

Evaluating the Effect of Soil Temperature and Planting Date on Soybeans in Manitoba

Delayed soybean planting beyond mid- to late-May had the potential to reduce yields and expose soybeans to fall frost damage. Soil temperatures greater than 10°C did not guarantee improved crop establishment or yields.

COLD SOIL TEMPERATURES at planting and frost in spring and fall pose a risk to soybeans in Manitoba. Planting dates can be manipulated to ensure soybean seeds are planted into the correct soil temperature and to lessen the risk of frost damage in spring and fall. Little is known regarding the impact of planting date and soil temperature on soybean growth, yield and quality under Manitoba conditions.

The objective of this project was to determine the effect of soil temperature at different planting dates on soybean growth, yield and seed quality. Small-plot field trials were conducted from 2014 to 2017 at Brandon, Carberry, Portage la Prairie and Roblin, for a total of 12 site-years.

Soybean planting dates in this study fell into a “recommended” window from mid- to late-May (May 18 to May 29) or “late” window during early June (May 30 to June 11), which was nine to 15 days after the first planting date. Within each planting date category were “cold,” “control” and “warm” soil temperature treatments.

To establish different soil temperature treatments, plots were covered in early spring with foam board/reflective material to insulate the soil (cold), white/clear plastic to reflect the sun (control) or black plastic to warm the soil (warm).

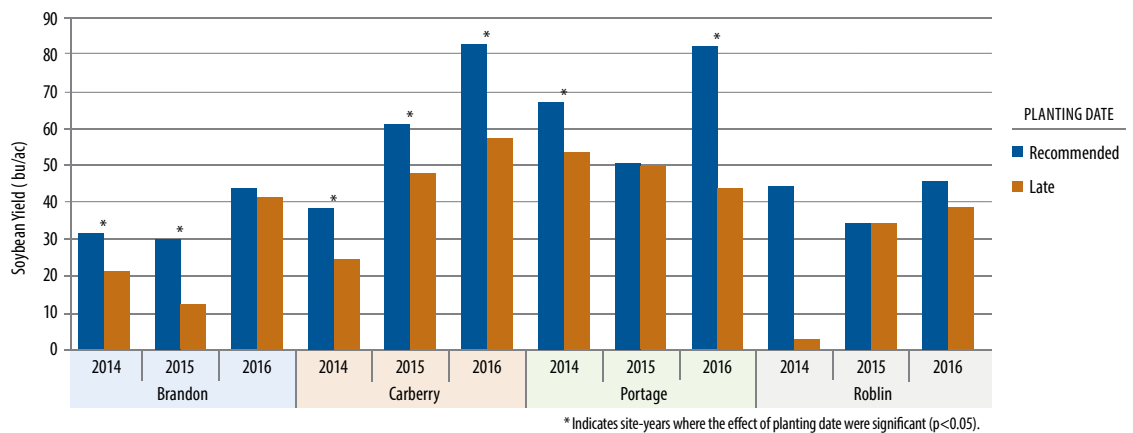
Soybeans planted during early June in this study reached only 40 to 80% of the soybean yields achieved by soybeans planted during mid- to late-May (Figure 1). In one of three years at Roblin, late planting resulted in significant fall frost damage and negligible yields (Figure 1). These findings highlight greater yield potential associated with mid- to late-May planting dates over June planting. They also showcase the risk of soybean yield reduction from fall frost at locations in Manitoba that have shorter growing seasons.

The optimum temperature for soybean germination and emergence is 20 to 22°C, according to previous controlled environment research. In this study, soil coverings produced a range of

soil temperatures under field conditions that were often below 18 to 22°C and occasionally below 10°C. However, soil temperature differences at planting were not consistently associated with differences in soybean yield. This suggests that soil temperature differences among treatments may not have been great enough to affect the soybean crop, or that soybeans were able to compensate for these early-season differences.

Results from this project are supported by another study in Manitoba conducted by Dr. Yvonne Lawley, examining the impact of soil temperatures at planting (6–16°C) on soybean plant establishment and yield. This study also found that calendar date likely had a greater influence on soybean yield than soil temperature at planting, despite a wide range of soil temperatures. In addition, soil temperatures of 14°C or greater at planting resulted in faster soybean emergence, but no differences were found between established plant populations. ▶

Figure 1. Planting date effect on soybean yield averaged across soil temperatures at Brandon, Carberry, Portage and Roblin, Manitoba (2015–2017). “Recommended” planting dates were seeded mid- to late-May and “late” planting dates were seeded early June.



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