Southern United States Soybean Disease Loss Estimates for 2014

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Since 1974, soybean disease loss estimates for the southern United States have been published in the annual proceedings of the Southern Soybean Disease Workers (SSDW). Summaries of the results from between 1977 and 2010 have been published in numerous refereed scientific journals (5,7-10,12-19). The most recent disease loss estimates from 2010 to 2014 were published in the SSDW proceeding (1-4,6). In addition, a website through the University of Illinois Extension Service is available and summarizes the yield loss estimates from both the northern and southern U.S. from 1996 through 2013. The website can be accessed at:

http://extension.cropsci.illinois.edu/fieldcrops/diseases/yield_reductions.php

Various methods were used to obtain the disease losses, and most individuals used more than one. The methods employed were: field surveys, plant disease diagnostic clinic samples, variety trials, questionnaires to Cooperative Extension staff, research plots, grower demonstrations, private crop consultant reports, foliar fungicide trials, sentinel plot data, and "pure guess". In the case where individuals have retired (e.g., Arv Grybauskas in MD), another individual was contacted to aid in continuing the disease loss estimates project. The production figures for each state were collected from the USDA/NASS website in mid-January of 2015. Production losses were based on estimates of yield in the absence of disease. The formula used to derive production losses was: potential production without disease loss = actual production ÷ (1-percent loss) (decimal fraction). Rounding errors may occur in the tables provided below, specifically Table 2 and 3, due to the presence of “trace” estimates of disease which were estimated to be approximately 1×10^{-9}. Total losses in the form of percent disease loss by state and total losses in millions of bushels were determined by averaging the loss by state with the inclusion of the trace estimates.

Soybean acreage in the sixteen southern states covered in this report in 2014 increased compared to that reported in 2013 by 5.8% (1). Seven states reported a record yield for the 2014 season. The 2014 average per acre soybean yield was 43.8 bushels per acre, a 10.9% increase in average yield over the 2013 average yield (39 bu/A). In 2014, more than 963 million bushels were harvested from over 20 million acres from 16 southern states accounting for a 19.5% increase in the total harvest from an increase of 5.8% in the total number of acres harvested. The 2014 total acres harvested, average yield in bushels per acre, and total production in each state are presented in Table 1. Percentage loss estimates from each state are specific as to causal organism or the common name of the disease (Table 2). The total average percent disease loss for 2014 was 8.16% which accounted for a 2.8% increase in percent disease loss compared to that reported for 2013 (7.93%). In terms of the disease losses in millions of bushels, the 2014 disease losses accounted for 113.17 million bushels in lost potential production, or a 17.3% increase over the losses incurred during the 2013 production season (93.5 million bushels).

Table 1. Soybean production in 16 southern states in 2014.

State	Acres (1,000's)	Bu/Acre	Yield in Bu (1,000's)
Alabama	475	40	19,000
Arkansas	3,210	50*	160,500
Delaware	183	48*	8,784
Florida	37	43	1,591
Georgia	290	40*	11,600
Kentucky	1,750	48	84,000
Louisiana	1,405	57*	80,085
Maryland	505	46	23,230
Mississippi	2,200	52*	114,400
Missouri	5,600	46.5*	260,400
North Carolina	1,730	40	69,200
Oklahoma	355	29	10,295
South Carolina	440	35	15,400
Tennessee	1,610	46*	74,060
Texas	140	38.5	5,390
Virginia	650	39.5	25,675
TOTAL	**20,580**		**963,610**
		Avg. 43.8	

* Denotes state that set a yield record.

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Table 2. Estimated percentage loss of soybean yield due to diseases from 16 southern states during 2014.

	% yield suppression by state																
Disease	**AL**[a]	**AR**	**DE**	**FL**	**GA**	**KY**	**LA**	**MD**	**MS**	**MO**	**NC**	**OK**	**SC**	**TN**	**TX**	**VA**	**TOTAL**
Anthracnose	0.10	0.40	0.00	0.10	0.25	0.10	0.00	0.00	Tr[b]	0.00	0.20	0.10	0.03	0.05	0.00	0.20	**0.12**
Bacterial diseases	0.00	0.05	0.00	0.10	0.00	0.00	0.25	0.00	0.10	0.00	0.20	0.10	Tr	0.00	0.00	0.01	**0.05**
Brown stem rot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	**0.01**
Cercospora leaf blight	2.00	0.02	0.00	0.00	0.00	0.10	1.50	0.00	1.50	0.00	0.20	0.10	0.50	0.05	0.00	1.00	**0.44**
Charcoal rot	0.10	1.70	0.00	0.00	Tr	3.00	0.75	0.00	0.50	0.00	0.10	2.50	0.25	1.00	0.00	0.00	**0.62**
Diaporthe/Phomopsis complex (seed rot)	0.25	0.05	0.00	0.25	0.00	0.0	0.00	0.00	0.01	0.00	0.50	0.10	0.03	1.00	0.00	0.10	**0.17**
Downy mildew	0.00	0.01	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	**0.01**
Frogeye leaf spot	2.00	0.50	0.05	0.50	Tr	0.10	3.00	0.05	3.75	0.25	0.75	0.05	0.03	2.90	0.10	2.00	**1.00**
Fusarium wilt and root rot	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.10	0.00	0.25	0.00	0.00	Tr	0.01	0.00	0.01	**0.03**
Other diseases[c]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00	1.20	0.00	0.03	0.00	0.10	0.00	**0.33**
Phytophthora root and stem rot	0.00	0.03	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.25	0.60	0.05	0.03	0.00	0.00	0.01	**0.09**
Pod and stem blight	Tr	0.07	0.00	0.00	2.00	0.20	0.00	0.00	Tr	0.50	1.00	0.10	Tr	0.00	0.00	0.30	**0.26**
Purple seed stain	0.25	0.01	0.00	0.00	Tr	0.01	0.25	0.00	Tr	0.00	0.10	0.05	0.03	0.05	0.20	0.10	**0.07**
Reniform nematode	0.25	0.00	0.00	0.00	0.25	0.00	2.00	0.00	2.00	0.00	0.10	0.00	1.00	0.01	0.00	0.00	**0.35**
Root-knot nematode	0.25	2.90	1.00	0.00	4.00	0.00	2.00	1.00	2.25	0.25	0.80	0.25	2.00	0.00	0.00	1.00	**1.11**
Soybean cyst nematode	0.25	0.80	2.00	0.00	0.10	3.00	0.00	1.50	1.00	3.50	2.00	2.00	1.00	2.50	0.00	3.00	**1.42**
Other nematodes[d]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.10	2.50	0.00	0.00	0.00	**0.19**
Rhizoctonia aerial blight	0.25	0.05	0.00	0.25	0.00	0.00	0.25	0.00	1.50	0.00	Tr	0.00	Tr	0.00	0.00	0.01	**0.14**
Sclerotinia stem rot (white mold – *Sclerotinia sclerotiorum*)	Tr	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
Seedling diseases	0.25	0.07	0.03	0.50	0.10	1.00	1.00	0.03	0.50	0.00	0.06	0.20	0.10	1.50	0.10	0.10	**0.35**
Septoria brown spot	Tr	0.02	0.02	0.10	0.00	0.50	0.25	0.02	1.00	0.00	0.15	0.20	0.05	1.25	0.00	0.10	**0.23**
Southern blight	0.05	0.01	0.01	0.50	0.25	0.00	0.25	0.01	0.05	0.00	0.40	0.05	0.03	0.00	0.10	0.00	**0.11**
Soybean rust	0.10	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.10**
Stem canker	0.25	0.01	0.00	0.10	0.00	0.10	0.25	0.00	0.25	0.00	Tr	0.00	Tr	0.10	0.00	0.50	**0.10**
Sudden death syndrome	0.05	2.30	0.00	0.00	0.00	0.10	0.25	0.00	0.10	3.50	0.50	0.20	0.01	1.75	0.00	1.00	**0.61**
Virus diseases[e]	0.50	0.00	0.50	0.50	0.00	0.50	0.00	0.50	1.20	0.00	0.20	0.10	0.03	0.00	0.00	0.00	**0.25**
Total % disease	**6.90**	**9.03**	**3.75**	**4.50**	**6.95**	**9.71**	**14.00**	**3.25**	**17.81**	**8.50**	**9.56**	**6.25**	**7.62**	**12.62**	**0.60**	**9.55**	**8.16**

[a]Rounding errors may exist
[b]Tr = trace (0.000000001)
[c]Other diseases listed included: Phymatotrichopsis root rot (TX), red crown rot (MS, NC), target spot (MS, NC, SC)
[d]Other nematodes listed included: Columbia lance nematode (NC, SC), sting nematode (NC), stubby root nematode (OK)
[e]Virus diseases listed included: *Bean pod mottle virus* (AL, AR, KY, MS, NC), *Soybean mosaic virus* (AL, AR, KY, MS, NC, SC), *Soybean vein necrosis virus* (AL, DE, KY, MS, OK), *Tobacco ringspot virus* (AR, DE, KY)

Table 3. Estimated suppression of soybean yield (Millions of Bushels) as a result of disease during 2014.

	yield suppression by state (millions of bushels)																
Disease	**AL[a]**	**AR**	**DE**	**FL**	**GA**	**KY**	**LA**	**MD**	**MS**	**MO**	**NC**	**OK**	**SC**	**TN**	**TX**	**VA**	**TOTAL**
Anthracnose	0.02	0.71	0.00	0.00	0.03	0.09	0.00	0.00	0.00	0.00	0.15	0.01	0.00	0.42	0.00	0.06	**1.50**
Bacterial diseases	0.00	0.09	0.00	0.00	0.00	0.00	0.23	0.00	0.14	0.00	0.15	0.01	0.00	0.00	0.00	0.00	**0.63**
Brown stem rot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.03**
Cercospora leaf blight	0.41	0.04	0.00	0.00	0.00	0.09	1.40	0.00	2.09	0.00	0.15	0.01	0.08	0.04	0.00	0.28	**4.60**
Charcoal rot	0.02	3.00	0.00	0.00	0.00	2.79	0.70	0.00	0.70	0.00	0.08	0.27	0.04	0.85	0.00	0.00	**8.45**
Diaporthe/Phomopsis complex (seed rot)	0.05	0.09	0.00	0.00	0.00	0.47	0.00	0.00	0.01	0.00	0.38	0.01	0.00	0.85	0.00	0.03	**1.90**
Downy mildew	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
Frogeye leaf spot	0.41	0.88	0.00	0.01	0.00	0.09	2.79	0.01	5.22	0.71	0.57	0.01	0.00	2.46	0.01	0.57	**13.75**
Fusarium wilt and root rot	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.71	0.00	0.00	0.00	0.01	0.00	0.00	**0.81**
Other diseases	0.00	0.00	0.00	0.00	0.00	0.00	1.86	0.00	2.79	0.00	0.92	0.00	0.01	0.00	0.01	0.00	**5.57**
Phytophthora root and stem rot	0.00	0.05	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.71	0.46	0.01	0.00	0.00	0.00	0.00	**1.70**
Pod and stem blight	0.00	0.12	0.00	0.00	0.25	0.19	0.00	0.00	0.00	1.42	0.77	0.01	0.00	0.00	0.00	0.09	**2.84**
Purple seed stain	0.05	0.02	0.00	0.00	0.00	0.01	0.23	0.00	0.00	0.00	0.08	0.01	0.00	0.04	0.01	0.03	**0.48**
Reniform nematode	0.05	0.00	0.00	0.00	0.03	0.00	1.86	0.00	2.78	0.00	0.08	0.00	0.17	0.01	0.00	0.00	**4.98**
Root-knot nematode	0.05	5.12	0.09	0.00	0.50	0.00	1.86	0.24	3.13	0.71	0.61	0.03	0.33	0.00	0.00	0.28	**12.96**
Soybean cyst nematode	0.05	1.41	0.18	0.00	0.01	2.79	0.00	0.36	1.39	9.96	1.53	0.22	0.17	2.12	0.00	0.85	**21.05**
Other nematodes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.01	0.42	0.00	0.00	0.00	**0.81**
Rhizoctonia aerial blight	0.05	0.09	0.00	0.00	0.00	0.00	0.23	0.00	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.47**
Sclerotinia stem rot (white mold – *Sclerotinia sclerotiorum*)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.15**
Seedling diseases	0.05	0.12	0.00	0.01	0.01	0.93	0.93	0.01	0.70	0.00	0.05	0.02	0.02	1.27	0.00	0.03	**4.15**
Septoria brown spot	0.00	0.04	0.00	0.00	0.00	0.47	0.23	0.01	1.39	0.00	0.11	0.02	0.01	1.06	0.00	0.03	**3.37**
Southern blight	0.01	0.02	0.00	0.01	0.03	0.00	0.23	0.00	0.07	0.00	0.31	0.01	0.00	0.00	0.00	0.00	**0.70**
Soybean rust	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.05**
Stem canker	0.05	0.02	0.00	0.00	0.00	0.09	0.23	0.00	0.35	0.00	0.00	0.00	0.00	0.08	0.00	0.14	**0.97**
Sudden death syndrome	0.01	4.06	0.00	0.00	0.00	0.09	0.23	0.00	0.14	9.96	0.38	0.02	0.00	1.48	0.00	0.28	**16.67**
Virus diseases	0.10	0.01	0.05	0.01	0.00	0.47	0.00	0.12	1.67	0.00	0.15	0.01	0.00	0.00	0.00	0.00	**2.58**
Total disease loss	**1.41**	**15.93**	**0.34**	**0.08**	**0.87**	**9.03**	**13.04**	**0.78**	**24.79**	**24.19**	**7.31**	**0.69**	**1.27**	**10.70**	**0.03**	**2.71**	**113.17**

[a]Rounding errors may exist