



Wheat and barley response to stripe rust and fungicides

CATEGORY [disease](#) | March 18, 2020

When stripe rust severity was low, resistant and intermediate wheat and barley varieties did not suffer significant yield losses. When leaf spot and stripe rust disease levels were high, a foliar fungicide application was necessary to reduce yield losses even on resistant varieties.

Seven spring wheat and 3 barley varieties/cultivars with varying levels of stripe rust resistance were compared for disease reaction, and yield and quality losses at Lacombe and Olds, Alberta, from 2012 to 2014. Fungicide application was used to compare disease severity and yield components between protected and non-protected plots under disease pressure from natural infection conditions.

A foliar application of propiconazole (Tilt 250EC) at the recommended rate was made when 5 to 10% stripe rust severity was observed on the susceptible varieties between the flag leaf emergence stage (GS 37) to the late heading stage (GS 59).

Disease assessments were made at 7 to 14 day intervals until plants were at the dough development stage. Stripe rust caused by *Puccinia striiformis* was the major disease observed during the 3-year test.

In 2012 and 2013 at Lacombe and 2013 at Olds, a foliar application of Tilt resulted in 20% higher yield for the highly susceptible wheat variety AC Crystal under moderate stripe rust severity. Severe yield losses did not occur with resistant and moderately resistant varieties that had stripe rust severity of less than 1 to 4.1% severity compared to 62.8% severity on AC Crystal.

However, a moderate level of stripe rust and the leaf spot complex caused reductions in thousand kernel weight (TKW) ranging from 5.3% to 13.5% for all wheat and barley varieties tested except for Lillian wheat and Seebe barley, which did not have lower TKW.

Foliar fungicide necessary under high disease pressure

When stripe rust developed early in the growing season resulting in severe disease at Lacombe and Olds in 2014, significant yield losses without a foliar fungicide application were observed ranging from 17.6% on the moderately resistant AC Andrew wheat to 91% on the highly susceptible AC Crystal wheat. Yield losses in resistant and intermediate varieties were smaller than in susceptible cultivars, while CDC Imagine and Lillian wheat and Seebe barley did not incur significant yield losses.

Variety	Class	Stripe rust resistance	Leaf spot resistance	Yield (g/plot)		
				Lacombe and Olds 2014		
				Mean spray	Mean check	% loss reduction
AC Andrew	CWSWS	I	MR	2609	2149	17.6*
AC Crystal	CNHR	S	I	2159	193	91.1*
CDC Abound	CWRS	MS	MS	1934	909	53.0**
CDC Imagine	CWRS	I	MS	1748	1466	16.1
Harvest	CNHR	MR	MS	1952	1162	40.5**
Lillian	CNHR	R	MS	1672	1424	14.8
Snowwhite 476	CPS-W	S	MS	1962	813	58.6**
Mahigan	6-row barley	MS	I	1819	1339	26.4*
Seebe	2-row barley	R	MS to S	2040	1816	11.0
H98077001	6-row barley	S	I	1675	815	51.3**

*, ** Significant at P = 0.05 and 0.01

Source: Adapted from Kumar et al. 2019

Severe TKW and test weight losses also occurred for susceptible wheat and barley varieties under severe disease pressure.

One foliar fungicide application helped to protect susceptible varieties from stripe rust, and helped to protect yield potential. However, if stripe rust becomes well-established (five to 10% stripe rust severity) at or before the flag leaf emergence stage, severe yield losses can be expected if a fungicide is not applied to highly susceptible varieties. Additionally, a dual application of fungicide may be needed, such as at or just before flag leaf emergence and then again after heading.

Farmers are also encouraged to not rely exclusively on ratings from the provincial variety guides as shifts in stripe rust pathogen virulence can occur, which result in resistant varieties exhibiting more susceptible reactions. Although ratings are updated on an annual basis, in-field crop scouting is still critical, while following rust risk forecasts can also identify prairie regions where timely scouting is required.

This research was supported by Alberta Crop Industry Development Fund (ACIDF), Brewing & Malting Barley Research Institute, Alberta Barley Commission and Alberta Agriculture and Forestry

Krishan Kumar, Kequan Xi, Thomas K. Turkington, Mazen Aljarrah & Flavio Capettini (2019) Yield responses in spring wheat and barley cultivars, varying in stripe rust resistance in central Alberta, Canadian Journal of Plant Pathology, DOI: [10.1080/07060661.2019.1680443](https://doi.org/10.1080/07060661.2019.1680443)