BARLEY (*Hordeum vulgare* 'Russell')
Stripe rust; *Puccinia striiformis* f. sp. *hordei*

Xianming Chen and David A. Wood
USDA-ARS and Dept. of Plant Pathol., WSU
P.O. Box 646430
Pullman, WA 99164-6430

Fungicide seed treatments for reducing yield losses caused by stripe rust on spring barley, 2006.

The study was conducted in a field with Palous silt loam under natural infection of stripe rust near Pullman, WA. Urea (46-0-0) was applied at 11.3 kg/ha at the time of cultivation. Seed of susceptible 'Russell' spring barley was treated with Raxil, Dividend Extreme, Apron XL, and various rates of BAS 595XEF combined with Apron XL at 5.56 ml/100 kg and with or without Charter at 400 ml/100 kg. Non-treated seed served as check. The treated seed was planted at 11.3 kg/ha in rows 0.3 m apart with an experimental drill planter on 28 Apr. Harmony Extra 4.16 g plus Buctri 0.17 L/ha with Agridex at 1% of spray volume was applied on 30 May at tillering stage. A randomized block design was used with four replications for each treatment. Stripe rust severity (percent of diseased foliage) was assessed for each plot on 29 Jun at late boot stage; 10 Jul at flowering stage; and 24 Jul at soft dough stage. Area under disease progress curve (AUDPC) was calculated for each plot using the three sets of rust severity data. Relative AUDPC was calculated as percent of the non-treated check. Plots were individually measured at the time of harvest and plot area ranged from 6.6 to 7.7 m^2. Plots were harvested on 15 Aug when kernels were naturally dry, and test weight of kernels was measured for each plot. Rust severity, relative AUDPC, test weight, and yield data were subjected to analysis of variance and means were separated by Fishers protected LSD test.

Mean severity of stripe rust in non-treated check plots was 1.3, 20.0, and 62.5% on 29 Jun, 10 Jul, and 24 Jul, respectively. When the first note of stripe rust severity was recorded on 29 Jun when plants were at late boot stage, stripe rust was less than 5% in all plots. Even through some differences were observed among treatments, they were generally not significant from the non-treated check. When the second note of rust severity was recorded on 10 Jul at flowering stage, plants in the non-treated check plots had 20% severity. Only the treatment with Charter at 400 ml/100 kg, BAS 595XEF at 200 ml/100 kg, and Apron XL at 5.56 ml/100 kg had stripe rust severity significantly lower than that of the non-treated check. Similarly, only this treatment had an AUDPC value significantly lower that that of the non-treated check. As the result of stripe rust reduction, only this treatment significantly increased yield compared with the non-treated check, although all fungicide treatments, except for the treatment of BAS 595XEF at 150 ml/100 kg combined with Apron XL at 5.56 ml/100 kg, increased yield by 2.9 to 14.1%. There were no significant differences in grain test weight among the treatments and non-treated check. The generally low efficacies of the fungicide treatments was due to the low pressure of barley stripe rust, in contrast to the high pressure of wheat stripe rust at the same field location.

	Stripe rust severity (%)[y]				Test	Yield[w]	
	29 Jun	10 Jul	24 Jul	Relative	weight	Mean	Increase
Seed treatment, rate[z]	Late boot	Flowering	Soft dough	AUDPC[x]	(kg/L)	(kg/h)	(%)
Charter, 400.0 ml/100 kg + BAS 595XEF, 200.0 ml/100 kg + Apron XL, 5.56 ml/100 kg …….	1.0 c[v]	6.3 c	55.0 b	67.5 b	0.69 a	6422 a	14.1
Charter, 400.0 ml/100 kg + BAS 595XEF, 50.0 ml/100 kg + Apron XL, 5.56 ml/100 kg …….	2.0 a	20.0 ab	60.0 ab	98.1 a	0.68 a	6230 ab	10.7
Dividend Extreme, 260.0 ml/100kg …….	1.3 bc	13.8 abc	70.0 ab	96.3 a	0.68 a	6122 ab	8.7
BAS 595XEF, 50.0 ml/100 kg + Apron XL, 5.56 ml/100 kg …….	2.0 a	11.3 bc	70.0 ab	92.4 ab	0.69 a	5982 ab	6.2
Raxil MD, 423.8 m;/100 kg …….	1.3 bc	12.5 abc	72.5 a	96.6 a	0.68 a	5973 ab	6.1
BAS 595XEF, 100.0 ml/100 kg + Apron XL, 5.56 ml/100 kg ……..	1.0 c	22.5 a	70.0 ab	111.9 a	0.68 a	5915 ab	5.1
Apron XL, 5.56 ml/100 kg ……..	1.5 abc	18.8 ab	65.0 ab	100.5 a	0.68 a	5793 ab	2.9
BAS 595XEF, 150.0 ml/100 kg + Apron XL, 5.56 ml/100 kg ……..	1.8 ab	12.5 abc	65.0 ab	89.4 ab	0.68 a	5630 b	0.0
Non-treated check ……	1.3 bc	20.0 ab	62.5 ab	100.0 a	0.68 a	5630 b	0.0
LSD ($P \leq 0.05$) …….	0.6	11.0	15.5	28.4	0.01	742.3 b	

[z] Seed was treated with the fungicides before planting .
[y] Stripe rust severity was recorded as percentage of leaf area with disease.
[x] AUDPC stands for area under disease progress curve, = ∑[rust severity (i) + rust severity (i+1)]/2*days. Relative AUDPC was calculated for each treatment as the percent of the AUDPC (as 100%) of the non-treated control.
[w] Yield was calculated based on 3-5% moisture for each plot.
[v] Column numbers followed by the same letter are not significantly different at $P = 0.05$ as determined by LSD test.