm season grasses; 405 nematode samples 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	1.0	19.80	9.90	29.70
Foliar Diseases	0.5	9.90	9.90	19.80
Nematodes	0.5	9.90	9.90	19.80
Total	**2.0**	**39.6**	**29.70**	**69.30**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

VEGETABLES

About 150,000 acres of vegetables were grown in Georgia in 2019 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 2017 and 2018. 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	14.0	25.2	8.1	33.3
Squash (yellow + zucchini)	12.0	4.5	6.8	11.3
Tomato	6.0	2.2	12.8	15.0

Other Vegetable Crops	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Pepper (bell)	4.0	5.7	3.8	9.5
Cucumber	6.0	4.5	2.8	7.3
Snap bean	8.0	2.1	1.2	3.3
Greens (brassica)	15.0	10.1	8.5	18.6
Headed brassica (cabbage, broccoli)	10.0	7.2	10.5	17.7
Onion (field and storage)	5.0	6.6	7.8	14.4
Cantaloupe	3.0	0.3	1.1	1.4
Eggplant	2.0	0.5	0.9	1.4
Total	**11.1a**	**68.9**	**64.3**	**133.2**

* This column is not additive due to the way losses for vegetables are tabulated. Total values for vegetable commodities are taken from the 2019 Farm Gate Value Report.

Estimate by Bhabesh Dutta, Extension Vegetable Pathologist

WHEAT

Wheat farm gate value in 2019 in Georgia was $29.9 million. Wheat was harvested from 113,084 acres with an average yield of 55.27 bu/A. Georgia wheat acreage for grain production increased slightly (+15.9 %) this year compared with 2018. The top five wheat-producing counties (by area) were Dooly, Terrell, Laurens, Randolph and Houston. Powdery mildew (*Blumeria graminis*) was observed throughout the state and found at moderate to high levels at Tifton research sites. Mildew was also observed at Plains and Midville. Leaf rust (*Puccinia triticina*) was observed at all UGA research locations in the state. Disease severity levels were low. Mild winter and spring temperatures as well as intermittent humidity did not provide conducive conditions for leaf rust epidemics. Higher disease levels were observed later in the season on susceptible varieties. Stripe rust (*Puccinia striiformis*) was observed at Plains where plots were artificially inoculated and also in Tifton and Midville at low levels. In Georgia, 2019 was a scab year and Fusarium head blight (FHB/scab) (*Fusarium graminearum*) was severe throughout the state. The disease was observed from extreme southeastern counties to wheat-producing counties in the northern Piedmont. In some experimental plots and breeding lines at the UGA CAES Southwest Georgia Research and Education Center in Plains, FHB severity reached up to 40-50%. In nearby production fields, FHB was prevalent and severe. Environmental conditions at the time of flowering provided extremely conducive conditions for FHB infections in most of the state. However, the adverse effect of FHB was masked by the low wheat acreage planted and harvested in Georgia in 2019. 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. A few instances of soilborne wheat mosaic virus were reported. Oat crown rust (*Puccinia coronata*) occurrences were numerous, and severity was high in commercial fields. Crown rust was observed at Plains and Tifton in the oat variety trial. There currently is little resistance to this disease available in production varieties

Diseases	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Rust/Stripe Rust	0.5	0.149	0.299	0.448
Glume Blotch	0.0	0.000	0.000	0.000
Powdery Mildew	0.5	0.149	0.000	0.149
Fusarium Head Blight	1.0	0.299	0.299	0.598
Barley Yellow Dwarf Virus	0.5	0.149	0.149	0.298
Soilborne Wheat Mosaic / Spindle Streak Mosaic Virus	0.0	0	0	0
Total	**2.5**	**0.746**	**0.747**	**1.493**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2019

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	11.23	7.2	0.87	0.34	1.21	10.7
Blackberry	6.63	4.6	0.32	0.60	0.92	13.9
Blueberry	220.44	6.7	15.84	11.99	27.83	12.6
Bunch Grape	12.35	16.9	2.50	0.47	2.97	24.0
Corn	321.37	9.1	29.24	2.7	31.94	9.9
Cotton	983.63	12.9	126.89	31.3	158.19	16.1
Muscadine Grape	12.35	7.2	0.96	0.18	1.14	9.2
Ornamentals	836.99	9.2	76.58	26.91	103.49	12.4
Peach	71.78	2.7	2.01	4.19	6.20	8.6
Peanut	663.04	24.5	162.45	70.5	232.95	35.1
Pecan	263.36	10.0	26.34	30.9	57.24	21.7
Soybean	37.50	4.5	1.71	0.25	2.05	5.5
Strawberry	10.57	4.1	0.44	1.03	1.47	13.9
Turfgrass	1980.00	2.0	39.60	29.70	69.30	3.5
Vegetable	1179.20	11.1	68.9	64.3	133.2	11.3
Wheat	29.91	2.5	0.75	0.75	1.50	5.0
TOTALS	**6,640.34**	**--**	**555.40**	**276.11**	**831.60**	**13.3**

[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.

Trade and brand names are used only for information. University of Georgia Cooperative Extension and the UGA College of Agricultural and Environmental Sciences do not guarantee or warrant published standards of any product mentioned, nor does the use of a trade or brand name imply approval of any product to the exclusion of others that may also be suitable.

extension.uga.edu

Annual Publication 102-12 **September 2021**

Published by the University of Georgia in cooperation with Fort Valley State University, the U.S. Department of Agriculture, and counties of the state. For more information, contact your local UGA Cooperative Extension office.