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Soybean Rust Incidence and the Response of Soybeans to Fungicides in 2008

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2008 Growing Season

Rainfall measurements at the Tidewater AREC in May, June, July, August and October was 0.39, 2.77, 0.29, 3.53 and 2.67 in. below normal, respectively, and September was 1.54 in. above normal. Rainfall during the period totaled 19.63 in., which was 8.11 in. below normal. Average minimum air temperatures were normal (±1°F) in July, August and October, 2°F above normal in September, 3°F above normal in June, and 2°F below normal in May. Maximum air temperatures averaged near normal in May, August, September and October, 2°F above normal in July, and 8°F above normal in June according to records from a NOAA station at the Tidewater AREC in Suffolk. The first killing frost in the Tidewater area was on 31 October when night-time temperatures ranged in the mid 20's to 30 ºF. Most fields planted to soybeans in 2008 showed good emergence after planting, except in areas of drought stress.

Soybean Rust (SBR) in 2008

The initial findings of the SBR fungus were on living leaves of kudzu in areas along the Gulf Coast of the U.S. (Fig. 1A). Temperatures in these areas were generally above freezing which allowed kudzu to maintain foliage on which the fungus could survive throughout the winter and sporulate in the spring before soybean planting. The spread of SBR northward from coastal areas was slower than in 2006 or 2007 as a result of below normal rainfall and high temperatures throughout the mid-south and Gulf Coast Region. By July 9, the first reports of the disease on soybeans were in Florida and Georgia. Occurrences through September 15 continued to be limited mostly to the Gulf Coast Region, except for an outbreak in the Mississippi Valley area of eastern Arkansas and western Mississippi. Disease incidence at this time was limited to Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi and Texas (Fig. 1B). Disease detection in the Mid-Atlantic Region included South Carolina on 19 September, North Carolina and Virginia on October 1, and Delaware on 23 October. Sampling in Virginia until the first killing frost on 30 October detected SBR in following ten counties: Chesapeake, Isle of Wight, Mecklenburg, Southampton, Suffolk, Surry, Sussex, Virginia Beach, Accomack, and Northampton. (Fig. 2).

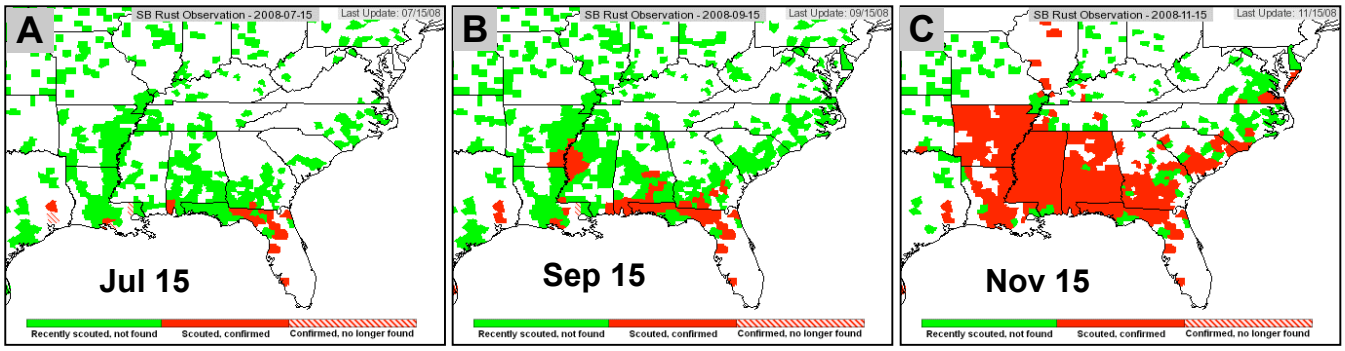

Figure 1. Counties with soybean rust on 15 July, 15 September, and 15 November 2008.

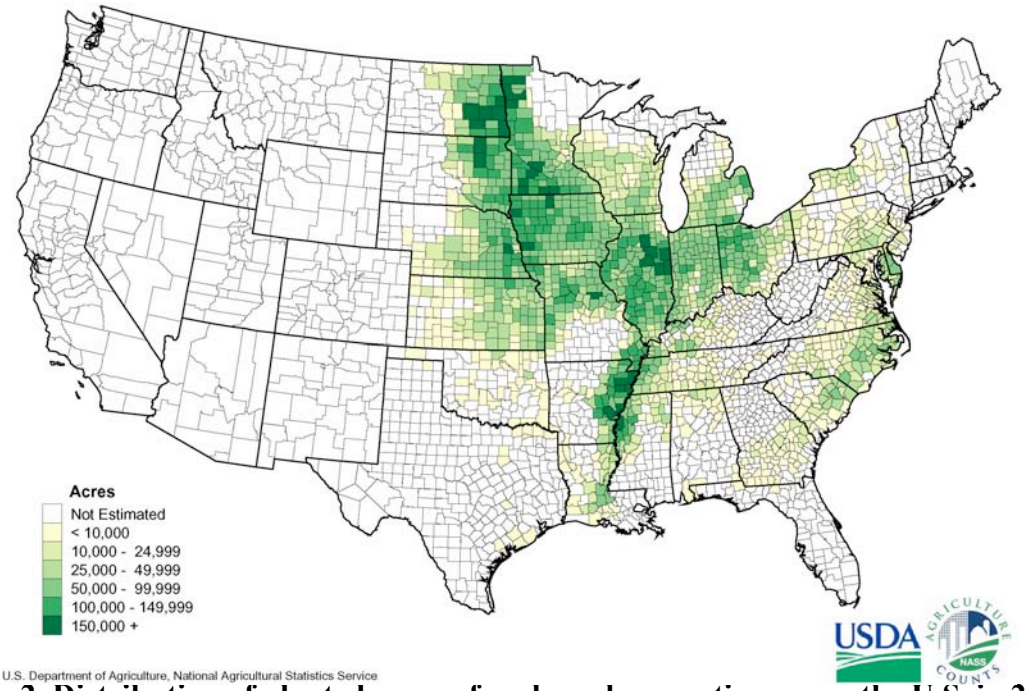

Figure 2. Distribution of planted acres of soybean by counties across the U.S. in 2007.

DISEASE INCIDENCE AND YIELD LOSSES IN 2008

Soybean yields in Virginia averaged 32 bu/A in 2008 on 570,000 acres. Yields were limited mostly by dry weather stress and root damage by nematodes (Table 1). Soybean cyst, southern root-knot and northern root-knot nematodes caused the heaviest losses of yield based on diagnostic samples at the Tidewater AREC and soil samples processed in the nematode assay lab at Virginia Tech. Other nematodes that caused root damage included sting, lance and stubby root nematodes.

Leaf spot diseases (brown spot, frogeye leaf spot, anthracnose, Cercospora blight) showed low incidence as a result of dry weather stress and were believed to have little or no impact on yield. Since SBR did not appear until after full season and double-cropped soybeans had surpassed the full seed stage (R_6), no loss of yield to SBR was reported. Overall, the reduction of soybean yields due to

disease in Virginia was estimated to be 7.4% of yield potential. Based on the estimated total production of 18.24 million bushels of soybeans in Virginia, the total loss of yield to diseases was 1.46 million bushels which had a value of 12.61 million dollars.

Table 1. Estimated loss in yield as a result of soybean diseases in 2008.

Disease	Causal agent(s)	Percent loss
Seedling diseases	*Rhizoctonia spp., Pythium spp., etc.*	0.5
Cercospora blight	*Cercospora kikuchii*	0.2
Purple seed stain	*Cercospora kikuchii*	0.1
Downy mildew	*Peronospora manshurica*	Trace
Anthracnose	*Colletotrichum truncatum*	0.4
Brown spot	*Septoria glycines*	0.2
Pod & stem blight	*Diaporthe phaseolorum* var. *sojae*	0.2
Soybean rust	*Phakopsora pachyrhizi*	0
Frogeye leaf spot	*Cercospora sojina*	0
Southern blight	*Sclerotium rolfsii*	0.1
Brown stem rot	*Phialophora gregata*	0.3
Charcoal rot	*Macrophomina phaseolina*	0.2
Stem canker	*Diaporthe phaseolorum* var. *caulivora*	Trace
Sudden death syndrome	*Fusarium solani* f.sp. *glycines*	Trace
Root & lower stem rot	*Rhizoctonia* spp.	Trace
Red crown rot	*Cylindrocladium parasiticum*	Trace
Phytophthora root & stem rot	*Phytophthora megasperma* f.sp. *glycinea*	0
Sclerotinia stem rot	*Sclerotinia sclerotiorum* and *S. minor*	0
Viruses	SMV, PMV, BPMV, etc.	Trace
Bacterial pustule	*Xanthomonas phaseoli*	0
Bacterial blight	*Pseudomonas glycinea*	0.2
Soybean cyst nematode	*Heterodera glycines*	2.5
Southern root knot nematode	*Meloidogyne incognita*	1.5
Other nematodes	---various---	1.0
Total loss (%)		**7.4***

* The loss estimate equals 1.46 million bushels based on production of 18.24 million bushels in 2008. At a value of $8.65/bu, the loss would be $12.61 million in farm revenue.

DETECTION OF SOYBEAN RUST IN 2008

Ten regional sentinel plots were sampled from flowering up to beginning senescence for early detection of SBR in 2008 (Table 2). A total of 219 samples of leaflets were processed from sentinel plots by microscopic examination; 130 at the Tidewater AREC, 26 at the Eastern Shore AREC, and 63 at the PPWS Department in Blacksburg. Sentinel plots were located at the Tidewater AREC in Suffolk, Charles City County, Mecklenburg County, Greensville County at Skippers, Chesapeake, Shenandoah County, Northern Piedmont AREC at Orange, Eastern Virginia AREC at Warsaw, Eastern Shore AREC at Painter, and Northampton County. Leaf samples were collected and either shipped overnight by site cooperators or hand carried to the Tidewater AREC, Eastern Shore AREC, or the Virginia Tech - PPWS Department for processing. Upon receipt, the samples were placed in moist chambers at room temperature (70º - 77° F), incubated for 3 to 5 days at near 100% RH, and examined under a dissecting microscope for pustules of soybean rust (Fig. 3).

A total of 164 samples from commercial fields in 33 counties were processed in 2008 (Table 3). The Tidewater AREC processed 104 samples and the Eastern Shore AREC processed 60 samples.

Table 2. Sentinel plot samples processed for soybean rust in 2008.

	June		July		August		September		October		Total	Total
County	-*	+	-	+	-	+	-	+	-	+	positive	samples
Accomack	0	0	3	0	3	0	3	0	4	1	1	14
Charles City ..	0	0	3	0	9	0	7	0	0	0	0	19
Chesapeake ...	0	0	2	0	12	0	9	0	3	1	1	27
Greensville	0	0	6	0	11	0	9	0	3	0	0	29
Mecklenburg .	0	0	3	0	11	0	7	0	5	1	1	27
Northampton .	0	0	3	0	3	0	3	0	3	0	0	12
Orange.....	0	0	0	0	9	0	9	0	2	0	0	20
Richmond.....	0	0	5	0	12	0	6	0	3	0	0	26
Shenandoah ...	0	0	0	0	6	0	8	0	3	0	0	17
Suffolk.....	1	0	6	0	12	0	8	0	0	1	1	28
Total	1	0	31	0	88	0	69	0	26	4	4	219

* - equals number of samples negative for soybean rust; + equals number positive.

A

Figure 3. A) Incubation of leaflets collected weekly from each of three varieties in five sentinel plots. Leaves were incubated at near 100% relative humidity for 3 to 5 days to induce development of pustules and production of spores B) Young, white spores produced by pustules in incubation boxes.

Microscopic examinations of samples from sentinel plots and commercial fields resulted in detection of SBR on leaflets from a sentinel plot in Chesapeake on 1 October. Continued sampling up to 29 October confirmed incidence of the disease in a total of 10 counties (Accomack, Chesapeake, Isle of Wight, Southampton, Mecklenburg, Northampton, Suffolk, Surry, Sussex, and Virginia Beach). Photographs of leaflets were taken to illustrate the small size of lesions and the need for dissecting microscope to find and identify rust pustules (uredinia) and spores for disease detection (Fig 4, 5). Confirmation of positive samples by microscopic examination was obtained by ELISA tests.

Table 3. Commercial field samples processed for soybean rust in 2008.

County	June		July		August		September		October		Total	Total
	-*	+	-	+	-	+	-	+	-	+	+	Samples
Accomack	0	0	7	0	7	0	8	0	8	0	0	30
Amelia	0	0	0	0	0	0	0	0	2	0	0	2
Appomattox	0	0	0	0	0	0	1	0	0	0	0	1
Brunswick	0	0	0	0	0	0	1	0	1	0	0	2
Campbell	0	0	0	0	0	0	1	0	0	0	0	1
Caroline	0	0	0	0	1	0	0	0	0	0	0	1
Charles City	0	0	0	0	0	0	4	0	3	0	0	7
Chesapeake	0	0	1	0	1	0	3	0	5	2	2	12
Culpeper	0	0	0	0	1	0	0	0	0	0	0	1
Dinwiddie	0	0	0	0	0	0	0	0	3	0	0	3
Essex	0	0	0	0	0	0	1	0	0	0	0	1
Gloucester	0	0	0	0	1	0	0	0	1	0	0	2
Greensville	0	0	0	0	0	0	0	0	7	0	0	7
Hanover	0	0	0	0	0	0	2	0	0	0	0	2
Henrico	0	0	0	0	0	0	1	0	2	0	0	3
Isle of Wight	0	0	0	0	0	0	0	0	2	1	1	3
King and Queen	0	0	0	0	0	0	1	0	1	0	0	2
King William	0	0	0	0	0	0	0	0	1	0	0	1
Lunenburg	0	0	0	0	0	0	1	0	0	0	0	1
Madison	0	0	0	0	0	0	1	0	0	0	0	1
Mecklenburg	0	0	0	0	0	0	1	0	1	0	0	2
Middlesex	0	0	0	0	1	0	0	0	1	0	0	2
Northampton	0	0	7	0	7	0	8	0	5	3	3	30
Nottoway	0	0	0	0	0	0	0	0	1	0	0	1
Pittsylvania	0	0	0	0	0	0	2	0	1	0	0	3
Powhatan	0	0	0	0	1	0	0	0	1	0	0	2
Prince George	0	0	0	0	0	0	0	0	3	0	0	3
Southampton	0	0	0	0	1	0	0	0	8	1	1	10
Spotsylvania	0	0	0	0	1	0	0	0	0	0	0	1
Suffolk	0	0	0	0	1	0	0	0	0	0	0	1
Surry	0	0	0	0	0	0	0	0	3	1	1	4
Sussex	0	0	0	0	0	0	0	0	8	2	2	10
Virginia Beach	0	0	1	0	0	0	6	0	4	1	1	12
Total	0	0	16	0	23	0	42	0	72	11	11	164

* - equals number of samples negative for soybean rust; + equals number positive.

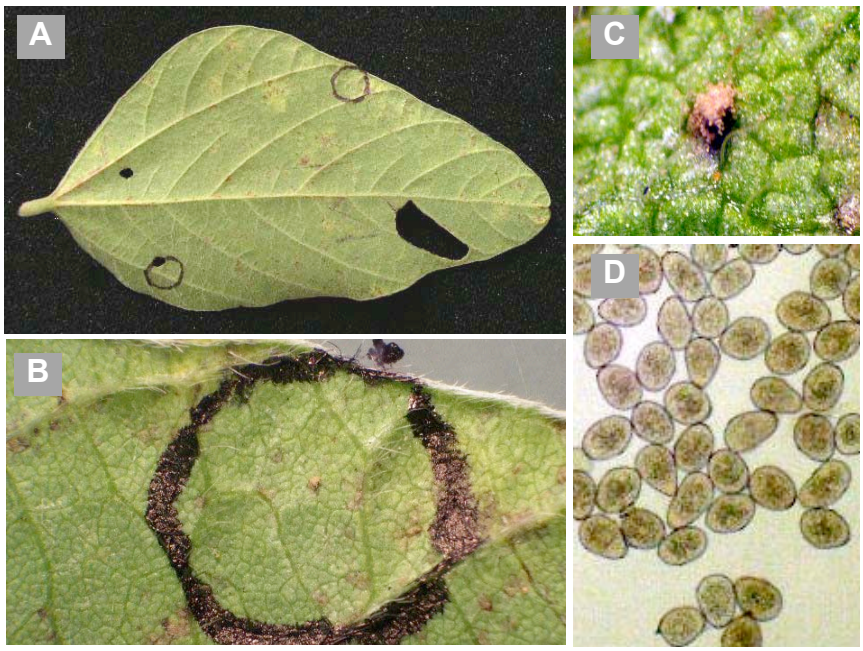

Figure 4. A) Soybean rust pustules circled on leaflet; B) pustule under dissecting scope; C) pustule highly magnified under dissecting scope; and D) rust spores magnified under compound microscope.

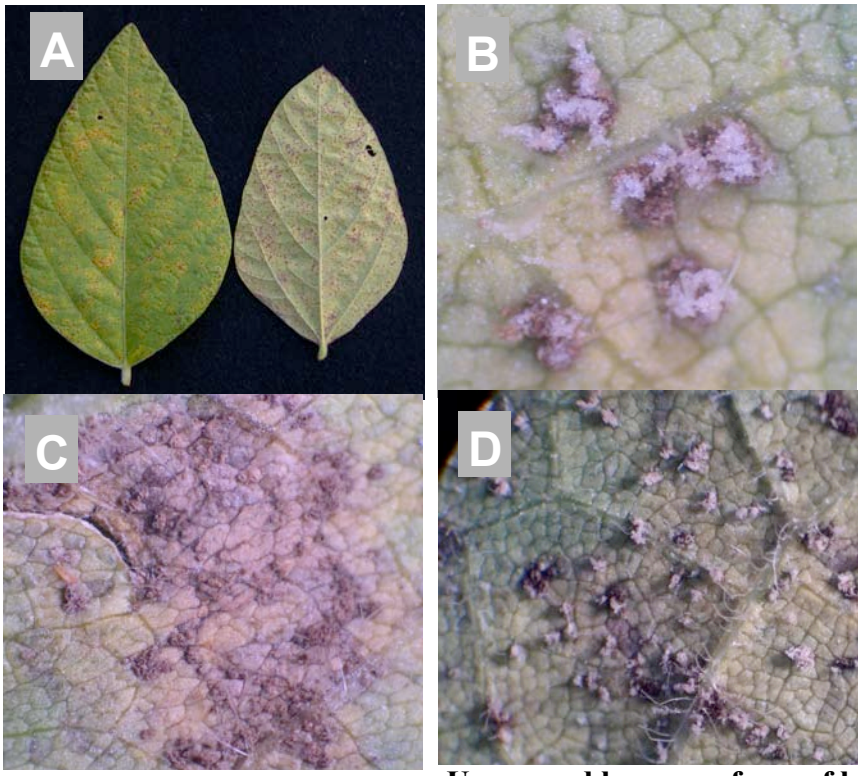

Figure 5. A) Upper and lower surfaces of leaflets with lesions caused by soybean rust in 2008 at Suffolk; B) fully developed rust pustules with young, white and some older, tan spores; C) mixture of young and old pustules on lower surface of leaf; and D) old pustules that have lost their spores through dissemination by wind and rainfall.

WET DEPOSITION SPORE TRAPS

Fig. 6. Wet deposition trap.

Five spore traps each for monitoring spore deposition in rainfall were maintained from June through September for detection of rust spores in rainfall. Spore traps were located at the Tidewater AREC (Suffolk), Eastern Virginia AREC (Warsaw), Northern Piedmont AREC (Orange), Eastern Shore AREC (Painter) and Virginia Tech (Blacksburg). Samples were collected (Fig. 6) on 8 micron filters after each rain event. Samples were sent to Dr. Erik Stromberg (Virginia Tech) for PCR analysis of filter contents.

One filter from the trap at the Tidewater AREC (June 23 – 26) and one from the trap at the Eastern Virginia AREC (Jun 23 – July 7) were positive for SBR of the 52 samples collected (Table 4). The PCR test is a highly effective means for detection of *Phakopsora pachyrhizi*. However, it is not known if the spores were viable or capable of germination and causing infection.

Table 4. Detection of *Phakopsora pachyrhizi* in wet deposition spore traps, 2008.

Trap location	Number of samples submitted	Positive results*	Trap dates of positive results	Rain amount (in.)
TAREC, Suffolk	18	1	Jun 23 - 26	0.24
NPAREC, Orange	8	0	--	--
ESAREC, Painter	6	0	--	--
Virginia Tech, Blacksburg	9	0	--	--
EVAREC, Warsaw	11	1	Jun 23 – Jul 7	2.15

*Results confirmed by PCR.

AIR TEMPERATURES AND RAINFALL AT SENTINEL PLOTS AND FUNGICIDE TRIALS IN 2008.

Moderate to sometimes severe drought stress occurred across much of eastern Virginia in 2008 and at locations of sentinel plots and fungicide trials (Table 5). Periods of dry weather stress and above normal temperatures in June, August and September were believed to limit yield potential. Unlike 2006 when tropical storm Ernesto brought soaking rains at the end of August, no tropical storms brought rainfall into the Coastal Plain or Piedmont areas of Virginia in 2007 or 2008. Table 5 summarizes seasonal temperatures at locations where several of the sentinel plots and fungicide trials were located in 2008. All locations reported below normal rainfall for the period from May through October. Weather data in Suffolk and Skippers were obtained from the Peanut/Cotton InfoNet (http://www.ipm.vt.edu/infonet). The Virginia Agricultural Experiment Station Mesonet (http://www.ahnrit.vt.edu/research/weather.html) collected weather data at the Eastern Virginia AREC at Warsaw and the Eastern Shore AREC at Painter. Normal rainfall records were obtained from annual reports by the Virginia Agricultural Statistics Service.

Table 5. Weather summary for locations of fungicide trials in 2008.

Location	Month	2008 Air Temperatures (F) Avg.	Max	Min.		Rainfall (in.) 2008	Normal
Tidewater AREC, Suffolk	MAY	65.3	78.2	53.1		3.43	3.82
	JUN	79.4	94.0	65.9		1.56	4.33
	JUL	77.4	91.0	66.6		5.58	5.87
	AUG	75.7	88.2	65.1		2.18	5.71
	SEP	72.0	82.8	63.0		6.01	4.47
	OCT	57.4	72.2	45.3		0.87	3.54
	Mean	71.2	84.4	59.8	**Total**	**19.63**	**27.74**
Hawkins Farm, Skippers	MAY	65.8	78.4	53.1		3.43	3.88
	JUN	80.2	93.9	66.5		2.23	3.30
	JUL	78.2	90.9	67.4		5.19	4.54
	AUG	76.8	90.0	65.1		1.45	4.34
	SEP	71.3	82.9	61.9		5.23	4.26
	OCT	56.8	71.6	45.0		1.14	3.46
	Mean	**71.5**	**84.6**	**59.8**	**Total**	**18.67**	**23.78**
Eastern Shore AREC, Painter	MAY	62.9	72.6	52.2		4.89	3.51
	JUN	75.7	85.1	65.9		2.98	3.06
	JUL	76.4	85.4	67.6		3.08	4.37
	AUG	74.0	82.5	65.1		2.20	4.15
	SEP	70.7	78.4	62.7		5.88	3.69
	OCT	57.2	67.1	47.6		0.29	3.52
	Mean	**69.5**	**78.5**	**60.2**	**Total**	**19.32**	**22.30**
Eastern Virginia AREC, Warsaw	MAY	63.2	74.1	51.7		1.81	4.51
	JUN	75.0	86.8	64.3		1.19	3.40
	JUL	76.3	87.2	66.7		2.96	4.65
	AUG	73.6	84.9	63.4		1.29	4.12
	SEP	69.7	79.9	60.0		4.61	4.35
	OCT	56.1	68.1	45.2		1.07	4.31
	Mean	**69.0**	**80.2**	**58.6**	**Total**	**12.93**	**25.34**

The optimum temperature range for leaf infection and development of SBR is 68° to 77º F. In addition to favorable temperature, the fungus requires moisture (leaf wetness or ≥ 95% RH) for spore germination and infection of leaflets. In an attempt to determine when conditions were favorable in 2008, the number of days was tabulated with daily average temperatures between 60° to 77º F and short-term rainfall totals ≥0.5 in. in the previous 5 days, ≥1 in. over the previous 10 days, or periods of relative humidity ≥95% for ≥12 hrs/day. According to data collected at the Tidewater AREC, favorable conditions for infection were recorded for 12 days in May, 7 days in June, 14 days in July, 13 days in August, 12 days in September, and 3 days in October. The longest periods of favorable conditions for infection occurred for 9 days in May (May 14 to May 22), 7 of 8 days in June (Jun 17 to Jun 24), 10 of 13 days in July (Jul 5 to Jul 17), 13 of 14 days in August (Aug 9 to Aug 24), and 6 of 7 days in early September (Sep 6 to Sep 12), and 8 of 10 days beginning in late September (Sep 25 to Oct 4).

FUNGICIDE TRIALS:

Plots were 30-ft long and 12-ft wide. Row spacing ranged from 18- to 30-in. depending upon location. A randomized complete block design was used with four replications of treatments. Fungicides were applied with either a CO_2-pressurized backpack sprayer in a 6-ft spray swath, or a Lee Spider sprayer in a 12-ft spray swath. Both sprayers were equipped with 8002VS or Tee Jet 11015 nozzles spaced 18- in. apart and delivered a volume of 16.5 to 20 gal/A at 30 to 42 psi depending upon the location. Yield data were collected from the center, 4.75-ft-wide by 30-ft-long section in each plot with a self-propelled, small-plot combine.

Results

Tidewater AREC, Suffolk, Trial 108 (Phipps). The field site was planted to Pioneer 95Y20 on 4 June. The soil type was Kenansville loamy fine sand that was planted to soybean in 2006 and 2007. Plots were eight, 30-ft rows spaced 18-in. apart. Roundup Ultra Max at 28 fl oz/A on 24 June and 8 July, First Rate 84WG at 0.3 oz on 8 July and Butyrac at 8 fl oz/A on 21 July were applied for weed control. Baythroid XL at 3 fl oz/A was applied on 22 August for insect control. All fungicide treatments were applied with a Lee Spider sprayer. The timing of fungicide application was designed to evaluate one spray at R_3 (20 August) versus two sprays at R_3 and R_5 (2 September), unless soybean rust was present within 100 mi. of the location prior to R_3. Plots were harvested on 3 November.

Table 6. Soybean fungicide trial 108 Suffolk.

Treatment, rate/A and application date[z]	Brown spot[y] (7 Oct)	Cercospora blight[y] (7 Oct)	% senescence[x] (7 Oct)	Yield[w] (bu/A)	*P*-value of yield vs. check	100 seed wt. (oz)[v]	% phomop-sis seed decay[v]
Untreated	19.5 a	22.0 a	73.8 a	44.2	--	.5520 e	0.3
Quilt 14 fl oz +COC 25.4 fl oz (8/20)	11.8 bc	12.5 b-d	37.5 c	43.5	.8181	.5627 c-e	0.3
Quilt 14 fl oz + COC 25.4 fl oz (8/20, 9/2)	7.8 d-f	8.8 cd	25.0 d	39.1	.1112	.5732 a-e	0.0
Quadris Xtra 4 fl oz + Coverall 3.2 fl oz (8/20, 9/2)	14.5 b	12.5 b-d	42.5 c	44.3	.9833	.5617 c-e	0.0
Headline 250EC 6 fl oz + Folicur 432SC 3.1 fl oz + Coverall 3.2 fl oz (8/20)	10.0 c-e	11.5 b-d	42.5 c	41.3	.3505	.5910 a	0.3
Headline 250EC 6 fl oz + Folicur 432SC 3.1 fl oz + Coverall 3.2 fl oz (8/20, 9/2)	5.8 f	8.0 d	23.8 d	46.9	.3943	.5845 a-c	0.3
Stratego 250EC 10 fl oz + Induce 3.2 fl oz (8/20)	14.3 b	14.0 b	51.3 b	39.0	.1027	.5592 de	0.3
Stratego 250EC 10 fl oz + Induce 3.2 fl oz (8/20, 9/2)	11.3 b-d	12.5 b-d	43.8 bc	43.2	.7381	.5796 a-d	0.3
Absolute 500SC 5 fl oz (8/20)	11.0 b-d	13.0 bc	43.8 bc	41.2	.3401	.5653 b-e	0.0
Absolute 500SC 5 fl oz (8/20, 9/2).	6.8 ef	8.8 cd	22.5 d	41.7	.4294	.5901 ab	0.0
P-value	.0001	.0001	.0001	.3020	--	.0286	.8948

[z] The 1st application was applied on 20 Aug at R_3 (beginning pod) and 2nd application was applied on 2 Sep at R_5 (beginning seed). [y] Data are based on visual estimates of percentages of leaf area with disease. [x] Percent senescence is percent of yellow and necrotic leaves and defoliation. [w] Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 3 Nov. [v]Random samples of seed were collected at harvest for determining 100 seed wt and percentages of seed with phomopsis seed decay. Means followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at *P*=0.05. Arcsine transformation of visual estimates of disease was made in analysis to determine statistical significance.

None of the treatments caused symptoms of chemical injury or increased yield significantly. Cercospora blight and brown spot were the only diseases that were reduced significantly by

treatments (Table 6). Headline plus Folicur on August 20 or August 20 and September 2 increased seed weight significantly. Seed weight was also increased by sprays of either Stratego 10 fl oz or Absolute 5 fl oz applied on August 20 and September 2. All treatments reduced incidence of brown spot, Cercospora blight, and early senescence of plants on October 7.
Soybean rust was detected on 6 leaflets/63 collected at the test site on 24 Oct.

Tidewater AREC, Suffolk, Trial 208 (Phipps). The variety, planting date, cultural practices, and location of this trial were the same as Trial 108. Fungicide treatments were applied with a Lee Spider Spray on 20 August (R_3). Cercospora blight was reduced significantly by all treatments (Table 7). Soybean rust was not detected in the trial. Percentages of plant senescence on 7 October were suppressed by all treatments. None of the treatments caused visible evidence of chemical injury. None of the treatments had a significant effect on yield.

Table 7. Soybean fungicide trial 208, Suffolk.

Treatment and rate/A[z]	Brown spot[y] (7 Oct)	Cercospora blight[y] (7 Oct)	% senescence[x] (7 Oct)	Yield[w] (bu/A)	*P*-value of yield vs. check	100 seed wt. (oz)[v]	% purple seed stain[v]
Untreated	20.0 a	18.3 a	68.8 a	50.3	--	.5358	0.8 b
Quadris 2.08SC 6 fl oz + COC 25.4 fl oz	9.8 de	11.0 de	38.8 c	51.8	.6675	.5446	0.3 bc
Quilt 1.67SC 14 fl oz + COC 25.4 fl oz	10.0 de	12.3 c-e	32.5 c-e	49.2	.7507	.5505	0.0 c
Stratego 250EC 10 fl oz + Induce 3.2 fl oz	9.0 d-f	11.8 c-e	36.3 cd	52.5	.5260	.5505	0.0 c
Absolute 500SC 5 fl oz	8.3 ef	9.5 e	24.5 e	49.6	.8370	.5607	0.0 c
Folicur 432SC 4 fl oz + Induce 3.2 fl oz	13.5 bc	11.8 c-e	36.3 cd	53.0	.4451	.5535	0.3 bc
Headline 250EC 6 fl oz + Coverall 3.2 fl oz	6.5 f	9.5 e	28.8 c-e	53.1	.4235	.5730	0.3 bc
Headline 250EC 4.7 fl oz + Folicur 3.1 fl oz + Coverall 3.2 fl oz	8.5 ef	9.8 de	35.0 cd	50.3	1.0000	.5569	0.0 c
Domark 1.9ME 4 fl oz	11.5 cd	12.8 b-d	30.0 c-e	49.8	.8958	.5570	0.5 bc
Domark 1.9ME 5 fl oz	14.8 b	14.3 bc	48.8 b	50.4	.9851	.5668	0.3 bc
Proline 480SC 2.5 fl oz	16.3 b	15.8 ab	56.3 b	48.8	.6675	.5627	1.5 a
Stratego 250EC 10 fl oz + Proline 480SC 1.0 fl oz	20.0 a	11.0 de	27.5 de	46.8	.3162	.5524	0.3 bc
P-value	.0001	.0001	.0001	.8276	--	.2328	.0668

[z]A single application was applied at beginning pod (R3) on 20 Aug. [y]Data are based on visual estimates of disease incidence and leaf area affected. [x]% senescence is percent of yellow and necrotic leaves and defoliation. [w]Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 3 Nov. [v]Random samples of seed were collected at harvest for determining 100 seed wt and percentages of seed with purple seed stain. Means followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at *P*=0.05, except purple seed stain was analyzed at *P*=0.10. Arcsine transformation of visual estimates of disease was made in analysis to determine statistical significance.

Duke farm, Trial 308, Suffolk (Phipps). The field site was planted to Pioneer 95Y20 on 22 May. The soil type was Dragston fine sandy loam that was planted to soybean in 2007 and 2006, and corn in 2005. Plots were eight, 30-ft rows spaced 18-in. apart. Roundup Ultra Max at 22 fl oz/A on 24 June and Roundup Ultra Max at 22 fl oz plus First Rate 84WG at 0.3 oz on 8 July were applied for weed control. All treatments were applied using a Lee Spider sprayer at R_2 on 7 August and a second application of Topguard was applied in treatment #3 at R_5 on 20 August. Plots were harvested on 31 October with a small-plot combine. None of the treatments caused symptoms of chemical injury. Soybean rust was not detected in the trial. Brown spot and Cercospora blight occurred at low levels on 9 October, but were not believed to reduce yield (Table 8). None of the treatments showed strong suppression of plant senescence on 9 October, but the effects of some treatments were significant. Orthogonal contrasts of treatment yields to the non-treated check did not detect a significant yield response to any treatment. Seed weights were not affected significantly by any treatment.

Table 8. Soybean fungicide trial 308, Suffolk.

	% leaf area with disease (9 Oct)[y]						% seed disease[v]	
Treatment and rate/A[z]	Brown spot	Cercos-pora blight	% senses-cence[x] (9 Oct)	Yield[w] (bu/A)	*P*-value of yield vs. untreated	Wt./100 seed[v] (oz)	purple seed stain	downy milde w
Untreated	12.0 a	11.3	93.8 a	46.4	--	.5628	0.0	0.0 b
Topguard 7 fl oz (8/7).....	7.5 bc	7.5	88.0 a-c	42.7	.5238	.5371	0.5	0.0 b
Topguard 7 fl oz (8/7, 8/20) ...	8.8 ab	7.5	84.5 bc	41.9	.4385	.5464	0.3	0.0 b
Topguard 14 fl oz (8/7).....	7.5 bc	9.5	90.0 ab	41.5	.4056	.5422	0.3	0.3 b
Quilt 14 fl oz + COC 25.4 fl oz (8/7).....	7.5 bc	8.8	81.3 c	45.6	.8889	.5583	0.0	1.0 a
Quadris Xtra 4 fl oz + Coverall 3.2 fl oz (8/7)	6.3 bc	7.5	83.8 bc	45.1	.8159	.5495	0.5	0.0 b
Headline 250EC 6 fl oz + Folicur 432S 3.1 fl oz + Coverall 3.2 fl oz (8/7)	5.0 c	6.3	82.5 c	37.3	.1265	.5467	0.5	0.0 b
Absolute 500SC 5 fl oz (8/7)..	7.5 bc	8.8	81.3 c	43.8	.6504	.5396	0.3	0.0 b
P-value.....	.0407	.1751	.0607	.8126	--	.3588	.6072	.0042

[z] Treatments were applied on 7 Aug at R_2 (full flower) and 20 Aug (Trt. #3) at R5 (beginning seed). [y]Data are based on visual estimates of disease incidence and leaf area affected. [x] Percent senescence is percent of yellow and necrotic leaves and defoliation. [w] Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 31 Oct. [y]Random samples of seed were collected at harvest for determining 100 seed wt and percentages of seed with disease. Means followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at *P*=0.05, except % senescence was analyzed at P=0.10. Arcsine transformation of visual estimates of disease was made in analysis to determine statistical significance.

Duke farm, Trial 408, Suffolk (Phipps). The variety, planting date, cultural practices, and location of this trial were the same as Trial 308. Fungicide treatments were applied with a Lee Spider Spray on 12 August (R_3). Plots were harvested on 31 October and 3 November with a small-plot combine. None of the treatments caused chemical injury. Brown spot was reduced significantly by all treatments, but not Cercospora blight. Soybean rust was detected in the trial on 24 October (2 of 70 leaflets). All fungicide treatments resulted in significant suppression of plant senescence on 9 October but differences from the untreated check were not more than 15% (Table 9). Yields were not increased by any treatment. None of the treatments were significantly different from the untreated check on the basis of seed weight.

Table 9. Soybean fungicide trial 408, Suffolk.

Treatment and rate/A[z]	% leaf area (9 Oct)[y] Brown spot	Cercos-pora blight	% senescence[x] (9 Oct)	Yield[w] (bu/A)	*P*-value of yield vs. check	Wt./100 seed (oz)	% phomop-sis seed decay[v]
Untreated	12.5 a	11.3	95.3 a	61.0	--	.5505 a-e	0.0 b
Quadris 2.08SC 6 fl oz + COC 25.4 fl oz	7.0 b	6.3	87.5 b-d	51.6	.1411	.5348 de	0.3 ab
Quilt 1.67SC 14 fl oz + COC 25.4 fl oz	6.3 b	7.5	88.8 bc	55.2	.3632	.5377 c-e	0.0 b
Quadris Xtra 4 fl oz + Coverall 3.2 fl oz	7.5 b	8.3	86.3 b-d	48.7	.0589	.5280 e	0.0 b
Stratego 250EC 10 fl oz + Induce 3.2 fl oz	5.0 b	5.8	81.3 cd	55.0	.3437	.5388 b-e	0.0 b
Absolute 500SC 5 fl oz	6.3 b	6.3	82.5 cd	54.2	.2825	.5613 ab	0.0 b
Headline 250EC 6 fl oz + Coverall 3.2 fl oz	5.0 b	6.3	83.8 b-d	53.1	.2163	.5589 a-c	0.0 b
Headline 250EC 4.7 fl oz + Folicur 432SC 3.1 fl oz + Coverall 3.2 fl oz	5.0 b	6.3	80.0 d	58.7	.7119	.5680 a	0.0 b
Domark 1.9ME 5 fl oz	6.3 b	7.5	90.0 b	55.4	.3766	.5511 a-d	0.5 a
P-value	.0027	.1130	.0024	.7024	--	.0226	.0795

[z] A single application was applied at beginning pod (R3) on 12 Aug. [y] Data are based on visual estimates of disease incidence and leaf area affected. [x] Percent senescence is percent of yellow and necrotic leaves and defoliation. [w] Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 31 Oct and 3 Nov. [v] Random samples of seed were collected at harvest for determining 100 seed wt and percentages of phomopsis seed decay. Means followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at $P=0.05$, except phomopsis seed decay was analyzed at $P=0.10$. Arcsine transformation of visual estimates of disease was made in analysis to determine statistical significance.

Greensville County, Trial 508, Clements Farm (Phipps and Hu). Soil at the field site was Fluvanna-Mattaponi complex, and planted to milo in 2007 and soybean in 2006. Seed of Pioneer 95Y20 were planted in rows spaced 18-in. apart on 2 June. Standard practices for production of glyphosate-resistant soybeans were followed after planting. Plots were 13-ft wide by 30-ft long and treatments were replicated in four randomized complete blocks. A single application of treatments was made with a backpack sprayer at beginning pod stage (R_3) on 21 August using a CO_2, backpack sprayer. Soybeans were harvested on 3 December. All treatments reduced incidence of brown spot and Cercospora blight significantly according to ratings on 10 October (Table 10). Treatments did not cause any plant injury. Senescence of plants on 10 October was reduced significantly by all treatments. Yields were not increased by treatments according to an LSD comparison, but orthogonal contrasts indicated that response to Folicur plus Induce was significant ($P \leq 0.10$). Seed weight was not increased significantly by treatments. No evidence of soybean rust was found in the trial.

Table 10. Soybean fungicide trial 508, Clements Farm, Greensville County.

Treatment and rate/A[z]	% leaf area with disease (10 Oct)[y]		% senescence[x] (10 Oct)	Yield[w] (bu/A)	*P*-value of yield vs. check	Wt./100 seed (oz)	% seed disease[v]	
	Brown spot	Cercospora blight					purple seed stain	phomop-sis seed decay
Untreated	20.0 a	26.3 a	50.0 a	50.5 a-d	--	.6255	0.0 b	0.3
Quadris 2.08SC 6 fl oz + COC 25.4 fl oz	6.3 c	9.5 bc	23.8 d-f	52.6 a-c	.4689	.6426	0.0 b	0.3
Quilt 1.67SC 14 fl oz + COC 25.4 fl oz	7.8 c	8.8 bc	28.8 c-f	45.8 d	.1013	.6114	0.0 b	0.0
Quadris Xtra 4 fl oz + Coverall 3.2 fl oz	7.8 c	10.0 bc	35.0 bc	49.9 b-d	.8353	.6020	0.0 b	0.3
Stratego 250EC 10 fl oz + Induce 3.2 fl oz	5.0 c	7.3 bc	20.0 ef	54.5 ab	.1630	.6023	0.0 b	0.0
Absolute 500SC 5 fl oz	5.0 c	7.5 bc	33.8 b-d	48.7 cd	.5119	.6352	0.0 b	0.3
Folicur 432SC 4 fl oz + Induce 3.2 fl oz	6.5 c	10.5 bc	25.0 c-f	56.0 a	.0627	.6373	0.5 ab	0.0
Headline 250EC 6 fl oz + Coverall 3.2 fl oz	5.0 c	5.0 c	18.8 f	53.2 a-c	.3446	.6572	0.0 b	0.0
Headline 250EC 4.7 fl oz + Folicur 3.1 fl oz + Coverall 3.2 fl oz	5.5 c	6.3 c	30.0 b-e	52.4 a-c	.5119	.6483	0.0 b	0.0
Domark 1.9ME 5 fl oz	13.8 b	12.5 b	40.0 b	48.3 cd	.4381	.6146	0.8 a	0.0
P-value	.0001	.0001	.0001	.0330	--	.1398	.0377	.8542

[z] A single application was applied at beginning pod (R3) on 21 Aug. [y] Data are based on visual estimates of disease incidence and leaf area affected. [x] Percent senescence is percent of yellow and necrotic leaves and defoliation. [w] Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 3 Dec. [v] Random samples of seed were collected at harvest for determining 100 seed wt and percentages of seed with disease. Means followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at *P*=0.05. Arcsine transformation of visual estimates of disease was made in analysis to determine statistical significance.

Duke farm, Trial 608, Suffolk (Holshouser). Soil at the field site was Eunola fine sandy loam, and planted to corn in 2007 and soybean in 2006. Seed of Pioneer 95Y20 and RT5450N were planted in rows spaced 15-in. apart on 7 July. Plots were 6.5-ft wide by 17-ft long and treatments were replicated in four randomized complete blocks. A single application of Headline 6 fl oz/A + Induce 0.25% (v/v) was made with a tractor-mounted sprayer having 8003 nozzles delivering 20.4 gal/A at specified application dates. Soybeans were harvested on 3 December.

Soybean rust was first detected in plots on 23 October. Disease severity was rated in three of the four replications according to a 0-8 severity scale (see Table 11 footnote). Data combined across fungicide application dates showed that SBR was significantly more severe on P95Y20 than RT5450N (Table 11). The treatments applied on P95Y20 showed significant reductions in SBR severity when fungicide sprays were applied on 29 August, 4 September, or 15 September. Data combined across varieties also showed that treatments were most effective when applied on 29 August, 4 September, and 15 September. Defoliation was heaviest in the untreated check and plots sprayed on 7 August, and lowest in plots treated on 29 August and 4 September.

Table 11. Soybean fungicide timing trial 608, Duke Farm, Suffolk.

Fungicide application date[z]	% defoliation (31 Oct)[y]		SBR severity (0-8)[x] (Oct 23-24)		Yield (bu/A)[w]	
	P95Y20	RT5450N	P95Y20	RT5450N	P95Y20	RT5450N
Aug 7	51.7 ab	90.0 a	4.6 ab	3.0	39.8 b	37.6
Aug 18	38.3 cd	78.3 b-d	3.0 bc	3.0	36.1 b	38.6
Aug 29	28.3 d	73.3 cd	1.8 c	1.6	43.0 ab	37.9
Sep 4	40.0 b-d	70.0 d	1.4 c	0.8	48.7 a	40.6
Sep 15	48.3 a-c	81.7 a-d	1.9 c	0.9	41.6 ab	37.4
Sep 29	46.7 a-c	85.0 a-c	4.5 ab	3.4	49.3 a	37.4
Untreated	56.7 a	88.3 ab	5.7 a	3.9	41.9 ab	39.6
P(F)	.0105	.0373	.0640	.1150	.0349	.9437
Fungicide timing mean						
Aug 7	70.8 a		3.8 b		38.7 bc	
Aug 18	58.3 cd		3.0 c		37.4 c	
Aug 29	50.8 e		1.7 d		40.4 a-c	
Sep 4	55.0 de		1.1 e		44.6 a	
Sep 15	65.0 bc		1.4 de		39.5 a-c	
Sep 29	65.8 b		4.0 b		43.3 ab	
Untreated	72.5 a		4.8 a		40.7 a-c	
Variety mean						
P95Y20	44.3 b		3.3 a		42.9 a	
RT5450N	81.0 a		2.4 b		38.4 b	
Split-plot analysis						
Fungicide timing	.0151		.0769		.0943	
Variety	.0001		.0003		0208	
Fungicide timing x variety	.2347		.1271		.4418	

[z] A single application of Headline 6 fl oz + Induce 0.25% (v/v) was applied at specified application date. [y] Defoliation rating scale: 0=none, 100=no leaves on plants. [x] Soybean rust severity : 0=none; 1=trace to 2.5; 2=2.5 to 5; 3=5 to 10; 4=10 to 15; 5=15 to 25; 6=25 to 35; 7=35 to 67.5; 8=67.5 to 100. [w] Yields are weight of soybeans with 13.5% moisture. Soybeans were harvested on 3 Dec. Means in a column and group followed by the same letter(s) are not significantly different according to Fisher's Protected LSD at *P*=0.05. Means followed by letters in groups with *P* >0.05 and ≤0.10 were based on analysis at P=0.10. Arcsine transformation of percentage data was made in analysis to determine statistical significance.

Eastern Shore AREC, Painter (Rideout and Waldenmaier).

The trials were conducted on a Bojac fine sandy loam soil (organic matter <1%) at the Eastern Shore Agricultural Research and Extension Center, Painter, VA. Standard practices for weed and insect control were followed in both trials. Conventional-tillage, full-season soybeans (cultivar Vigoro V39N4RR) were planted on 18 June and double-cropped soybeans (cultivar V39N4RR) were planted on 8 July following wheat. Plots consisted of two, 30-ft rows spaced 2.5-ft apart bordered by two non-treated rows. Treatments were arranged in a randomized complete block design with four replications. Treatments were applied with a CO_2-pressurized backpack sprayer which delivered 20 gal/A at 42 psi. The spray boom had four Tee Jet 11015 nozzles spaced 18-in. apart. Treatments were applied to the full-season soybeans on 15 August when 75% of the soybeans were at reproductive stage R_3 and no-till

soybeans on 20 September at stage R_3. Soybeans were harvested and weighed on 12 December in both full-season and double-cropped plots. A 100-seed sample was collected from each plot during harvest to assess seed weight and percent discolored seeds.

Results

Full – Season Soybean Trial: Dry weather predominated throughout most of the season with precipitation amounting to 4.4, 2.2, 5.8, 1.8, and 3.1 in. for July, August, September, October, and November, respectively. Little rainfall occurred in August thus yields were drastically reduced. There were no significant differences in yield or 100 seed weights. There was a significant difference in amount of Purple Seed Stain (PSS). In general, all treatments receiving applications of strobilurin fungicides (QoI) showed less PSS than the nontreated control. There were no significant differences in total discolored/damaged seeds. (Table 12).

Table 12. Soybean yields and percent discolored seed from a full-season soybean fungicide trial conducted at the ESAREC in Painter, VA in 2008.

Treatment (rate/A)	Yield bu/A	Seed wt. oz/100 seed	Purple seed stain (%)	Total discolored seed (%)
Nontreated Control	17.3	0.7161	4.8 a *	35.8
Quadris 2.08SC 6 fl oz +COC 1 % v/v	20.8	0.7090	0.6 cd	37.6
Quilt 1.66SC 14 fl oz +COC 1% v/v	20.8	0.7125	0.4 d	43.0
Quadris Xtra 280SC 4 fl oz + UAP 80/20 0.1% v/v	28.4	0.7266	0.6 cd	33.4
Stratego 2EC 10 fl oz +UAP 80/20 0.1% v/v	25.7	0.7372	0.6 cd	38.6
Absolute 500SC 5 fl oz	15.6	0.7196	1.0 cd	41.4
Folicur 3.6F 4 fl oz +UAP 80/20 0.1% v/v	21.2	0.7090	3.6 ab	34.0
Headline 2EC 6 fl oz +UAP 80/20 0.1% v/v	18.6	0.7196	0.4 d	32.6
Headline 2EC 4.7 fl oz + Folicur 3.6F 3.1 fl oz +UAP 80/20 0.1% v/v	19.6	0.7513	0.2 d	44.2
Domark 230ME 5 fl oz	25.2	0.7266	2.4 bc	33.6
Punch 3.3EC 4 fl oz	24.1	0.7231	3.2 ab	35.2
Punch 3.3EC 3 fl oz + Headline 2EC 4.5 fl oz	25.4	0.7337	1.0cd	30.2
LSD (P=.05)	n.s.	n.s.	1.98	n.s.

* Means within each column followed by the same letter are not significantly different (P= 0.05, Fisher's LSD), n.s. denotes not significant.

Double – Cropped Soybean Trial: Dry weather predominated throughout the season with precipitation amounting to 4.4, 2.2, 5.8, 1.8, and 3.1 in. for July, August, September, October, and November, respectively. Significant differences were noted in yields in this trial, however, few conclusions can be drawn from this data set. No other significant differences were detected in this trial (Table 13).

Table 13. Soybean yields and percent discolored seed from a double-cropped soybean fungicide trial conducted at the ESAREC in Painter, VA in 2008.

Treatment (Rate/A)	Yield bu/A	Seed wt. oz/100 seed	Purple seed stain (%)	Total discoloration seed (%)
Nontreated Control	33.6 ab*	0.6455	0.5	14.8
Quadris 2.08SC 6 fl oz +COC 1 % v/v	33.4 ab	0.6385	0.0	12.3
Quilt 1.66SC 14 fl oz +COC 1% v/v	31.2 bc	0.6455	0.3	14.8
Quadris Xtra 280SC 4 fl oz + UAP 80/20 0.1% v/v	29.3 c	0.6420	1.8	11.0
Stratego 2EC 10 fl oz +UAP 80/20 0.1% v/v	30.5 bc	0.6279	0.5	18.5
Absolute 500SC 5 fl oz	34.9 a	0.6455	0.0	14.5
Folicur 3.6F 4 fl oz +UAP 80/20 0.1% v/v	31.9 a-c	0.6490	1.3	9.8
Headline 2EC 6 fl oz +UAP 80/20 0.1% v/v	32.2 a-c	0.6561	0.0	15.8
Headline 2EC 4.7 fl oz + Folicur 3.6F 3.1 fl oz +UAP 80/20 0.1% v/v	34.8 a	0.6420	0.3	17.8
Domark 230ME 5 fl oz	31.3 bc	0.6490	0.8	12.5
Punch 3.3EC 4 fl oz	32.9 ab	0.6385	0.3	16.5
Punch 3.3EC 3 fl oz + Headline 2EC 4.5 fl oz	31.1 bc	0.6173	0.0	17.5
LSD (P=.05)	3.4	n.s.	n.s.	n.s.

* Means within each column followed by the same letter are not significantly different (*P*= 0.05, Fisher's LSD), n.s. denotes not significant.

Eastern Virginia AREC, Warsaw (Stromberg and Pitman).

Standard practices for weed and insect control were followed for soybean production in full season and double-cropped soybean trials. Both trials were planted to Southern States RT4370, a mid-Group III soybean. The full-season trial was planted on May 22, and the double-cropped soybean trial was planted on June 17. Treatments were arranged in a randomized complete block design with four replications. Fungicide sprays in the full-season trial were applied at R_3 on July 16 and some were repeated 14 days later on July 30 or 21 days later on August 5. Similarly, sprays in the drouble-cropped trials were applied at R_3 on August 13 and some were repeated 14 days later on August 27 or 21 days later on September 3. Applications were made with a CO_2-pressurized backpack sprayer having four 8004VS nozzles spaced 18-inches apart and delivering 20 gal/A at 40 psi.

Results

Full – Season Soybean Trial: Disease incidence was low and not significantly different. No SBR was detected at the test site. Differences in seed quality and yield in both trials were not significantly different (Table 14). Although some differences in test weight (lb/bu) were detected, none were significantly different from the untreated check.

Table 14. Soybean yields and seed weight from a full-season soybean fungicide trial conducted at the Eastern Virginia AREC at Warsaw in 2008.*

Treatment in product fl. oz/ A	Application growth stage	% harvest moisture	Seed quality (1-5)	Yield (bu/A)	Bushel wt. (lb)	
Non-treated control	--	12.33	2.20	35.33	54.33	a-c
Quadris 2.08 SC 6.0 fl oz +COC 100 SL 1.0 % v/v	R3	12.45	2.18	33.63	54.40	a-c
Quilt 1.67 SC 14.0 fl oz + COC 100 SL 1.0 % v/v	R3	12.40	2.20	34.75	54.68	a-c
Stratego 250 EC 10.0 fl oz +Induce 100 SL 0.125 % v/v	R3	12.50	2.18	35.48	54.68	a-c
Domark 230 ME 5.0 fl oz	R3	12.30	2.43	31.68	54.08	c
Headline 2.09 EC 6.0 fl oz	R3	12.28	2.18	33.50	54.53	a-c
Headline 2.09 EC 4.7 fl oz +Folicur 432 SC 3.1 fl oz	R3	12.53	2.13	34.90	54.73	a-c
Folicur 3.6 SC 4.0 fl oz	R3	12.35	2.13	32.95	54.18	bc
Laredo 2.0 EC 7.0 fl oz + Induce 100 SL 0.125 % v/v	R3	12.30	2.15	34.38	54.53	a-c
Absolute 500 SC 5.0 fl oz	R3	12.30	2.20	37.13	54.43	a-c
Punch 3.3 EC 4.0 fl oz	R3, 14 da	12.33	2.25	35.48	54.53	a-c
Punch 3.3 EC 3.0 fl oz +Headline 2.09 EC 4.5 fl oz	R3, 14 da	12.43	2.00	37.15	54.75	a-c
Folicur 2.6 SC 4.0 fl oz	R3, 21 da	12.50	2.15	38.25	54.35	a-c
Stratego 250 EC 10.0 fl oz +Induce 100 SL 0.125 % v/v	R3, 21 da	12.45	2.05	35.73	54.60	a-c
Absolute 500 SC 5.0 fl oz	R3, 21 da	12.53	2.05	36.00	55.15	a
Quadris 2.08 SC 6.2 fl oz + Alto 100 SL 4.0 fl oz + NIS 100 SL 0.25 % v/v	R3	12.50	2.15	35.35	54.68	a-c
Quadris Extra 2.34 SC 4.0 fl oz + NIS 100 SL 0.25 % v/v	R3	12.43	2.00	34.83	54.58	a-c
Statego 250 SL 10.0 fl oz +Proline 480 SC 1.0 fl oz	R3, 21 da	12.33	2.15	37.83	54.55	a-c
Stratego 250 EC 10.0 fl oz +Folicur 3.6 SC 3.6 fl oz	R3, 21 da	12.58	2.03	36.65	55.03	ab
Punch 3.3 EC 0.75 fl oz +Headline 2.09 EC 4.5 fl oz	R3, 21 da	12.53	1.90	39.05	54.98	ab

* Treatments were applied at beginning seed (R_3) on 16 July and 30 July or 5 August (14 or 21 days later). Means were not significantly different according to Student-Newman-Keuls LSD at P=0.05.

Double – Cropped Soybean Trial: Disease incidence was low and not significantly different. No SBR was detected at the test site or surrounding fields in the county. Only the treatment with Stratego plus Folicur showed evidence of phytotoxicity. Differences in seed quality, yield and weight/bu were not significantly different (Table 15).

Table 15. Soybean yields and seed weight from a double-cropped soybean fungicide trial conducted at the EVAREC in Warsaw, VA in 2008.*

Treatment and rate/A	Application growth Stage	% harvest moisture	Seed quality (1-5)	Yield (bu/A)	Bushel weight (lb)
Non-treated control	--	9.10	1.28	47.33	56.10
Quadris 2.08 SC 6.0 fl oz +COC 100 SL 1.0 % v/v	R3	8.95	1.35	51.45	56.08
Quilt 1.67 SC 14.0 fl oz + COC 100 SL 1.0 % v/v	R3	9.35	1.43	44.60	56.68
Stratego 250 EC 10.0 fl oz +Induce 100 SL 0.125 % v/v	R3	9.30	1.28	46.80	54.73
Domark 230 ME 5.0 fl oz	R3	9.10	1.43	47.98	56.45
Headline 2.09 EC 6.0 fl oz	R3	9.00	1.43	51.70	55.40
Headline 2.09 EC 4.7 fl oz +Folicur 432 SC 3.1 fl oz	R3	8.98	1.43	49.15	56.03
Folicur 3.6 SC 4.0 fl oz	R3	8.98	1.43	48.58	56.55
Laredo 2.0 EC 7.0 fl oz + Induce 100 SL 0.125 % v/v	R3	8.95	1.43	47.75	55.63
Absolute 500 SC 5.0 fl oz	R3	8.95	1.43	47.13	56.23
Punch 3.3 EC 4.0 fl oz	R3, 14 da	9.10	1.43	47.10	56.55
Punch 3.3 EC 3.0 fl oz +Headline 2.09 EC 4.5 fl oz	R3, 14 da	9.05	1.28	47.58	56.33
Folicur 2.6 SC 4.0 fl oz	R3, 21 da	8.95	1.35	47.43	56.65
Stratego 250 EC 10.0 fl oz +Induce 100 SL 0.125 % v/v	R3, 21 da	9.20	1.20	46.73	57.03
Absolute 500 SC 5.0 fl oz	R3, 21 da	9.10	1.28	46.28	56.18
Quadris 2.08 SC 6.2 fl oz + Alto 100 SL 4.0 fl oz + NIS 100 SL 0.25 % v/v	R3	8.98	1.50	48.35	56.68
Quadris Extra 2.34 SC 4.0 fl oz + NIS 100 SL 0.25 % v/v	R3	9.20	1.50	45.80	56.40
Statego 250 SL 10.0 fl oz +Proline 480 SC 1.0 fl oz	R3, 21 da	9.13	1.35	44.55	56.93
Stratego 250 EC 10.0 fl oz +Folicur 3.6 SC 3.6 fl oz	R3, 21 da	9.13	1.43	46.48	55.90
Punch 3.3 EC 0.75 fl oz +Headline 2.09 EC 4.5 fl oz	R3, 21 da	9.15	1.28	46.23	56.25

* Treatments were applied at beginning seed (R_3) on 13 August and 27 August, or 3 September (14 or 21 days later). Means were not significantly different according to Student-Newman-Keuls LSD at P=0.05.

Summary: SBR Incidence and the Response of Soybeans to Fungicides in 2008

1. A total of 219 samples of soybean leaflets were examined from 10 regional sentinel plots and 163 samples from commercial fields in 33 counties for detection of SBR in 2008.

2. Sentinel plots were established at the Tidewater AREC (Suffolk), Chesapeake, Greensville County, Mecklenburg County, Shenandoah County, Charles City County, Northern Piedmont AREC (Orange), Eastern Virginia AREC (Warsaw), Eastern Shore AREC (Painter), and Northampton County. Samples of 100 leaflets were collected and processed for detection of SBR at 2-week intervals until flowering and thereafter weekly until crop maturity.

3. The first outbreak of SBR, caused by *Phakopsora pachyrhizi*, was found in leaf samples from Chesapeake on October 1; thereafter, the disease was confirmed in 10 counties and cities (Chesapeake, Suffolk, Surry, Sussex, Virginia Beach, Isle of Wight, Southampton, Mecklenburg, Accomack, and Northampton).

4. No loss of yield to SBR was expected since the disease appeared after soybeans were beyond growth stage R6 (full seed).

5. The slow build up of SBR on soybeans to the south of Virginia coupled with above normal temperatures and below normal rainfall in June, July and August were generally unfavorable for SBR infection and development in the southeastern U.S.

6. Dry weather stress during the season limited development of common diseases in soybeans throughout most of 2008 (i.e. Cercospora blight, purple seed stain, brown spot, frogeye leaf spot, anthracnose, pod and stem blight, etc.).

7. Fungicide treatments with Headline, Absolute, Quadris, Quadris Extra, Quilt, Stratego, Punch, Folicur, Absolute, Domark, Laredo, and Headline + Folicur showed no effect on yield in nine replicated field trials in 2008.

8. One fungicide trial planted on 7 July at the Tidewater AREC (Suffolk) showed significant levels of SBR prior to harvest. A single application of Headline 2.08EC 6 fl oz/A on September 4 resulted in the most effective control of SBR and increased yield significantly.