



## Target the flag leaf or early anthesis for leaf spot disease control in spring wheat

CATEGORY [disease](#) | *July 6, 2021*

The most profitable practices were applications of propiconazole (Tilt 250E0), benzovindiflupyr and azoxystrobin (Trivapro A+B) at BBCH 39-45 (flag leaf) or prothioconazole and tebuconazole (Prosaro XTR) at BBCH 61-63 (early anthesis) -- when environmental conditions were conducive for disease development.

The objective of this study was to determine the effects of four, single foliar fungicide application timings on leaf spot disease severity, yield, quality and economics of modern Canadian Western Red Spring (CWRS) wheat varieties.

Field experiments were conducted at Barrhead, Bon Accord, Red Deer, and an irrigated site at Lethbridge in 2018 and 2019. AAC Brandon and AAC Viewfield were grown in each year.

AAC Brandon expressed resistance to the prevalent races of leaf, stem, and stripe rust. It is moderately resistant to loose smut and Fusarium head blight (FHB). AAC Viewfield has intermediate resistance to FHB. It expressed resistance to yellow rust and stem rust and moderate resistance to leaf rust and common bunt. Both cultivars have improved disease resistance over previously grown varieties.

The fungicide treatments included Tilt 250E (propiconazole) and Trivapro A+ B (azoxystrobin + propiconazole + benzovindiflupyr) applied at BBCH 22-23 (herbicide timing). Both fungicide products are registered to control Septoria leaf spot (*Septoria* spp.) and tan spot (*Pyrenophora triticirepentis*) at this stage. Trivapro A+B was also applied at BBCH 30-32 (plant growth regulator timing) and at BBCH 39-45 (flag leaf timing).

Prosaro XTR (prothioconazole + tebuconazole) was applied at BBCH 61-63 (FHB timing), which is registered to control leaf blotch (*Septoria tritici*), glume blotch (*Stagonospora nodorum*), tan spot (*Pyrenophora triticirepentis*), and suppression of FHB (*Fusarium* spp.).

These fungicide treatments were compared with the non-treated control on the two CWRS wheat varieties.

Site-years were separated into 'responsive' sites that had a significant yield response to fungicide treatments, and 'non-responsive' sites that did not show a yield response. Responsive site-years were characterized by higher relative humidity (65.4 - 74.0%) and an average 10.8 inches (273 mm) of precipitation, and had 32% higher foliar disease levels compared with the non-responsive sites. The non-responsive sites received an average of 6.9 inches (175 mm) of observed precipitation.

### **No benefit from early fungicide application**

There were no significant yield responses to the fungicide treatments at non-responsive site years.

The responsive sites had significant yield differences between fungicide treatments, but no significant fungicide × site-year or cultivar × fungicide × site-year interactions. As a result, fungicide response analysis was based on fungicide treatment averaged over the four responsive sites and both cultivars.

The Tilt 250E and Trivapro A+B treatments at BBCH 22-23 along with the non-treated control had the highest leaf spot disease severities of any fungicide treatments in early to mid-August. The fungicide treatments at BBCH 22-23 had 54% higher leaf spot severity and BBCH 30-32 was 42% higher compared with the fungicide treatment at BBCH 39-45.

There were also no significant yield differences between the non-treated control and fungicide applications at BBCH 22-23 or BBCH 30-32. This suggested there was no yield advantage associated with early fungicide applications, and this practice provides no economic benefit to growers.

The lowest leaf spot disease severities were observed for Trivapro A+B applications at BBCH 39-45. The fungicide application of Prosaro XTR at BBCH 61- 63 resulted in 27% more leaf disease than the application at BBCH 39-45, but was not significantly different. Both fungicide products are registered to control the dominant leaf spot diseases, and the results suggests that a fungicide application at anthesis (BBCH 61-63) may also be helpful in controlling leaf spot diseases.

The thousand kernel weight was significantly greater at the later fungicide application timings (BBCH 39-45 and BBCH 61-63) relative to the earlier fungicide treatments and the non-treated control.

Days to maturity, test weight, protein and FHB/DON were not affected by fungicide applications.

The highest yield was achieved with the Prosaro XTR application at early anthesis (BBCH 61-63) at 110 bu/ac (7.40 t/ha), which was a significant 10.8% yield increase over the non-treated control of 99 bu/ac (6.68 t/ha).

The next highest yield came from spraying at the flag leaf stage with Trivapro A+B with a yield of 109 bu/ac (7.37 t/ha) and statistically similar to the Prosaro XTR treatment.

The lowest yielding treatment was fungicide application with Trivapro A+B at BBCH 30-32 at 100 bu/ac (6.77 t/ha), which was not significantly different from the non-treated control or the BBCH 22-23 treatments.

An economic analysis was conducted based on the cost of fungicide and application costs, yield, and current wheat prices at the time of the study.

In this study, the Trivapro A+B treatment at flag leaf (BBCH 39-45) and the Prosaro XTR treatment at BBCH 61-63 in 2018 or 2019 would be the two most economical choices for growers when environmental conditions were favorable for disease development. Earlier applications would not have provided an economic benefit.

Although this study found that later fungicide applications resulted in the greatest yield, it is important to note that yield responses occurred only at 50% of the site-years. Growers should base fungicide application decisions on the disease triangle of environment, pathogen and host cultivar.

---

This research was supported by Saskatchewan Wheat Development Commission, Alberta Innovates and Alberta Wheat Commission (2018F056R). In-kind project support was provided by Alberta Agriculture and Forestry (AAF), Syngenta, and the University of Alberta.

Miss. Mahnoor Asif, Dr. Sheri Strydhorst, Dr. Stephen Strelkov, Mr. Allen Terry, Dr. Michael Harding, Dr. Jie Feng, and Dr. Rong-Cai Yang. Evaluation of disease, yield and economics associated with fungicide timing in Canadian Western Red Spring wheat. *Canadian Journal of Plant Science*. **Open Access:** <https://doi.org/10.1139/CJPS-2020-0318>

Photo credit S. Strydhorst.