GEORGIA PLANT DISEASE LOSS ESTIMATES
2013

Compiled by Alfredo Martinez-Espinoza
Extension Plant Pathologist

2013 Georgia Plant Disease Loss Estimates

It is estimated that 2013 plant disease losses, including control costs, amounted to approximately $821.85 million. The value of the crops used in this estimate was approximately $6,551.91 million, resulting in a 12.55% total 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, 2013 Georgia Farm Gate Value Report (AR-14-01). Some estimates for fruits, ornamentals, and turf rely on specialist's knowledge of the industry and industry sources for information.

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2013 PLANT DISEASE CLINICS ANNUAL SUMMARY

Extension Plant Pathology maintains plant disease clinics in Athens and Tifton to aid county extension faculty in diagnosing and correcting disease related plant problems. Additionally, a laboratory for analysis for nematodes is maintained in Athens. The Plant Disease Clinic in Athens, operated by Ansuya Jogi, is located in Room 2405 Miller Plant Science Building. Samples analyzed in this clinic include commercial fruit, ornamentals, turf, Christmas trees and forestry; all homeowner samples; and legume forages, small grains, grain forages, mushroom identification, 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 field crops, pecans, and commercial vegetables. The Extension Nematology Lab, operated by Dr Ganpati Jagdale, is located at 2350 College Station Rd. This clinic processes soil and plant samples for nematode analysis.

In 2013, 883 commercial plant samples were processed for diagnosis in Athens and 590 commercial plant samples were processed for diagnosis in Tifton. For the homeowners, 515 samples were analyzed. A total of 6,751 samples were analyzed for nematodes.

Diagnoses and educational recommendations are returned to the county faculty. All clinic samples are stored in Distance Diagnostics through Digital Imaging (DDDI), a web based database administered and supported by Sherri Clark, IT Associate Director, Consortium for Internet Imaging and Database Systems.

2013 PLANT DISEASE CLINIC SAMPLE SUMMARIES

PLANT SAMPLES DIAGNOSES			
Crop	**Commercial Samples**	**Homeowner Samples**	**Total**
Field Crops	367	2	369
Fruits and Nuts	208	42	250
Ornamentals and Trees	308	186	494
Miscellaneous	6	9	15
Turf	300	206	506
Vegetables	284	70	354
Total	**1,473**	**515**	**1,988**

SAMPLES FOR NEMATODE DIAGNOSES	
Crop	**Samples**
Field Crops	4,395
Fruits and Nuts	47
Miscellaneous	76
Ornamentals	272
Trees	11
Turf	577
Vegetables	1,373
Total	**6,751**

APPLE

Summer rots and fire blight are the major diseases that are consistently associated with economic losses to apple production in Georgia; however, 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. Late freezes increased fire blight, as damaged tissue was infected by the bacterial pathogen. Based on rainfall records, 2013 was one of the wettest years in the last 100. As a result, disease losses and expenditures for controlling diseases were increased substantially. Bitter rot, one of Georgia's primary summer rot diseases, caused extensive losses. 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	232.9	90.0	322.9
Bitter Rot	2.00	232.9	120.0	352.9
Bot Rot	0.01	1.2	52.0	53.2
Black Rot	0.01	1.2	33.0	34.2
Alternaria Leaf Spot	0.01	1.2	0.0	1.2
Powdery Mildew	0.01	1.2	11.5	12.7
Sooty Blotch	0.01	1.2	0.0	1.2
Fly Speck	0.01	1.2	0.0	1.2
Cedar Apple Rust	0.01	1.2	0.0	1.2
Scab	0.01	1.2	0.0	1.2
Other Diseases	0.01	1.2	1.0	2.2
Total	**4.1**	**476.3**	**307.5**	**783.8**
*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 2013, Botrytis fruit rot was observed in many locations; this disease is especially damaging when wet weather occurs during bloom. Resistance to numerous fungicide classes caused an increase in Botrytis levels. Viruses, many of which can't be readily detected, continue to make their way into the state, and these have also caused significant losses. Fungicidal applications generally decreased losses to low levels relative to the total crop. However, cane diseases increased in 2013, with orange cane blotch and cane blight topping the list of diseases observed.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Botrytis	0.30	35.3	1554.7	1590.0
Orange Rust	0.01	1.2	194.3	195.5
Cane and Leaf Rust	0.10	11.8	777.3	789.1
Double Blossom	0.10	11.8	388.7	400.4
Viruses	5.00	588.0	194.3	782.4
Phytophthora Root Rot	0.10	11.8	38.9	50.6
Cane Blight	1.50	176.4	388.7	565.1
Septoria Leaf Spot	0.50	58.8	155.5	214.3
Botryosphaeria	0.20	23.5	194.3	217.9
Total	**7.8**	**918.5**	**3886.7**	**4805.2**
Estimated by Phil Brannen, Extension Plant Pathologist				

BLUEBERRY

Blueberry production in 2013 was impacted dramatically by several diseases. Early-season freezes increased disease losses to mummy berry; however, losses were low to moderate where good fungicide programs were utilized. Excessive rainfall increased fruit rots as well. Phytopthora and other root rots caused substantial mortality, especially in young plantings; this was once more directly related to exceptional rainfall. Necrotic ring blotch, a new viral pathogen, was prevalent in some locations, but it was generally reduced and of minimal impact. Exobasidium leaf and fruit spot continued to increase in importance, causing field losses and issues in the packing line. Bacterial leaf scorch, a newly identified bacterial disease of southern highbush blueberries, was less prevalent. Nematodes in replant sites was less of an issue since educational efforts have resulted in fumigation prior to planting.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Mummy Berry	0.1	328.6	5,591.0	5,919.6
Botrytis Blight	0.0	32.9	2,236.4	2,269.3
Foliar Disease	1.0	3,285.6	1,677.3	4,962.9
Rots	3.0	9,856.9	1,677.3	11,534.2
Bacterial Scorch	0.1	328.6	559.1	887.7
Dieback	0.1	328.6	559.1	887.7
Phytophthora Root Rot	0.5	1,642.8	559.1	2,201.9
Total	**4.8**	**15,804.0**	**11,182.0**	**28,663.3**
Estimate by Phil Brannen, Extension Plant Pathologist				

BUNCH GRAPE

Due to excessive rainfall, bunch grape diseases were very prevalent in 2013, and both powdery and downy mildews were observed where spray programs were not well administered. The downy mildew epidemic was initiated early in the season and resulted in 100% losses in some vineyards; virtually all vineyards lost production to downy mildew and various fruit rots and cane diseases. Botrytis rot also generally increased, and fungicide resistance was a continuing issue for the industry. 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 an insect, 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. Cold temperatures, therefore, allow for production of Vinifera wine grapes, whereas warm winters result in increased disease. Pierce's disease losses were substantially greater in 2013, and new infections from Pierce's disease were also observed, likely due to a warmer winter in 2012/2013. An indirect result of Pierce's disease mortality has been an increase in leaf roll viruses. This disease, caused by a complex of several viruses, was introduced through replanting of vines killed by Pierce's disease. Surveys of wine grape vineyards in 2012/2013 indicated that these viruses have resulted in substantive losses, and leaf roll virus is now a major issue for the Georgia wine grape industry.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Botrytis	0.5	24.2	75.0	99.2
Downy Mildew	5.0	242.4	90.0	332.4
Black Rot	2.0	97.0	70.0	167.0
Powdery Mildew	3.0	145.5	20.0	165.5
Phomopsis Cane Blight	2.0	97.0	35.0	132.0
Crown Gall	0.01	0.5	1.0	1.5
Pierce's Disease	0.10	4.8	10.0	14.8
Leaf Roll Virus	0.10	4.8	5.0	9.8
Total	**12.7**	**616.3**	**306.0**	**922.3**
Estimate by Phil Brannen, Extension Plant Pathologist				

CORN

In 2013, corn for grain was harvested from 477,688 acres in Georgia with an average yield of 185.15 bu/A. The 2013 crop was valued at $510.3 million. Throughout much of the corn-growing season, conditions were cooler and wetter than normal. Southern rust (*Puccinia polysora*) was detected across much of the Coastal Plain by early July. However, the impact of the disease was never fully realized, likely because of suppression by fungicides and cool temperatures. A second virulent race of *P. polysora*, one able to successfully infect even those hybrids with the rpp9 gene for resistance, was confirmed again in 2013. Northern corn leaf blight (*Exserohilum turcicum*) was widespread again in 2013 and losses associated with this disease seemed to be favored by environmental conditions. Losses to aflatoxin were reduced as a result of ample rainfall in 2013. The most important disease in 2013, also as a result of cooler and wetter conditions during the tasselling and silking stages was Diplodia ear rot. This disease severely affected some of the more popular hybrids and losses in some fields likely surpassed 50%.

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. Elevated losses to nematodes are largely the result of 1) a lack of nematode-resistant hybrids and 2) 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	0.1	0.5	0.0	0.5
Nematodes	5.0	25.5	1.4**	26.9
Mycotoxins	0.2	1.0	0.0	1.0
Southern Corn Rust	2.0	10.2	3.6***	13.8
Northern Corn Leaf Blight	2.5	12.8	--***	12.8
Other Leaf Diseases*	trace	0	--***	--
Diplodia Ear Rot	10.0	51.0	0.0	51.0
Total	**19.8**	**101.0**	**5.0**	**106.0**

* "Other leaf diseases" primarily includes southern corn leaf blight (*Bipolaris maydis*) but may include diseases such as gray leaf spot as well.
** It is estimated that approximately 95,377 acres (20% 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 50% of the corn acreage was sprayed with fungicides at least once during the 2013 season at a cost of $5/A for application and $10/A for cost of fungicide.

Estimate by Robert Kemerait, Extension Plant Pathologist

COTTON

Cotton was planted to an estimated 1,393,721 acres in 2013. The average lint yield was 910.6 lb/A. The crop was valued at $1.210 billion. Rainfall was abundant throughout most of the 2013 season and temperatures were generally cooler than normal. Losses to seedling disease, primarily Rhizoctonia seedling blight, or "soreshin," were more severe in 2013 than in 2012 as a result of cooler and wetter conditions. For the same reason, early-season outbreaks of Ascochyta leaf blight and Fusarium wilt were more severe than in the recent past. Despite significant rainfall, target spot, "Corynespora leaf spot," was less important than in 2012, likely as a result of unseasonably cool temperatures. Rainfall during the season resulted in significant losses to boll rot.

Losses to nematodes, primarily 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 use nematicides effectively. Loss of Temik 15G from the growers' arsenal has increased the difficulty of controlling nematodes.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Boll Rot (lint)	2.0	24.2	0.0	24.2
Nematodes	**13.0**	**157.3**	**19.5**[a]	**176.8**
Southern root-knot	10.0	121.0	---	---
Reniform	2.5	30.2	---	---
Columbia lance	0.5	6.0	---	---
Seedling Disease	2.0	24.2	0.7[b]	24.9
Fusarium Wilt	0.1	1.2	---	---
Ascochyta Blight	Trace	---	---	---
Stemphylium leaf spot	1.5	18.1	---	18.1
Target "Corynespora" leaf spot	1.0	12.1	2.5[c]	14.6
Total	**19.6**	**237.1**	**22.7**	**258.6**

[a] This figure is based upon an estimation that approximately 55% of the cotton acreage in the state is treated with AVICTA Complete Pak or AERIS Seed-Applied System, and approximately 5.0% of the acreage was treated with Telone II.
[b] 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 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.
[c] This figure is based upon an estimate that 15% of the cotton acreage in the state was sprayed with a fungicide in 2013 to manage foliar diseases of cotton.

Estimate by Robert Kemerait, Extension Plant Pathologist

MUSCADINE GRAPE

Disease pressure, especially fruit rots, increased dramatically in 2013. This was due to excessive rainfall. Good fungicidal spray programs generally resulted in minimal losses. 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 were unable to spray effectively, diseases were significant.

Disease*	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Bitter Rot	0.6	26.3	60.0	86.3
Macrophoma Rot	0.6	26.3	50.0	76.3
Ripe Rot	0.6	26.3	30.0	56.3
Angular Leaf Spot	0.6	26.3	10.0	36.3
Black Rot	0.6	26.3	0.0	26.3
Phomopsis Dead Arm	0.5	21.9	1.0	22.9
Total	**3.5**	**153.5**	**151.0**	**304.5**
*Controlled with fungicides applied for other diseases.				
Estimate by Phil Brannen, Extension Plant Pathologist				

ORNAMENTALS

The 2013 farm gate value for ornamental horticulture (excluding turf) was estimated at $462.95 million, which is an overall 1% reduction from 2012. Although field and container nursery production saw an increase of $7.43 million in farm gate value compared to 2012, greenhouse (floriculture) production was reduced by $13.41 million from 2012. Ornamental production value is closely tied to the economy and new construction. Farm gate value of ornamental production (greenhouse, nursery, and field nursery) has been reduced by 20% since its peak in 2007. Numerous ornamental production facilities have closed in recent years across the state. The ornamental disease loss estimate is only for ornamental 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 rot diseases still account for the largest percentage of disease loss in commercial ornamental production. Cooler and wetter weather contributed to root rot and downy mildew diseases. Impatiens downy mildew was a major issue in 2012; however, its occurrence was limited in 2013 simply because impatiens were not widely grown. Rose rosette-associated disease continues to increase in landscapes. It has not been detected in production nurseries.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Bacterial diseases (fire blight, leaf spots)	0.3	1.39	0.9	2.29
Fungal leaf spots, stem cankers, needle blights	1.5	6.94	7.5	14.44
Root and crown rots	4.0	18.52	8.8	27.32
Powdery mildew	0.6	2.77	2.2	4.97
Botrytis blight	0.2	0.93	1.2	2.13
Virus (TSWV, INSV, Hosta Virus X, rose rosette)	0.5	2.31	0.3	2.61
Minor diseases (rust, downy mildew, nematode)	2.0	9.26	4.8	14.06
Total (Ornamental production)	**9.1**	**42.12**	**25.7**	**67.82**

Production Category (2010 Farm Gate Value)	% Reduction in Crop Value[1]	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Field Nursery ($70.46 M)	1.5	1.02	1.9	2.92
Container Nursery ($146.74 M)	7.5	11.03	11.8	22.83
Floriculture (Greenhouse) ($245.75 M)	12.2	30.07	12.0	42.07
Total (Ornamental production)	**9.1**	**42.12**	**25.7**	**67.82**

[1] Column is not additive because disease losses are weighted according to production category

Estimate by Jean Williams-Woodward, Extension Plant Pathologist

PEACH

Despite wet conditions, peach production was excellent in 2013. Due to adequate fungicide programs, brown rot and scab diseases were of minimal consequence. In light of the extensive rainfall observed in 2013, this is nothing short of amazing. 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.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Brown Rot	0.1	56.2	2,050.0	2,106.2
Scab	0.01	5.6	1,500.0	1,505.6
Bacterial Spot	0.01	5.6	30.0	35.6
Phony Peach	0.1	56.2	230.0	286.2
Gummosis	0.1	56.2	20.0	76.2
Armillaria Root Rot	1.0	561.7	50.0	611.7
Phomopsis Constriction Canker	0.01	5.6	10.0	15.6
Total	**1.3**	**747.1**	**3,890.0**	**4,637.1**
Estimate by Phil Brannen, Extension Plant Pathologist				

PEANUT

According to 2013 reports, peanut was planted to 428,550 acres. Yields in 2013 averaged 4,624 lb/A for a total production valued at $507.4 million. Severity of tomato spotted wilt increased in 2013 for the first time in several years. Though losses associated with spotted wilt were estimated to be only 2%, this was an increase of eight times from 2012. Environmental conditions throughout much of the 2013 field season, as in 2012, were cooler and wetter than normal for summer on the Coastal Plain of Georgia. Aspergillus crown rot, a common early-season disease for peanut producers in Georgia, was less severe than in the recent past because of rainfall and cool temperatures at planting. White mold (stem rot) outbreaks were not as severe in 2013 as in many years because of cooler temperatures. Early and late leaf spot diseases, though a problem for some growers where peanuts were planted on a short rotation, were generally not a significant problem for most growers, despite an abundance of rainfall. Exceptions occurred where excessive rain kept growers out of the field and delayed fungicide applications. 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. Cooler temperatures and abundant rainfall, however, reduced stress on peanut plants affected by the plant-parasitic nematode, thus reducing potential losses to this pest. Development and spread of Cylindrocladium black rot (CBR) was slight in 2013 despite conditions that could favor the disease. As the popular fungicide tebuconazole continued to be available in generic formulations, growers using the generic formulations were able to realize less expensive fungicide programs. However, growers must realize that other fungicides may provide better value by providing improved disease control.

Disease	% Reduction in Crop Value[a]	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($Millions)
Leaf spots	1.5	7.6	20.9[b]	28.5
White mold	2.0	10.1	10.8[c]	20.9
Limb Rot	0.25	1.3	---[d]	1.3
Pod Rot	Trace	---	---[e]	---
Nematodes	2.5	12.7	4.0[f]	16.7
Cylindrocladium Black Rot	Trace	---	---	---
Seedling Disease	0.1	0.5	---[g]	0.5
Tomato Spotted Wilt	2.0	10.1	---	10.1
Diplodia Collar Rot	Trace	0	---	---
Total	**8.35**	**42.4**	**35.7**	**78.0**

[a] The total value of the crop was $507.4 million according the Georgia Farm Gate Value report.
[b] It was estimated that 55% of peanut acreage in Georgia receives some irrigation and that most of this acreage was sprayed with fungicides seven 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 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 non-irrigated fields, four applications were calculated at $3/A. For Irrigated fields, four applications at $9/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.
[g] The cost of the fungicide seed treatment is absorbed in the cost of the seed.

Estimate by Robert Kemerait, Extension Plant Pathologist

PECAN

According to data from the UGA Weather Station located at Marine Corps Logistics Base in Albany, Georgia, the 2013 growing season (Apr 1 to Aug 31) experienced more rainy days (77) and total precipitation (38.51") than previous years. The rainfall data was similar to 2003, a historically damaging year for pecan scab. Damage resulting from scab in 2013 was less than in 2003, in part to having fewer over-crowded orchards throughout the state and a better understanding and use of the different fungicide classes available. In University of Georgia fungicide trials in Tift County, non-treated controls of the cultivar 'Desirable' had nut scab severity ratings of 95-100% in August. In addition to scab, leaf scorch (mainly anthracnose) was more severe as well. Most occurrences of anthracnose were on the leaves, with fruit infection being less common. This contributes to premature defoliation, as does leaf dieback caused by a *Lasiodiplodia* sp. The latter is a new disease that has been observed for several years. Incidence of this leaf dieback was higher in 2013, but the extent of the damage is unknown. Several of the "minor" diseases would be more significant, but they were controlled by the numerous fungicides applied for scab.

In 2013, pecan acreage was estimated to be 145,769 acres in Georgia with a total farm gate value of $315,570,610. Fungicide use increased as a result of the wet weather, with an estimated average of 12 applications per acre, although some orchards with susceptible cultivars received twice that many.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)[1]	Total ($ Millions)
Scab	15.0	47.3	31.4	78.7
Anthracnose	1.0	3.1	0	3.1
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	16.0	50.4	31.4	81.8

[1] Twelve treatments on 145,769 acres @ $18.00/A; scab fungicide programs are also effective against anthracnose, downy spot, brown spot, and powdery mildew in most cases; number of sprays varied by location.

Estimate by Jason Brock and Tim Brenneman, Extension Plant Pathologists

SOYBEAN

Conditions in the 2013 field season were generally cool and wet, and therefore, favorable for the development and spread of Asian soybean rust, *Phakopsora pachyrhizi*. Because of the threat from Asian soybean rust was significant and because yields were promising, many producers applied fungicides this season. In protecting against Asian soybean rust, growers also protected against other foliar diseases as well. Other diseases of importance included Phomopsis pod and stem blight, the *Diaporthe/Phomopsis* complex, and to some extent, anthracnose. Plant parasitic nematodes (especially the southern root-knot nematode) continued to cause damage to the soybean crop in numerous fields across Georgia. In 2013, soybeans were planted to a reported 226,966 acres with an average yield of 42.2 bu/A. The total soybean production for Georgia in 2013 was valued at $125.4 million.

Disease	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Soybean cyst nematode[1]	Trace	---	--	---
Root-knot nematodes	2.0	2.5	0	2.5
Other nematodes[2]	0.5	0.6	---	0.6
Asian soybean rust	0.5	0.6	3.75	4.35
Anthracnose	0.1	0.1	0	0.1
Brown leaf spot	0.0	0	0	0.0
Charcoal rot	Trace	---	0	---
Diaporthe/Phomopsis complex	0.5	0.6	0	0.6
Downy mildew	0.0	0	0	0.0
Frogeye leaf spot	Trace	---	0	---
Red crown rot	Trace	---	0	---
Pod and stem blight	0.5	0.6	0	0.6
Purple stain	Trace	---	0	---
Seedling diseases *(Rhizoctonia/Pythium/Fusarium)*	0.1	0.2	0.1	0.3
Southern blight	0.2	0.2	0	0.2
Stem canker	0.0	0	0	0
Fusarium Wilt	0.0	0	0	0
Virus diseases	0.0	0	0	0
Bacterial diseases	0.0	0	0	0
Total	**4.4**	**5.4**	**3.85**	**9.25**

[1] Resistant varieties are used to manage most nematode and disease problems; Temik 15G is generally no longer available. It is estimated that fungicides were applied to 150,000 acres once and 50,000 acres twice 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 fungicide application cost growers $15/A.
[2] "Other nematodes" includes reniform, sting, and Columbia lance nematodes.

Estimate by Robert Kemerait, Extension Plant Pathologist

STRAWBERRY

Foliar and fruit disease pressures were moderate to high in 2013, due to excessive rainfall throughout the season. Botrytis (gray mold) was an issue, and resistance to numerous fungicides was reported in multiple locations. Phytophthora, Pythium and Rhizoctonia root rots were often damaging. Two viral diseases, strawberry mild yellow edge and strawberry mottle, were introduced from nurseries; infected plants did not grow well and produced virtually no fruit. This was the first time in recent history that viral diseases caused significant losses in strawberries. Leaf scorch and anthracnose were also observed in some locations. However, overall, it was still a good year for strawberry production.

There is concern that the strobilurin fungicides, which are heavily and virtually exclusively utilized for control of anthracnose, may be developing resistance. There is a strong need for fungicides with different modes of action if strawberry production is to continue in Georgia.

Disease	% Reduction in Crop Value	Damage ($ Thousands)	Cost of Control ($ Thousands)	Total ($ Thousands)
Gray Mold	0.1	9.3	403.0	412.3
Fungal Leaf Spots	0.1	9.3	125.4	134.7
Anthracnose	0.1	9.3	134.3	143.6
Root Rots & Nematodes	2.0	185.7	223.9	409.6
Angular Leaf Spot	0.0	0.9	9.0	9.9
Total	**2.3**	**214.5**	**895.5**	**1,110.0**
Estimated by Phil Brannen, Extension Plant Pathologist				

TURFGRASS

In 2013, it was estimated that there were 1.99 million acres of turf with a maintenance value of $1.86 billion in Georgia. There were 22,506 acres used for sod/stolons production in the state, yielding a farm gate value of $91,030,619. Cold and cool temperatures were common in the first semester of the year. These conditions in combination with extended periods of rain and cloud coverage exerted environmental stresses on warm season grasses, affecting dormancy break and green-up. Most affected grasses with these types of conditions were bermuda and centipede grasses. Therefore in 2013, environmental problems rather than diseases were the norm. *Rhizoctonia solani* infections on warm season grasses were ubiquitous early in the year. *Bipolaris* spp. and *Drechslera* spp were particularly problematic on bermudagrass and annual ryegrass during the spring and fall of 2013. *Sclerotinia homoeocarpa* (dollar spot) was severe and widely prevalent throughout the state in several turfgrass species. A few cases of leaf and sheath blight (LSR or mini-ring) disease caused by *Rhizoctonia zeae* were registered throughout the state on bermudagrass greens. Rust infections caused by *Puccinia* species were ubiquitous and prevalent in zoysiagrass and tall fescue. *Gaeumannomyces* spp. (causal agent of take all root rot/root decline of warm season grasses/bermudagrass decline) continued to be prevalent throughout the state. A few incidences of *Ophiosphaerella* spp. (spring dead spot) affecting *Cynodon* spp. (bermudagrass) were observed in 2013. In general, cool-season grasses had only minor disease incidences and made it through 2013 without major problems. There were 433 turfgrass samples received at the UGA plant disease clinic during 2013, with the large majority of them formed by warm season grasses. Over 400 nematodes analysis were submitted to the UGA nematology laboratory from warm and cool-season swards.

Turf Diseases	% Reduction in Crop Value	Damage ($ Millions)	Cost of Control ($ Millions)	Total ($ Millions)
Soil-borne and Crown Diseases	3.0	55.80	37.20	93.00
Foliar Diseases	1.0	18.60	9.30	27.90
Nematodes	0.2	3.72	1.86	5.58
Total	**4.2**	**78.12**	**48.36**	**126.48**
Estimate by Alfredo Martínez-Espinoza, Extension Plant Pathologist				

VEGETABLES

About 150,000 acres of vegetables, worth a total of ca. $998 million, were grown in Georgia in 2013. The wet conditions during the spring growing season, especially during harvest, exacerbated plant diseases. Phytophthora fruit rot (*Phytophthora capsici)* and anthracnose (*Colletotrichum orbiculare*) caused greater losses than normal in cucurbit crops. Downy mildew (*Peronospora destructor*), which devastated the Vidalia onion crop in 2012, was not an issue in 2013. Disease losses in onions were less in 2013 than in 2012; however, some growers still had losses in stored onions due to black mold (*Aspergillus niger*) in 2013. Fusarium wilt of watermelon continues to increase in incidence in Georgia, and in 2013 it caused some early season losses. The most prevalent disease on tomatoes and peppers again was bacterial spot, caused by *Xanthomonas campestris* pv. *vesicatoria.* New resistant bell pepper varieties are continuing to help reduce losses to bacterial spot.

Major Vegetable Crops	**% Reduction in Crop Value[1]**	**Damage ($ Millions)**	**Cost of Control ($ Millions)**	**Total ($ Millions)**
Watermelon	10.0	14.3	6.5	20.8
Squash (yellow + zucchini)	3.0	1.5	2.0	3.5
Tomato	1.0	0.5	2.9	3.4
Other Vegetable Crops	**% Reduction in Crop Value[1]**	**Damage ($ Millions)**	**Cost of Control ($ Millions)**	**Total ($ Millions)**
Pepper (bell)	1.5	2.1	2.0	4.1
Cucumber	2.0	1.2	2.0	3.2
Snap Bean	1.0	0.2	1.3	1.5
Greens	1.0	0.6	1.3	1.9
Cabbage	1.0	0.8	0.7	1.5
Onion (dry)	1.5	1.4	4.0	5.4
Cantaloupe	2.5	0.6	2.6	3.2
Eggplant	0.5	0.1	0.4	0.5
Total	**2.4[1]**	**22.76**	**27.2**	**49.0**

[1] This column is not additive due to the way losses for vegetables are tabulated.
Total values for vegetable commodities are taken from the 2013 farm gate values (AR-14-01).

Estimate by F. Hunt Sanders, Jr., Disease Management Specialist

WHEAT

The farm gate value of wheat in 2013 in Georgia was $154,589,039. Wheat was harvested from 388,256 acres with an average yield of 61.73 bu/acre. The top five wheat-producing counties (by area) were Early, Dooly, Sumter, Terrell, and Worth, respectively. The exceedingly dry conditions in the fall made land preparation difficult, and low soil moisture hampered seedling emergence. Drier and warmer conditions into late December and January resulted in a modest crop establishment. Moist and cooler temperatures in late January through mid May led to several disease issues. Powdery mildew (*Blumeria graminis* f. sp *tritici*) incidences were high in south Georgia in 2013. Powdery mildew arrived early in the season and stayed late into the spring with highest disease levels observed in Georgia in many years. Normally, mildew infections decrease in April as the temperature warms. The cooler and moister conditions continuing late into the spring, however, produced mildew infections at epidemic proportions. Many fields were treated early with fungicides due to high levels of infection. Stripe rust (*Puccinia striiformis)* incidence was high with almost every wheat-growing county in Georgia reporting stripe rust infections. However, stripe rust severity was low due to earlier fungicide applications for powdery mildew. Leaf rust (*Puccinia triticina*) was observed at low to moderate levels across the state. Fungicides used earlier for powdery mildew and stripe rust also reduced leaf rust infections. Leaf and glume blotch (*Stagonospora nodorum*) were observed at moderate levels across the state, primarily at the end of the season. Helminthosporium spot blotch (*Bipolaris sorokiniana* or *Drechslera sorokiniana*) was also observed at low levels across the southern part of the state as well as tan spot (*Pyrenophora tritici-repentis*). Barley yellow dwarf virus (BYDV) was observed at low to moderate levels across the state. Low to nil incidences of soilborne wheat mosaic virus (SBMV) and wheat spindle streak mosaic virus (SSMV) were observed due to the warm temperatures present in the state.

Wheat Diseases	**% Reduction in Crop Value**	**Damage ($ Millions)**	**Cost of Control ($ Millions)**	**Total ($ Millions)**
Leaf Rust/Stripe Rust	0.5	0.77	0.30	1.07
Glume Blotch	0.1	0.15	0.00	0.15
Powdery Mildew	1.0	1.23	1.23	2.46
Barley Yellow Dwarf Virus	0.0	0.00	0.00	0.00
Soilborne Wheat Mosaic /Spindle Streak Mosaic Virus	0.0	0.00	0.00	0.30
Total	**1.6**	**2.15**	**1.53**	**3.68**
Estimate by Alfredo Martinez-Espinoza, Extension Plant Pathologist				

SUMMARY OF TOTAL LOSSES DUE TO DISEASE DAMAGE AND COST OF CONTROL IN GEORGIA – 2013

Crop or Commodity	Estimated Crop Value ($ Millions)	% Reduction in Crop Value[1]	Value of Damage ($ Millions)	Cost of Control ($ Millions)	Total Disease Loss (Damage & Control) ($ Millions)	Total % of Loss [1, 2]
Apple	11.16	4.1	0.4763	0.3075	0.783	7.0
Blackberry	10.84	7.8	0.918	3.886	4.805	44.3
Blueberry	312.76	4.8	15.804	11.182	28.663	9.1
Bunch Grape	4.23	12.7	0.6163	0.306	0.922	21.8
Corn	510.3	19.8	101.0	5.0	106.0	20.7
Cotton	1,210.0	19.6	237.1	22.7	258.6	21.3
Muscadine Grape	4.23	3.5	0.153	0.151	0.304	7.1
Ornamentals	462.95	9.1	42.12	25.7	67.82	14.6
Peach	55.42	1.3	0.7471	3.890	4.637	8.35
Peanut	507.4	8.35	42.4	35.7	78.0	15.3
Pecan	3,15.57	16.0	50.4	31.4	81.8	25.9
Soybean	125.4	4.4	5.4	3.85	9.25	7.3
Strawberry	9.07	2.3	0.2145	0.8955	1.110	12.2
Turfgrass	1,860.0	4.2	78.12	48.36	126.48	6.8
Vegetable	998.0	2.4	22.76	27.2	49.0	4.9
Wheat	154.58	1.6	2.15	1.53	3.68	2.3
TOTALS	**6,551.91**	**---**	**600.38**	**222.06**	**821.85**	**12.55**

[1] This column is not additive.
[2] Total % loss for each crop and 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 non-target 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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