



Fusarium head blight control in durum wheat

CATEGORY [disease](#) | June 10, 2025

Applying a foliar fungicide at BBCH65 (50% anthesis) effectively suppressed Fusarium head blight. Fusarium head blight suppression when application was delayed up to the end of anthesis at BBCH69 was statistically similar to application at BBCH65. Spray timing at BBCH59 when the wheat head was full emerged provided little benefit.

Fusarium head blight (FHB), caused primarily by *Fusarium graminearum*, has significantly reduced durum wheat yield and quality in recent years. Currently, no durum wheat varieties are rated as 'resistant' to FHB, with most rated as 'susceptible' or 'moderately susceptible', and three listed as 'intermediate', according to the Saskatchewan Varieties of Grain Crops 2025. As a result, durum growers rely on an integrated approach to help manage the disease, including selecting the most resistant variety, using a diverse crop rotation and using a fungicide to suppress the disease when the environment looks conducive for disease development. Growers can follow the Prairie-wide Fusarium head blight risk maps <https://prairiefhb.ca/map> to help determine their FHB risk during the growing season to help guide foliar fungicide application.

The current foliar fungicide application recommendation is when at least 75% of the heads on the main stem are fully emerged up to 50% anthesis (BBCH 58-65). A research trial was conducted from 2015 to 2018 to further refine application timing at two seeding rates on FHB index, Fusarium-damaged kernels (%FDK), mycotoxin deoxynivalenol (DON), yield and agronomic end use quality traits.

The Saskatchewan research was conducted at the University of Saskatchewan Saskatoon, Outlook's Canada-Saskatchewan Irrigation Diversification Centre, and Agriculture and Agri-Food Canada's Melfort Research Farm. There was little FHB pressure at Saskatoon and Outlook in 2018, leaving 6 site-years of data. The Saskatoon and Outlook sites were irrigated for 4 weeks beginning at early flowering to stimulate disease infection.

The susceptible durum variety, CDC Desire, was used in the trials and seeded at two rates of 7.5 and 40 seeds/ft² (75 and 400 seeds/m²). Some research has found that higher seeding rates in wheat can decrease tillering and flowering windows to reduce the window of Fusarium infection. The Saskatchewan Ministry of Agriculture's recommended seeding rate is 20 to 25 seeds/ft² (200 to 250 seeds/m²).

In 2016, 7 foliar fungicide treatments with Caramba (metconazole) fungicide were applied based on the developmental stage of the primary tillers. These were:

- BBCH59 end of heading; spike fully emerged;
- BBCH61 beginning of anthesis; first anthers visible;
- BBCH65 50% of anthers mature;
- BBCH69 end of anthesis; all spikelets have completed flowering, but some dehydrated anthers may remain;
- BBCH61 + BBCH73 early milk;
- Non-treated check;
- Sprayed check, application at all timings to attempt a disease- and toxin-free check.

In 2017 and 2018, an additional treatment was added at the BBCH73 early milk timing.

Plots were inoculated with *F. graminearum*-colonized corn kernels approximately 12 to 14 days prior to flowering.

FHB incidence and severity were evaluated at 21 to 23 days after 50% anthesis. Yield, test weight, and thousand kernel weight were measured. Quality parameters measured included %FDK, DON and grain protein content (GPC).

Site-years were divided into high and low disease pressure. High sites included Saskatoon with a FHB index of 20.5% and Outlook at 18.6% in 2016 in the untreated check. Low sites were Saskatoon (12.9%), Outlook (12.3%) and Melfort (11.3%) 2017 and Melfort 2018 (10.8%).

There was no interaction between fungicide treatments and seeding rates at any of the high and low disease site-years. This was despite the fact that the high seeding rate had only 1.1 to 2.0 spikes per plant compared to 2.7 to 5.4 spikes per plant for the low seeding rate. The most likely explanation for this non-interaction was that the duration of heading and flowering was not affected by seeding rate.

However, under high disease conditions, the higher seeding rate had 31.1% higher grain yield than the low rate. The higher seeding rate also had higher FHB index and TW, but lower GPC. DON was greater in treatments with low seeding rate.

Later fungicide application still effective – high disease sites

Fungicide treatment had significant effects on all yield and quality parameters under high disease pressure. Yield was higher with all fungicide application timings, with the greatest yield increase of 37.5% over the check coming from the BBCH 65 (50% anthers mature) application, which yielded 69 bu/ac (4.6 t/ha), compared to the untreated check that yielded 50 bu/ac (3.35 t/ha). This was followed by the dual application that was 29% higher and BBCH61 at 25.1% higher than the untreated check, and were statistically similar. BBCH69 increased yield by 19.6%, and BBCH59 had the lowest fungicide yield increase at 4.4%.

Fungicide treatments also affected the FHB index, as calculated by: % disease incidence x % disease severity/100. The untreated check under high disease pressure had a FHB index of 19.5% and the dual treatment had the lowest at 3.5%. Application at the earliest stage at BBCH59 had the highest FHB index of all fungicide treatments at 12.7%. Applications during anthesis from BBCH61 to BBCH69 stages were similar with a mean FHB index of 7.1%.

The level of FDK under high disease pressure for the untreated check was 24%. This was lowered to 12.1% with the dual fungicide treatment. Among the other fungicide treatments, BBCH59 timing did not differ from the untreated check at 21.1%, while applications during anthesis (BBCH61 to BBCH69)

were much reduced from the untreated check, but had statistically similar FDK levels ranging from 14.3% (BBCH 69) to 17.0% (BBCH 61).

DON was high in the high disease year of 2016 because of the wet weather and irrigation at both Saskatoon and Outlook. The untreated check had the highest DON level at 15.8 ppm. The dual treatment and the treatments applied at anthesis BBCH61 through BBCH69 were statistically similar ranging from 9.9% to 12.3% with the trend to higher DON levels with earlier anthesis applications. The early application treatment at the end of heading (BBCH 59) did not differ from the untreated check, and it showed little benefit in this study.

In 2016, all the fungicide treatments except BBCH 59 had higher TW than the untreated check; all treatments had higher TKW than the untreated check. The BBCH59 application had the lowest TW and TKW. The dual treatment and treatments at the 3 other anthesis stages had higher TW and TKW than the control and BBCH59 treatments.

Fungicide effects – low disease sites

The high seeding rate had a yield of 94 bu/ac (6.32 t/ha) compared to a yield of 91 bu/ac (6.09 t/ha) with the low seeding rate when averaged across all fungicide treatments. There was no difference in %FDK between seeding rates, but DON was higher at 1.8% with the low seeding rate compared to 1.2% at the higher seeding rate.

All fungicide treatments produced higher yields than the untreated check. Application at BBCH65 had the highest yield at 101 bu/ac (6.77 t/ha), which was an increase of 10.1% over the untreated check at 92 bu/ac (6.15 t/ha). Yields at the other anthesis applications and the dual application were statistically similar ranging from 98 to 98.5 bu/ac (6.58 to 6.61 t/ha). The application at BBCH59 had a yield of 93 bu/ac (6.25 t/ha), which did not differ statistically from the untreated check.

The highest FHB index was in the untreated check at 11.8%, while the lowest was at the BBCH65 timing at 2.9%. Application at BBCH59 had the highest of the fungicide treatments at 6.8% FDK.

The untreated check had the highest FDK at 15.6%, while the lowest was BBCH65 at 6.9% and the dual application at 7.3%.

Fungicide application lowered DON levels with the untreated check having a DON level at 2 ppm, which was statistically similar to BBCH59 (1.8%) and BBCH61 at 1.6%. Applications at the later anthesis stages and the dual application had statistically similar DON levels ranging from 1.2 to 1.0 ppm.

Fungicide application did not affect TW, TKW, and GPC during the drier 2017 and 2018 growing seasons.

Overall, the research confirmed that applying fungicide at BBCH65 (50% anthesis) is important for managing FHB. Additionally, application up to the end of anthesis at BBCH69 can still be effective if application is delayed. Under high disease pressure, a dual application is unlikely to provide additional benefits.

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Fungicide Mitigates Fusarium Head Blight in Durum Wheat When Applied as Late as the End of Flowering in Western Canada. Gursahib Singh, Garry Hnatowich, Gary Peng, and Hadley R. Kutcher
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