2022 GEORGIA PLANT DISEASE LOSS ESTIMATES

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UNIVERSITY OF GEORGIA
EXTENSION

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2022 plant disease losses, including control costs, amounted to an estimated $933 million. The value of the crops used in this estimate was approximately $8200 million, resulting in a 11.4% 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 2022 Georgia Farm Gate Value Report (AR-24-01). Some estimates for fruits, ornamentals, and turf rely on Extension specialists' knowledge of the industry and industry sources for information.

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2022 PLANT DISEASE CLINICS ANNUAL SUMMARY

Extension Plant Pathology maintains plant disease clinics in Athens and Tifton to aid county Extension faculty in diagnosing and managing plant disease problems. Additionally, a nematode analysis laboratory is maintained in Athens. The Athens Plant Disease Clinic evaluates commercial fruit (apples, grapes, peaches, strawberries), ornamental plants, forestry, forage, turfgrass, small grains, and home landscape and garden samples. The Tifton Plant Disease Clinic evaluates row crops, pecans, commercial fruit (blueberries, caneberries, citrus) and commercial vegetable samples. State Extension specialists associated with the plant disease clinics are Phillip Brannen, Bhabesh Dutta, Bob Kemerait, Alfredo Martinez-Espinoza, Jonathan Oliver, and Jean Williams-Woodward. The Extension Nematology Lab is located in Athens and managed by Ganpati Jagdale, where soil and plant samples are processed for nematode analysis. The Plant Molecular Diagnostic Laboratory (MDL) was re-opened in 2022 under the direction of Alejandra Jimenez Madrid. The MDL is a fee-based lab that conducts molecular identification of pathogens, fungicide resistance screening for certain pathogens, and processes samples for statewide pathogen surveys.

The plant disease clinics maintain an online database of samples and diagnoses utilizing the PClinic and NClinic record management systems. In 2022, 968 commercial and home samples were processed for plant diseases, leading to an estimated 1,452 diagnoses. A total of 4,707 samples were received for nematode analysis. Extension specialists return the diagnoses and educational recommendations to county faculty.

2022 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PHYSICAL AND DIGITAL SAMPLES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	95	0	95
Fruits and Nuts	173	18	191
Miscellaneous	11	5	16
Ornamentals and Trees	220	116	336
Turf	91	48	139
Vegetables	161	30	191
Total	**751**	**217**	**968**

NEMATODE SAMPLES (Prepared by the Extension Nematology Lab)	
Crop	**Grower and Research Samples**
Field Crops	3800
Fruits and Nuts	141
Ornamentals and Trees	168
Turf	513
Vegetable or Herbs	34
Unknown	51
Total	**4707**

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 2022, but it was not prevalent during bloom. Glomerella leaf spot caused significantly more losses than average due to wet conditions and expanded disease levels in multiple orchards. As in 2020 and 2021, Glomerella was the most damaging disease observed and it continues to expand its range. Disease losses and expenditures for controlling rot diseases were above average in 2022, 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 the 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	33.7	50.0	83.7
Bitter Rot/Glomerella	25.00	3367.2	180.0	3547.2
Bot Rot	0.03	4.0	52.0	56.0
Black Rot	0.02	2.7	33.0	35.7
Alternaria Leaf Spot	0.01	1.3	0.0	1.3
Powdery Mildew	0.01	1.3	12.0	13.3
Sooty Blotch*	0.01	1.3	0.0	1.3
Fly Speck*	0.10	13.5	0.0	13.5
Cedar Apple Rust*	0.01	1.3	0.0	1.3
Scab*	0.01	1.3	0.0	1.3
Other Diseases	1.0	134.7	5.0	139.7
Total	**26.5**	**3562.5**	**332.0**	**3894.5**

* Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

BLACKBERRY

Diseases are typically a major reason for losses observed in blackberry production; however, as blackberries remain a relatively new commodity in Georgia, there is limited research information available for this expanding market. In 2022, disease losses were significant in some locations, but overall losses were substantially less than in the most recent prior season. Significant losses were caused by viruses, many of which cannot be readily detected. Cane blight and cane dieback (caused by *Botryosphaeria* species) also caused sizable losses in some locations, but losses were not widespread and fungicidal applications generally decreased losses. The most frequently observed diseases on blackberries in 2022 were cane and leaf rust, Pseudocercospora leaf spot, and orange cane blotch, but these were generally well-controlled through the application of fungicides.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	0.10	20.5	375.8	396.3
Orange Rust	0.01	2.0	47.0	49.0
Cane and Leaf Rust	0.01	2.0	159.7	161.8
Double Blossom	0.01	2.0	94.0	96.0
Viruses	2.00	409.6	47.0	456.6
Phytophthora Root Rot	0.20	41.0	9.4	50.4
Cane Blight	0.50	102.4	94.0	196.4
Leaf Spots	0.05	10.2	65.8	76.0
Botryosphaeria	0.10	20.5	47.0	67.5
Total	**3.0**	**610.3**	**939.5**	**1549.8**

Estimate by Jonathan Oliver, Extension Plant Pathologist

BLUEBERRY

A significant late freeze event, as well as several diseases, had a significant impact on blueberry production in 2022. As frequently seen following late freeze events, increased damage from *Botrytis* was prevalent in some locations. In many locations, the late freeze also resulted in leaf drop, reducing the carryover of leaves infected with rust from the prior growing season. This led to a reduction in leaf rust during spring 2022. Blueberry leaf rust and other foliar diseases, including Septoria leaf spot and anthracnose leaf spot, were observed during the summer and fall; however, these were generally well controlled with fungicides. Significant losses due to fruit rots were noted in some locations, and substantial plant mortality, especially evident following an extended dry period in September and October 2022, was observed in some plantings due to dieback (caused by Botryosphaeria stem blight) and Phytophthora root rot. While viral problems were rarely observed on blueberries, bacterial leaf scorch continued to damage plantings, resulting in plant mortality and reduced yields in some locations. Generally, where good fungicide programs were implemented, Phomopsis dieback, mummy berry, and *Exobasidium* continued to be well-controlled by most producers during 2022.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Mummy Berry	0.10	482.1	5702.2	6184.3
Botrytis Blight	0.20	964.3	2154.2	3118.4
Foliar Disease	1.00	4821.5	1647.3	6468.8
Fruit Rots	4.50	21696.7	1647.3	23344.0
Bacterial Leaf Scorch	0.30	1446.4	506.9	1953.3
Dieback	0.10	482.1	506.9	989.0
Phytophthora Root Rot	0.60	2892.9	506.9	3399.8
Total	**6.8**	**32786.2**	**12671.5**	**45457.7**

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, including 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 2022, due in large part to warmer temperatures in the previous few winters. Aggressive vector (insect) management, combined with destroying infected plants, has helped to stem rapid vineyard demise. Hybrid grapes with Pierce's disease resistance are also being planted as an alternative to *vinifera* wine grapes.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	2.0	887.1	90.0	977.1
Downy Mildew	2.0	887.1	205.0	1092.1
Black Rot	0.5	221.8	92.0	313.8
Powdery Mildew	0.5	221.8	32.0	253.8
Phomopsis Cane Blight	0.5	221.8	40.0	261.8
Crown Gall	0.01	4.4	0.1	4.5
Pierce's Disease	3.00	1330.7	20.0	1350.7
Leaf Roll Virus	0.10	44.4	5.0	49.4
Total	**8.6**	**3819.0**	**484.1**	**4303.1**

Estimate by Phil Brannen, Extension Plant Pathologist

CORN

In 2022, corn for grain was harvested from approximately 405,374 acres in Georgia with an average yield of 186.9 bu/acre. The 2022 crop was valued at $522,738,318. The winter of 2021–2022 occurred during a La Niña ENSO phase. This winter was generally warmer than normal which likely contributed to increased problems from nematodes. Rainfall was abundant later in the season. Losses associated with southern corn rust were less severe than in 2021. Aggressive use of fungicides reduced damage from 2014 (7%) to about 4.5% in 2020, 4.0% in 2021, and 2.0% in 2022. Tar spot (*Phyllachora maydis*) was found in Georgia for the first time in 2021 and was observed again in 2022. Losses in both years to this disease were minimal. Hot and dry conditions in 2019 were favorable for aflatoxin contamination, especially in non-irrigated fields. Conditions were much less favorable for aflatoxin in 2020, 2021, and especially in 2022 due to abundant later-season rainfall.

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 can better recognize and diagnose symptoms in the field. A warm winter of 2021–2022 increased the threat from nematodes. Losses to nematodes are largely the result of 1) lack of nematode-resistant hybrids, 2) lack of use of nematicides in affected fields, and 3) an unseasonably warm winter.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Root & Stalk Rot	trace	—	—	—
Nematodes	5.0	26.1	1.5**	27.6
Mycotoxins	0.001	—	—	—
Southern Corn Rust	2.0	10.4	2.8***	13.2
Northern Corn Leaf Blight	0.05	0.26	—***	0.26
Other Leaf Diseases*	0.01	0.05	—***	0.05
Fusarium Ear Rot	trace	—	—	—
Diplodia Ear Rot	—	—	—	—
Total	**7.06**	**36.81**	**4.3**	**41.11**

*Primarily includes southern corn leaf blight (*Bipolaris maydis*) and tar spot (*Phyllachora maydis*), but also may include gray leaf spot, Northern corn leaf spot, and *Curvularia* leaf spot.

**It is estimated that approximately 15% of harvested acres of corn were treated with 5 lb/acre Counter insecticide-nematicide or 3 oz of Velum for control of nematodes. Estimated cost is $25/acre. The sting, stubby-root, and southern root-knot nematodes are the primary plant-parasitic nematodes affecting corn in Georgia.

***It is estimated that 35% of the corn acreage was sprayed with fungicides once during the 2022 season at a cost of $5/acre for application and $15/acre for cost of fungicide.

Estimate by Robert Kemerait, Extension Plant Pathologist

COTTON

In 2022, cotton was planted on an estimated 1.3 million acres. The average lint yield was 1005.9 lb/acre. The crop was valued at $1.3 billion. The winter of 2020–2021 was generally warmer than normal (La Niña ENSO phase) which contributed to increased problems from nematodes. Rainfall was abundant during the latter part of the season, which favored increased yields over previous seasons, but it also increased problems with boll rot and some leaf disease. However, losses to areolate mildew decreased from 2021 to 2022. Stemphylium leaf spot was especially severe in some areas in 2022. Very little, if any, loss could be attributed to bacterial blight or the cotton leafroll dwarf virus in 2022.

Losses to nematodes (similar to 2018, 2019, 2020, and 2021), primarily from southern root-knot nematodes, continue to be one of the most important problems for cotton growers in Georgia. Until growers plant more acres to nematode-resistant varieties or 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.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Boll Rot (lint)	5.0	65.6	—	65.6
Nematodes	5.0	65.6	15.8*	81.4
Southern root-knot	4.0	(52.5)	—	—
Reniform	0.5	(6.6)	—	—
Columbia lance	0	—	—	—
Sting	0.5	(6.6)	—	—
Seedling Disease	0.5	6.6	2.6**	9.2
Fusarium Wilt	0.4	5.2	—	5.2
Ascochyta Blight	trace	0	—	—
Stemphylium Leaf Spot	5.0	65.6	—	65.6
Target Spot	0.5	6.6	4.9***	11.5
Areolate Mildew (Ramularia leaf spot)	0.1	1.3	—***	1.3
Bacterial Blight	trace	—	—	—
Cotton Leafroll Dwarf	trace	—	—	—
Total	**16.5**	**216.5**	**23.3**	**239.8**

*This figure is 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, and approximately 5% of the acreage was treated with Telone II.

**This figure is an estimate of the cost of additional fungicide seed treatments that are used to manage seedling diseases. For this figure, it is estimated that 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.

***This figure is based upon an estimate that 25% of the cotton acreage in the state was sprayed with a fungicide ($15/acre) in 2022 to manage foliar diseases of cotton.

Estimate by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially from fruit rots, was average in 2022. Good fungicidal spray programs generally result in minimal losses, but ripe rot, Macrophoma rot, and other diseases were observed at low levels 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 and various hybrids, 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	1.0	70.9	75.0	145.9
Macrophoma Rot	1.0	70.9	60.0	130.9
Ripe Rot	1.0	70.9	40.0	110.9
Angular Leaf Spot	0.6	42.5	0.0	42.5
Black Rot*	0.6	42.5	0.0	42.5
Phomopsis Dead Arm	0.5	35.4	1.0	36.4
Total	**4.7**	**333.2**	**186.0**	**519.2**

*Controlled with fungicides applied for other diseases.

Estimate by Phil Brannen, Extension Plant Pathologist

ORNAMENTALS

The farm gate value for ornamental horticulture production (container nurseries, field nurseries, and greenhouses, and excluding turf) surpassed $1 billion for the second straight year in 2022. Farm gate value for ornamental plant and tree production in field nurseries, container nurseries, and greenhouses was $249.50, $223.06, and $611.16 million, respectively, for a total of $1.083 billion in 2022. This was an increase of $40.25 million over 2021. Field (mostly tree) nursery production added $53.76 million to its value, whereas greenhouse production dropped in value by $24.7 million. Field nursery expansion and possibly better control of canker diseases affecting deciduous tree production may have accounted for the increase in farm gate value over 2021. 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 the largest percentage of disease losses in commercial ornamental production. Fungal branch cankers and vascular dieback on deciduous trees, as well as fungal leaf spots, continued to be a problem in ornamental production. Fungicide applications applied in the fall have reduced branch canker incidence. Rose rosette virus 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)	0.2	2.17	1.10	3.27
Fungal Leaf Spots, Stem Cankers, Needle Blights	2.5	27.09	10.35	37.44
Root and Crown Rots	3.5	37.93	9.60	47.53
Powdery Mildew	0.4	4.33	2.20	6.53
Downy Mildew	0.1	1.08	2.60	3.68
Botrytis Blight	0.1	1.08	1.23	2.31
Viruses (TSWV, INSV, rose rosette, hosta virus X)	0.6	6.50	0.30	6.80
Minor diseases (rusts, nematodes)	0.05	0.54	0.95	1.49
Total	**7.45**	**80.74**	**28.33**	**109.07**

Production Category (2022 Farm Gate Value)	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Field Nursery ($249.50 M)	5.5	13.72	4.03	17.75
Container Nursery ($223.06 M)	8.4	18.74	12.20	30.94
Floriculture (Greenhouse; $611.6 M)	7.9	48.28	12.10	60.38
Total ($1,043.47 M)	**7.45**	**80.74**	**28.33**	**109.07**

* This 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 2022. However, surveys for fungicide resistance indicated that this is still a significant problem for the peach industry. Previous surveys have shown that resistance is prevalent in the pathogen that causes brown rot, but field surveys have allowed for prescription fungicide management (selection of fungicide classes for which resistance was not observed). Anthracnose fruit rot is generally increasing in prevalence, possibly due to fungicide resistance in this pathogen population as well. Bacterial spot was observed at minimal levels, but resistance development to antibiotics and/or copper bactericides used to control this disease has also been confirmed, especially copper resistance. Armillaria root rot continued to be a major, expanding problem in replant peach production. Phony peach, caused by the bacterium *Xylella fastidiosa*, was also observed in production orchards. Both Armillaria and phony peach diseases take trees out of production, as diseased trees are destroyed when identified.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Brown Rot	0.2	165.0	2500.0	2665.0
Scab	0.01	8.2	2000.0	2008.2
Bacterial Spot	0.50	412.4	40.0	452.4
Phony Peach	0.50	412.4	260.0	672.4
Gummosis	0.10	82.5	5.0	87.5
Anthracnose	0.50	412.4	5.0	417.4
Armillaria Root Rot	0.50	412.4	50.0	462.4
Phomopsis Constriction Canker	0.01	8.2	10.0	18.2
Total	**2.3**	**1913.7**	**4870.0**	**6783.7**

Estimate by Phil Brannen, Extension Plant Pathologist

PEANUT

In 2022 peanuts were harvested from 712,773 acres. Yields in 2022 averaged 4397.95 lb/acre for a total production valued at $790.8 million in Georgia.

The winter of 2021–2022 was generally warmer than normal (La Niña ENSO Phase) which likely contributed to increased problems from nematodes and losses to tomato spotted wilt disease. Rainfall was abundant during the latter part of the season which favored increased problems with leaf spot diseases; however, cooler soils helped to mitigate the risk of white mold. Loss to tomato spotted wilt in 2022 was estimated to be 7.0%, up from 3.5% in 2021 and 4.0% in 2020. 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. Though losses to the lesion nematode are still small, growers are beginning to report increased damage to this pest. Development and spread of Cylindrocladium black rot (CBR) was slight in 2022.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Spots	1.5	11.9	40.3*	52.2
White Mold	3.5	27.7	32.2**	59.9
Limb Rot	trace	—	—***	—
Pod Rot	trace	—	—****	—
Nematodes	3.0	23.3	8.2*****	32.5
Cylindrocladium Black Rot	trace	—	—	—
Seedling Disease	0.5	4.0	0.9******	4.9
Tomato Spotted Wilt Virus	7.0	55.3	—	55.3
Diplodia Collar Rot	trace	—	—	—
Total	**15.5**	**122.2**	**81.6**	**203.8**

* It was estimated that 55% of peanut acreage in Georgia receives some irrigation and that most of this acreage was sprayed with fungicides on average seven times during the season. Fungicide treatments for leaf spot control alone are about $10/acre per application. Growers usually sprayed non-irrigated fields less often, perhaps five times per season at $8/acre. 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.

**This figure reflects the additional cost BEYOND control of leaf spot if growers chose to use products such as azoxystrobin, prothioconazole, tebuconazole, solatenol, flutolanil, inpyrfluxam, penthiopyrad, or other to control soilborne diseases at some point during the season. For non-irrigated fields, four applications were calculated at $8.00/acre each. For irrigated fields, four applications at$14.00/acre were calculated.

***Cost of control for limb rot is included in treatments for white mold.

**** The cost of gypsum treatments applied to reduce pod rot has not been estimated.

***** For the cost of nematode management, it was estimated that 5.0% of the acreage in Georgia is treated at a cost of $85/acre and 20%at $36/acre (Velum Total or AgLogic).

******The cost of the fungicide seed treatment is absorbed in the cost of the seed. It was estimated that 20% of the acreage was treated with azoxystrobin or other product in-furrow at planting at a cost of $6/acre.

Estimate by Robert Kemerait, Extension Plant Pathologist

PECAN

In 2022, Georgia had an estimated 215,073 acres of pecans with a total farm gate value of $400.8 million. The growing season started out relatively dry in April, May, and June, so leaf scab was moderate, and early-season nut scab was less than usual. However, July and August were very wet with frequent rains that made it difficult to stay on a regular spray schedule. This is a critical part of the season as the nuts enlarge, and nut scab potential was extremely high.

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, non-treated controls of the cultivar 'Desirable' had nut scab severity ratings of 100% in late August. This level of scab would result in a complete crop loss if not controlled. The widespread use of newer fungicides such as the phosphites in early season and Miravis Top and Miravis Prime during nut sizing helped to contain losses that could have been considerably higher. Root knot nematode (RKN) was again included this year as surveys have shown it to be widespread across the state. RKN can severely impact young trees and is almost certainly damaging to older trees as well. The loss estimate is a best guess, as the magnitude of this damage is unknown. Some growers now use nematicides either at planting or injected in the irrigation systems.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Scab	10.0	40.1	18.0	58.1
Anthracnose	0	0	0	0
Root Knot Nematodes	1.0	4.1	0.5	4.6
Downy Spot	0	0	0	0
Powdery Mildew	0	0	0	0
Zonate Leaf Spot	0	0	0	0
Bacterial Leaf Scorch	0.1	0.4	0	0.4
Total	**11.1**	**44.6**	**18.5**	**63.1**

* Eight treatments on 125,000 acres @ $18/acre (including cost of application), based on the number of sprayed acres and averaging applications on highly susceptible and more resistant cultivars. Scab fungicide programs also are effective against anthracnose, downy spot, brown spot, and powdery mildew.

Estimate by Tim Brenneman, Research Extension Plant Pathologist, and Lenny Wells, Extension Horticulture Specialist

SOYBEAN

In 2022, soybeans were planted to a reported 167,476 acres with an average yield of 43.3 bu/acre. The total soybean production for Georgia in 2022 was valued at $103.2 million.

The winter of 2021–2022 was generally warmer than normal which likely allowed for earlier reintroduction of soybean rust into the state. Warmer winters also tend to increase losses from nematodes. Rainfall was abundant during the latter part of the season, and this increased problems with some diseases. Soybean rust was much more of a problem in 2020 and 2021 than it was during the hotter and drier 2019 season. Rust was less severe in 2022 than it was in 2021.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soybean Cyst Nematode*	trace	—	—	—
Root-Knot Nematodes	1.5	1.5	—	1.5
Other Nematodes**	0.2	0.2	—	0.2
Asian Soybean Rust	1.0	1.0	1.4	2.4
Anthracnose	0.5	1.5	—	0.5
Brown Leaf Spot	—	—	—	—
Target Spot	trace	—	—	—
Charcoal Rot	0.01	0.1	—	0.1
Diaporthe/Phomopsis Complex	0.5	0.5	—	0.5
Downy Mildew	trace	—	—	—
Frogeye Leaf Spot	0.001	0.0	—	0.0
Red Crown Rot	trace	—	—	—
Cercospora Leaf Blight	1.0	1.0	—	1.0
Pod and Stem Blight	1.0	0.0	—	1.0
Purple Stain	0.1	0.1	—	0.1
Seedling Diseases (Rhizoctonia/Pythium/Fusarium)	0.1	0.1	—	0.1
Southern Blight	trace	—	0	—
Stem Canker	0	0	0	0
Fusarium Wilt	trace	0	—	—
Virus Diseases	0	0	0	0
Bacterial Diseases	0	0	0	0
Total	**5.91**	**6.0**	**1.4**	**7.4**

*Resistant varieties are used to manage most nematode and disease problems. It is estimated that fungicides were applied to 25% acres for management of foliar diseases and were used as seed treatments to reduce seedling diseases on a small portion of the planted acreage. It is estimated that each foliar fungicide application cost growers $15.00/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 the fall of 2020, and it resulted in 100% losses on multiple farms during the spring of 2021; some losses were also observed on the new crop that was planted in the fall of 2021 and therefore in the spring of 2022. Unfortunately, this disease arrived on nursery plants, and currently registered fungicides do not adequately control the pathogen. However, recommendations for clean nurseries generally resulted in significantly less disease in 2022. Other foliar and fruit disease pressures were not generally severe in 2022. 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 good year for strawberry production, despite seasonal rains which increased disease levels on some 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	163.1	480.6	643.7
Fungal Leaf Spots	0.1	16.3	53.4	69.7
Anthracnose	1.0	163.1	149.5	312.6
Root Rots and Nematodes	3.0	489.3	53.4	542.7
Angular Leaf Spot	0.1	16.3	10.7	17.0
Neopestalotiopsis	1.0	163.1	320.4	483.5
Total	**6.2**	**1011.3**	**1068.0**	**2079.3**

Estimate by Phil Brannen, Extension Plant Pathologist

TURFGRASS

In 2022, the turfgrass industry sectors (golf courses, sport fields, sod production, lawncare, residential and commercial landscapes) accounted for an estimated 2.85 million acres in Georgia, with a maintenance value of $2.00 billion. Sod/stolon were planted on 27,253 acres with a farm gate value of $194.42 million. Abiotic problems, including cultural and environmental issues, nutritional deficiencies, excessive thatch layer, poor root system, and soil compaction, continued to be problematic and regularly observed in all turf species and industry sectors in 2022. Rhizoctonia large patch of warm-season grasses caused by *Rhizoctonia solani* was one of the most common diagnosed problems, especially in zoysiagrass and St. Augustinegrass. Dollar spot epidemics caused by *Clarireedia montheithiana* and *C. jacksonii* were common in warm and cool season grasses in spring and fall. *Pythium* spp. was usually observed in submitted samples to the UGA Plant Pathology Plant Disease Clinic. Leaf spots caused by *Bipolaris* spp. and *Drechslera* spp. were persistent on bermudagrass and cool season grasses, respectively, during the spring of 2022. *Gaeumannomyces* spp. (causal agent of take all root rot/root decline of warm-season grasses/bermudagrass decline) continued to be prevalent throughout Georgia, especially in the southern part of the state. Gray leaf spot (*Magnaporthe grisea*) was severe on St. Augustinegrass. Slightly cooler than normal temperatures during spring alleviated plant stress in bentgrass and tall fescue, resulting in a minor incidence of anthracnose (*Colletotrichum cereale*). However, Pythium root and crown rot (*Pythium* spp.) were commonly diagnosed on bentgrass. Minor infections of rust and fairy ring were documented. *Ophiosphaerella* spp. (SDS-spring dead spot) infections on *Cynodon* spp. (bermudagrass) in golf courses were minimal due to preventative care in the fall. Plant parasitic nematode sample submissions continue to be abundant on bent and bermudagrass greens. No bacterial or viral diseases were documented.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soil-borne and Crown Diseases	1.5	30	10	40
Foliar Diseases	0.5	10	6	16
Nematodes	1.0	20	10	30
Total	**3.0**	**60**	**26**	**86**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

VEGETABLES

About 150,000 acres of vegetables were grown in Georgia in 2022 worth a total farm gate value of $1.36 billion. 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 post-harvest rot (bacterial and fungal origin) in onions were observed resulting in economic losses. Alternaria leaf blight in brassica and anthracnose in pepper and cucurbits were problematic and resulted in considerable economic losses. Losses due to whitefly-transmitted viral diseases were comparatively lower than losses incurred during 2020. Southern blight (*Agroathelia 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	10.5	19.5	6.8	26.3
Squash (yellow + zucchini)	9.5	4.0	5.8	9.8
Tomato	5.0	2.2	10.8	13.0

Other Vegetable Crops	% Reduction in Crop Value*	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Pepper (bell and specialty)	4.0	4.8	3.6	8.4
Cucumber	4.5	3.4	2.1	5.5
Snap Bean	3.5	0.8	0.6	1.4
Greens (brassica and nonbrassica)	8.5	5.8	6.2	12.0
Headed brassica (cabbage, broccoli)	10.0	7.2	1.5	17.7
Onion (field and storage)	9.0	9.2	10.4	19.6
Cantaloupe	4.5	1.0	1.8	2.8
Eggplant	1.0	0.2	0.7	0.9
Total	**4.45***	**58.1**	**59.3**	**117.8**

*This column is not additive due to the way losses for vegetables are tabulated. It was estimated as total loss ($)/total farmgate value of vegetables in 2022 ($) x 100.

Estimate by Bhabesh Dutta, Extension Vegetable Pathologist

WHEAT

The wheat farm gate value in 2022 was $60.5 million produced on 123,879 acres. The area planted with wheat in the state decreased compared with previous years. The average yield was 59.05 bu/acre and was slightly higher than in 2021. Stripe rust (*Puccinia striiformis*) and leaf rust (*Puccinia triticina*) were reported in several counties in south and central Georgia. Powdery mildew (*Blumeria graminis*) was observed and found at mid to high levels across the state. The epidemic persisted into mid-April at the UGA CAES Southwest Georgia Research and Education Center in Plains. There was a freeze advisory in late March, but it had very little effect on the main wheat-growing areas. Several samples were submitted to the UGA Plant Pathology Plant Disease Clinic and were diagnosed with Fusarium head blight (FHB) and most of the growers planned or applied a fungicide treatment for the disease. Stagonospora spot blotch (*Stagonospora nodorum*), leaf blotch (*Bipolaris sorokiniana*), and tan spot (*Pyrenophora tritici-repentis*) were observed frequently across the state. Barley yellow dwarf virus (BYDV) was documented at low levels. There were no incidences reported of soilborne wheat mosaic virus (SBMV) in the state in 2022. Like in 2021, oat crown rust (*Puccinia coronata*) epidemics continued to be numerous and with high severity in commercial fields. There is currently very little resistance to this disease in commercial oat varieties.

Diseases	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Leaf Rust / Stripe Rust	0.2	121.075	121.075	242.150
Glume Blotch / Spot Blotch, Tan Spot	0.2	121.075	60.537	181.612
Powdery Mildew	0.1	60.537	0.000	60.537
Fusarium Head Blight	0.2	121.075	302.688	423.763
Barley Yellow Dwarf Virus	0.1	60.537	0.000	60.537
Soilborne Wheat Mosaic / Spindle Streak Mosaic Virus	0.0	0.000	0.000	0.000
Total	**0.8**	**484.29**	**484.30**	**968.59**

Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2022

Crop or Commodity	Estimated Crop Value *($ Millions)*	% Reduction in Crop Value[1]	Value of Damage *($ Millions)*	Cost of Control *($ Millions)*	Total Cost to Producer *(Damage & Control; $ Millions)*	Total % Loss[1,2]
Apple	9.9	26.50	3.56	0.33	3.90	39.27
Blackberry	19.9	3.00	0.61	0.94	1.55	7.80
Blueberry	449.4	6.80	32.78	12.67	45.45	10.11
Bunch Grape	40.6	8.60	3.82	0.48	4.30	10.59
Corn	522.7	7.06	36.81	4.30	41.11	7.86
Cotton	1,311.5	16.50	216.50	23.30	239.80	18.28
Muscadine Grape	6.7	4.70	0.33	0.19	0.52	7.77
Ornamentals	1,083.7	7.45	80.74	28.33	109.07	10.06
Peach	80.6	2.30	1.91	4.90	6.80	8.45
Peanut	790.8	15.50	122.20	81.60	203.80	25.77
Pecan	400.8	11.10	44.60	18.50	63.70	15.74
Soybean	103.2	5.91	6.00	1.40	7.40	7.17
Strawberry	15.3	6.20	1.10	1.07	2.08	13.59
Turfgrass	2,000.0[3]	3.00	60.00	26.00	86.00	4.30
Vegetable	1,305.1	4.45	58.10	59.30	117.80	90..
Wheat	60.5	0.80	0.48	0.48	0.97	1.59
Totals	**8.200.7**		**669.45**	**263.79**	**933.65**	**11.38**

[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.

[3] Maintenance 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.

Cover photo references from top to bottom: Brian Ward, Louisiana State University AgCenter, Bugwood.org; Department of Plant Pathology, North Carolina State University, Bugwood.org; Rebecca A. Melanson, Mississippi State University, Bugwood.org; and Ned Tisserat, Colorado State University, Bugwood.org.

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