Evaluating the effect of land rolling soybeans plants to improve yield and harvest efficiency

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Objective

Evaluate the impact of using a large land roller on soybean yield response.

Background

Large land rollers consist of heavy rolling drums pulled behind a tractor to push crop residue, stones, and other debris into the soil. These rollers have also been used to improve seed to soil contact in forage stands (DeJong-Hughes et al., 2012). Recently, Midwest farmers have adopted the use of these tools to roll soybeans during vegetative growth to promote lateral branching and ultimately higher yields (Rueber and Holmes, 2011).

Research has shown no increase in yield response, but the adoption of land rolling has increased in practice since 2010 throughout the Midwest (Boyers et al., 2019). Additional research has shown an increase in weed pressure, and reduced water infiltration rates following rolling (Rueber and Holmes, 2012; Lenssen, 2009).

Methods

This study used a randomized strip trial design with three treatments replicated three times in a Trumbull County field. The study field was prepared for planting with spring vertical tillage following a corn crop the previous year. Soybeans were planted at 160,000 seeds/acre on May 2, 2024, in 15-inch row spacings. Land rolling treatments were conducted at varying dates after planting (Table 1).

Table 1. Timing of land rolling treatments.

Treatment	Detail
Control	No rolling, as planted conditions
Pre-Emergence	Rolling 24 hours after planting before crop emergence
Vegetative	Rolling 29 days post planting when 75% of plants had a fully opened trifoliate (V1 growth stage)

Rolling treatments were applied with a 40-ft Mandako 3-Plex (Plum Coulee, MB) roller pulled by a John Deere 4630 tractor. Soil conditions at the time of rolling were average moisture - not overly wet or dry. Crop stands were evaluated on June 7, 2024, for damage and overall stand count.

Strips were harvested on October 7, 2024. Approximately 1.5 acres were harvested from each strip (35’ x 1,865’) and yield was measured using a calibrated yield monitor in the combine. Grain moisture was corrected to 13%. Yield and stand counts were compared using ANOVA.

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Results

No significant differences were observed in rolling treatments compared to the control (Table 2). Additionally, no significant differences were observed in stand counts on June 7, 2024. Harvest efficiency was decreased in the control plots as the combine had to stop four times to remove rocks from the header. Total stoppage time was approximately 8 minutes and a stoppage every 1.125 acres.

Table 2. Yield results of rolling soybeans at pre-emergence and V1 growth stage compared to non-rolled control.

Treatment	Yield (bu/acre)	Stand Count (plants/acre
Control	82.6a	151,000a
Pre-Emergence	84.3a	150,333a
V1	85.7a	150.666a
LSD	**5.88**	**4.21**
C.V.	**3.08**	**1.23**

Summary

This research confirms other studies findings with no yield benefit of rolling soybean plants. Rolling soybeans is estimated to cost approximately $8.40/acre based on the 2024 Iowa Custom Rate Survey. To recover land rolling costs, a yield benefit of 0.80 bu/acre or greater would have to be realized, assuming a soybean price of $10.50/bu. Although a yield benefit was not observed, harvest efficiency was increased in rolled plots due to fewer stops to remove rocks from the combine header. Observed stoppage rates in this study equates to a decrease of 5% to 14% reduction in harvest efficiency (Anderson, 2023). Farms with few rocks may not necessarily see the same harvest efficiency following land rolling, and should view land rolling as a net expense.

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