

Land Rolling Soybeans to Increase Yield

GFO Funded – Interim Report

Purpose:

Land rolling helps conserve moisture and prepares the field for harvest. Rolling helps level the soil and pushes rocks into the ground, improving combine efficiency. Some producers roll immediately after planting, while others wait until the soybeans have emerged. Rolling immediately after planting provides improved seed-to-soil contact and reduces the likelihood of plant injury. However, it also increases the chance of soil crusting, which hinders soybean emergence. Soybean fields that are not rolled after the drill may emerge more quickly. If heavy rainfall occurs after seeding, rolled fields are more prone to crusting. To avoid these challenges some growers choose to roll their fields after beans have emerged. There have also been reports that early season stress from post emergent rolling may shorten internodes, stimulate early season growth, increase pod number, and thereby increase yields.

Picture 1: Land rolling at the 1st trifoliolate.



The objectives of this project are to: i) document yield gains or losses from rolling and ii) identify the best plant growth stage to roll soybeans after emergence.

Methods:

Eleven trials were established near Bornholm, Lucan, Elora, and Winchester in 2017-18 in both no-till and conventionally tilled fields. The treatments applied were:

- 1 Untreated control
- 2 Land rolling immediately after seeding
- 3 Land rolling at the V1 growth stage (first trifoliolate)
- 4 Land rolling at the V2 growth stage (second trifoliolate)
- 5 Land rolling at the V3 growth stage (third trifoliolate)

Crop Advances: Field Crop Reports

Rolling was conducted using a 30 inch diameter smooth roller weighing about 400 lbs per foot of roller. All treatments were replicated 3 times. Soybeans were planted in 15 inch rows with a row unit planter. A small tractor with 9 inch wide tires was used to avoid driving on emerged plants with tractor tires. Rolling was conducted in the afternoon when plants are less turgid and recover more quickly from rolling.

Results

Rolling soybeans after emergence provided a small yield gain. See table #1. The statistical confidence of this yield gain is weak, which means the repeatability of these results is uncertain. A third year of research is planned to build a more robust data set. It should be noted that although the numeric yield of rolling at the third trifoliolate was the same as rolling at the second there were clear instances of individual trials where the third trifoliolate was too late, suffering yield losses. For those growers that choose to roll after emergence this study provides strong evidence that no yield loss is associated with that practice as long as best management practices are followed. It would appear that rolling at the first or second trifoliolate is the best time to maximize yield gains and minimize plant stand losses.

Table 1. Soybean Yield Response to Land Rolling

Treatment	Bu/ac	Adv.
1) Untreated	62.6 b	
2) Rolling immediately after seeding	63.5 ab	0.9
3) V1 Rolling (first trifoliolate)	64.4 a	1.8
4) V2 Rolling (second trifoliolate)	63.8 a	1.2
5) V3 Rolling (third trifoliolate)	63.8 a	1.2

2017-2018, 11 Ontario trials, 3 replications, LSD = 1.6 (P = 0.25)

Rolling emerged soybeans did not significantly reduce plant stands until it was delayed to the third trifoliolate leaf stage. Once beans reach the third trifoliolate stems break off more easily killing the plant. See Picture 2.

Tilled fields sustain more damage since the small plants do not have the protective cushion corn stalk residue provides in a no-till system, although the final yield response was equal in both tilled and no-tilled fields.

Summary:

- 1) A small yield gain was observed when soybeans were rolled at the V1 – V3 leaf stage. Although it must be stated that the third trifoliolate stage is too late in many cases. The statistical confidence of this yield gain was weak, so further research will be necessary to determine if these results are repeatable.

Picture 2: Rolling at the 3rd trifoliolate resulted in excessive plant stand losses.



- 2) For producers that typically roll fields immediately after seeding this study provides strong evidence that no yield reductions occur if rolling is delayed and conducted at the first or second trifoliolate leaf stage.
- 3) Rolling soybeans after emergence does not reduce yields if fields are rolled during the heat of the day to ensure that soybeans are limp. Soybeans are the most turgid (stiff) during the morning hours and rolling during that time will result in more plant injury. Seedlings are vulnerable to being broken off at emergence so post emergent rolling should be delayed to the first trifoliolate.
- 4) If rolling is delayed to the third trifoliolate excessive plant stand losses can occur especially from tractor tire damage.

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