Soybean planting dates based on soil temperature in Manitoba

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INTRODUCTION

Soybean [Glycine max (L) Merr.] production has increased dramatically in Manitoba over the past decade with 1.63 million acres planted in 2016 (Stat Can, 2016). Due to this expansion, there are many new soybean growers in the province faced with the decision of when to plant soybeans. It is currently recommended in Manitoba to plant soybeans when the soil temperature at seed depth is at least 10°C on the day of planting. However, current information on the effects of soil temperature at planting is limited.

OBJECTIVES

1) To determine if soil temperature at planting was an influential factor for soybean yield, emergence, and physiological maturity in Manitoba.

2) To identify the soil temperature that produced the highest soybean yield.

MATERIALS & METHODS

• Two soybean varieties:
  - Dekalb 23-10Ry (early variety)
  - Dekalb 25-10Ry (late variety)

• Six planting dates assigned by the target calendar dates for corresponding soil temperatures at planting are labeled for each planting date treatment.

• No differences between cultivars were found for soybean yield. Reported results are averaged over the two cultivars.

• A significant quadratic relationship between soybean yield and soil temperature at planting was only found for one in two site years at Carman in 2015 (Figure 2). Maximum soybean yield occurred at 9°C, beyond which yield declined with increasing soil temperature (Figure 2B). As Carman 2015 was the only site year with planting delayed into June, the decline in yield was likely influenced by later planting rather than warming soil.

• Yields were overall greater at Carman in 2014 and 2015 when soybeans were planted into cooler soil temperatures, although soybean yield was represented as a response to soil temperature at planting for both Carman 2014 and 2015, it is more likely that yield differences occurred due to calendar date rather than soil temperature at planting (Figure 1B).

RESULTS

• No differences between cultivars were found for soybean emergence. Reported results are averaged over the two cultivars.

• A significant positive relationship between soybean plant stand at 100% emergence and soil temperature at planting for both cultivars. As Carman 2015 was the only site year, yield response to soil temperature at planting occurred for one in two site years at Morden in 2015 (Figure 4). This result suggests that soil temperatures of at least 14°C are favorable for soybean plant stands of early and late soybean cultivars. As Carman 2015 was the only site year with planting delayed into June, the decline in yield was likely influenced by later planting rather than warming soil.

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• Soybean planting dates based on soil temperature in Manitoba over the past decade suggest that there is no soybean yield penalty from low soil temperatures at planting. This finding should be tested with additional site years to strengthen planting date recommendations for Manitoba.

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CONCLUSIONS

• Results from this two-year field study suggest that there is no soybean yield penalty from low soil temperatures at planting. This finding should be tested with additional site years to strengthen planting date recommendations for Manitoba.

• Calendar date had a greater effect on soybean yield than soil temperature at planting.

• Late spring frost events occurred at both Carman and Morden, MB on May 30, 2015; however, Carman experienced a milder frost event compared to Morden. Air temperatures ranged from -0.4 and -0.7°C over two hours at Carman, whereas temperatures ranged from -0.5 to -1.6°C for three hours at Morden. More extensive seedling damage was observed at Morden due to frost (Figure 6).

• At the time of the late spring frost in Morden 2015 the first four treatments had emerged. As a result, these four treatments had greater seedling mortality (Figure 5). Thus, this late spring frost damage was likely responsible for higher seedling mortality (Figure 5) and lower soybean stand in these four treatments (Figure 3B).

• Overall, this late spring frost rather than soil temperature at planting had an effect on soybean emergence variables.

Frost Effect

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REFERENCES


