

# Seeding Rates to Reduce Tillering and Flowering Duration for Fusarium Head Blight Management in Wheat: Factsheet

## Objective:

1. To demonstrate the potential for higher seeding rates to reduce tillering, duration of flowering, fusarium head blight (FHB) infection, and quality loss in durum wheat.
2. To demonstrate the ability of foliar fungicide applications to increase grain yield and reduce FHB infection, and subsequent quality loss in durum wheat.
3. To demonstrate the combined ability of higher seeding rates and foliar fungicide to optimize both yield and quality of durum wheat.

## Methodology:

Field trials were conducted at Swift Current, Scott, and Indian Head in 2020. The treatments consisted of four seeding rates (125, 250, 375, or 500 seeds/m<sup>2</sup>) and two fungicide treatments (untreated versus fungicide applied at 50% anthesis). The fungicide product was Prosaro XTR (Bayer Crop Sciences) and the application rate provided a total of 100 g/ha each of prothioconazole and tebuconazole.

## Key Findings:

- Higher seeding rates resulted in higher plant and head densities, but reduced tillering for individual plants.
  - Swift Current increased plant densities from 86-311 plants/m<sup>2</sup> for seeding rates ranging from 125-500 seeds/m<sup>2</sup>. Head densities ranged from 210-282 spikes/m<sup>2</sup>. Values declined from 2.5 spikes/plant at the lowest seeding rate to 0.9 spikes/plant at the highest (less than one is not possible).
  - Scott experienced increasing mortality at the highest seeding rates and actual populations ranging from 86-205 plants/m<sup>2</sup>. Head density data was discarded due to an error.
  - At Indian Head, the populations ranged from 97-346 plants/m<sup>2</sup>. Head densities ranged from 392-464 spikes/m<sup>2</sup>. Values ranged from 4.1 spikes/plant at 125 seeds/m<sup>2</sup> to 1.4 spikes/plant at 500 seeds/m<sup>2</sup>.
- Overall infection levels were lowest at Swift Current, higher but still low at Indian Head, and highest at Scott. These differences can be largely explained by the weather conditions whereby Swift Current and, especially Indian Head, were drier than normal and Scott had above-average precipitation, especially in July when the crop was susceptible to infection (Table 1).
  - At Swift Current, FHB index values were affected by seeding rate but not fungicide, and there was no interaction between the two factors. The seeding rate effects were not as expected, with values increasing from 1.4% to 3.2% as the seeding rate increased from 125-500 seeds/m<sup>2</sup>.
  - At Indian Head, where disease pressure was low but higher than at Swift Current, neither the fungicide nor seeding rate effects were significant, and nor was the interaction between these two factors. Despite the lack of statistical significance, the trends at Indian Head were as expected with slightly higher FHB index values in the control (4.2%) relative to the treated plots (3.5%) and lower values at the highest seeding rate (2.7%) relative to the lower rates (4.0-4.7%).
  - At Scott, where conditions were more favorable for disease, FHB index was affected by fungicide but not seeding rate. When averaged across seeding rates, fungicide reduced FHB index values from 14.2% to 8.3%. When averaged across fungicide treatments, there were no trends observed for seeding rate. For untreated durum (i.e., no fungicide applied), the least infection was observed at 125 seeds/m<sup>2</sup> (10.5%) while values at 250-500 seeds/m<sup>2</sup> rates were similar (15.0-16.2). In contrast, when fungicide was applied, the highest infection occurred at the lowest seed rate (10.2%) while values at the higher seeding rates trended lower (6.9-8.6%).
- Higher seeding rates were more beneficial for improving yield at Swift Current and Scott than they were at Indian Head, but these locations also had higher seedling mortality (i.e., at Scott) and/or less tillering (i.e., at Swift Current). Yield gains with the fungicide application were always small and never statistically significant.

The full report is available at: [www.warc.ca](http://www.warc.ca). This trial was funded by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canadian Agricultural Partnership bi-lateral agreement.

- At Swift Current, yields increased linearly with seeding rate, from 44.5 bu/ac at 125 seeds/m<sup>2</sup> to 48.5 bu/ac at 500 seeds/m<sup>2</sup>. The lack of a fungicide response was not unexpected given the dry weather and low levels of disease.
- At Scott, the lack of a fungicide response was unexpected given the wetter weather, high yields, and relatively high disease pressure according to the visual FHB ratings. The greatest yield gains, by far, occurred when the seeding rate was increased from 125 seeds/m<sup>2</sup> to 250 seeds/m<sup>2</sup>. Statistically, yields were similar at seeding rates ranging from 250-500 seeds/m<sup>2</sup>.
- At Indian Head, there was no grain yield response to either fungicide application or seeding rate, and there was no interaction between these factors. Yields trended higher with fungicides by 2 bu/ac, or 3%, when averaged across seeding rates. Focusing on seeding rates, the trend was for lower yields at the lowest seeding rate and more similar yields for 250-500 seeds/m<sup>2</sup> seeding rates.
- Additional data collected is included in the full report available at [www.warc.ca](http://www.warc.ca)

**Table 1. Fungicide treatment and seeding rate effects on fusarium head blight (FHB) index in durum. FHB index is the overall average infected spike area, including spikes where no infection was observed. Main effect means within a column followed by the same letter do not significantly differ ( $P \leq 0.05$ ).**

Main Effect	Swift Current	Scott <sup>y</sup>	Indian Head
<u>Fungicide</u> <sup>z</sup>	----- FHB Index (%) -----		
Untreated	2.3 A	14.2 A	4.2 A
Treated	2.3 A	8.3 B	3.5 A
S.E.M.	0.22	1.08	0.58
<u>Seeding Rate</u>	----- Pr > F (p-values) -----		
125 seeds/m <sup>2</sup>	1.4 B	10.3 A	4.0 A
250 seeds/m <sup>2</sup>	1.3 B	11.3 A	4.2 A
375 seeds/m <sup>2</sup>	2.7 A	12.4 A	4.6 A
500 seeds/m <sup>2</sup>	3.2 A	10.9 A	2.7 A
S.E.M.	0.31	1.30	1.49
<u>Orthogonal Contrast</u>	----- Pr > F (p-values) -----		
SR – linear	<0.001	0.544	0.312
SR – quadratic	0.287	0.260	0.209

<sup>z</sup> The fungicide was Prosaro XTR applied at 50% anthesis

<sup>y</sup> Fung x Seed interaction was significant for FHB index at Scott