2020 GEORGIA PLANT DISEASE LOSS ESTIMATES

Compiled by Elizabeth L. Little

University of Georgia Extension Plant Pathologist

UNIVERSITY OF GEORGIA
EXTENSION

2020 GEORGIA PLANT DISEASE LOSS ESTIMATES

2020 plant disease losses, including control costs, amounted to an estimated $806 million. The value of the crops used in this estimate was approximately $6.712 billion, resulting in a 12.01% 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 2020 Georgia Farm Gate Value Report (AR-22-01). Some estimates for fruits, ornamentals, and turf rely on specialists' 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

2020 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 nematode analyses is maintained in Athens. The Plant Disease Clinic in Athens is operated by Ansuya Jogi. Samples analyzed in this clinic include homeowner samples, commercial fruit and ornamentals, forestry, forages, turfgrass, and small grains. The Plant Disease Clinic in Tifton is operated by Jason Brock. Crops analyzed in this clinic include pecans, row crops, and commercial vegetables. Specialists associated with the clinics are Phillip Brannen, Jason Brock, Bhabesh Dutta, Robert Kemerait, Elizabeth Little, Alfredo Martinez-Espinoza, Jonathan Oliver, and Jean Williams-Woodward. The Extension Nematology Lab, operated by Ganpati Jagdale and Katherine Martin, processes soil and plant samples for nematode analysis.

In 2020, 1,052 physical and digital commercial and home samples were processed for plant disease diagnosis, leading to an estimated 1,308 diagnoses. A total of 4,914 samples were processed for nematode analysis. Diagnoses and educational recommendations are returned to the county faculty by specialists.

2020 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PHYSICAL AND DIGITAL SAMPLES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	63	3	66
Fruits and Nuts	130	34	164
Miscellaneous	3	5	8
Ornamentals and Trees	214	218	432
Turf	66	56	122
Vegetables	228	32	260
Total	**704**	**348**	**1052**
NEMATODE SAMPLES (Prepared by the Extension Nematology Lab)			
Crop	**Grower Samples**	**Research Samples**	**Total**
Field Crops	406	2172	2578
Fruits and Nuts	35	503	538
Miscellaneous	314	0	314
None	3	0	3
Turf	232	0	232
Unknown	11	833	844
Vegetables	13	392	405
Total	**1014**	**3900**	**4914**

APPLE

Summer rots and fire blight are the major diseases consistently associated with economic losses to apple production in Georgia. Although other diseases generally are 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 2020 but was not prevalent during bloom. Cold damage during bloom was much more of an issue than fire blight, and cool conditions likely decreased this disease. Bitter rot, one of our primary summer-rot diseases, caused significantly more losses than average because of wet conditions, as did Glomerella leaf spot. In fact, Glomerella was the most damaging disease observed in 2020 and continues to expand its range. Disease losses and expenditures for controlling rot diseases were above average in 2020, as rainfall was prevalent throughout the growing season, allowing for significant disease establishment. There still is 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	0.25	26.4	50.0	76.4
Bitter Rot/Glomerella	10.00	1056.8	175.0	1231.8
Bot Rot	0.03	3.2	52.0	55.2
Black Rot	0.02	2.1	33.0	35.1
Alternaria Leaf Spot	0.01	1.1	0.0	1.1
Powdery Mildew	0.01	1.1	12.0	13.1
Sooty Blotch*	0.01	1.1	0.0	1.1
Fly Speck*	0.10	10.6	0.0	10.6
Cedar Apple Rust*	0.01	1.1	0.0	1.1
Scab*	0.01	1.1	0.0	1.1
Other Diseases	1.00	105.7	5.0	110.7
Total	**11.5**	**1210.3**	**327.0**	**1537.3**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

BLACKBERRY

Blackberries are still a relatively new commodity for Georgia, and there is limited research information available for this expanding market. Diseases typically are a major reason for losses observed in blackberry production. In 2020, disease losses were relatively low; however, significant rainfall in the weeks leading up to harvest led to significant issues with cane dieback in some locations. Fungicidal applications generally decreased losses that were due to disease. Viruses, many of which cannot be readily detected, caused significant losses. The most frequently observed diseases on blackberries in 2020 were orange cane blotch, *Pseudocercospora* leaf spot, cane and leaf rust, and cane dieback (cane blight and *Botryosphaeria*).

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	0.10	18.6	327.5	346.1
Orange Rust	0.01	1.9	40.9	42.8
Cane and Leaf Rust	0.01	1.9	163.8	165.6
Double Blossom	0.01	1.9	81.9	83.7
Viruses	2.00	371.4	40.9	412.3
Phytophthora Root Rot	0.20	37.1	8.2	45.3
Cane Blight	0.60	111.4	81.9	193.3
Leaf Spots	0.05	9.3	32.8	42.0
Botryosphaeria	0.30	55.7	40.9	96.6
Total	**3.3**	**609.0**	**818.8**	**1427.9**

Estimate by Jonathan Oliver, Extension Plant Pathologist

BLUEBERRY

Above-average spring rainfall impacted blueberry production in 2020. Significant berry splitting was noted, especially on rabbiteye blueberries. Significant losses caused by fruit rots also were noted, likely having been exacerbated by frequent rainfall and berry splits immediately prior to the rabbiteye harvest. Above-average rainfall resulted in increased mortality due to *Phytophthora* and other root rots in some plantings. *Phomopsis* dieback and mummy berry were present; however, losses were low to moderate where good fungicide programs were implemented. As observed in previous years following mild winters, early-season issues with blueberry leaf rust were noted in 2020; nonetheless, fungicide programs were effective for rust management. 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; however, several unsprayed sites were severely impacted in 2020. Furthermore, bacterial leaf scorch continued to damage numerous plantings during 2020, resulting in significant plant mortality.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Mummy Berry	0.10	0.34	5.45	5.79
Botrytis Blight	0.00	0.0	2.06	2.06
Foliar Disease	1.00	3.38	1.57	4.96
Fruit Rots	8.00	27.07	1.57	28.64
Bacterial Leaf Scorch	0.40	1.35	0.48	1.84
Dieback	0.10	0.34	0.48	0.82
Phytophthora Root Rot	0.50	1.69	0.48	2.18
Total	**10.1**	**34.17**	**12.11**	**46.29**

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, various fruit rots and cane diseases—especially *Botrytis*—powdery mildew, and downy mildew. Sour rot also was prevalent at the end of the season. Fungicide resistance also is 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 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 2020 in part because of 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	1108.7	90.0	1198.7
Downy Mildew	8.0	2217.4	205.0	2422.4
Black Rot	1.0	277.2	92.0	369.2
Powdery Mildew	1.0	277.2	32.0	309.2
Phomopsis Cane Blight	1.0	277.2	40.0	317.2
Crown Gall	0.01	2.8	0.1	2.9
Pierce's Disease	1.75	485.1	20.0	505.1
Leaf Roll Virus	0.10	27.7	5.0	32.7
Total	**16.9**	**4673.3**	**484.1**	**5157.4**

Estimate by Phil Brannen, Extension Plant Pathologist

CORN

In 2020, corn for grain was harvested from 433,000 acres in Georgia with an average yield of 188.4 bushels per acre (bu/A). The 2020 crop was valued at $358.1 million. The winter of 2019–2020 was generally warmer than normal which likely allowed for earlier reintroduction of southern rust into the state. The early part of the 2020 field season in Georgia was wet over portions of the state and delayed planting for some growers. Repeated storms and hurricanes later in the season complicated harvest. Losses associated with southern corn rust were more severe than in any season since 2014. Aggressive use of fungicides reduced damage from 7% in 2014 to about 4.5% in 2020. In 2019, hot and dry conditions were very favorable for aflatoxin, especially in non-irrigated fields. Conditions were much less favorable for aflatoxin in 2020.

The importance of damage from nematodes—e.g., sting, stubby root, and southern root-knot nematodes—continues to become more apparent as growers, consultants, and Extension agents are better able to recognize and diagnose symptoms in the field. Abundant moisture early in the 2020 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 the lack of nematode-resistant hybrids and a 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	21.5	1.0**	22.5
Mycotoxins	0.5	1.8	—	1.8
Southern Corn Rust	4.5	16.1	2.6***	18.7
Northern Corn Leaf Blight	0.1	3.6	***	3.6
Other Leaf Diseases*	trace	—	***	—
Diplodia Ear Rot	—	—	—	—
Total	**11.1**	**43.0**	**3.6**	**46.6**

* Primarily includes southern corn leaf blight (*Bipolaris maydis*) but also may include diseases such as gray leaf spot. Eye spot also was observed in 2020.

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

*** An estimated 20% of the corn acreage was sprayed with fungicide once and 10% sprayed twice during the 2020 season at a cost of $5/acre for application and $10/acre for cost of fungicide.

Estimate by Robert Kemerait, Extension Plant Pathologist

COTTON

In 2020, cotton was planted on an estimated 1.2 million acres. The average lint yield was 917.6 lb/acre. The crop was valued at $727.8 million. The winter of 2019–2020 was generally warmer than normal which likely increased damage from plant parasitic nematodes slightly but decreased losses to seedling diseases as compared to 2019. The early part of the 2020 field season was wet across much of Georgia and delayed planting for some growers. Repeated storms and hurricanes later in the season complicated harvest and greatly increased the damage from boll rot. Losses to target spot and areolate mildew also increased from 2019 to 2020. Very little, if any, loss could be attributed to bacterial blight or the cotton leafroll dwarf virus.

Losses to nematodes (similar to 2018 and 2019), primarily from southern root-knot nematodes, continue to be one of the most important problems for cotton growers in Georgia. 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)	4.0	29.1	—	29.1
Nematodes	7.0	50.9	15.0*	65.9
Southern root-knot	6.0	43.7	—	
Reniform	0.5	3.6	—	
Columbia lance	—	—	—	
Sting	0.5	3.6		
Seedling Disease	0.3	2.2	2.0**	4.2
Fusarium Wilt	0.4	2.9	—	2.9
Ascochyta Blight	trace	—	—	—
Stemphylium Leaf Spot	1.0	7.2	—	7.2
Target Spot	0.5	3.6	3.6***	7.2
Areolate Mildew (Ramularia leaf spot)	0.5	3.6	—***	3.6
Bacterial Blight	trace	—	—	—
Cotton Leafroll Dwarf	trace	—	—	—
Total	**13.7**	**99.5**	**20.6**	**120.1**

* 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 an estimate that 20% of the cotton acreage was sprayed with a fungicide ($15/acre) in 2020 to manage foliar diseases.

Estimate by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially from fruit rots, was above average in 2020. 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	61.8	75.0	136.8
Macrophoma Rot	3.0	123.5	60.0	183.5
Ripe Rot	2.0	82.3	40.0	122.3
Angular Leaf Spot	0.6	24.7	10.0	34.7
Black Rot*	0.6	24.7	0.0	24.7
Phomopsis Dead Arm	0.5	20.6	1.0	21.6
Total	**8.2**	**337.6**	**186.0**	**523.6**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

ORNAMENTALS

The farm gate value for ornamental horticulture (container nurseries, field nurseries, and greenhouses, but excluding turf) increased by $93.12 million over the 2019 value for a total value of $930.11 million in 2020. The greatest increase in ornamental production was in floriculture (greenhouse), which increased in value by $122.65 million over 2019 for a total value of $599.18 million. Container-nursery production also increased in value by $14.49 million over 2019 for a total value of $192.46 million in 2020. However, field (mostly tree) nursery production saw a $39.51 million loss in production from 2019 for a total value of $138.46 million in 2020. This loss is mostly because of canker diseases affecting deciduous trees, particularly *Botryosphaeria* canker on red maples. The ornamental disease loss estimate includes only commercial plant production and excludes the value-added service landscape industries.

Root and crown rot diseases still account for a large percentage of disease loss in commercial ornamental production. Fungal branch cankers continued to be a problem in field- and container-grown nurseries, mostly on red maple. Fungicide applications with a bark-penetrating adjuvant applied in the fall have reduced disease incidence. Rose rosette-associated virus, which causes rose rosette disease, and boxwood blight continue to be of concern for growers and landscapers.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Bacterial Diseases (fire blight, leaf spots)	0.1	0.93	0.90	1.83
Fungal Leaf Spots, Stem Cankers, Needle Blights	4.0	37.20	9.50	46.70
Root and Crown Rots	3.7	34.41	8.95	43.36
Powdery Mildew	0.3	2.79	2.10	4.89
Downy Mildew	0.1	0.93	3.00	3.93
Botrytis Blight	0.1	0.93	1.21	2.14
Viruses (TSWV, INSV, rose rosette, hosta virus X)	1.0	9.30	0.30	9.60
Minor diseases (rusts, nematodes)	0.05	0.47	0.95	1.42
Total	**9.35**	**86.96**	**26.91**	**113.87**

Production Category (2020 Farm Gate Value)	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Field Nursery ($138.46 M)	11.8	16.35	2.16	18.51
Container Nursery ($192.46 M)	9.6	18.48	12.10	30.58
Floriculture (Greenhouse) ($599.18 M)	8.7	52.13	12.65	64.78
Total ($930.10 M)	**9.35**	**86.96**	**26.91**	**113.87**

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

Estimate by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Because of excellent and targeted fungicide programs, brown rot and scab diseases were of minimal consequence on peaches in 2020. Extensive surveys have indicated that brown rot fungicide resistance is prevalent in many locations, but field surveys have allowed for prescription fungicide management (selection of fungicide classes for which resistance was not observed). Bacterial spot was more prevalent than normal, and resistance development to antibiotics and/or copper bactericides used to control this disease has been confirmed. 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	0.2	130.3	2500.0	2630.3
Scab	0.01	6.5	2000.0	2006.5
Bacterial Spot	0.50	325.8	40.0	365.8
Phony Peach	0.5	325.8	260.0	585.8
Gummosis	0.1	65.2	5.0	70.2
Armillaria Root Rot	1.0	651.6	50.0	701.6
Phomopsis Constriction Canker	0.01	6.5	10.0	16.5
Total	**2.3**	**1511.6**	**4865.0**	**6376.6**

Estimate by Phil Brannen, Extension Plant Pathologist

PEANUT

In 2020 peanut was harvested from 798,054 acres. Yields in 2020 averaged 4,104.6 lb/acre for a total production valued at $678.0 million. Disease losses in Georgia were affected by the environmental conditions during 2020 and also by the extremely hot and dry conditions at harvest in 2019. Harvest conditions in 2019 coupled with pathogen resistance to azoxystrobin resulted in significant problems with seedling disease (*Aspergillus* crown rot) in 2020. The winter of 2019–2020 was warmer than normal. The early part of the 2020 field season was wet across much of the state and delayed planting for some growers. Repeated storms and hurricanes later in the season complicated harvest. The severity of leaf spot diseases increased from 2019 because of abundant moisture and because growers were often unable to get in the fields for timely fungicide applications. Cooler temperatures in 2020 from 2019 did reduce losses to white mold. Loss to tomato spotted wilt in 2020 was estimated to be 4.0%, which was down from 7.0% in 2019.

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. Losses to the lesion nematode are still small, but growers are beginning to report increased damage. The development and spread of *Cylindrocladium* black rot (CBR) was slight in 2020.

Disease	% Reduction in Crop Value[a]	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Spots	3.0	35.8	24.4[b]	60.2
White Mold (*Sclerotium*)	8.0	54.2	32.6[c]	86.8
Limb Rot (*Rhizoctonia*)	trace	—	—[d]	—
Pod Rot	trace	—	—[e]	—
Nematodes	3.0	20.3	9.1[f]	29.4
Cylindrocladium Black Rot	trace	—	—	—
Seedling Disease	1.5	10.2	0.8[g]	11.0
Tomato Spotted Wilt Virus	4.0	27.1	—	27.1
Diplodia Collar Rot	trace	—	—	—
Total	**19.5**	**147.6**	**66.9**	**214.5**

[a] The total value of the crop was $678.0 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 on average 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 4–5 times per season. This figure is based upon the approximate cost to growers if they ONLY used fungicides (e.g., chlorothalonil) for leaf spot control.

[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 others to control soilborne diseases at some point during the season. For non-irrigated fields, four applications were calculated at $8/acre. For irrigated fields, four applications at $12/acre 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/acre and 20% at $36/acre (Velum Total or AgLogic).

[g] The cost of the fungicide seed treatment is absorbed in the cost of the seed. An estimated 20% of the acreage was treated with azoxystrobin in-furrow at planting at a cost of $5/acre.

Estimate by Robert Kemerait, Extension Plant Pathologist

PECAN

The 2020 growing season was one with weather conditions favorable for pecan scab. At the UGA Ponder Farm, the pre-pollination period of April and May had 12 days with more than 0.1 in. of rain. The frequent rains continued, with 24 days measuring over 0.1 in. of rain during June, July, and August. Scab potential was relatively high and growers needed frequent fungicide applications. The good news was that many of the rain events occurred in clusters of days, allowing for needed protective fungicide applications to be made in a timely fashion.

Many commercial growers in the southern part of the state made 10 or more fungicide applications to control scab successfully. In University of Georgia fungicide trials in Tift County, nontreated controls of the cultivar 'Desirable' had nut scab severity ratings of 85.6% and 70.1% in late August. This level of scab potential on the fruit would result in a near loss.

The estimated pecan acreage was 215,135 acres in Georgia with a total farm gate value of $282.3 million.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Scab	8.0	22.5	30.9	53.4
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	**8.0**	**22.5**	**30.9**	**53.4**

* Eight treatments on 95,414 acres @ $18/acre; scab fungicide programs also are 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 2020, soybeans were planted to a reported 113,680 acres with an average yield of 43.8 bushels/acre. The total soybean production for Georgia in 2020 was valued at $52.0 million. The winter of 2019–2020 was generally warmer than normal which likely allowed for earlier reintroduction of soybean rust into the state. The early part of the 2020 field season in Georgia was wet and delayed planting for some growers. Repeated storms and hurricanes later in the season complicated harvest. Soybean rust was much more of a problem in 2020 than it was during the hotter and drier 2019 season.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soybean Cyst Nematode*	trace	—	—	—
Root-Knot Nematodes	2.0	1.0	—	1.0
Other Nematodes**	0.2	0.1	—	0.1
Asian Soybean Rust*	3.0	1.6	0.45	2.05
Anthracnose*	0.5	0.3	0	0.3
Brown Leaf Spot*	—	—	0	—
Charcoal Rot	0.1	0.5	—	0.5
Diaporthe/Phomopsis Complex	trace	—	—	—
Downy Mildew	trace	—	—	—
Frogeye Leaf Spot*	0.01	0.05	0	0.05
Red Crown Rot	trace	—	—	—
Cercospora Leaf Blight*	0.5	0.3	0	0.3
Pod And Stem Blight*	1.0	0.5	0	0.5
Purple Stain*	0.1	0.05	0	0.05
Seedling Diseases (*Rhizoctonia/Pythium/Fusarium*)	trace	—	—	0
Southern Blight (*Sclerotium*)	0.25	—	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	**7.7**	**4.4**	**0.45**	**4.85**

* Resistant varieties are used to manage most nematode and disease problems. Fungicides were applied to an estimated 30,000 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/acre.

** "Other nematodes" includes reniform, sting, and Columbia lance nematodes.

Estimate by Robert Kemerait, Extension Plant Pathologist

STRAWBERRY

Neopestalotiopsis, a new disease of strawberry, was first observed in 2020 and resulted in 100% losses on multiple farms. Unfortunately, this disease arrived on nursery plants, and currently registered fungicides do not adequately control the pathogen. Other foliar and fruit disease pressures were severe in 2020, as expected with a wet year. Anthracnose, caused by *Colletotrichum* fungi, increased in prevalence, and resistance to QoI fungicides was confirmed in multiple locations. *Phytophthora* root rot also increased, and likely fungicide resistance has caused issues with this pathogen. Overall, it was a difficult year for strawberry production, as 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	181.1	477.9	659.0
Fungal Leaf Spots	0.1	18.1	53.1	71.2
Anthracnose	1.0	181.1	148.7	329.8
Root Rots & Nematodes	2.0	362.2	53.1	415.3
Angular Leaf Spot	0.0	1.8	10.6	12.4
Neopestalotiopsis	30.0	5432.5	318.6	5751.1
Total	**34.1**	**6176.8**	**1062.0**	**7238.8**

Estimate by Phil Brannen, Extension Plant Pathologist

TURFGRASS

The COVID-19 pandemic affected the turfgrass industry in profound ways, especially in the service sector of the industry. In 2020, there were an estimated 2.8 million acres of turf encompassing all turfgrass industry sectors (golf courses, sport fields, sod production, lawncare, residential and commercial landscapes) with a maintenance value of $1.98 billion. Sod/stolon production yielded a farm gate value of $130.5 million. Extreme weather, record-breaking storms and severe flooding events were unrelenting in 2020. The severe weather events started early in the year and continued through the summer with temperature fluctuations and unusually wet conditions.

Poor turfgrass green-up was common 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. 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. *Pythium* spp. were usually observed in submitted samples to the Plant Disease Clinic. Outbreaks of dollar spot caused by *Clarireedia montheithiana* and *C. jacksonii* were common. Bipolaris leaf spot caused by *Bipolaris* spp. and *Drechslera* spp. were persistent in 2020 on bermudagrass during the spring and fall. Gray leaf spot (*Magnaporthe grisea*) was severe on St. Augustinegrass. *Gaeumannomyces* spp. (causal agent of take all root rot/root decline of warm-season grasses and bermudagrass decline) continued to be prevalent throughout the state.

Extreme heat plagued Georgia in the summer of 2020, exerting severe stress in bentgrass and tall fescue. Anthracnose (*Colletotrichum cereale*) and Pythium root and crown rot (*Pythium* spp.) were ubiquitous in bentgrass. Plant parasitic nematode sample submissions were abundant on bent and bermudagrass greens. Minor infections of rust and fairy ring were also observed. *Ophiosphaerella* spp. (spring dead spot, or SDS) infections on *Cynodon* spp. (bermudagrass), aided by a severe frost in February in the northern part of the state, were heavy on commercial sites. SDS in golf courses was minimal due to preventative care in the fall.

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	5.90	15.80
Nematodes	0.5	9.90	9.90	19.80
Total	**2.0**	**39.6**	**25.70**	**65.30**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

VEGETABLES

About 150,000 acres of vegetables were grown in Georgia in 2020 worth a total of approximately $1.24 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). Sour skin (*Burkholderia* spp.), center rot (*Pantoea* spp.), and postharvest rot (bacterial and fungal origin) were observed in onion, resulting in economic losses. Alternaria leaf blight in brassica and anthracnose in pepper and cucurbits were problematic and resulted in considerable economic losses. Losses because of whitefly-transmitted viral diseases were comparatively lower than losses incurred during 2019. 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	21.6	7.2	28.8
Squash (yellow + zucchini)	10.0	3.7	5.5	9.2
Tomato	5.0	1.8	10.2	12.0

Other Vegetable Crops	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Pepper (bell and specialty)	3.0	4.3	3.2	7.5
Cucumber	5.0	3.7	2.3	6.0
Snap Bean	5.0	1.2	0.8	2.0
Greens (brassica and nonbrassica)	12.0	8.1	7.6	15.7
Headed Brassica (cabbage, broccoli)	10.0	7.2	10.5	17.7
Onion (field and storage)	6.0	7.9	8.3	16.2
Cantaloupe	4.0	0.5	1.2	1.7
Eggplant	1.0	0.2	0.7	0.9
Total	**4.86**	**60.2**	**57.5**	**117.7**

* Columns are not additive because of the way losses for vegetables are tabulated.

Estimate by Bhabesh Dutta, Extension Vegetable Pathologist

WHEAT

Because of the COVID-19 pandemic in 2020, it was difficult to collect data on disease incidence and severity. The partial or total shutdowns of the diagnostic laboratory, county offices, and college campuses were implemented at a critical time during the wheat-growing season, which prevented disease sample collection. The farm gate value of wheat in 2020 was $30.80 million and wheat acreage for grain production (103,059 acres) continues to be stagnant compared to 2019. Average yield was 56.61 bushels/acre.

Overall disease incidence was low in 2020. Based on anecdotal evidence, leaf rust (*Puccinia triticina*) was observed at low levels. In Georgia, 2020 was a peculiar year for Fusarium head blight (FHB/scab; *Fusarium graminearum*). In some experimental plots and breeding lines located at the UGA CAES Southwest Georgia Research & Education Center in Plains, FHB was prevalent and severe. Environmental conditions at the time of flowering provided conducive conditions for FHB infections in most of the state, especially in the Coastal Plain growing region. However, there were few to no reports of FHB on wheat in commercial fields, which is probably because of low wheat acreage planted and harvested in Georgia in 2020. Stagonospora spot blotch, tan spot, and barley yellow dwarf virus (BYDV) were observed at low levels across the state. Soilborne wheat mosaic virus was reported in a few areas of the state.

Diseases	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Rust / Stripe Rust	0.0	0.00	0.15	0.15
Glume Blotch	0.0	0.00	0.00	0.00
Powdery Mildew	0.0	0.00	0.00	0.00
Fusarium Head Blight	1.5	0.46	0.31	0.77
Barley Yellow Dwarf Virus	1.0	0.31	0.15	0.46
Soilborne Wheat Mosaic / Spindle Streak Mosaic Virus	0.0	0	0	0
Total	**2.5**	**0.77**	**0.61**	**1.38**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2020

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	9.36	11.5	1.21	0.33	1.54	16.45
Blackberry	17.96	3.28	0.61	0.82	1.43	7.96
Blueberry	304.19	10.1	34.17	12.11	46.29	15.22
Bunch Grape	23.04	16.9	4.67	0.48	5.16	22.4
Corn	358.1	11.1	43.0	3.6	46.6	13.01
Cotton	727.8	13.7	99.5	20.6	120.1	16.50
Muscadine Grape	3.78	8.2	0.34	0.19	0.52	13.8
Ornamentals	930.11	9.35	86.96	26.91	113.87	12.24
Peach	63.64	2.3	1.51	4.865	6.38	10.03
Peanut	678.0	19.5	147.6	66.9	214.5	31.64
Pecan	282.29	8.0	22.5	30.9	53.4	18.92
Soybean	52.0	7.7	4.4	0.45	4.85	9.33
Strawberry	11.93	34.1	6.18	1.06	7.24	60.69
Turfgrass	1980.00	2.0	39.6	25.70	65.30	3.30
Vegetable	1239.30	4.86	60.2	57.5	117.7	9.5
Wheat	30.80	2.5	0.77	0.61	1.38	4.48
Totals	**6712.3**	**—**	**553.22**	**253.03**	**806.25**	**12.01**

[1] This column is not additive.

[2] Total percent loss for each crop and the grand total is figured on the basis of (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 102-13 **January 2023**

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.