2016 GEORGIA PLANT DISEASE LOSS ESTIMATES

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UNIVERSITY OF GEORGIA
EXTENSION

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In 2016, Georgia's plant disease losses, including control costs, amounted to an estimated $821 million. The value of the crops used in this estimate was approximately $6,596 million, resulting in a 12.8% 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 and Economic Development's 2016 Georgia Farm Gate Value Report (AR-17-01). Some estimates for fruits, ornamentals, and turf rely on specialists' knowledge of the industry and industry sources for information.

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2016 PLANT DISEASE CLINICS ANNUAL SUMMARY

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

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

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

2016 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PHYSICAL and DIGITAL SAMPLES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	270	2	272
Fruits and Nuts	173	47	220
Miscellaneous	4	6	10
Ornamentals and Trees	469	302	771
Turf	258	123	381
Vegetables	613	64	677
Total	1787	544	2331

NEMATODE SAMPLES			
Crop	**Samples**	**Crop**	**Samples**
Field Crops	4262	Trees	46
Fruits and Nuts	199	Turf	714
Miscellaneous	238	Vegetables	70
Ornamentals	419		
Total of all nematode samples			**5948**

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 pathogen, was not prevalent, although sometimes observed. Disease losses and expenditures for controlling diseases were above average in 2016, as rainfall was prevalent throughout the growing season, allowing for disease establishment. Bitter rot, one of our primary summer rot diseases, caused significantly more losses than average. There is still a strong need for more efficacious fungicides, especially for control of bitter rot. Cost of control included pesticide usage for fire blight, pruning costs, and summer rot control measures.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Fire Blight	2.00	305.5	90.0	395.5
Bitter Rot	4.00	610.9	140.0	750.9
Bot Rot	0.01	1.5	52.0	53.5
Black Rot	0.01	1.5	33.0	34.5
Alternaria Leaf Spot	0.01	1.5	0.0	1.5
Powdery Mildew	0.01	1.5	11.5	13.0
Sooty Blotch*	0.01	1.5	0.0	1.5
Fly Speck*	0.10	15.3	0.0	15.3
Cedar Apple Rust*	0.01	1.5	0.0	1.5
Scab*	0.01	1.5	0.0	1.5
Other Diseases	0.01	1.5	1.0	2.5
Total	**6.2**	**943.7**	**327.5**	**1271.2**

*Controlled with fungicides applied for other diseases.

Estimated by Phil Brannen, Extension Plant Pathologist

BLACKBERRY

Blackberries are still a relatively new commodity for Georgia. Diseases have been a major reason for losses observed, and limited research information is available for this expanding market. In 2016, disease was minimal, although Botrytis fruit rot was observed in some locations. This disease is especially damaging when wet weather occurs during bloom. Viruses, many of which can not be readily detected, continue to make their way into the state, and these have also caused significant losses. Fungicidal applications generally decreased losses. Cane diseases were not as prevalent in 2016, although orange cane blotch and cane blight still topped the list of diseases observed. As with many other fruit commodities, low chill hours negatively impacted blackberry fruiting and yield.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	0.10	7.0	295.2	302.2
Orange Rust	0.01	0.7	36.9	37.6
Cane and Leaf Rust	0.01	0.7	147.6	148.3
Double Blossom	0.01	0.7	73.8	74.5
Viruses	2.00	140.8	36.9	177.7
Phytophthora Root Rot	0.01	0.7	7.4	8.1
Cane Blight	0.50	35.2	73.8	109.0
Septoria Leaf Spot	0.05	3.5	29.5	33.0
Botryosphaeria	0.05	3.5	36.9	40.4
Total	**2.7**	**192.9**	**738.0**	**930.9**

Estimated by Phil Brannen, Extension Plant Pathologist

BLUEBERRY

Blueberry production in 2016 was impacted by several diseases. Low chill hours produced negative impacts on yield without regard to diseases. Although mummy berry was present, losses were low to moderate where good fungicide programs were implemented. Phytophthora and other root rots continued to cause mortality in some plantings. Rust has increased dramatically in importance in recent years to become a major leaf disease. This trend continued in 2016 likely due to a warm winter and carryover inoculum on leaves that did not senesce normally. Necrotic ring blotch virus was prevalent in some locations, but it was generally reduced and of minimal impact. Exobasidium leaf and fruit spot was not as prevalent, as new disease management techniques were adapted by producers—a direct impact of research and Extension programs. However, some unsprayed sites were decimated by this disease. Bacterial leaf scorch, a recently identified bacterial disease of southern highbush blueberries, damaged numerous plantings in 2016. Nematodes in replant sites continued to decrease as an issue since educational efforts have resulted in fumigation prior to planting. Anthracnose was a major issue in some locations, but more aggressive management programs helped to reduce losses over those observed in 2015.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Mummy Berry	0.2	0.6	6.2	6.8
Botrytis Blight	0.0	0.03	2.5	2.5
Foliar Disease	1.5	4.6	1.8	6.4
Rots	4.0	12.2	1.8	14.0
Bacterial Scorch	0.4	1.2	0.6	1.8
Dieback	0.1	0.3	0.6	0.9
Phytophthora Root Rot	0.5	1.5	0.6	2.1
Total	**6.7**	**20.4**	**14.1**	**34.5**

Estimated by Phil Brannen, Extension Plant Pathologist

BUNCH GRAPE

Although rainfall was more than sufficient for disease development, bunch grape disease losses were similar to the losses observed in 2015. Downy mildew was observed early on fruit where spray programs were not well administered. Virtually all vineyards lost some production to downy mildew and various fruit rots and cane diseases. North Georgia is on the southern edge of the region where one can grow European bunch (Vinifera) wine grapes. The limiting factor is Pierce's disease, a bacterial disease which is vectored by the glassy-winged sharpshooter. 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 increased in 2016, likely due to substantially warmer temperatures the previous winter. An indirect result of Pierce's disease mortality has been an increase in leaf roll virus. This disease, caused by a complex of several viruses, was introduced through replanting of vines killed by Pierce's disease. Leaf roll virus and other viruses are now a major issue for the Georgia wine grape industry.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Botrytis	1.0	123.1	75.0	198.1
Downy Mildew	8.0	985.1	124.0	1109.1
Black Rot	2.0	246.3	80.0	326.3
Powdery Mildew	3.0	369.4	20.0	389.4
Phomopsis Cane Blight	2.0	246.3	35.0	281.3
Crown Gall	0.01	1.2	1.0	2.2
Pierce's Disease	1.00	123.1	10.0	133.1
Leaf Roll Virus	**0.10**	**12.3**	**5.0**	**17.3**

Estimated by Phil Brannen, Extension Plant Pathologist

CORN

In 2016, corn for grain was harvested from 406,318 acres in Georgia with an average yield of 181.9 bu/A. The 2016 crop was valued at $277.2 million. The 2016 field season in Georgia was hot and dry. Conditions were generally unfavorable for the aggressive spread of southern corn rust (*Puccina polysora*) or northern corn leaf blight (*Exserohilum turcicum*) and losses associated with these diseases were low. However, these same hot and dry conditions were very favorable for aflatoxin, especially in nonirrigated fields.

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 diagnose symptoms in the field. Heat and drought exacerbated losses to plant-parasitic nematodes in 2016. Elevated 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	1.3	0.0	1.3
Nematodes	6.5	18.0	1.1**	19.1
Mycotoxins	0.5	1.4	0.0	1.4
Southern Corn Rust	1.5	4.2	3.0***	7.2
Northern Corn Leaf Blight	0.3	0.8	--***	0.8
Other Leaf Diseases*	trace	0	--***	--
Diplodia Ear Rot	---	0	0.0	--
Total	**8.8**	**25.7**	**4.1**	**29.8**

* "Other leaf diseases" primarily includes southern corn leaf blight (*Bipolaris maydis*) but may include diseases such as gray leaf spot.

** It is estimated that approximately 60,948 acres (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.

*** It is estimated that 40% of the corn acreage was sprayed with fungicides once during the 2016 season and 10% twice at a cost of $5/A for application and $10/A for the cost of fungicide.

Estimated by Robert Kemerait, Extension Plant Pathologist

COTTON

Cotton was planted to an estimated 1,197,151 acres in 2016. The average lint yield was 1001 lb/A. The crop was valued at $967.7 million. Conditions were dry for many cotton growers in 2016 and temperatures were generally very warm, although the crop was affected by tropical storms very late in the season. Hot and dry conditions throughout much of the season greatly reduced risk to a number of diseases including target spot and bacterial blight. Hot and dry conditions increased losses to Stemphylium leaf spot. After many years of no reports, 2016 was the second year in a row where losses to bacterial blight were reported.

Losses to nematodes, primarily 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)	2.5	24.2	---	24.2
Nematodes	8.5	82.2	20.0*	102.2
Southern Root-Knot	(6.0)	(58.1)	---	---
Reniform	(2.0)	(19.4)	---	---
Columbia Lance	(trace)	(--)	---	---
Sting	(0.5)	(4.8)		
Seedling Disease	1.0	9.7	0.8**	10.5
Fusarium Wilt	0.1	1.0	---	1.0
Ascochyta Blight	trace	---	---	---
Stemphylium Leaf Spot	1.0	9.7	---	9,7
Target Spot	0.2	1.9	1.4***	3.3
Bacterial Blight	0.2	1.9		1.9
Total	**13.5**	**130.6**	**22.2**	**152.8**

* Based upon an estimation that approximately 55% of the cotton acreage in the state is treated with AVICTA Complete Pak, AERIS Seed-Applied System or Velum Total, and approximately 5.0% of the acreage was treated with Telone II.

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

*** Based upon estimate that 10% of the cotton acreage was sprayed with a fungicide in 2016 to manage foliar diseases.

Estimated by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially fruit rot, was above average in 2016. Good fungicidal spray programs generally result in minimal losses, but ripe rot was 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	1.0	106.7	70.0	176.7
Macrophoma Rot	0.6	64.0	50.0	114.0
Ripe Rot	1.0	106.7	35.0	141.7
Angular Leaf Spot	0.6	64.0	10.0	74.0
Black Rot*	0.6	64.0	0.0	64.0
Phomopsis Dead Arm	0.5	53.3	1.0	54.3
Total	**4.3**	**458.6**	**166.0**	**624.6**

* Controlled with fungicides applied for other diseases.

Estimated by Phil Brannen, Extension Plant Pathologist

ORNAMENTAL HORTICULTURE

The farm gate value for ornamental horticulture has been steadily increasing for several years. The 2016 farm gate value for ornamental horticulture (excluding turf) was estimated at $719.55 million, which was an increase of $49.76 million over 2015. Field nursery, container nursery, and greenhouse (floriculture) production saw an increase of $12.29, $12.67, and $24.80 million, respectively, in farm gate value over 2015. Ornamental production farm gate value is closely tied to new residential and business construction. The ornamental disease loss estimate includes only commercial plant production and excludes the value-added service industries because the value, disease loss, and cost of control are not documented and vary greatly within the industry.

Root diseases still account for the largest percentage of disease loss in commercial ornamental production. Boxwood blight, caused by *Calonectria pseudonaviculata*, continues to be of concern to ornamental production as well as the landscape industry. The relatively hot and dry conditions of 2016, compared with 2015, resulted in lower foliar disease pressure. Cercospora leaf spots and powdery mildew were problematic in some nurseries. *Rose rosette virus* is a concern for the industry and the virus disease is particularly problematic in landscapes in northern Georgia.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Bacterial Diseases (fire blight, leaf spots)	0.3	2.16	1.01	3.17
Fungal Leaf Spots, Stem Cankers, Needle Blights	2.0	14.39	9.10	23.49
Root and Crown Rots	3.5	25.18	8.95	34.13
Powdery Mildew	0.7	5.04	2.10	7.14
Downy Mildew	0.3	2.16	3.20	5.36
Botrytis Blight	0.3	2.16	1.25	3.41
Viruses (TSWV, INSV, rose rosette, hosta virus X)	0.3	2.16	0.30	2.46
Minor diseases (rusts, nematodes)	0.2	1.44	1.05	2.49
Total	**7.6**	**54.69**	**26.96**	**81.65**

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Field Nursery ($90.36 M)	1.10	1.13	1.95	3.08
Container Nursery ($151.38 M)	7.17	11.76	12.30	24.06
Floriculture (Greenhouse) ($428.05 M)	9.23	41.80	12.71	54.51
Total	**7.6**	**54.69**	**26.96**	**81.65**

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

Estimated by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Peach production was down in 2016, likely due to reduced chill hours following a warmer than average winter. Due to adequate fungicide programs, brown rot and scab diseases were of minimal consequence. 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 also not prevalent, again indicating that the bacterial control recommendations are relatively effective, even under excessive rainfall conditions. Armillaria continued to be a major, expanding problem in replant peach production. Of concern, phony peach, caused by the bacterium *Xylella fastidiosa*, increased in production orchards, possibly as a result of overall warming temperatures. This disease takes trees out of production, so an increase in prevalence was particularly troubling.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Brown Rot	0.1	48.8	2080.0	2128.8
Scab	0.01	4.9	1555.0	1559.9
Bacterial Spot	0.01	4.9	30.0	34.9
Phony Peach	0.3	146.3	250.0	396.3
Gummosis	0.1	48.8	20.0	68.8
Armillaria Root Rot	1.0	487.8	50.0	537.8
Phomopsis Constriction Canker	0.01	4.9	10.0	14.9
Total	**1.5**	**746.3**	**3995.0**	**4741.3**

Estimated by Phil Brannen, Extension Plant Pathologist

PEANUT

In 2016, peanut was harvested from 735,368 acres. Yields in 2016 averaged 4562 lb/A for a total production valued at $624.4 million. Conditions during the 2016 growing season were hot and dry in most areas although conditions remained quite favorable for stem rot (white mold) to develop. Infrequent rains inhibited movement of fungicides to the crown of the plant, increasing severity of white mold, especially in nonirrigated fields. Such conditions also increased severity of pod rot as a result of underground white mold. Leaf spot diseases, for the most part, were less severe in 2016 because of dry conditions. Losses to tomato spotted wilt virus (TSWV) increased in 2016 to an estimated 3.5% up from 3% in 2015. TSWV losses have been steadily increasing since 2012. Environmental conditions throughout much of the 2016 field season favored white mold (stem rot) and the "underground" form of the disease. Early and late leaf spot diseases were generally not a significant problem for most growers, except where highly susceptible varieties like 'Georgia-13M' and 'TUFRun™'511' were grown. The peanut root-knot nematode remained a problem in the south-central and southwestern regions of the state. Losses to nematodes increased slightly as use of Temik 15G was greatly restricted. However, availability of Velum Total for management of nematodes helped to manage this problem. The development and spread of Cylindrocladium black rot (CBR) was slight.

Disease	% Reduction in Crop Value[a]	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf spots	1.0	6.2	34.6[b]	40.8
White mold (Sclerotium)	7.5	46.8	18.6[c]	65.4
Limb Rot (Rhizoctonia)	0.1	0.6	---[d]	0.6
Pod Rot	Trace	---	---[e]	---
Nematodes	3.0	18.7	7.2[f]	25.9
Cylindrocladium Black Rot	Trace	---	---	---
Seedling Disease	1.0	6.2	---[g]	6.2
Tomato Spotted Wilt Virus	3.5	21.8	---	21.8
Diplodia Collar Rot	Trace	---	---	---
Total	**16.1**	**100.3**	**60.4**	**160.7**

[a] The total value of the crop was $624.4 million according the 2016 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 7 times during the season. Fungicide treatments for leaf spot control alone are about $8/acre per application. Growers usually sprayed nonirrigated 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, or flutolanil to control soilborne diseases at some point during the season. For nonirrigated fields, four applications were calculated at $3.00/A. For irrigated fields, four applications at $9.00/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, it was estimated that 10.0% of the acreage in Georgia is treated at a cost of $80/A and 5% at #36/A.

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

Estimated by Robert Kemerait, Extension Plant Pathologist

PECAN

The growing season started out relatively dry, resulting in lower leaf scab potential early in the year. Rain events throughout the summer required fungicide applications to suppress scab development. Frequent rainfall in August resulted in higher late-season nut scab potential. Overall, the 2016 season had moderate scab pressure. Most commercial growers in the southern part of the state sprayed more than ten times to control scab successfully. In UGA fungicide trials in Tift County, nontreated controls of the cultivar 'Desirable' had nut scab severity ratings of 86.9% and 67.0% in mid-September. This level of scab on the fruit would result in a near 100% loss.

In 2016, pecan acreage was estimated to be 158,905 acres in Georgia with a total farm gate value of $355.9 million.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Scab	8.0	28.5	28.6	57.1
Anthracnose	0.0	0.0	0.0	0.0
Brown Spot	0.0	0.0	0.0	0.0
Downy Spot	0.0	0.0	0.0	0.0
Powdery Mildew	0.0	0.0	0.0	0.0
Zonate Leaf Spot	0.0	0.0	0.0	0.0
Phytophthora Shuck and Kernel Rot	0.0	0.0	0.0	0.0
Total	**8.0**	**28.5**	**28.6**	**57.1**

* Ten treatments on 158,905 acres @ $18.00/A; scab fungicide programs are also effective against anthracnose, downy spot, brown spot, and powdery mildew in most cases; the number of sprays varied by location.

Estimated by Jason Brock and Tim Brenneman, Extension Plant Pathologists

SOYBEAN

Conditions in the 2016 field season were generally hot, dry, and unfavorable for the development and spread of Asian soybean rust, *Phakopsora pachyrhizi*, and other foliar diseases during much of the season. Because the threat from Asian soybean rust was low, many producers did not apply fungicides this season. Plant parasitic nematodes (especially the southern root-knot nematode) continued to cause damage to the soybean crop in numerous fields across Georgia. In 2016, soybeans were planted to a reported 268,085 acres with an average yield of 41.33 bu/A. The total soybean production for Georgia in 2016 was valued at $112.2 million.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)**	Total *($ Millions)*
Soybean Cyst Nematode*	Trace	---	---	---
Root-Knot Nematodes	3.0	3.4	---	3.4
Other Nematodes**	0.35	0.4	---	0.4
Asian Soybean Rust	0.1	0.1	0.8	0.9
Anthracnose	0.25	0.3	---	0.3
Brown Leaf Spot	0	---	---	---
Charcoal Rot	Trace	---	---	---
Diaporthe/Phomopsis Complex	Trace	---	---	---
Downy Mildew	Trace	---	---	---
Frogeye Leaf Spot	0.25	0.3	---	0.3
Red Crown Rot	Trace	---	---	---
Cercospora Leaf Blight	0.25	0.3	---	0.3
Pod and Stem Blight	1.0	1.1	---	1.1
Purple Stain	Trace	---	---	---
Seedling Diseases (Rhizoctonia/ Pythium/Fusarium)	0.1	0.1	0.1	0.2
Southern Blight (Sclerotium)	0.25	0.3	---	0.3
Stem Canker	0	---	---	---
Fusarium Wilt	Trace	---	---	---
Virus Diseases	0	---	---	---
Bacterial Diseases	0	---	---	---
Total	5.55	6.3	0.9	7.2
Total	**8.0**	**28.5**	**28.6**	**57.1**

* Resistant varieties are used to manage most nematode and disease problems; Temik 15G is generally no longer available. Fungicides were applied to an estimated 50,000 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.

Estimated by Robert Kemerait, Extension Plant Pathologist

STRAWBERRY

Foliar and fruit disease pressure was moderate in 2016. Botrytis (gray mold) was a limited issue, even though resistance to numerous fungicides was reported in multiple locations. Phytophthora, Pythium, and Rhizoctonia root rots were sometimes damaging. Significant anthracnose was observed in some locations. Overall, it was an excellent year for strawberry production. There is concern that the pathogens causing anthracnose (*Colletotrichum* spp.) are developing resistance to some fungicides, but no resistance was confirmed where severe disease pressure was observed. There is a strong need for fungicides with different modes of action if we are to continue strawberry production in Georgia.

Disease	% Reduction in Crop Value	Damage *($ Thousands)*	Cost of Control *($ Thousands)*	Total *($ Thousands)*
Gray Mold	0.1	10.0	394.4	404.4
Fungal Leaf Spots	0.1	10.0	122.7	132.7
Anthracnose	0.3	30.0	131.5	161.5
Root Rots & Nematodes	2.0	200.0	219.1	419.1
Angular Leaf Spot	0.0	1.0	8.8	9.8
Total	**2.5**	**251.0**	**876.5**	**1127.5**

Estimated by Phil Brannen, Extension Plant Pathologist

TURFGRASS

In 2016 in Georgia, there were 2.3 million acres of turf encompassing all turfgrass industries (golf, sport fields, sod production, lawn care, commercial landscapes) with a maintenance value of $1.93 billion. There were 26,172 acres used for sod/stolons production in the state, yielding a farm gate value of $111.69 million. Unusually warm winter/spring temperatures prolonged several turfgrass disease infection periods for over six months. Among the diseases driven by these temperatures were large patch of warm season grasses caused by *Rhizoctonia solani*, dollar spot caused by *Sclerotinia homoeocarpa*, and bipolaris leaf spot caused by *Bipolaris* spp. and *Drechslera* spp. *Bipolaris* spp. and *Drechslera* spp. were particularly problematic on Bermuda grass and annual ryegrass during the spring and fall of 2016. *Gaeumannomyces* spp. (causal agent of take all root rot/root decline of warm season grasses/Bermuda grass decline) continued to be prevalent throughout the state. Poor centipedegrass green-up was a prevalent complain among clientele submitting samples to the plant disease diagnosis clinic. High summer temperatures exerted severe stress in bentgrass and tall fescue. Pythium root and crown rot as well as anthracnose (*Colletotrichum cereale*) were ubiquitous. Gray leaf spot (*Magnaporthe grisea*) was common in St. Augustine grass in 2016. A few cases of leaf and sheath blight (LSR or mini-ring) disease caused by *Rhizoctonia zeae* were recorded throughout the state on Bermuda grass greens. Numerous abiotic problems including cultural and environmental issues, nutritional deficiencies, excessive thatch problems and soil compaction were commonly diagnosed in all turf species. Minor infections of rust and fairy ring were also observed. *Ophiosphaerella* spp. (spring dead spot) affecting *Cynodon* spp. (Bermuda grass) infections were very low to nonexistent in the northern areas of the state. There were 417 turfgrass samples received at the UGA Plant Disease Clinic during 2016 with warm season grasses comprising a large majority of the samples. There were 383 turf soil samples were submitted to the UGA Nematology Laboratory for nematode analysis with 87% of the samples either from bentgrass or Bermuda grass swards.

Disease	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Soil-borne and Crown Diseases	3.0	57.90	28.90	86.80
Foliar Diseases	1.5	28.95	9.65	38.60
Nematodes	1.0	19.30	5.79	25.09
Total	**5.5**	**106.15**	**44.34**	**150.49**

Estimated by Alfredo Martínez-Espinoza, Extension Plant Pathologist

VEGETABLES

Approximately 150,000 acres of vegetables were grown in Georgia in 2016 with a total value around $1.2 billion. The dry conditions during the spring and the mid-fall growing seasons, especially during harvest, exacerbated whitefly and whitefly-transmitted viral diseases in cucurbits, solanaceous, and bean crops. Whitefly-transmitted viral diseases like cucurbit leaf crumple virus and cucurbit yellow stunt disorder virus were particularly severe. Fusarium wilt of watermelon (*Fusarium oxysporum* f. sp. *niveum*) caused greater losses than normal in spring and summer crops. Center rot (*Pantoea ananatis*) and postharvest rot (bacterial and fungal origin) problems in onion were observed resulting in economic losses. Black rot (*Xanthomonas campestris* pv. *campestris*) in cruciferous crops has been a growing issue for vegetable growers. Southern blight in tomato and snap beans (*Sclerotium rolfsii*) also caused economic losses.

Major Vegetable Crops	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Watermelon	10.0	14.2	6.0	20.2
Squash (yellow + zucchini)	30.0	15.0	18.0	33.0
Tomato	10.0	4.9	20.3	25.2

Other Vegetable Crops	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Pepper (bell)	8.0	6.3	6.0	12.3
Cucumber	10.0	6.0	6.4	12.4
Snap Bean	40.0	8.0	7.5	15.5
Greens	1.5	0.8	1.7	2.5
Cabbage	1.8	1.0	0.9	1.9
Onion (dry)	2.5	2.4	3.8	6.2
Cantaloupe	2.0	0.4	2.2	2.6
Eggplant	0.5	0.1	0.4	0.5
Total	**8.6***	**59.1**	**73.2**	**132.3**

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

Estimated by Alfredo Martínez-Espinoza, Extension Plant Pathologist

WHEAT

In 2016, the farm gate value for wheat in Georgia was $26 million. Wheat was harvested from 140,630 acres with an average yield of 43.67 bu/acre. Wheat acreage was greatly reduced across the state in 2016 (-33%) compared with the previous year. The top five wheat-producing counties (by area) were Pulaski, Dooly, Baker, Jefferson, and Macon. Fall 2015 was abnormally wet ahead of small grain planting in the Piedmont and mountainous areas of the state, making it difficult for a timely planting. Winter 2015 through spring 2016 was one of the warmest cool seasons on record, toppling last year's warm temperatures. Therefore, poor vernalization was a detrimental factor throughout the state. These warm temperatures allowed aphid populations to develop to large numbers, consequently resulting in high levels of barley yellow dwarf virus (BYDV) across the state. Fusarium head blight (FHB/scab) incidence was widespread across the state. This is the third year in a row of high FHB infections and economic losses even though the conditions were less favorable for scab development. Powdery mildew (*Blumeria graminis* f. sp *tritici*), stripe rust (*Puccinia striiformis*), and leaf rust (*Puccinia triticina*) infections were minimal across the state in 2016. Stagonospora spot blotch, tan spot, and wheat streak mosaic infections were observed at low levels in Georgia. Oat crown rust (*Puccinia coronata*) was observed at very high levels throughout the state in 2016.

Diseases	% Reduction in Crop Value	Damage *($ Millions)*	Cost of Control *($ Millions)*	Total *($ Millions)*
Leaf Rust/Stripe Rust	0.0	0.00	0.00	0.00
Glume Blotch	0.0	0.00	0.00	0.00
Powdery Mildew	0.0	0.00	0.00	0.00
Fusarium Head Blight	8.0	2.08	0.52	2.60
Barley Yellow Dwarf Virus	1.0	0.52	0.26	0.78
Soilborne Wheat Mosaic / Spindle Streak Mosaic Virus	0.0	0.00	0.00	0.00
Total	**9.0**	**2.60**	**0.78**	**3.38**

Estimated by Alfredo Martínez-Espinoza, Extension Plant Pathologist

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2016

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	14.33	6.2	0.94	0.33	1.27	8.9
Blackberry	6.85	2.7	0.19	0.74	0.93	13.6
Blueberry	283.87	6.7	20.4	14.1	34.5	12.2
Bunch Grape	10.21	17.1	2.1	0.35	2.45	24.0
Corn	277.23	8.8	25.7	4.1	29.8	10.7
Cotton	967.69	13.5	130.6	22.2	152.8	15.8
Muscadine Grape	10.21	4.3	0.46	0.17	0.63	6.2
Ornamentals	719.55	7.6	54.7	27.0	81.7	11.4
Peach	48.03	1.5	0.75	4.0	4.75	9.9
Peanut	624.38	16.1	100.3	60.4	160.7	25.7
Pecan	355.85	8.0	28.5	28.6	57.1	16.0
Soybean	112.2	5.6	6.3	0.9	7.2	6.4
Strawberry	9.75	2.5	0.25	0.88	1.13	11.6
Turfgrass	1930.0	5.5	106.2	44.3	150.5	7.8
Vegetable	1200.0	8.6	59.1	73.2	132.3	11.0
Wheat	26.01	9.0	2.6	0.78	3.38	13.0
TOTALS	**6596.16**	**---**	**539.04**	**282.05**	**821.09**	**12.8**

[1] This column is not additive.

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

ATTENTION!

Pesticide Precautions

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

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

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

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

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

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

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

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