

Control of soybean rust in a determinate cultivar at the Rattray Arnold Research Station, Zimbabwe, 2004-05.

Soybeans were planted 17 Dec 04 in 30-in row widths at the Rattray Arnold Research Station near Harare, Zimbabwe. An early-planted, early-maturing border was planted around the test provide additional inoculum. The experimental design was a split plot with four replications. The main effects were fungicide treatment, i. e. product and rates, with 2-application and 3-application programs as the subplots. Plots were 6 rows wide, with 4 rows receiving the fungicide applications. Four rows of each plot were harvested, with a harvest length of 16.4 ft. Fungicides were applied using a rate of 40 gal/A with a hand-operated backpack sprayer fitted with a pressure regulator and a Lurmark® F110/1.6/3 flood-jet nozzle. The first application was made 50 days after planting (DAP) with subsequent applications 20 days apart. Soybean rust was rated as a percentage of leaf area affected in the lower, mid and upper canopy on each date of evaluation, the mean of these values were obtained to produce a single severity value for each date. These means were then used to produce an area under disease progress curve (AUDPC). The data was not transformed since preliminary analysis indicated it was not warranted. The defoliation within each plot was visually evaluated as a percent defoliation on 30 Mar 05, at 103 DAP. Plots were harvested 133 DAP. Yields were calculated in bu/A at 13% moisture.

Soybean rust was first recorded in the plots on 10 Mar 05, at 83 DAP, between the second and third fungicide application, thus all treatments were applied as a protectant. The only plots where soybean rust was seen on this date were the unprotected controls where a visual severity of 5% was reported in the lower canopy. There were significant differences among the treatments for AUPDC, defoliation and yield. All treatments had significantly lower disease severity and less defoliation than the unprotected control. However, only 10 of the 19 treatments had significantly greater yield than the unprotected control. The difference between the 2-application program and the 3-application program was also significant; the 2-application program had more severe disease, and greater defoliation than the 3-application program when means were compared. The mean yield of the 2-application program was less than that of the 3-application program, but not significantly. There was a significant treatment by application program interaction with AUDPC but not with defoliation or yield. However, there were treatments where there were apparent differences between the 2 and 3 applications for defoliation and yield. These differences show a trend where the residual activity differs among the products. No phytotoxicity was observed in any treatments.

Fungicide, rate per acre	Soybean rust severity (AUDPC) ²			Defoliation %			Yield (bu/A)					
	2 applications ³		3 applications ³	2 applications		3 applications	2 applications		3 applications			
			Mean ⁴			Mean ⁴			Mean ⁴			
Headline 250EC, 9.2 fl oz ^w	0	F	0	F	0	11	6	9	I	54.0	59.3	56.7 A
Caramba 90SL ^y + Headline 250EC, 9.2 + 4.1 fl oz	0	F	0	F	0	29	14	21	HI	55.1	53.1	54.1 A B
Caramba 90SL ^y + Headline 250EC, 8.2 + 4.8 fl oz	88	DE	6	EF	47	30	21	26	GHI	52.0	51.8	51.9 B C
Impact 125SC, 6.9 fl oz.....	0	F	0	F	0	36	29	33	FGH	49.4	54.0	51.7 B C
Caramba 90SL ^y , 8.2 fl oz.....	216	B C	6	EF	111	30	16	23	HI	48.2	53.6	50.9 B C D
Stratego 250EC, 12 fl oz ^w	181	C	72	EF	127	46	34	40	DEFGH	49.9	49.8	49.8 B C D E
Caramba 90SL ^y + Headline 250EC, 7.8 + 3.6 fl oz	28	EF	28	EF	28	38	31	34	FGH	52.0	47.6	49.8 B C D E
Folicur 3.6F, 4 fl oz.....	28	EF	0	F	14	48	29	38	EF GH	48.1	50.7	49.4 C D E F
Punch EC, 3 fl oz.....	28	EF	9	EF	19	34	33	33	FGH	50.1	47.8	49.0 C D E F G
Caramba 90SL ^y + Headline 250EC, 6.1 + 3.6 fl oz	275	B	81	EF	178	56	51	54	B C D E F	48.8	48.9	48.9 C D E F G
Stratego 250EC, 8.4 fl oz ^w	53	EF	0	F	27	38	25	31	FGHI	45.1	50.2	47.6 C D E F G H
Domark 230ME, 5.1 fl oz.....	0	F	0	F	0	75	70	73	AB	48.6	45.8	47.2 D E F G H
Punch EC, 4.3 fl oz.....	0	F	0	F	0	58	66	62	A B C D	44.5	49.8	47.2 D E F G H
Echo 720 F, 27.4 fl oz.....	238	B C	56	EF	147	65	40	53	B C D E F	45.7	48.6	47.1 D E F G H
Folicur 3.6F, 3 fl oz.....	44	EF	0	F	22	65	33	49	C D E F G	47.9	46.0	47.0 D E F G H
SA 120 201EC, 6.9 fl oz.....	0	F	0	F	0	49	45	47	C D E F G	46.7	46.7	46.7 D E F G H
Rubigan EC 11 fl oz ^w	0	F	0	F	0	78	58	68	A B C	47.0	45.9	46.5 E F G H
Procare 2EC, 20 fl oz.....	166	C D	31	EF	98	71	48	59	B C D E	46.3	44.7	45.5 F G H
Plantvax 4F, 21.4 fl oz.....	0	F	0	F	0	69	68	68	A B C	43.0	46.6	44.8 G H
No fungicide.....	447	A	521	A	484	80	88	84	A	44.4	43.4	43.9 H
Application program mean ⁵	90		41		50		40			48.3	49.2	
	a		b		a		b					

² Area under the disease progress curve.

³ Significant differences between treatments, (p=0.05), however, three was also a significant treatment by application number interaction, means with the same letter are not significantly different by Students LSD.

⁴ Significant differences between treatments when 2-application and 3-application data were combined, (p=0.05) means with the same letter are not significantly different by Students LSD.

^w 0.125% NIS was included in the treatment.

^y Application at growth stage R1 was Folicur 3.6F, 4 fl oz, second and third applications were Caramba 90SL at listed rate.

⁵ Significant difference between the means of the application programs, (p=0.05) means with the same letter are not significantly different by Students LSD.