Special Report

Soybean Disease Loss Estimates for the Southern United States During 1992 and 1993

J. ALLEN WRATHER, Plant Science Unit, University of Missouri-Delta Center, Portageville 63873, and GABRIEL L. SCIUMBATO, Delta Research and Extension Center, Mississippi State University, Stoneville 38776

Soybean disease loss estimates for the southern United States have been published in the Southern Soybean Disease Workers Proceedings since 1974. Compilations of this information have been published elsewhere (2–4).

The loss estimates for 1992 and 1993 published here were solicited by state from: Alabama, Bill Gazaway; Arkansas, Gary Cloud; Delaware, Bob Mulrooney; Florida, Tom Kucharek; Georgia, Guy Padgett; Kentucky, Don Hershman; Louisiana, Ken Whitam; Maryland, James Kantzes; Mississippi, Joe Fox; Missouri, Allen Wrather; North Carolina, Steve Koenning; Oklahoma, Phil Pratt; South Carolina, Charles Drye; Tennessee, Melvin Newman; Texas, Joe Krausz; and Virginia, Pat Phipps.

These individuals used various methods to estimate disease losses, and most individuals used more than one. The methods they used were field surveys, diagnostic clinic, variety trials, questionnaires to extension staff, research plots, grower demonstrations, private crop consultant reports, and foliar fungicide trials.

The actual production figures for each state were supplied by the state's crop reporting service. Production losses were based on estimates of yield in the absence of disease. Dollars lost to disease were calculated by multiplying the estimated loss in metric tons by the average annual price of $211.31/t in 1992 ($5.75/bu) and $238.88/t in 1993 ($6.50/bu).

Percent loss estimates from each state are specific for the causal organism or the common name of the disease. Additional information on each disease can be found in the *Compendium of Soybean Diseases* (5).

During 1992, 15.23 million metric tons (559.79 million bushels) were harvested from 7.02 million hectares (17.35 million acres) in the southern states. Disease losses were estimated at 10.74%, resulting in a production loss of 1.41 million metric tons (52.00 million bushels) valued at $299.00 million ($5.75/bu) (Table 1). The greatest percent loss occurred in Florida (27.50%) and the least in Mississippi (3.16%). The greatest financial loss occurred in Arkansas ($82.11 million), followed by Missouri ($58.94 million) and Louisiana ($32.03 million).

During 1993, 12.7 million metric tons (468.38 million bushels) were harvested from 6.55 million hectares (16.18 million acres) in the southern states. Disease losses were estimated at 9.80%, resulting in a production loss of 1.16 million metric tons (42.39 million bushels) valued at $276.20 million ($6.50/bu) (Table 2). The greatest percent loss occurred in Florida (23.32%) and the least in Virginia (3.9%). The greatest financial loss occurred in Arkansas ($67.95 million), followed by Missouri ($63.70 million) and Mississippi ($26.50 million).

The greatest economic loss over both years was caused by soybean cyst nematode ($177.82 million), followed by charcoal rot ($84.42 million), root and stem rots ($49.87 million), and root-knot and ectoparasitic nematodes ($48.61 million).

It is obvious from these production loss estimates that diseases played a major role in limiting soybean production during 1992 and 1993 in the South. Soybean diseases have been a problem in the South (2–4) and in the North (1) in the past and will continue to be a problem unless research and extension efforts are expanded to provide more effective preventive and therapeutic disease management strategies and systems to producers.

Contribution from the Missouri Agriculture Experiment Station, Journal Series No. 12118.

Accepted for publication 30 September 1994.

LITERATURE CITED

1. Doupnik, B., Jr. 1993. Soybean production and disease loss estimates for North Central United States from 1989 to 1991. Plant Dis. 77:1170-1171.
2. Mulrooney, R. P. 1988. Soybean disease loss estimate for Southern United States in 1985 and 1986. Plant Dis. 72:364-365.
3. Mulrooney, R. P. 1988. Soybean disease loss estimates for Southern United States in 1987. Plant Dis. 72:915.
4. Sciumbato, G. L. 1993. Soybean disease loss estimates for the Southern United States during 1988–1991. Plant Dis. 77:954-956.
5. Sinclair, J. B., and Backman, P. A., eds. 1989. Compendium of Soybean Diseases, 3rd ed. American Phytopathological Society, St. Paul, MN.

Table 1. Estimated percent soybean yields lost to disease in 1992 in 16 southern states

Diseases	Percent loss per state																
	AL	AR	DE	FL	GA	KY	LA	MD	MS	MO	NC	OK	SC	TN	TX	VA	AVG[a]
Seedling diseases	0.2	1.0	TR[b]	2.5	0.25	0.1	TR	...	TR	TR	0.1	0.3	0.2	1.5	0.5	0.2	0.43
Root & lower stem rots	0.2	0.5	TR	10.0	0.25	0.1	0.5	...	TR	TR	0.5	0.3	1.75	0.5	2.0	0.1	1.04
Pod & stem blight	0.5	0.1	TR	1.0	0.5	1.5	2.0	0.5	0.5	...	0.1	1.75	1.0	0.01	3.0	0.1	0.79
Charcoal rot	0.3	0.1	0.5	TR	...	0.2	1.0	...	2.0	1.5	0.1	2.0	0.05	1.0	0.3	...	0.57
Sudden death syndrome	0.2	0.5	...	...	...	0.8	TR	...	0.25	TR	...	...	...	0.5	0.1	...	0.15
Stem canker	0.2	0.4	...	...	...	TR	0.5	...	TR	...	...	...	0.01	0.5	0.1	...	0.11
Anthracnose	1.4	0.5	TR	1.0	0.25	0.3	1.0	TR	TR	...	0.01	2.0	1.5	1.5	4.0	...	0.84
Downy mildew	0.2	1.0	TR	TR	...	TR	TR	...	TR	...	TR	TR	0.1	0.2	...	...	0.09
Cercospora leaf blight and purple seed stain	0.1	0.5	TR	0.5	0.75	TR	2.0	5.0	0.3	...	0.01	1.0	0.5	0.01	1.0	0.1	0.74
Septoria brown spot	0.5	1.0	...	TR	0.5	0.3	TR	TR	TR	...	0.1	0.3	0.2	2.0	0.1	0.2	0.33
Foliar diseases (other)	0.5	1.0	...	...	1.5	...	1.0	...	TR	...	0.02	1.0	0.5	0.1	1.0	...	0.41
Bacterial diseases	0.1	2.0	...	...	...	TR	TR	...	TR	...	...	0.05	0.05	...	TR	...	0.14
Virus diseases	0.1	1.0	TR	...	1.0	0.1	1.0	...	0.01	0.2	0.6	TR	0.5	...	0.1	0.1	0.29
Soybean cyst nematodes	1.5	3.0	3.0	1.0	2.5	2.6	2.0	4.0	0.05	4.0	7.0	0.7	3.0	2.5	0.1	3.0	2.50
Root-knot nematodes and ecto-parasitic types	1.0	1.0	1.0	11.5	3.5	...	2.0	1.0	0.05	TR	1.7	TR	7.0	0.1	0.5	0.4	1.92
Other diseases[c]	1.5	...	...	...	...	...	3.0	...	...	1.0	...	...	...	0.1	0.1	0.8	0.41
Total percent loss[a]	8.5	13.6	4.5	27.5	11.0	6.0	16.0	10.5	3.16	6.7	10.24	9.4	16.36	10.52	12.9	5.0	10.74
Yield (m ton/ha)	1.81	2.22	2.15	2.15	1.81	2.49	1.95	2.49	2.15	2.42	1.81	1.48	1.48	2.22	2.08	2.08	2.05
Total hectares ($\times 10^6$)[a]	0.11	1.30	0.09	0.02	0.26	0.47	0.49	0.22	0.71	1.72	0.57	0.09	0.24	0.38	0.15	0.21	7.03
Yield loss (m ton $\times 10^5$)[a,d]	0.17	3.89	0.08	0.12	0.52	0.69	1.52	0.58	0.48	2.79	1.06	0.14	0.59	0.89	0.41	0.22	14.15
Dollar loss ($\times 10^6$)[a,e]	3.57	82.11	1.78	2.53	10.93	14.66	32.03	12.19	10.18	58.94	22.37	2.88	12.42	18.98	8.74	4.60	299.00

[a] Rounding errors present.
[b] TR = trace.
[c] Other diseases include Rhizoctonia foliar blight (LA), Fusarium root rot (MO), frogeye leaf spot (AR & TN), and red crown rot (VA).
[d] The yield loss is based on the percent loss of what yield would have been had no disease occurred.
[e] Dollar loss = estimated yield loss × $211.31/m ton.

Table 2. Estimated percent soybean yields lost to disease in 1993 in 16 southern states

Diseases	Percent loss per state																
	AL	AR	DE	FL	GA	KY	LA	MD	MS	MO	NC	OK	SC	TN	TX	VA	AVG[a]
Seedling diseases	0.2	0.2	TR[b]	2.0	0.25	0.2	TR	...	0.31	0.5	0.1	0.3	0.1	1.0	0.4	0.2	0.36
Root & lower stem rots	0.1	3.0	TR	10.0	0.25	0.1	1.0	...	1.43	1.0	0.8	0.3	1.0	0.5	0.7	0.2	1.27
Pod & stem blight	0.5	TR	0.5	0.01	0.25	1.5	2.0	0.5	1.02	...	0.05	1.0	1.0	0.01	1.0	0.1	0.59
Charcoal rot	0.2	3.0	0.2	1.0	...	0.1	2.0	...	3.47	2.0	0.2	2.0	0.07	1.5	0.7	TR	1.03
Sudden death syndrome	0.3	0.1	...	...	...	0.05	TR	...	TR	TR	...	...	...	0.5	0.1	...	0.07
Stem canker	0.2	0.1	...	...	0.5	TR	0.5	...	TR	0.5	...	...	0.01	0.01	0.1	...	0.12
Anthracnose	1.5	TR	TR	0.01	0.25	0.5	0.5	0.1	0.78	0.5	...	1.5	1.5	1.5	4.0	...	0.79
Downy mildew	0.1	0.2	TR	0.1	...	TR	TR	...	TR	...	0.01	TR	0.1	0.01	TR	...	0.52
Cercospora leaf blight and purple seed strain	0.1	0.1	...	0.1	0.75	0.4	1.0	0.1	0.6	...	0.01	0.75	0.5	0.01	1.0	0.1	0.35
Septoria brown spot	0.6	0.1	TR	0.1	0.5	0.5	TR	0.1	0.06	TR	0.03	TR	0.15	1.5	0.1	TR	0.23
Foliar diseases (other)	2.0	0.1	...	...	0.75	...	3.0	...	0.36	...	0.01	0.5	0.5	0.01	0.3	...	0.47
Bacterial diseases	0.1	0.3	...	...	...	TR	TR	...	TR	...	...	0.05	0.05	...	TR	...	0.03
Virus diseases	0.2	0.4	TR	...	0.5	TR	TR	...	TR	...	0.6	TR	1.0	...	0.1	TR	0.18
Soybean cyst nematodes	1.5	2.0	4.0	1.0	2.5	2.0	2.0	6.0	0.87	3.0	6.5	0.5	3.0	2.5	0.1	2.5	2.50
Root-knot nematodes and ecto-parasitic types	1.0	0.3	1.0	9.0	3.5	...	2.0	1.0	0.04	0.5	1.8	TR	7.0	0.1	0.5	0.5	1.77
Other diseases[c]	...	...	...	...	...	...	...	...	...	...	...	...	...	0.01	0.1	0.3	0.03
Total percent loss[a]	8.6	9.9	5.7	23.32	10.0	5.35	14.0	7.8	8.94	8.0	10.11	6.9	15.98	9.16	9.2	3.9	9.80
Yield (m ton/ha)	1.55	2.22	1.81	2.08	1.08	2.55	1.45	2.02	1.61	2.35	1.61	1.68	1.08	1.95	1.34	1.34	1.73
Total hectares ($\times 10^6$)[a]	0.12	1.29	0.09	0.02	0.20	0.47	0.48	0.23	0.77	1.42	0.49	0.09	0.21	0.40	0.08	0.19	6.55
Yield loss (m ton $\times 10^5$)[a,d]	0.17	2.84	0.09	0.10	0.22	0.64	1.00	0.37	1.11	2.67	0.93	0.11	0.36	0.76	0.09	0.10	11.60
Dollar loss ($\times 10^6$)[a,e]	3.97	67.95	2.15	2.41	5.20	15.34	24.05	8.78	26.50	63.70	22.23	2.54	8.65	18.01	2.27	2.43	276.20

[a] Rounding errors present.
[b] TR = trace.
[c] Other diseases include red crown rot (VA), seed deterioration (TN), and miscellaneous diseases (TX).
[d] The yield loss is based on the percent loss of what yield would have been had no disease occurred.
[e] Dollar loss = estimated yield loss × $238.88/m ton.