

Reducing Soybean Seed Costs Through Lower Seeding Rates

(Final Report)

Purpose:

Ontario soybeans are grown using various row widths and seeding rates. The most popular row widths are 7.5" and 15" rows. Seed is the single largest input cost for the production of glyphosate tolerant varieties. With the widening popularity of soybean seed treatments and the increased cost of glyphosate tolerant varieties this research was conducted to determine the most profitable soybean seeding rate and row width for various soil types and planting dates.

If recommended seeding rates could be reduced (for example from 225 000 to 200 000 seeds/acre in 7.5 inch rows) while still achieving maximum yields, a significant savings could be realized. This reduced seeding rate would represent a savings of approximately \$6.25 per acre, assuming a \$35.00 per unit cost for glyphosate tolerant seed with 2800 seeds/pound.

In total 50 large scale replicated field trials were conducted between 2005 - 2007. In addition to these 3 small plot trials were conducted at the Elora Research Station by the University of Guelph to evaluate a larger range of seeding rates than was possible in field scale trials. These small plot sites also included two seeding dates to determine if planting date had a significant impact on the required seeding rate.

Methods:

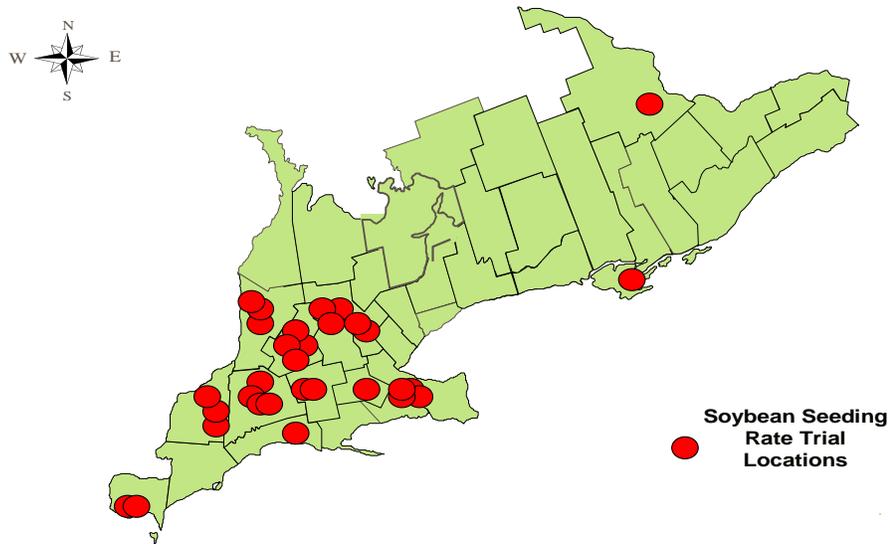
This project compared plant stands and final yields of 7.5 inch rows compared to 15 inch rows at various seeding rates, soil types, and planting dates. Trials did not include wider row widths because previous research has shown yields decline significantly if row widths are greater than 20". Most Ontario producers also use row widths of less than 20 inches. Each treatment was 20 feet wide with a minimum length of 1200 feet. Most sites were field length strips (>1500 feet). Many of the sites were no-till soybeans following corn, although some sites were soybeans following soybeans. At three of the sites each year, two different planting dates were seeded. The two planting dates included the ideal planting date (May 10-25) and a late planting date.

Treatments included:

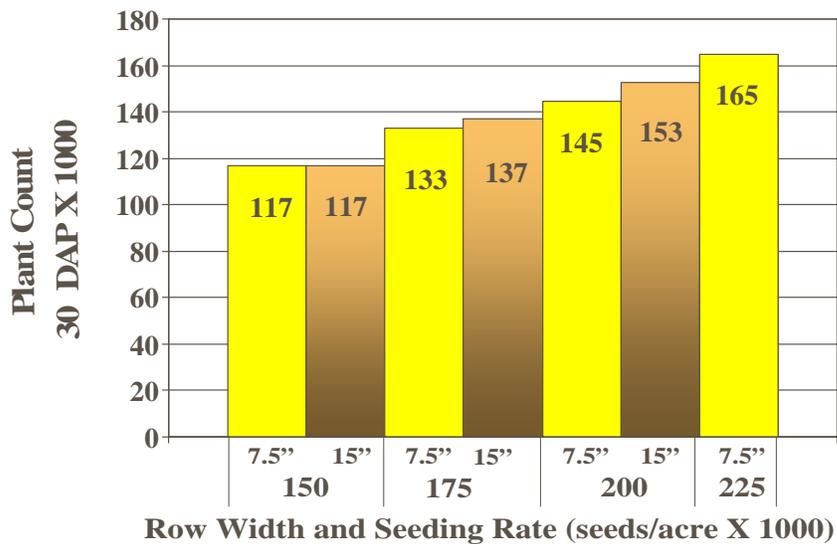
| Row Width | Seeding Rate (x 1000) | | | |
|-----------|-----------------------|-----|-----|-----|
| 7.5 inch | 150 | 175 | 200 | 225 |
| 15 inch | 150 | 175 | 200 | |

Results and Summary:

Figure #1. Soybean Seeding Rate Trial Locations (2005-2007)



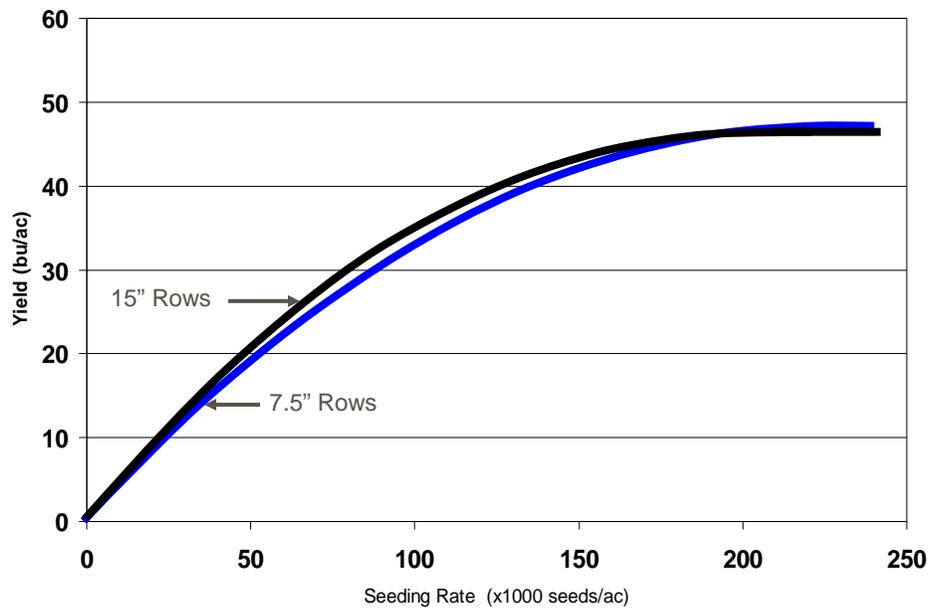
Graph #1. Soybean Plant Stands Results of 50 Trials Seeded with a Drill (2005-07)
(Stands taken at 30 Days after planting, DAP)



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Plant stand counts taken at 30 days after seeding showed that between 73 – 78% of the seed emerged and survived to 30 days after seeding. The highest seeding rate (225 000 seeds/acre) produced the lowest percentage of surviving plants. 73% of seeds planted survived to 30 days after planting (165 000 plants of the 225 000 seeds that were planted). The lowest seeding rate (150 000 seeds/acre) produced the highest percentage of surviving plants 30 days after planting. 78% of what was seeded survived to 30 days after seeding. The difference in emergence percentages may be a result of early season plant competition between seedlings resulting in a reduction of the seedling survival at higher seeding rates.

Graph #2. Soybean Yield Results of 50 Trials (2005-07)



The highest yield was achieved for both row widths at about 200 000 seeds/acre. The optimal seeding rate for 7.5" rows was 190 000 seeds/acre and 177 000 seeds/acre for 15" rows. This is based on a seed cost of \$35 per bag and a seed size of 2800 seeds/lbs. The present recommendation for 7.5" rows is 225 000 seeds/acre. A savings in seed cost of approximately \$8.75 per acre could be realized by reducing seeding rates from 225 000 to 190 000 in 7.5" rows. The present recommendation for 15" rows is 188 000 seeds/acre. A savings in seed cost of approximately \$3.25 per acre could be realized by reducing seeding rates from 188 000 to 177 000 in 15" rows.

7.5" rows sometimes yielded higher than 15" rows. This study found that under poor growth conditions such as late planting, heavy soils, and low fertility, solid seeding provided slightly higher yields than 15" rows (1-3 bu/ac). Averaged across all sites the 15" rows yielded statistically the same as the 7.5". 15" rows did show better emergence when crusting was a problem.

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Soybeans have a high mortality rate, so it's important to consider plant stands when making seeding rate recommendations. This study has found that a plant stand taken at 30 days after seeding of 149 000 plants per acre produced the highest yield. The highest economic seeding rate of 190 000 seeds/acre resulted in a plant stand of 141 000 plants/acre in 7.5" rows. The highest economic seeding rate of 177 000 seeds/acre in 15" rows resulted in a plant stand of 137 000 plants/acre. In this study 190 000 seeds/acre were required to achieve a plant stand of 141 000 plants/acre when using a drill. When emergence conditions are excellent (warm soils, no crusting, etc) it is often possible to achieve 141 000 plants/acre with a lower seeding rate than 190 000 seeds/acre. Fungicide and insecticide seed treatments have also been shown to increase average plant stands by 5000 and 12 000 plants per acre respectively in Ontario.

Small Plot Results:

One small plot trial planted at two different seeding dates was also conducted each year at the Elora Research Station. The results from these trials indicate that planting date can have a significant impact on the seeding rate required as well as the oil and protein content of the seed. In 2006 there was no row width effect on either date, but a strong date effect and a strong seeding rate effect. For the May 10 seeding date, 95% of the yield was achieved with a seeding rate of only 103,000 per acre. For the June 9 planting date, the required seeding rate to achieve 95% of the yield was more typical – 202,000 per acre.

The conclusions from this study are:

- 1) Soybeans yield well over a wide range of populations and are not highly responsive to seeding rates.
- 2) The highest economic seeding rate for 7.5" rows was 190 000 seeds/acre and 177 000 seeds/acre with a 15" drill.
- 3) On average 15" rows yielded the same as 7.5" rows
- 4) Lowering seeding rates has the greatest impact on 7.5" rows.
- 5) Planting date can have a significant impact on the seeding rate required and on seed quality.
- 6) No-till and conventional tillage systems required the same seeding rate to achieve the optimal plant stand.

Next Steps:

This study has been conducted for three years and has ended in 2007.

Acknowledgements:

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