

# Evaluation of Seeding Rates of Wheat Under Various Environmental Conditions

## Objectives:

The objective of this study was to evaluate the ideal seeding rate for spring wheat under various environmental conditions.

## Trial Design:

- The study was conducted at 2 sites in 2022, and 6 sites in 2023.
- Seeding rate treatments targeted 10 plants/ft<sup>2</sup>, 15 plants/ft<sup>2</sup>, 20 plants/ft<sup>2</sup>, 25 plants/ft<sup>2</sup>, 30 plants/ft<sup>2</sup>, 35 plants/ft<sup>2</sup>, and 40 plants/ft<sup>2</sup>.
- Sites were grouped into low moisture conditions (<70% of long-term average), and high moisture conditions (>70% of long-term average).
- The Swift Current site received hail in 2023 resulting in approximately 50% yield loss and was excluded from the analysis.

## Results:

### Low Moisture Conditions

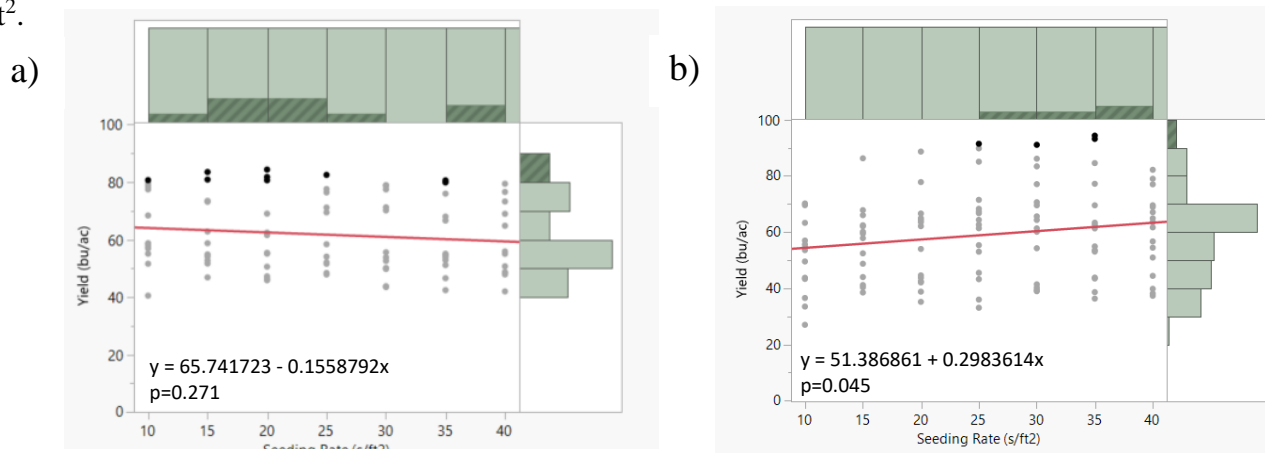
- The head density ( $r=0.81$ ;  $p<0.001$ ) and tiller density ( $r=0.49$ ;  $p<0.001$ ) were significantly correlated to yield. Thus, indicating these factors strongly influenced yields.
- Head and tiller densities that consistently resulted in high yields most commonly occurred at seeding rates of 15-20 seeds/ft<sup>2</sup>.
- In low moisture conditions, the yield decreased linearly as seeding rates increased ( $p=0.271$ ) (Figure 1a). Therefore, the highest yields consistently occurred at low seeding rates between 15-25 seeds/ft<sup>2</sup>.

### High Moisture Conditions

- The head density ( $r=0.81$ ;  $p<0.001$ ), tiller density ( $r=0.20$ ;  $p=0.036$ ), and head size ( $r=-0.23$ ;  $p=0.032$ ) were significantly correlated to yield. Similar to low moisture conditions, these factors significantly impact yields.
- The head density and tiller density that resulted in the highest yields consistently occurred at seeding rates of 30 seeds/ft<sup>2</sup>.
- In high moisture conditions the yield increased linearly as seeding rates increased ( $p=0.047$ ) (Figure 1b). Expectedly, the highest yields were most commonly found at high seeding rates between 35-40 seeds/ft<sup>2</sup>.

## Conclusions:

In conclusion, seeding rates varied based on environmental conditions. In the low moisture conditions, yield was maximized at 20 plants/ft<sup>2</sup>. Whereas, in the high moisture conditions, yield was maximized at 30 plants/ft<sup>2</sup>. The results are similar to current seeding rate recommendations (20-25 plants/ft<sup>2</sup>) and indicate that this recommendation is suitable to mitigate risk of unpredictable environmental conditions while maximizing yields. Considering the results of this study, further research investigating whether seeding rates should vary based on topography would be beneficial to maximize yield potential for farmers.



**Figure 1.** Yield response (bu/ac) to seeding rates in low moisture conditions (a), and high moisture conditions (b).

The full report is available at [www.warc.ca](http://www.warc.ca). This project was supported by the Saskatchewan Wheat Development Commission. WARC Project #21-23 February 2024