

Table 1. Yield losses by stripe rust and increases by fungicide application on winter wheat varieties in experimental plots under natural infection near Pullman, WA in 2010

Cultivar	Acreage in 2010		Stripe rust AUDPC ^{b,c}			Yield (BU/A) ^c			Yield loss (%)	Yield Inc. (%)	Test Weight (LB/BU) ^c	
	Acres ^a	%	Check	Fungicide		Check	Fungicide	Difference	by stripe rust	by fungicide ^e	Check	Fungicide
AP700CL	48,000	2.74	171.38	36.00	*	116.76	115.12	-1.64	-1.43	-1.41	58.75	59.10
Bauermeister	29,500	1.69	1053.75	392.50	***	67.28	84.75	17.47	20.61	25.96	57.97	58.43
Bruehl	168,900	9.65	78.75	36.00	***	95.27	102.05	6.78	6.65	7.12	57.13	56.78
Brundage 96	39,400	2.25	397.50	82.63	**	98.37	110.98	12.61	11.36	12.82	57.83	58.61
Buchanan	25,700	1.47	345.75	230.38	**	93.32	89.06	-4.25	-4.77	-4.56	57.87	58.19
Cashup	15,800	0.90	1117.63	291.25	**	78.78	88.11	9.33	10.59	11.84	59.17	59.14
Chuckar	17,800	1.02	60.50	27.00		106.62	114.81	8.19	7.14	7.68	59.21	59.56
Declo	10,900	0.62	2752.50	566.88	***	42.15	75.27	33.12	44.00	78.58	54.56	56.67
Eddy	34,000	1.94	1915.75	330.13	***	71.37	92.53	21.16	22.87	29.65	60.69	61.92
Eltan	309,850	17.71	728.25	265.25	*	85.99	96.05	10.07	10.48	11.71	56.60	56.74
Farnum	10,900	0.62	67.25	9.00	*	66.43	67.93	1.51	2.22	2.27	59.49	59.77
Finley	42,500 ^d	2.43	297.25	71.38	*	61.70	64.98	3.28	5.04	5.31	62.17	62.73
Lambert	13,150	0.75	2373.75	409.50	***	64.43	96.65	32.22	33.34	50.01	56.56	58.04
Madsen	95,100	5.43	39.88	9.00		110.12	111.30	1.18	1.06	1.07	59.59	59.59
Masami	23,000	1.31	630.75	285.50	***	86.10	100.64	14.53	14.44	16.88	56.21	56.81
ORCF-102	169,000	9.66	580.88	184.63	**	90.04	102.57	12.53	12.22	13.92	57.48	58.19
ORCF-103	19,900	1.14	1342.50	450.63	***	83.07	97.35	14.28	14.67	17.19	56.81	56.78
Paladin	13,000	0.74	2103.13	713.00	***	63.72	80.03	16.31	20.38	25.60	58.29	59.56
PS 279	0	0.00	2937.50	1300.75	***	29.88	65.19	35.31	54.17	118.19	55.44	58.08
Rod	56,883	3.25	654.50	242.75	**	104.87	103.19	-1.69	-1.63	-1.61	57.52	57.41
Stephens	27,100	1.55	1202.50	196.25	***	102.07	116.44	14.37	12.34	14.08	58.15	58.61
Tubbs 06	16,200	0.93	2036.25	487.00	***	78.75	102.32	23.57	23.03	29.93	55.65	56.32
Westbred 528	108,100	6.18	513.63	135.00	*	97.44	108.21	10.77	9.95	11.05	59.35	59.95
Xerpha	159,766	9.13	1624.38	495.75	**	70.49	95.44	24.95	26.15	35.40	57.83	58.43
<i>Mean</i>			1042.74	302.01	***	81.88	95.04	13.17	14.79	21.61	57.93	58.56
<i>Mean (Excl. PS 279)</i>	(83.11)		960.36	258.58	***	84.14	96.34	12.20	13.07(9.36 ^f)	17.41	58.04	58.58

^a Acreages of cultivars Eltan, ORCF102, Westbred 528, Madsen, Stephesn, Masami, and Lambert include half or third of acreages in mixture.

^b AUDPC (area under the disease progress curve) is a measure of disease severity over time.

^c Significant levels: * at $P = 0.05$; ** at $P = 0.01$; and *** at $P = 0.001$.

^d The acreage is the total of both Finley and Fineway.

^e Fungicide Tilt (4.0 az/A plus M-90 (1% v/v) was sprayed at the early boot stage (1 June) when susceptible check PS 279 had 1% rust severity.

^f The average percent of yield loss is adjusted by percentage of the cultivars.

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Summary of the 2010 Winter Wheat Yield Loss and Fungicide Study

1. The 2010 stripe rust epidemic had a potential to cause yield loss of 54% if all fields had planted with cultivars as equally susceptible as 'PS 279'.
2. Stripe rust would have caused an average 9.36% yield loss on the winter wheat crops without the application of fungicides.
3. The cultivars that have various level of resistance grown in 2010 could have reduced yield loss from 54% to 9.36% without fungicide application.
4. Fungicide application, if sprayed on time like in this study, should save crops from over 9% yield loss in average.
5. If all of the winter wheat fields had grown with cultivars with the resistance level of Madsen, yield loss would have been less than 1% (insignificant), without spraying fungicides.