3-2011

Proceedings of the 38th Annual Meeting, Southern Soybean Disease Workers (March 9-10, 2011, Pensacola Beach, Florida)

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Proceedings of the Southern Soybean Disease Workers

38th Annual Meeting

March 9-10, 2011 Pensacola Beach, Florida

PROCEEDINGS OF THE SOUTHERN SOYBEAN DISEASE WORKERS

38TH ANNUAL MEETING

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Proceedings of the Southern Soybean Disease Workers are published annually by the Southern Soybean Disease Workers.

38th Annual Meeting of the Southern Soybean Disease Workers
March 9-10, 2011
Pensacola Beach, Florida

	<u>**Wednesday, 9 March 2011**</u>
8:00-12:00	**NECRA212 state reports and business meeting**
8:00-10:00	**State reports (WI, SD, OH, NE, ND, MO, MN, MI, KS)** -10 minutes for each state
10:00-10:10	***Break***
10:10-11:00	**State reports continued (IN, IL, IA, AL, MS)**
11:00	**Business meeting**
12:00	**Adjourn**

1:00-5:40	**Southern Soybean Disease Workers meeting**
1:00-1:15	**Introductions** Boyd Padgett
1:15-3:00	**Frogeye Leaf Spot (*Cercorosa sojina*) symposium** Boyd Padgett, moderator
1:15-1:40	**Development of Baseline *Cercospora sojina* Sensitivity Levels to Quinone Outside Inhibitor Fungicides and Monitoring for Resistance** G. R. Zhang, and C. A. Bradley
1:40-2:05	**Soybean Pathogen Found to be Resistant to Fungicides** M. A. Newman, and C. A. Bradley
2:05-2:30	**Strobilurin-resistant *Cercospora sojina* in Kentucky: Field History** D. Hershman
2:30-3:00	**Discussion:** -research needs -mode-of-action rotation -fungicide suggestions in areas with resistance
3:00-3:20	***Break***

3:20-4:40	**Graduate Student Paper Competition** Tom Allen, Moderator
3:20-3:40	**Mycoparasitism of *Phakopsora pachyrhizi* by *Simplicillium lanosoniveum* and Its Effects on Soybean Rust: A Microscopy Study** N. A. Ward**,** K. Maruthachalam, K. V. Subbarao, M. Brown, Y. Xiao, C. L. Robertson, C. G. Giles, and R. W. Schneider
3:40-4:00	**Relationship Between Stink Bugs and Phomopsis Seed Decay in Mississippi Soybean Production** J. L. Jones, A. Catchot, and F. Musser
4:00-4:20	**Survey of Multiple Seed Isolates of *Cercospora kikuchii* from Louisiana, Arkansas, and Missouri for Resistance to Thiophanate-methyl, Azoxystrobin, and Pyraclostrobin *in vitro*** P. P. Price, M. A. Purvis, G. B. Padgett, and R. W. Schneider
4:20-4:40	**Assessing the Validity of Diagnostic Quantitative PCR Assays for *Phakopsora pachyrhizi* and *P. meibomiae*** T. A. Rush, R. W. Schneider, M. C. Aime, and G. L. Hartman
4:40-5:40	**Break and SSDW Business Meeting**
6:15-7:15	**Social (Poolside weather permitting)**
7:15	**Dinner (Poolside weather permitting)**

<u>Thursday, 10 March 2010</u>

8:00-8:30	**Registration**
8:10-11:50	**Southern Soybean Disease Workers Paper Session** Jason Bond/Tom Allen, moderator
8:10-8:30	**Review of the 2010 Sudden Death Syndrome Outbreak in Iowa** L. Leandro

8:30-8:50	**Managing Frogeye Leaf Spot in Illinois** C. Vick, A. Vick, B. Hoene, M. Butera, H. Sabo, A. Ward, and J. P. Bond
8:50-9:10	**The Fusarium Root Rot Complex on Soybean in Minnesota** D. Malvick
9:10-9:30	**The Influence of Fungicide Seed Treatments on Plant Establishment and Grain Quality and Yield.** G. B. Padgett, M. Purvis, and P. Price, III.
9:30-9:50	**Yield Loss Relationships for Several Soybean Diseases and Development of a Cost:Benefit Calculator** R. W. Schneider, G. B. Padgett, K. M. Guidry, and P. K. Bollich
9:50-10:10	***Break***
10:10-10:40	**NCSRP Update** D. Wright
10:40-11:00	**Monitoring for Soybean Rust at Guantanamo Bay** E. J. Sikora
11:00-11:20	**Fungicide Efficacy Against the 2010 Aerial Blight Epidemic in Louisiana** C. A. Hollier
11:20-11:40	**Foliar Fungicides Impact on Arkansas' Endemic Soybean Diseases** C. M. Coker, and A. M. Greer
11:40-12:00	**USB Funding update** R. Joost
12:00-1:15	***Lunch Break (on your own)***
1:15-1:35	***Pythium* spp., *Phytophthora sojae*, *Macrophomina*, and SCN; Just a Few Challenges While Waiting for Soybean Rust in Ohio** A. Dorrance, M. Ellis, and K. Gearhart
1:35-1:55	**Fluxapyroxad - New Fungicide for Soybean Disease Control** G. Fellows, and N. Fassler

1:55-2:25	**Industry updates**
2:25-2:45	**Maturity Group IV Soybean Seed Quality: Mississippi Perspectives from 2009 and 2010** T. W. Allen, C. H. Koger, A. Catchot, D. Cook, J. Gore, N. Buehring, H. R. Smith, and F. Musser
2:45-3:10	**S05-11482- a high yielding soybean with resistance to multiple diseases and nematode species** J.G. Shannon, J.A. Wrather, M.A. Woolard, S.L. Smothers, S.M. Pathan, H.T. Nguyen, and R.T. Robbins
3:10-4:10	**Business Meeting** Treasury Report

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SOUTHERN SOYBEAN DISEASE WORKERS
FY 2010 TREASURY REPORT

Operational Account #42958 Union Bank, Monticello, AR

Receipt Summary - 2010	
Interest on Operational Account	$ 0.00
2009 Meeting Registration Receipts	$ 2,950.00
2009 Industry Support	$ 7,950.00
Total Receipts	**$ 10,900.00**

Disbursement Summary - 2010	
Printing Fees	$ 0.00
Postage	$ 98.28
2010 Annual Meeting Costs	$ 8,582.17
SSDW Association Awards	$ 1,000.00
Bank Account Fees	$ 0.00
Total Disbursements	**$ 9,680.45**

SSDW Assets – December 31, 2010	
Beginning Balance – 1/01/10	**$ 3,601.02**
Receipts	**$ 10,900.00**
Disbursements	**$ 9,680.45**
Net Assets – 12/31/10	**$ 4,820.57**
Balance of Operational Account	**$ 4,820.57**

Clifford M. Coker Cliff M. Coker
12/31/10
SSDW – Treasurer

Southern United States Soybean Disease Loss Estimate for 2010

Compiled by S. R. Koenning Extension Specialist, Department of Plant Pathology, Campus Box 7616, North Carolina State University, Raleigh, NC 27695-7616

Since 1974, soybean disease loss estimates for the Southern United States have been published in the Southern Soybean Disease Workers Proceedings. Summaries of the results from 1977 (6), 1985 and 1986 (2), 1987 (3), 1988 to 1991 (5), 1992 to 1993 (8), 1994 to 1996 (4) have been published. A summary of the results from 1974 to 1994 for the Southern United States was published (7) in 1995, and soybean losses from disease for the top ten producing countries of 1994 was published in 1997(9). An estimate of soybean losses to disease in the US from 1996-1998 was published in 2001, and a summary of losses from 1999-2002 was published online in 2003 (10, 11). In 2005, a summary of disease losses for the US from 1996-2004 was published electronically (12) in 2006 a summary of 2003 to 2005 was published in the Journal of Nematology (13), a 2009 summary of losses from 1996-2007 (14), and a 2010 summary focusing on soybean rust was published on line in Plant Health Progress (1).

The loss estimates for 2010 published here were solicited from: Edward Sikora in Alabama, Clifford Coker in Arkansas, Robert Mulrooney in Delaware, Jim Marois in Florida, Bob Kemerait in Georgia, Don Hershman in Kentucky, Boyd Padgett in Louisiana, Arvydas Grybauskas in Maryland, Tom Allen in Mississippi, Allen Wrather in Missouri, Steve Koenning in North Carolina, John Damicone in Oklahoma, John Mueller in South Carolina, Melvin Newman in Tennessee, Tom Isakeit in Texas, and Patrick Phipps in Virginia. Various methods were used to obtain the disease losses, and most individuals used more than one. The methods used were: field surveys, plant disease diagnostic clinic samples, variety trials, and questionnaires to Cooperative Extension staff, research plots, grower demonstrations, private crop consultant reports, foliar fungicide trials, and "pure guess". The production figures for each state were taken from the USDA/NASS website in mid January of 2011. Production losses were based on estimates of yield in the absence of disease. The formula was: potential production without disease loss = actual production ÷ (1-percent loss) (decimal fraction).

Soybean acreage in the sixteen southern states covered in this report in 2010 was over 1,000,000 acres less than in 2009 (1). The 2010 average per acre soybean yield decreased from that reported in 2009 due in large part to late season drought. In 2010, 649 million bushels were harvested from over 18 million acres in 16 Southern states. The overall average (weighted for acreage) for the 16 reporting states was 35.0 bushels/acre in 2010 while the overall average reported in 2009 was 40.0 bushels/acre (Table 1). The 2010 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 2010 was 7.51` % or 55.97 million bushels in potential production. In 2010, Tennessee reported the greatest percent loss at 17.10 %, followed by Mississippi at 14.25 %.

The estimated reduction of soybean yields is specific as to the causal organism or the common name of the disease (Table 3). The total reduction in soybean yield due to diseases in the 16 southern states was 55.97 million bushels in 2010. The highest average estimated percent loss was caused by soybean cyst nematode at 1.73%. Diseases continued to cause significant loss in soybean production throughout the 16 southern states that participated in this disease loss estimate in 2010. It is essential that Extension and University research continue their efforts to discover methods to control these diseases and to educate soybean producers concerning the best methods to prevent yield loss due to soybean diseases.

Table1. Soybean production for 16 Southern states in 2010.

State	Harvested acres	Yield/A (bu)	Total production (bu)
Alabama	345,000	26	8,970,000
Arkansas	3,150,000	35	110,250,000
Delaware	173,000	32	5,536,000
Florida	23,000	30	690,000
Georgia	260,000	26	6760,000
Kentucky	1,390,000	34	47,260,000
Louisiana	1,020,000	41	41,820,000
Maryland	465,000	34	15,810,000
Mississippi	1,980,000	39	76,230,000
Missouri	5,070,000	42	210,405,000
North Carolina	1,550,000	26	40,300,000
Oklahoma	475,000	25	11,875,000
South Carolina	455,000	23	10,465,000
Tennessee	1,410,000	31	43,710,000
Texas	185,000	30	5,550,000
Virginia	540,000	26	14,040,000
Total	18,491,000	31 bu/a; Wt. avg 35 bu/a	649,671,000

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14. Wrather, J. A., and S. R. Koenning. 2006. Estimates of disease effects on soybean yields in the United States 2003-2005. Journal of Nematology 38:173-180.

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Table 2. Estimated percentage loss of soybean yield due to diseases for 16 southern states during 2010.

Disease	AL	AR	DE	FL	GA	KY	LA	MD	MS	MO	NC	OK	SC	TN	TX	VA	Avg.
Anthracnose	0.50	0.30	tr	0.00	0.50	0.10	0.50	0.00	1.00	0.07	0.01	0.20	0.15	2.00	0.00	0.30	0.38
Bacterial diseases	0.00	0.00	0.00	0.25	0	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.01	0.03
Brown leaf spot	0.00	0.00	tr	0.00	tr	0.20	0.00	0.01	1.00	0.00	0.10	0.30	0.15	2.00	0.00	0.10	0.28
Brown stem rot	2.00	0.00	0.00	0.00	tr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	tr	0.00	0.20	0.16
Charcoal rot	0.50	4.50	1.00	0.50	tr	3.00	1.00	0.10	4.00	0.30	0.20	1.20	0.05	3.00	0.10	0.01	1.30
Diaporthe/Phomopsis	0.00	0.00	0.50	0.50	1.00	0.10	0.50	0.00	tr	0.30	0.04	0.50	0.25	2.00	0.00	0.40	0.41
Downy mildew	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	tr	0.15	0.00	0.00	0.00	0.01
Frogeye	0.00	0.07	0.00	2.00	tr	0.00	0.10	0.00	1.00	0.20	0.01	0.10	0.30	3.00	0.00	0.01	0.45
Fusarium wilt and 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	tr	0.00	0.00	0.01	0.00
Other diseases b	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.20	0.00	0.10	0.00	0.10	0.50	0.14
Phytophthora rot	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	1.80	0.10	tr	tr	0.00	0.00	0.01	0.14
Pod & stem blight	tr	0.05	0.10	0.50	3.00	0.05	0.50	0.01	tr	0.02	0.10	0.50	0.25	0.10	0.00	0.20	0.38
Purple seed stain	1.00	0.10	0.00	0.00	tr	0.00	0.50	0.05	tr	0.02	0.10	0.10	0.20	1.00	0.10	0.10	0.23
Soybean cyst nematode	tr	1.80	2.00	1.50	tr	1.00	0.00	1.00	tr	2.20	4.75	2.00	1.25	2.00	0.00	3.00	1.73
Root-knot nematode	1.50	1.80	1.00	2.00	3.50	0.00	1.00	0.50	1.00	0.05	0.80	0.20	3.00	0.00	0.00	1.00	1.08
Other nematodes c	0.25	0.00	0.00	0.00	1.50	0.00	1.00	0.00	1.00	0.00	0.50	tr	3.00	0.00	0.00	0.50	0.52
Rhizoctonia aerial blight	2.00	0.22	0.00	0.00	0.00	0.00	0.50	0.00	3.00	0.00	0.00	0.00	tr	0.00	0.00	0.00	0.38
Sclerotinia	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	0.00	0.00
Seedling diseases	0.50	0.01	0.00	1.00	0.25	0.01	0.00	0.00	1.00	0.50	0.20	0.50	0.10	1.00	0.00	0.80	0.37
Southern blight	0.25	0.01	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.20	tr	0.25	0.00	0.00	0.10	0.12
Soybean rust	tr	0.00	0.00	0.00	tr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stem Canker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	tr	0.00	0.00	tr	0.00	0.00	0.00	0.01	0.00
Sudden death syndrome	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	tr	0.05	0.00	0.00	0.00	1.00	0.00	0.10	0.08
Virus d	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	tr	0.00	0.20	tr	0.30	0.00	0.00	0.10	0.04
Total disease %	8.50	8.90	4.60	8.25	10.75	4.49	5.60	1.68	14.25	5.51	7.51	5.70	9.60	17.10	0.30	7.46	7.51

a Rounding errors present. Tr indicates Trace.

b Other diseases listed w ere: red crow n rot (Cylindrocladium)in NC, GA, SC, VA; Cercospora blight MS,VA;Neocomospora in AR;Phymatotrichopsis inTX.

c Other nematodes listed w ere: Stubby root and Sting in VA; Sting in NC and OK; Columbia lance in NC, SC, and Georgia;
and Reniform in AL,AR,GA,NC, SC, and TX.

d Viruses identified: Vein Necrosis MS;TSWV AL; SMV AL, AR, GA, MS, NC,SC; BPMV AR,DE,MS,NC,OK, and VA; TobRSV in AR; and PMV in VA.

Table 3. Estimated suppression of soybean yield (bushels in millions) as a result of disease for 16 southern states during 2010.

Disease	AL	AR	DE	FL	GA	KY	LA	MD	MS	MO	NC	OK	SC	TN	TX	VA	tot/Dis
Anthracnose	0.05	0.36	0.00	0.00	0.04	0.05	0.22	0.00	0.89	0.16	0.00	0.03	0.02	1.05	0.00	0.05	2.91
Bacterial diseases	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	0.00	0.00	0.00	0.03
Brown leaf spot	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.89	0.00	0.04	0.04	0.02	1.05	0.00	0.02	2.16
Brown stem rot	0.20	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	0.23
Charcoal rot	0.05	4.50	0.06	0.00	0.00	1.48	0.44	0.02	3.56	0.67	0.09	0.15	0.01	1.58	0.01	0.00	12.61
Diaporthe/Phomopsis	0.00	0.00	0.03	0.00	0.08	0.05	0.22	0.00	0.00	0.67	0.02	0.06	0.03	1.05	0.00	0.06	2.27
Downy mildew	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
Frogeye	0.00	0.07	0.00	0.02	0.00	0.00	0.04	0.00	0.89	0.45	0.00	0.01	0.03	1.58	0.00	0.00	3.09
Fusarium wilt and 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	0.00	0.00
Other diseases b	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.09	0.00	0.01	0.00	0.01	0.08	1.31
Phytophthora rot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.01	0.04	0.00	0.00	0.00	0.00	0.00	4.06
Pod & stem blight	0.00	0.05	0.01	0.00	0.23	0.02	0.22	0.00	0.00	0.04	0.04	0.06	0.03	0.05	0.00	0.03	0.79
Purple seed stain	0.10	0.10	0.00	0.00	0.00	0.00	0.22	0.01	0.00	0.04	0.04	0.01	0.02	0.53	0.01	0.02	1.10
Soybean cyst nematode	0.00	1.80	0.12	0.01	0.00	0.49	0.00	0.16	0.00	4.90	2.07	0.25	0.13	1.05	0.00	0.46	11.44
Root-knot nematode	0.15	1.80	0.06	0.02	0.27	0.00	0.44	0.08	0.89	0.11	0.35	0.03	0.30	0.00	0.00	0.15	4.64
Other nematodes c	0.02	0.00	0.00	0.00	0.11	0.00	0.44	0.00	0.89	0.00	0.22	0.00	0.30	0.00	0.00	0.08	2.07
Rhizoctonia aerial blight	0.20	0.22	0.00	0.00	0.00	0.00	0.22	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.31
Sclerotinia	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	0.00	0.00
Seedling diseases	0.05	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.89	1.11	0.09	0.06	0.01	0.53	0.00	0.12	2.90
Southern blight	0.02	0.01	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.03	0.00	0.00	0.02	0.24
Soybean rust	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	0.00	0.00
Stem Canker	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	0.00	0.00
Sudden death syndrome	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.53	0.00	0.02	0.66
Virus d	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.03	0.00	0.00	0.02	0.14
Total disease loss	0.83	8.96	0.27	0.06	0.81	2.22	2.48	0.27	12.67	12.27	3.27	0.72	0.97	9.02	0.02	1.13	55.97

a Rounding errors present.

POSTER

Soybean Varieties and Breeding Lines Shown With Resistance to Reniform Nematode in Greenhouse Tests, 1998-2010

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During the period 1998 - 2010 a total of 2,222 soybean varieties and lines were tested for reproduction of the reniform nematode *Rotylenchulus reniformis.* The majority of them were Private varieties from the Arkansas Soybean Variety Testing Program. After initially testing all entries in 1998 only new entries were tested in following years (1999-2010). From 2001 – 2010 a total of 480 Public breeding soybean lines and varieties were tested. These were submitted from the soybean breeding programs of Arkansas (Chen), Clemson (Shipe), Missouri (Shannon), North Carolina (Koenning), the USDA in Jackson TN (Arelli), and Virginia Tech (Rainey). Initially both soil nematodes and root eggs were counted. Starting in 2004 only the soil nematodes were counted. The tests were conducted in the greenhouse in 4 inch clay pots each holding 500 ml of a pasteurized loamy fine sand and inoculated with between 1,500 and 2,000 vermiform reniform nematodes, the same number each year, and replicated five times (5 pots), each with a single plant. Each pot was planted with a single seedling transplanted soon after emerging from the vermiculite germination media and inoculated immediately after with the nematodes. Five checks were used: Resistant varieties Forrest, Hartwig, Anand, Susceptible Braxton, and inoculated fallow. The mean number of vermiform nematodes (and/eggs) extracted from the soil (and/roots) of each treatment was calculated, as were the reproductive indices (RI = Pf (final population)/Pi (initial population), and the PF/PI of Hartwig, Anand, and Forrest. Test cultivars with RI's significantly greater than the RI of the best resistant variety were considered suitable (susceptible) hosts for *R. reniformis*.

Of the 2,222 lines a total of 62 Varieties were considered resistant and could be of value in a cotton/soybean rotation program. An additional 15 breeding lines submitted to the Variety testing program were also considered resistant and of use to a reniform resistance breeding program. Of the 480 lines submitted by public soybean breeders 92 were considered resistant and of value to a reniform resistance breeding program. A total of six soybean varieties showing reniform resistance were also submitted. A list of all resistant soybean varieties and breeding lines are given on an accompanying poster. For a compilation of these resistant varieties and lines and/or for references to the literature containing all lines tested, contact the senior author at: rrobbin@uark.edu.

Development of Baseline *Cercospora sojina* Sensitivity Levels to Quinone Outside Inhibitor Fungicides and Monitoring for Resistance

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Frogeye leaf spot (FLS), caused by *Cercospora sojina*, can cause yield reductions of soybean grown in the Southern and North Central United States. One of the primary ways of managing FLS is through the use of foliar fungicides in the quinone outside inhibitor (QoI, also referred to as strobilurin) class. Because QoI fungicides have a high risk of fungal pathogens developing resistance to them, research was initiated to establish baseline sensitivities of *C. sojina* to QoI fungicides and to establish a program to monitor for QoI fungicide resistant strains of *C. sojina*.

A historical collection of *C. sojina* isolates (courtesy of Dr. Dan Phillips, University of Georgia) was used to develop QoI baseline sensitivity levels. This collection consisted of isolates collected prior to QoI fungicide use in the U.S. To determine the baseline sensitivities, conidia of the *C. sojina* isolates were placed onto media amended with different levels of azoxystrobin, pyraclostrobin, or trifloxystrobin along with non-amended controls, and conidial germination was determined. The effective concentration of fungicide at which 50% of conidial germination was inhibited relative to the no-fungicide control (EC_{50}) was determined for each isolate – fungicide combination. The EC_{50} ranges and means were 0.0029 to 0.0323 µg/ml with a mean of 0.0127 µg/ml for azoxystrobin; 0.00014 to 0.00076 µg.ml and mean of 0.00027 µg/ml for pyraclostrobin; and 0.00018 to 0.00311 µg/ml and mean of 0.00012 µg/ml for trifloxystrobin.

In 2010, *C. sojina* isolates were collected from soybean fields treated with QoI fungicides from Illinois and several other states. *C. sojina* isolates collected in 2010 from two locations in Illinois, one location in Kentucky, and two locations in Tennessee were found to have EC_{50} levels that were over 200-fold higher than the mean EC_{50} levels of the baseline *C. sojina* isolates. These results indicated that these isolates had reduced sensitivity to QoI fungicides in comparison to the baseline isolates.

A greenhouse trial was conducted with the QoI reduced-sensitive *C. sojina* isolates collected in 2010 to confirm that they were resistant to QoI fungicides applied at normal use rates, and to determine if fungicides with other modes of action could control these isolates. In the greenhouse trial, FLS caused by the QoI reduced-sensitive isolate could not be controlled with QoI fungicides, while FLS caused by a baseline isolate could be controlled with QoI fungicides. Triazole fungicides were able to control FLS caused by both the QoI reduced-sensitive and the sensitive isolate. These results indicate that isolates resistant to QoI fungicides are present in Illinois, Kentucky, and Tennessee, and that FLS caused by QoI-resistant isolates can be controlled with triazole fungicides.

Soybean Pathogen Found to be Resistant to Fungicides

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Frogeye Leaf Spot (FLS) caused by the fungus *Cercospora sojina* has shown resistance to strobilurin fungicides in a commercial soybean field in Lauderdale County, Tennessee during the growing season of 2010. . Strobilurin fungicides belong to a group of fungicides known as the quinone outside inhibitors (QoI), which is the most widely-used group of foliar fungicides applied to field crops. In petri dish tests conducted by Plant Pathologists at the University of Illinois, spores from isolates of *C. sojina* were found to germinate in the presence of high concentrations of azoxystrobin, pyraclostrobin, and trifloxystrobin, which are active ingredients found in fungicide products known as Headline (BASF Corporation), Quadris (Syngenta Crop Protection), and Gem (Bayer CropScience), respectively. Many times these one-active ingredient products are mixed with a different chemistry class known as demethylation inhibitors (DMI), sometimes referred to as triazoles.

The Lauderdale County producer was disappointed in the control of FLS this season after two applications of a strobilurin fungicide he began to suspect fungicide resistance. He reported no problem in the last 3 or 4 years from using strobilurin fungicides. FLS leaf samples obtained from this field were sent to Dr. Carl Bradley for resistance testing and were found to be resistant to strobilurin fungicides. Currently, this is the only known report of strobilurin-resistant *C. sojina* in Tennessee. Lately, some other states have also reported FLS resistance to strobilurin fungicides. Research is ongoing in Dr. Bradley's lab at the University of Illinois, in which *C. sojina* isolates from Illinois and other states are being evaluated for fungicide resistance. Strobilurin fungicides have been deemed high risk for pathogens developing resistance to them. This high risk status has been determined by the Fungicide Resistance Action Committee (FRAC), an international committee that evaluates fungicide likelihood of developing resistance.

FLS has been the number one soybean foliar disease in Tennessee, causing an average annual yield loss of 3.4% state-wide for the last five years. Lack of crop rotation and planting of susceptible varieties have been responsible for much of the increase in yield loss. An increase in the number of reported races of *C. sojina* may also play a role in the heavy yield loss. Dr. Newman continues a soybean variety testing program for disease susceptibility and resistance to FLS and other diseases at the Research and Education Center at Milan, TN. This testing is supported by The Tennessee Soybean Promotion Board. Results for several years can be found at this web site: (www.utcrops.com). Strobilurin resistance to other common foliar diseases such as Septoria Brown Spot and Anthracnose has not been noticed in any commercial fields. To limit the spread and development of strobilurin fungicide-resistant FLS, growers are urged to manage this disease thru the use of resistant soybean varieties, crop rotation and use of effective triazole or triazole-strobilurin fungicide products for controlling FLS in susceptible varieties when appropriate.

Mycoparasitism of *Phakopsora pachyrhizi* by *Simplicillium lanosoniveum* and Its Effects on Soybean Rust: A Microscopy Study

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Simplicillium lanosoniveum has been documented to colonize sori of soybean rust (SBR) caused by *Phakopsora pachyrhizi*. Previous work also demonstrated that urediniospores from these sori (pustules) failed to germinate. Furthermore, we documented significant reductions in disease severity following field inoculations with *S. lanosoniveum*. To examine the mode of action by which *S. lanosoniveum* antagonized urediniospores, we used scanning (SEM) and transmission (TEM) electron microscopy, as well as confocal microscopy to investigate the various stages of this interaction. These observations provided evidence of degradation of organelles within urediniospores within 24 hours of exposure to *S. lanosoniveum*. Appresorium-like bodies were observed over germ pores, and within two days hyphae penetrated urediniospores through these germ pores. The mycoparasite colonized the inside of urediniospores, and extensive hyphal branching was observed in 90% of urediniospores. By the third day, hyphae exited urediniospores and produced numerous conidia. These studies provide confirmation of a mycoparasitic interaction between *S. lanosoniveum* and *P. pachyrhizi*. Evidence of these interactions will be provided. This mycoparasitic relationship can be exploited as a component of an IMP program or as a biological control agent in organic soybean production.

Relationship Between Stink Bugs and Phomopsis Seed Decay in Mississippi Soybean Production

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In recent years, seed quality has grown to be the biggest issue associated with Mississippi soybean production. In 2009, Mississippi soybean producers lost approximately 30 percent of the value of the crop to seed quality damage, specifically Phomopsis seed decay. Fungi including *Phomopsis* spp. are major contributors to quality issues; however, other biotic and abiotic factors reduce seed quality.

The stink bug is a major pest of soybean throughout the world. Collectively, the green stink bug, *Acrosternum hilare* (Say), the southern green stink bug, *Nezara viridula* (L.) and the brown stink bug, *Euschistus servus* (Say), make up the majority of the stink bug complex in the southern United States. Stink bugs damage soybean by penetrating the pod hulls with their piercing-sucking mouth parts and extracting nutrients from the maturing seeds. The extent of this damage can be measured in terms of both yield loss and quality reduction. However, depriving the seeds of vital nutrients is not the only risk to soybean from stink bugs. Pod hulls that are damaged leave the seeds exposed to pathogenic organisms that can further reduce yield and quality.

The Diaporthe-Phomopsis disease complex is comprised of several fungal species that cause yield and quality loss in soybean, with the primary fungal pathogen being *Phomopsis longicolla*. In 1994, *P. longicolla* was attributed with causing soybean losses in excess of over 180,000 metric tons. On average, Phomopsis seed decay causes more quality losses in soybean than any other fungus.

Year in and year out, stink bugs and Phomopsis seed decay are at the top of the list with respect to both yield and quality losses in Mississippi soybean production. The objective of this research project is to determine the relationship between stink bugs and *Phomopsis longicolla* in soybean. To address this main objective, an initial laboratory experiment was conducted to determine if stink bugs are capable of carrying *P. longicolla.* In 2011, a greenhouse experiment will be performed to determine if stink bugs are capable of transmitting *P. longicolla* to soybean. If this is proven, the greenhouse study will also highlight the difference in the damage to soybean by stink bug in the presence and absence of *P. longicolla.* A field experiment was conducted in 2010 and will be replicated in 2011 using field cages artificially infested with stink bugs over *P. longicolla* inoculated soybean plants to measure the extent of the damage from prolonged feeding and exposure to *P. longicolla*. In addition to the aforementioned studies, a survey of producer soybean fields throughout Mississippi will be conducted to attempt to quantify the association between stink bug injury and *P. longicolla* infection.

Survey of Multiple Seed Isolates of *Cercospora kikuchii* from Louisiana, Arkansas, and Missouri for Resistance to Thiophanate-methyl, Azoxystrobin, and Pyraclostrobin *in vitro*

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Resistance of *Cercospora kikuchii* to thiophanate-methyl has been documented in Japan since the late 1980s, and resistance of several *Cercospora* spp. to strobilurin fungicides has been confirmed in the United States. Therefore, to determine if resistance to selected fungicides exists in *C. kikuchii*, preliminary evaluations were conducted on selected populations.

One hundred seed isolates of *C. kikuchii* from locations in Louisiana (LA), Arkansas (AR-ARK and AR-CRO), and Missouri (MO) were cultured on PDA amended with commercial formulations of thiophanate-methyl, azoxystrobin, and pyraclostrobin at selected concentrations ranging from 0 to 1600µg/ml. Non-amended cultures served as controls for individual isolates. Colony diameter was recorded 10 days after inoculation, averaged 21.0mm, and did not differ significantly among locations.

When cultured on thiophanate-methyl, highly sensitive isolates showed no measurable growth at 1.56µg/ml, while highly resistant isolates grew 1600µg/ml. The frequencies of resistant isolates were 34.8, 24.0, 33.3, and 28.0% for LA, AR(ARK), AR(CRO), and MO, respectively, and were not significantly different among locations. When compared to growth on non-amended PDA, relative differences in colony diameter of resistant isolates ranged from -2.8 to 6.1mm and -4.7 to 4.5mm when subjected to thiophanate-methyl at 1.56 and 1600µg/ml, respectively.

When subjected to 1.56 and 1600µg/ml of azoxystrobin, 100% and 87 to 100% of isolates had measurable growth, respectively, across locations. At 1.56 and 1600µg/ml, considerable variability was observed in isolate sensitivity to azoxystrobin across locations, with relative differences in colony diameter ranging from -14.2 to 4.7mm and -19.7 to -0.25mm, respectively.

Isolates were subjected to 0, 1.56, 6.25, 25, 100, 400, 800, and 1600µg/ml of pyraclostrobin. Similar to that observed for azoxystrobin, 95.7 to 100% of isolates subjected to 1.56µg/ml of pyraclostrobin had measurable growth across locations with considerable variability in isolate sensitivities. Relative differences in colony diameter ranged from -19.7 to 3.0mm. However, at 1600µg/ml of pyraclostrobin, 4.4, 8.0, 36.0, and 44.4% of isolates had measurable growth for LA, AR(ARK), MO and ARK(CRO), respectively.

Results from this preliminary survey indicate that *C. kikuchii* populations highly resistant to thiophanate-methyl exist in the United States. Additionally, isolate sensitivities to strobilurin fungicides appear to be highly variable and may differ among active ingredients and locations.

Assessing the Validity of Diagnostic Quantitative PCR Assays for *Phakopsora pachyrhizi* and *P. meibomiae*

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There are 123 confirmed species in the genus *Phakopsora* worldwide, with 19 species reported in the continental United States. In 2002, a quantitative PCR (qPCR) diagnostic assay was developed by Frederick *et al*. that has been used for detecting *Phakopsora pachyrhizi* in spore trapping studies. Based upon these assays, spores of *P. pachyrhizi* were reported in Ohio and other states where soybean rust was never found. These reports may be based upon false positives. False positives are problematic because they may lead to unnecessary fungicide applications when there is no risk of disease development. In 2009 a new qPCR diagnostic assay was developed by Barnes *et al*. to eliminate false positive results. Both qPCR assays were tested against other rust pathogens; however, neither of these assays was tested against closely related *Phakopsora* spp. (other than *P. meibomiae*) that are known to occur in the continental United States. The species that we will test include *P. arthuriana* (collected from Puerto Rico), *P. crotonis* (collected from Florida), *P. meibomiae* (collected from Costa Rica, Puerto Rico, and Panama), *P. nishidana* (collected from Puerto Rico), *P. pachyrhizi* (collected from USA and Zimbabwe), *P. tecta* (collected from South Africa), and an unknown *Phakopsora* species (collected from Ecuador). All of these species, except for *P. arthuriana,* which was reported in Latin America and Puerto Rico, are found primarily in the southern United States, with the exception of *P. crotonis,* which also was reported in Indiana and Illinois. *Phakopsora crotonis* and *P. tecta* are closely related to *P. pachyrhizi* and *P. meibomiae* as determined by molecular phylogenetic analysis. We will assess the two diagnostic assays against these *Phakopsora* spp.

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Managing Frogeye Leaf Spot in Illinois

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Cercospora sojina Hara, the causal agent of frogeye leaf spot (FLS) is becoming a persistent threat to soybean production in the north central region of the United States. Over the past 10 years, the incidence and severity of the disease has increased. The disease can be managed effectively with the use of resistant varieties; however, very few varieties have resistance (Rcs_3 gene) for all known races of the pathogen. In Illinois, frogeye leaf spot can be sporadic, but is often a major yield robber when present. The objectives of this study were to compare the impact of frogeye leaf spot and the efficacy of fungicides in regular season and double crop soybeans.

Regular season trials were planted in 2009 and 2010 in Tamms, IL near the southern tip of the state. The double crop trials were planted in Belleville and Tamms. Regular season trials were planted in mid May and double crop planting dates were the first week of June. Treatments consisted of strobilurin, triazole and strobilurin/triazole mixes applied at the R3 soybean growth stage or at R3 and R5 growth stages. The soybean varieties were planted in 4 row plots. The treatments were arranged in a randomized complete block design and were replicated 5 times. Inoculation was used only during in the regular season trial in 2009. *C. sojina* was grown on soybean, lima bean medium for 10 days to produce spores. At the soybean growth stage V6, spores and water were applied to all plots using a CO_2 backpack sprayer at a rate of 88 ml per row or ~33,000 spores per plant. In all trials, the plants were rated at time of fungicide application and at 7, 14, 21, and 28 days after the application. Disease severity of FLS was moderate to severe in the regular season trials. All fungicides reduced FLS severity, however the level of control and the amount of yield protection varied (4 to 14 bushels per acre). In the double crop soybean trials, the severity of FLS was generally light to moderate. There were differences between the fungicides in controlling FLS and protecting yield in 1 of the 4 double crop trials.

The Influence of Fungicide Seed Treatments on Plant Establishment, Grain Quality, and Yield

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The use of seed treatments to manage insect and disease pests is increasing. Soybean fungicide seed treatments may provide added protection against seedling disease pathogens; however, this may not always result in a positive economic return. Therefore, to ascertain if fungicide seed treatments benefit Louisiana soybean, replicated small-plot field tests were initiated in 2007 at the Macon Ridge and Dean Lee Research Stations. Selected commercial and experimental seed-applied fungicides were evaluated. In addition to fungicide treatments, the effect of planting date and enhanced disease pressure on plant populations and yield was evaluated in some tests. Three planting dates (late March, Mid-April, early May) and Apron Maxx were evaluated in tests conducted at the MRRS in 2009 and 2010. In other tests, to increase the risk of seedling disease either *Pythium spp.* or *Rhizoctonia solani* was added in the seed furrow at planting. Plant populations varied among planting dates (2.7 to 5.4 plants/ft), but not within dates in 2009. Apron Maxx did not provide any benefit for protecting seedlings or yield. Similar results were observed for yield in 2010, but plant populations (5.0 to 6.0 plants/ft) did not vary dramatically among dates. In tests with enhanced disease pressure, plant populations and yields in soybean treated with commercial and experimental seed-applied fungicides were higher than non-treated soybean. However, in tests with natural disease pressure, no differences were observed among treatments. Based on results from these tests, fungicide seed treatments may be effective, but may not always be economical.

Yield Loss Relationships for Several Soybean Diseases and Development of a Cost: Benefit Calculator

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Several soybean diseases affect yield to different extents in the Gulf South, including Cercospora leaf blight, frogeye leaf spot, Rhizoctonia aerial blight, anthracnose, and pod and stem blight. All of these diseases can be managed to some extent with fungicides, but growers have been reluctant to spray because they have had no basis to determine whether or not there would be a return on investment. The objective of this research was to develop a quantitative means for predicting yield loss based on disease severities at specified plant growth stages. These yield loss estimates would then serve as the basis for cost-benefit analyses for spraying fungicides. This field project was conducted over 6 years at three locations in Louisiana. Thirty five varieties in three maturity groups were selected based on their differential responses to these diseases. Eight replicate field plots of each of these varieties were planted at each location, and then four of these replicates were sprayed with combinations of azoxystrobin, propiconazole plus trifloxystrobin, and thiophanate-methyl. Disease assessments were made periodically, and percent yield loss estimates were derived by comparing sprayed to nonsprayed controls within each variety. Yield loss response curves were constructed for each disease, and multicomponent equations were derived that returned percent yield loss following entries of specific disease severities at specified growth stages.

An Excel-based routine (calculator) was developed that allows the user to enter severities of specific diseases at known growth stages. The user also enters the current price of soybeans and the cost of selected fungicide applications, including the cost of fuel and other variables. The routine then calculates projected yield loss based upon the equations described above and calculates an estimated return on investment. While yield loss is a function of disease progression for the remainder of the season (area under the disease progress curve), our yield loss models are probably very conservative because field experiments were conducted over a protracted time period at three locations that included conducive and suppressive conditions for disease development, and we used a large number of varieties with varying yield potentials. Nevertheless, the routine also includes a sensitivity component in which the user can use his or her experience to modulate the projected return on investment. For example, if the weather forecast for the remainder of the season is not favorable for disease development, the user can select a smaller yield reduction attributable to the disease, and the return on investment would reflect this circumstance. A beta version of the calculator will be demonstrated.

Phakopsora pachyrhizi detected in a soybean sentinel plot in Guantanamo Bay, Cuba; 2011

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Soybean rust was detected in a soybean sentinel plot at the U.S. Naval Base at Guantanamo Bay, Cuba, on 14 February, 2011. *Phakopsora pachyrhizi* was confirmed on multiple leaflets using the Envirologix QuickStix test.

The plot was established at the W.T. Sampson High School on 10 November, 2010, in cooperation with the Environmental Division of the NAVFAC-GTMO. Soybeans were hand-planted in large rubber pots and maintained at the school by students and teachers as part of an educational outreach program.

The sentinel plot declined rapidly in early February, 2011, probably due to a heavy infestation of spider mites. On 14 February I found upon visiting the sentinel site that all the soybeans were either dead or dying with no green leaves left on the plants. Approximately 150 dead/brown leaflets were collected from the ground as well as a few that were still attached to plants. These were examined using a dissecting scope obtained from the high school. Fifteen of the 150 leaflets examined had erumpent uredinia present on the underside of leaves, and urediniospores were visible on three of the 15 leaflets. A positive reaction was obtained for *P. pachyrhizi* on four-of-four leaflets checked using the Envirologix QuickStix test. The soybean sentinel plot was destroyed after confirmation *of P. pachyrhizi*.

Phakopsora pachyrhizi was first reported in Cuba by scientists associated with the Ministry of Agriculture of Cuba after a severe outbreak occurred on soybeans in the Matanzas Province (East of Havana) in April of 2009. In that case the disease developed at the R3 growth stage and led to the complete defoliation of two 50 ha soybean fields.

The Guantanamo Bay area is a semi-arid dessert which receives approximately 24 inches of rainfall annually, but with ¼ of this falling during October. Near constant sea or land breezes help keep the bay cooler than most semi-arid deserts. However, the mountains that surround the bay to the west, north, and east shelter it from cloud systems, thus producing less precipitation and maintaining the land's aridity.

Pythium spp., *Phytophthora sojae*, *Macrophomina*, and SCN; just a few challenges while waiting for soybean rust in Ohio

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In Ohio, soybean replanting is a major economic input for 20 to 30% of the soybean acres in any given year. Much of the production region covers soils with clay content greater than 20%, high pH, and high organic matter and thus saturated soil conditions occur frequently throughout the season. Through statewide and regionally focused surveys we have identified several key pathogens that are contributing to this stand loss as well as root rot throughout the season. Cultural practices, seed treatments, and host resistance can all contribute to the management of these soil-borne pathogens.

Fungicide Efficacy Against the 2010 Aerial Blight Epidemic in Louisiana

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Aerial blight, caused by *Rhizoctonia solani* Kuhn, was epidemic on soybeans in areas of southern Louisiana where rainfall was abundant during the late vegetative and early reproductive growth stages during the 2010 season. Soybeans planted on April 15th south of Crowley, LA received 16.2 inches of rainfall from May 15th through July 11th with measurable precipitation on 28 of the 58 days. Rainfall amounts ranged from 0.01 to 2.57 inches during that period. Rainfall, combined with high relative humidity and soil temperatures ranging from mid-70s to low 90s F, maintained lengthy dew periods conducive to the development of Rhizoctonia infection within the canopy.

Single, double and quadruple applications of soybean fungicides were applied to Pioneer 94Y90 soybeans planted at 16” and 32” row spacings. Fungicides were selected and applied according to commercial fungicide company protocols except for the quadruple application which was for yield loss comparisons. Fungicides were applied at R2, R3, R5, R2+R5, R3+R5, and R1+R3+R5+R6, depending on fungicide or combination of fungicides used.

All fungicide treatments yielded higher than the untreated check for both the 16” and 32” row spacing. For the 16” row spacing differences ranged from 4.02 to 32.37 bushels per acre regardless of treatment. Single applications made with BAS 703 02F, Headline, Quadris, Quilt Xcel, and Topguard ranged from 4.02 to 26.02 bushels per acre above the untreated control depending on application stage. Double applications resulted in a range of 10.37 to 29.77 bushels per acre above the untreated control depending on application timing or product. The quadruple application treatment was a combination of Quadris, Headline, and Echo at label rates applied four times to eliminate disease as much as possible for a direct loss comparison to the untreated check. This multi-application treatment resulted in a yield of 46.1 bushels per acre, 32.37 bushels above the untreated check. Results for the 32” plots were similar.

Foliar Fungicides Impact on Arkansas' Endemic Soybean Diseases

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Conditions that favor high yields in soybean are also conditions that favor foliar diseases in soybean. Soybean diseases reduced yields in Arkansas by 8.9 % in 2010. The reliability and effectiveness of present foliar disease control measures, implementing recently labeled foliar fungicides targeting Soybean Rust (SR), needs refinement or is unknown. Many questions remain about effectiveness of "rust" fungicides (triazoles) on the endemic disease spectrum present before the introduction of soybean rust into the United States. Which fungicides are most economical for Arkansas conditions? When should SR fungicides or other fungicides be applied to realize the most "bang for the buck"? Soybean seed quality has become an increasing issue in Arkansas due to the increased expense of soybean seed and application timing will affect seed quality. Will the data support or repress some manufacturer's claims that product X "may improve the yield and/or quality of the crop even under limited disease pressure due to plant performance characteristics" and that "these additional benefits are due to positive effects on plant physiology"?

The plots relied upon natural infestation with the diseases endemic to the area. The rainfall events until the last half of July and early August along with the high relative humidity within the canopy and natural inoculum levels allowed Anthracnose, Pod & Stem Blight, Frogeye Leaf Spot and Cercospora Leaf Blight development. Dry weather from mid-August until harvest slowed disease development. Natural infestation levels of diseases were monitored weekly from early flower (R1) to maturity (R8) for incidence and severity. All test treatments at R3 or R3+R5 provided significant Frogeye Leaf Spot and Anthracnose disease control advantages over the untreated checks even though disease incidence and or disease severity remained well above threshold levels through R5. Data collected to determine the effect of various rates, timing of various fungicides to foliar diseases indicated that the triazoles fungicides (Topguard, Echo, Alto, Proline, and Folicur) sprayed at R3 or R3+R5 provided significant yield protection from FLS and Anthracnose of 5 to11 bushels per acre. The triazole/strobilurin mixed fungicides (Quadris or Headline, Quadris Xtra, Domark and Stratego) performed surprisingly below the level of the triazoles and significant yield increases were not supported in the data.

Findings from this project had a noteworthy positive economic effect on production cost by protecting yields by 5 to 11 bushels. Even in a year when disease development was slowed after R4 by dry weather, the data continues to support the IPM approach: fungicide use in presence of disease during favorable disease development conditions is recommended and can significantly protect yields; but their effectiveness varies with environment and disease intensity. Automatic fungicide sprays based only upon crop growth stage and should be avoided when diseases are not present or conditions are not favorable for disease development.

Fluxapyroxad: New Fungicide for Soybean Disease Control

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Fluxapyroxad is a new broad-spectrum fungicide under development by BASF. Fluxapyroxad inhibits respiration of fungi by blocking production of succinate dehydrogenase (SDH) and will be classified in FRAC group 7. It has both excellent preventative and curative activity through the inhibition of fungi at several stages of the fungal lifecycle including spore germination, germ tube growth, appresoria formation, and mycelial growth. Research has demonstrated fluxapyroxad is highly active on several major plant pathogens from the ascomycete, basidiomycete, deuteromycete, and zygomycete classes of fungi and is effective for use on a wide variety of crops, including cereals, corn, soybean, fruiting vegetables, tuberous and corm vegetables, pome fruits, and stone fruits with excellent crop safety. The expected use rate ranges from 50 – 200 g ai/ha. The compound has a favorable toxicological and ecotoxicological profile. The active ingredient trade name for fluxapyroxad is Xemium Fungicide. EPA registration is expected in 2012.

Fluxapyroxad will be sold in premix with pyraclostrobin to combine the strengths of two fungicides into one single dual action fungicide. Priaxor fungicide will be registered for use in corn, soybean, and other row crops including wheat and consists of a 2:1 ratio of pyraclostrobin:fluxapyroxad. Field results demonstrate good control of key soybean diseases including frogeye leaf spot, septoria brown spot, and aerial web blight. Yield results from field research trials also show a positive yield increase over the untreated treatments.

Maturity Group IV Soybean Seed Quality: Mississippi Perspectives from 2009 and 2010

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Numerous factors can lead to a reduction in soybean seed quality. Over the past two seasons, research in Mississippi has been conducted to determine strategies that may reduce the risk of losses attributed with seed quality in Maturity Group IV soybean. Research has mainly focused on the foliar application of a fungicide, insecticide, or combination of the two at various reproductive growth stages. However, additional research projects have been conducted to determine the differences between irrigation timings, delayed harvest, herbicide application, dessicant application, seeding rates, as well as inherent differences between soybean varieties. Soybean seed was harvested and submitted to Midsouth Grain Inspection Services to be graded according to quality characteristics: foreign matter (FM), mold, stink bug damage, damaged kernel total (DKT), test weight (TW), and high temperature damage (HT). Deductions are assessed at the grain elevator and in years with excessive damage can be extreme. Variables, including FM, HT, and DKT can impact the overall marketability of soybean at the elevator by influencing the final selling price.

Environmental conditions during the 2009 growing season lead to severe quality losses that could be attributed to mold, stink bug, and additional environmental factors influencing the seed. Foliar applications of azoxystrobin (4 oz/Acre of Quadris) and befenthrin (5.2 oz/Acre of Brigade) were made at 3 locations in Mississippi. Each location sustained a different environment during the season resulting in a mild (Stoneville, MS), moderate (Raymond, MS), and severe (Starkville, MS) level of seed quality losses. Return-on-investments were calculated following application and while some applications did improve return on investment there were still severe losses of seed quality. Application timings included R3, R5, and R3 + R5 combinations. In addition, secondary trials were conducted whereby azoxystrobin applications were made at numerous timings (R1, R3, R5, R6) as well as final concentrations (0, 4, 6, 8, 12, 16 oz/A) at the same three study locations. At the location with moderate levels of seed mold, treatment timings and number of applications significantly reduced mold levels ($R^2 = 0.4587$; $p = 0.0252$) as well as final fungicide concentrations ranging from 0 to 16 oz of azoxystrobin ($R^2 = 0.507$; $p < 0.0001$) in harvested, graded seed samples. Additionally, the number of insecticide applications significantly reduced the overall graded quality, percent mold ($R^2 = 0.620$; $p = 0.003$).

Conditions during 2010 were optimal for soybean seed quality and few losses were suffered. Therefore it was difficult to assess treatments and their overall effect on seed quality.

S05-11482- a high yielding soybean with resistance to multiple diseases and nematode species

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The University of Missouri-Delta Research Center, Portageville, MO has developed and released S05-11482, a late IV-early V (relative maturity 4.9-5.0) high yielding conventional soybean from a cross of S99-2281 x S00-9985-03. S05-11482 has shown high yield potential in tests on various soil types across years and different locations of the southeastern states. It has yielded 112% (64.3 Bu/A) of yields of ‘Asgrow AG4903’ (57.3 Bu/A), a widely grown Roundup Ready cultivar of similar maturity, across 20 tests in southeast Missouri, 2007-2010 (see table below). It has also yielded higher than the standard check 5601T of similar maturity across 16 tests in the USDA Uniform Preliminary Group V and Uniform Group V tests-southern states in 2008 and 2009, respectively. Plants are determinate, medium tall in height with white flowers, tawny pubescence and tan pods. Seed are shiny, yellow with black hila averaging 40% protein and 22.7% oil (dry weight basis) with a 100-seed weight of 12g. S05-11482 shows resistance to soybean mosaic virus and has the Rcs3 gene for broad resistance to frogeye leaf spot races. It is moderately resistant to sudden death syndrome (SDS), reniform nematode, southern root knot nematode, and soybean cyst nematode races 1, 2, 3, 5 and 14. Resistance of S05-11482 to phytophthora root rot (PRR) is unknown but it has performed well on clay soils where PRR is known to be present. It is moderately susceptible to stem canker. It is also a chloride excluder and tolerant to soil salinity. Performance of S05-11482 across soil types in 20 southeast Missouri tests is shown below:

Overall yield means (bu/A) by soil type from southeast Missouri 2007-2010

Variety	Loam	Clay	Sand	Combined
S06-11482	63.3	63.0	66.7	64.3
Checks*	61.8	57.6	47.6	57.3
# Locations	8	8	4	20

*2007-09 Check AG 4903, 2010 Check P95Y01