Management of leaf spotting diseases of winter wheat in western Canada

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Introduction

Leaf spotting diseases of winter wheat are frequently observed in western Canada. The most common leaf spotting diseases are tan spot [*Pyrenophora tritici-repentis* (Died.) Drechs.], Septoria complex [*Septoria tritici* Roberge in Desmaz. and *Stagonospora nodorum* (Berk.) Castellani & E.G. Germano], and spot blotch [*Cochliobolus sativus* (Ito & Kuribayashi) Drechs. Ex Dastur]. Powdery mildew [*Blumeria graminis* (DC.) E.O. Speer f.sp. *tritici* Ém. Marchal] is observed in years with conducive climatic conditions. Winter wheat is believed to escape the impact of some insect pests and Fusarium head blight (*Fusarium* spp.) due to its early development and maturity. However, even though the impact of leaf spotting diseases and management practices to control the diseases have been evaluated in spring wheat, little research has been conducted on winter wheat in western Canada.

Objective

The objective of this study was to determine the benefit of varietal selection and various fungicides treatments to control leaf spot diseases of winter wheat in order to provide improved disease control strategies to growers and industry

Materials and Methods

Field experiments were conducted at Lacombe, Melfort and Brandon in 2006 and at Lacombe and Brandon in 2007 for a total of five site-years. Two winter wheat varieties with variation in susceptibility to leaf spotting diseases: Osprey (susceptible) and McClintock (less susceptible) were assigned to main plots of split-plot experiments and fungicide treatments to the sub-plots. Fungicide applications were made at either of two timings: A – stem elongation and B – flag leaf fully emerged. Treatments were as follows:

1) unsprayed check,
2) Headline (pyraclostrobin 250 g L-1 @ 0.125 kg ai ha-1) at timing B,
3) Stratego (propiconazole and trifloxystrobin @ 125 g L-1 each) at timing B,
4) Dithane Rainshield DG 75% (mancozeb @ 1.7 kg ai ha-1) at timing B,
5) Tilt (propiconazole 250 g L-1 @ 0.125 kg ai ha-1) at timing B,
6) Tilt (propiconazole 250 g L-1 @ 0.125 kg ai ha-1) at timing A,
7) Tilt (propiconazole 250 g L-1 @ 0.0625 kg ai ha-1) at each timing,
8) Tilt (propiconazole 250 g L-1 @ 0.0625 kg ai ha-1) at timing A and Dithane Rainshield DG 75% (mancozeb @ 1.7 kg ai ha-1) at timing B.

9) Dithane Rainshield DG 75 % (mancozeb @ 1.667 kg ai ha-1) at timing A and
Tilt (propiconazole 250 g L-1 @ 0.0625 kg ai ha-1) at timing B.

Flag and penultimate leaves of twenty five plants per plot were visually assessed for leaf spot diseases at the soft dough growth stage using the Horsfall-Barratt scale (converted to a percentage of foliage diseased) to evaluate the severity of infection. Plots were harvested to determine seed yield.

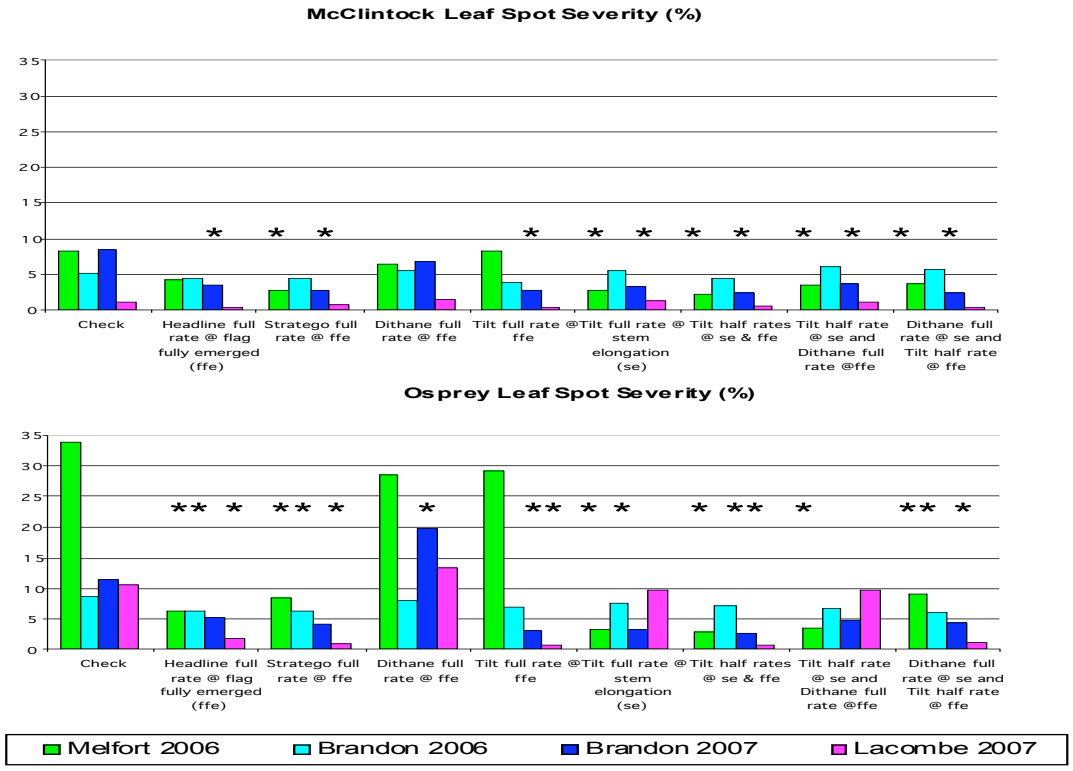

Figure 1. Leaf spotting disease severity (%) on winter wheat varieties Osprey and McClintock at at four site-years. Significant differences according to Dunnett's test ($P \leq 0.05$) between fungicide treatments and the unsprayed check are indicated by asterisks.

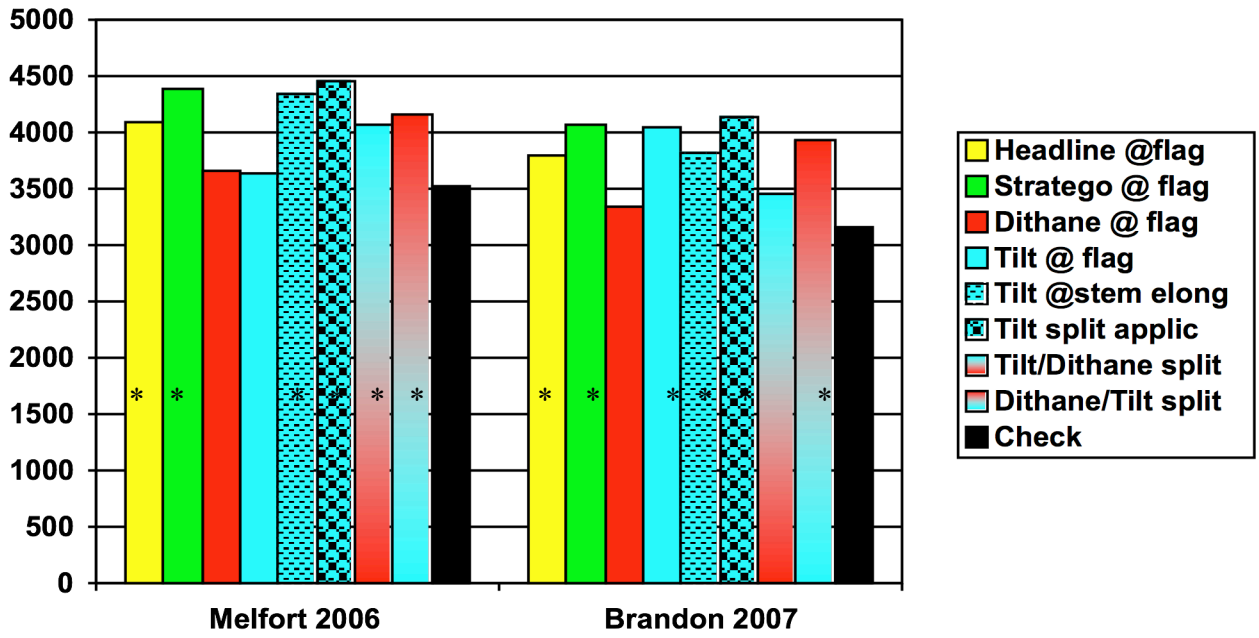

Figure 2. Seed yield (kg ha-1) of fungicide treatments averaged over varieties at two site-years. Significant differences according to Dunnett's test ($P \leq 0.05$) between fungicide treatments and the unsprayed check are indicated by asterisks.

Results

The severity of leaf spotting diseases of unsprayed check treatments ranged from trace levels at Lacombe in 2006 to 33.9% (variety Osprey) at Melfort in 2006 (Figure 1). Leaf spot severity of the unsprayed checks, averaged over the four site-years with significant leaf spotting symptoms, was almost three times greater on Osprey (16.1%) than on McClintock (5.8%). Significant interaction effects were observed between variety and fungicide treatments at all four site-years and indicated that the less susceptible variety (McClintock) either did not benefit in terms of symptom reduction from fungicide treatment or fewer of the treatments were effective. At the two site-years with the greatest leaf spotting disease severity, yield increases of 21 and 26% were detected when averaged over varieties and fungicide treatments (Figure 2). Application of Headline, Stratego and Tilt at recommended rates all reduced leaf spot symptoms over the unsprayed control. An anomaly occurred at Melfort in 2006 where Tilt applied at the full rate at flag leaf stage did not control the leaf spot disease complex or show an increase in yield. However, Tilt applied at stem elongation or in split applications reduced leaf spot symptoms and improved yield. In general, split applications of fungicide did not greatly enhance disease control or increase yield over a full rate application at the flag leaf stage. Leaf spot disease severity was

similar between application timing (stem elongation and flag leaf stages) at two site-years, but varied inconsistently for leaf spot severity and yield at two site years.

Conclusions

Varietal selection is an important leaf spot disease management practice in winter wheat production in western Canada. Fungicides were effective in decreasing disease severity and increasing yield at two of the five site-years. Little reduction in leaf spot severity or increase in yield was observed with split applications of fungicide as compared to the recommended rate application at the flag leaf stage.

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