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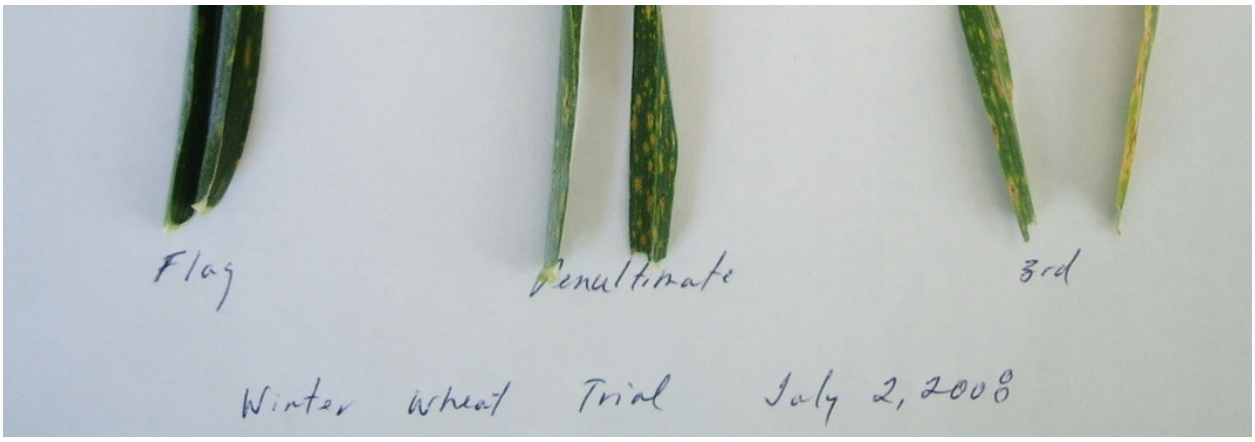


# Winter wheat leaf spot control

CATEGORY **disease** | ***June 9, 2022***

Using a cultivar with greater disease resistance and applying a fungicide reduced leaf spot diseases in winter wheat. Fungicide application resulted in a 3.3 to 13.2% (2 to 8 bu/ac) yield increase over the untreated check.

Leaf spot diseases are commonly seen on winter wheat in western Canada and include tan spot (*Pyrenophora tritici-repentis*), the Septoria complex (*Zymoseptoria tritici* and *Parastagonospora nodurum*), and spot blotch (*Bipolaris sorokiniana*). Powdery mildew (*Blumeria graminis*) can also occur under cool, dry conditions.

Disease management for crops in general is best achieved through an integrated approach that includes the use of resistant cultivars, cultural practices, and fungicide application. However, there is little published research on disease management for winter wheat in western Canada. In addition, the variety selection guides used by farmers and agronomists to compare and select winter wheat varieties do not include information on leaf spot disease resistance for winter wheat cultivars. When it comes to fungicide application, little guidance on the timing of application is available to

farmers wanting to incorporate chemical control into their winter wheat disease management program.

Research was carried out to evaluate the response of two winter wheat cultivars, each rated differently for leaf spot resistance, to fungicide applications at the beginning of stem elongation, at flag leaf, and split applications at both of the two timings. The winter wheat varieties used were CDC Osprey (susceptible to leaf spots based on researcher observations), and McClintock (moderately susceptible to leaf spot diseases). The experiments were conducted from 2006 to 2008 at Lacombe, AB (2006, 2007), Melfort, SK (2006, 2008), and Brandon, MB (2006, 2007), for a total of six site-years.

In total, eight different fungicide treatments were compared to an untreated check, all applied using 40 L/ac (100 L/ha) of water, except for propiconazole at 80 L/ac (200 L/ha) of water:

(1) Pyraclostrobin (Headline) at flag leaf (fully emerged, BBCH 39)
(2) Propiconazole + trifloxystrobin (Stratego) at flag leaf
(3) Mancozeb (Dithane) at flag leaf
(4) Propiconazole (Tilt, high rate, 200 mL/ac) at flag leaf
(5) Propiconazole (Tilt, high rate, 200 mL/ac) at beginning of stem elongation (BBCH 30)
(6) Propiconazole (Tilt) split application with low rate (100 mL/ac) at stem elongation and low rate (100 mL/ac) at flag leaf
(7) Propiconazole (Tilt) and mancozeb (Dithane) split application with low rate (100 mL/ac) propiconazole at stem elongation and mancozeb at flag leaf
(8) Mancozeb (Dithane) and propiconazole (Tilt) split application with mancozeb at stem elongation and low rate (100 mL/ac) propiconazole at flag leaf.

**Cultivars with better genetic disease resistance help in managing leaf spot diseases**

Tan spot and the Septoria complex were the two main leaf spot diseases observed in the study. Powdery mildew occurred only at Melfort in 2008. To assess cultivar leaf disease performance, leaf spot severity was rated on the flag and penultimate leaves as well as on the entire plant, at the soft dough stage (BBCH 85). Leaf spot severity ranged from trace amounts to 64% for the average rating of the combined flag and penultimate leaf stages.

McClintock had consistently lower leaf spot ratings compared to CDC Osprey. This lower disease severity was also correlated to the higher thousand kernel weight (TKW) and higher test weight of McClintock compared to CDC Osprey.

### Fungicides improve leaf disease control

In general, the use of fungicides reduced leaf spot disease severity, resulting in increased yield and improved quality (TKW, test weight, plump kernels) in this study. The highest yield, for example, was 69 bu/ac for the split application of Tilt compared to 61 bu/ac for the untreated check. Specific results were as follows:

1. **Fungicide Timing (Stem Elongation vs Flag Leaf)**

No significant differences were found between high-rate Tilt applied at stem elongation compared to the fungicides applied at flag leaf, meaning that leaf spot severity, yield, or grain quality was not affected by application timing.

The researchers commented that precipitation during the study years was generally lower than the long-term averages at the sites, particularly in July, with the exception of Melfort in 2008, which received above-average rainfall in July. These lower moisture conditions were not as conducive for disease development as might occur in years with greater precipitation, particularly in July; therefore, potential differences in fungicide timing may become more apparent in wetter years.

2. **Type of Application (Single Flag Leaf vs Split Application)**

Leaf spot disease severity was significantly lower in the split application treatments compared to the single fungicide applications at flag leaf, although disease ratings were quite low. The lower disease severity translated into slightly higher yield for the split applications.

3. **Performance of Individual Fungicides at Flag Leaf Timing**

At the flag leaf application, disease severity from the individual fungicide treatments, ranked from lowest to highest severity, was: Headline < Stratego < Tilt < Dithane.

Yield and quality results between fungicide products were somewhat varied. Yield, TKW, test weight, and plump kernels were highest for Headline and Stratego. Protein was the highest for Stratego, followed by Tilt, which had only slightly higher protein than Headline. Overall, Stratego resulted in the highest yield and quality, while Dithane performed the lowest in these categories. Once again, although these differences were significant, the differences were relatively minor due to the overall low levels of disease.

### 4. Performance of Split Application Fungicide Treatments

There were no differences between the split application fungicide treatments, except for TKW. Low-rate propiconazole at stem elongation plus mancozeb at flag leaf resulted in slightly lower TKW than the other two split application treatments. Leaf spot severity ratings were higher, although not significant, for this treatment which may explain the lower TKW compared to the other split application treatments.

### Integrated disease management improved control

In this study, there was no significant interaction between cultivar and fungicide, despite McClintock having less disease than CDC Osprey. While McClintock did have a better rating to leaf spots (moderately susceptible) compared to CDC Osprey (susceptible), in the end, McClintock suffered significant disease severity. As a result, McClintock still benefitted from the use of fungicides. The researchers suggested that cultivars with greater differences in genetic disease resistance may respond differently to fungicide applications.

This study concluded that cultivar resistance and fungicide use are both valuable disease management strategies for winter wheat. Fungicide use should be decided by disease presence (influenced by previous history of disease, crop residue as a source of inoculum, crop rotation), weather conditions, cost of fungicide and application, and expected crop value. Split fungicide applications may increase yield and grain quality. Using a strobilurin fungicide mixed with a fungicide of a different group may increase disease control, contributing to higher yields and quality. Also, for fungicide insensitivity management, tank-mixing products from high-risk fungicide groups, such as strobilurins, with a product from a low-risk group may help delay pathogen insensitivity to fungicides.

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Kutcher, H.R., Turkington, T.K., McLaren, D.L., Irvine, R.B., and Brar, G.S. 2018. Fungicide and cultivar management of leaf spot diseases of winter wheat in western Canada. Plant Disease. 102: 1828-1833.

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