

## Increasing Profits through Precision Seeding and Seed Treatments

### Purpose:

Traditional seed drills do a poor job of distributing seed evenly resulting in clumping of seed, large gaps within the row and uneven emergence. A planter allows for more precise seed metering and better depth control leading to more uniform stands. Ontario research has shown that Cruiser Maxx seed treatment can significantly increase plant stands. Due to the cost of glyphosate tolerant seed, producers are beginning to lower seeding rates.

This project assessed (2008-2010) if the use of planters would provide higher yields than drills and if seeding rate requirements are different for Cruiser Maxx treated seed. It will also determine if seeding rate requirements are different when using precision seeding equipment compared to a drill.

### Methods:

Two large scale field trials with 3 replications were conducted each year in 2008, 2009, and 2010. Each plot within a trial was either 10' or 20' wide with a length of at least 1000 feet. Five sites were no-till and one was conventional tillage. Drilled treatments were seeded with a 1560 John Deere no-till drill and the planter treatments were planted with a Kearney 15" vacuum planter with John Deere 7000 row units. Yields were measured using a calibrated weigh wagon.

### Trials included the following treatments:

Row Width	Seeding Rate (x 1000) & Seed Treatment					
	Un. <sup>1</sup>	CM <sup>2</sup>	Un.	CM	Un.	CM
7.5 inch drill	100	100	200	200	300	300
15 inch drill	-	100	-	200	-	-
15 inch planter	100	100	200	200	300 <sup>3</sup>	300 <sup>4</sup>

<sup>1</sup>Untreated Seed, <sup>2</sup>Cruiser Maxx Seed Treatment, 3 and 4 – these treatments were only conducted in 2010

### Results:

The 2010 growing season was excellent. Warm temperatures and steady rainfall throughout most of the summer resulted in above average yields. 2009 was cool and wet, and disease and aphid pressure was moderate. No significant insect or disease pressure was detected in 2008. The Bornholm site reached threshold and was sprayed for aphids on August 20<sup>th</sup>, 2009. There was no pressure from aphids in 2010. Results are shown in Table#1.

Crop Advances: Field Crop Reports

Table 1: 2008- 2010 Trial Results

Trt.	Equipment	Width (Inches)	Seed Rate (X 1000)	Seedtrt <sup>1</sup>	Yield (bu/ac)	% Oil	% Protein	% Estab30 <sup>2</sup>	% Estabfinal <sup>3</sup>	Sdwt100 <sup>4</sup>
1	Drill	7.5	100	UT	44.5	21.0	40.3	65.5	62.4	15.8
2	Drill	7.5	100	CM	45.6	21.1	40.3	70.8	70.4	16.2
3	Drill	7.5	200	UT	51.8	20.9	40.7	68.2	59.1	16.1
4	Drill	7.5	200	CM	52.3	20.9	40.8	74.4	65.2	16.2
5	Drill	7.5	300	UT	54.6	20.7	40.8	71.0	62.5	16.3
6	Drill	7.5	300	CM	54.9	20.8	40.9	77.7	70.4	16.4
7	Drill	15	100	CM	45.2	21.0	40.3	74.8	75.6	16.1
8	Drill	15	200	CM	51.1	20.9	40.7	74.5	68.5	16.4
9	planter	15	100	UT	45.5	21.0	40.5	74.9	72.6	15.7
10	planter	15	100	CM	46.9	21.0	40.5	82.2	81.9	15.9
11	planter	15	200	UT	52.2	20.7	40.9	73.4	66.9	15.8
12	planter	15	200	CM	53.1	20.8	40.7	77.4	69.3	16.4

<sup>1</sup> Seed Treatment, UT = untreated and CM = Crusier Maxx

<sup>2</sup> % Establishment 30 = % plant stand of seeding rate taken at 30 days after seeding (ie. stand divided by seeding rate)

<sup>3</sup> % Establishment Final = % plant stand of seeding rate taken pre-harvest. (ie. stand divided by seeding rate)

<sup>4</sup>Seed weight per 100 seeds in grams

Crop Advances: Field Crop Reports

Table 2: Results Analysis Table<sup>1</sup>

Contrast Name	Groups	Treatments Compared	Yield	Oil %	Protein %	% Estab30	% Estabfinal	Sdwt100
Drill Row width	7.5"	2, 4	48.9	21.0	40.5	72.6	67.8	16.2
	15"	7, 8	48.2	20.9	40.5	74.6	72.0	16.2
			NSD <sup>2</sup>	NSD	NSD	NSD	NSD	NSD
Seeding Rate ('000)	100	1, 2, 7, 9, 10	45.6	21.0	40.4	73.6	72.6	16.0
	200	3, 4, 8, 11, 12	52.1	20.8	40.7	73.6	65.8	16.2
			*	*	*	NSD	*	*
Drill vs Planter	Drill 15	7, 8	48.2	20.9	40.5	74.6	72.0	16.2
	Planter 15	10, 12	50.0	20.9	40.6	79.8	75.6	16.2
			*	NSD	NSD	*	NSD	NSD
Drill 7.5 vs Planter 15	Drill 7.5	1, 2, 3, 4	48.6	21.0	40.5	69.7	64.3	16.1
	Planter 15	9, 10, 11, 12	49.4	20.9	40.6	77.0	72.7	16.0
			*	*	NSD	*	*	NSD
Seed Treatment	Untreated	1, 3, 5, 9, 11	49.7	20.9	40.6	70.6	64.7	16.0
	Cruiser Max	2, 4, 6, 10, 12	50.6	20.9	40.6	76.5	71.4	16.2
			*	NSD	NSD	*	*	*

<sup>1</sup> This table compares groups of treatments to show which treatment groups are statistically different

<sup>2</sup> NSD = no statistical difference, \* = values are statistically different at the 10% confidence level

**Stand Counts:**

1) Cruiser Maxx:

A statistically significant difference was observed from 2008-2010 for both the 30 days stand establishment and the preharvest stand establishment. The Cruiser Maxx had a stand of 76.5% compared to the untreated seed of 70.6% at 30 days, and 71.4% and 64.7% respectively at preharvest ( $P = 0.05$ ).

2) Equipment

The planter had a higher plant stand establishment in 15" rows compared to the 7.5" drill. The 7.5" drill provided a stand of 69.7%, while the 15" planter was 77% 30 days after seeding. At preharvest the stands were 64.3% and 72.7% respectively. The planter in 15" rows had a statistically better establishment than the drill in 15" rows after 30 days, but was not statistically significant at pre-harvest.

**Yields:**

The impact of seeding rate was highly significant ( $P < 0.0001$ ) on yield from 2008-2010. A higher seeding rate resulted in more yield. There was no difference in yield between a 7.5" row seeded with a drill and a 15" row seeded with a drill. The planter had a significant impact on yield. The planter in 15" rows compared to the drill in 15" rows yielded 50.0 bu/ac compared to 48.2 bu/ac, respectively. The planter in 15" rows also yielded more than the drill in 7.5 inches. The yields were 49.4 compared to 48.6 bu/ac. Cruiser Maxx seed treatment provided slightly more yield than the untreated seed. (50.6 bu/ac compared to 49.7 bu/ac) Figure 1 shows the yield response of the 7.5" rows on yield. Many of the treatments at the same seeding rate had essentially the same yield so points on the graph are difficult to distinguish from one another.

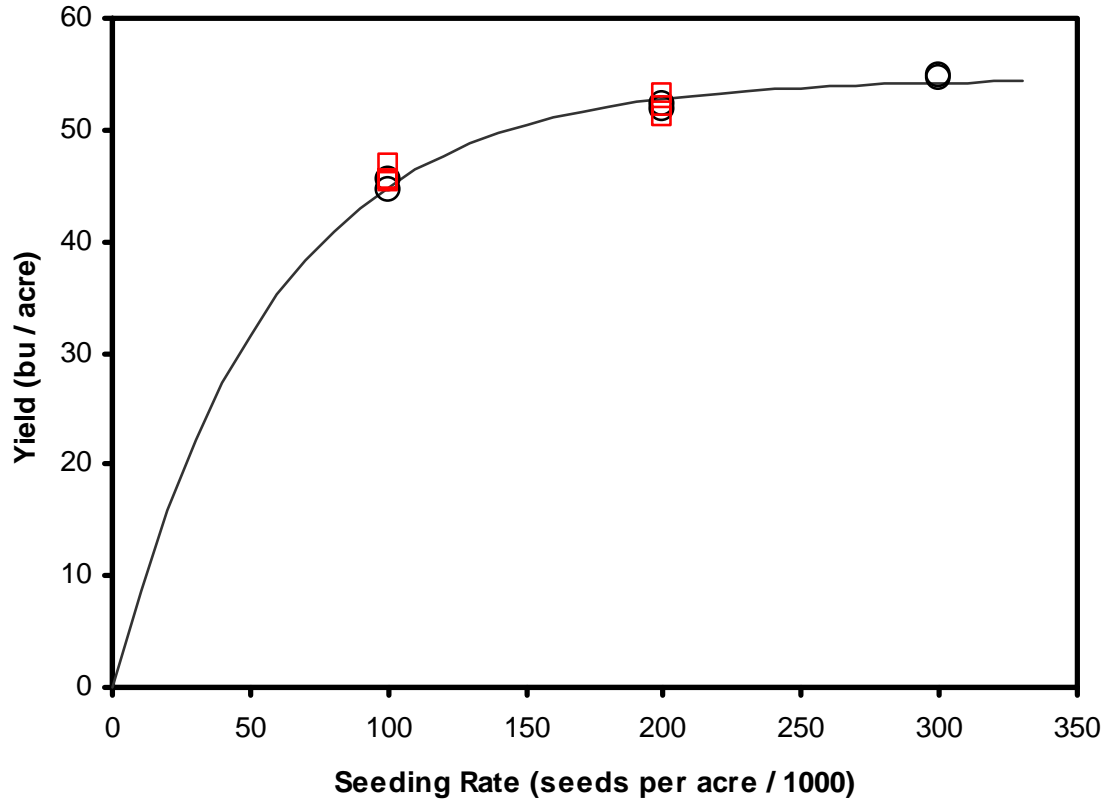
Assuming a seed cost of \$45/unit, 2800 seeds/pound, a yield of 42 bu/ac, and a selling price of \$11/bu the most economical seeding rate would have been 186 000 seeds/acre according to the response curve in Figure 1.

**Seed Characteristics:**

1) Oil

Considered across locations, seed treatments, row widths and equipment types, there was a significant effect of seeding rate on oil content. ( $P = 0.0001$ ). Row width also showed a statistically significant effect on oil content between 15" planter rows and 7.5" drill rows ( $P = 0.005$ )

Figure 1: Soybean Yield Responses to Seeding Rate in 2008-10\*.



\* Circles represent yields from 7.5" rows and squares represent yields from 15" planted rows

Seeding Rate	% Oil Content
100,000 seeds/ac	21.0
200,000 seeds/ac	20.9

Seeding Rate	% Oil Content
Drill 7.5" row	21.0
Planter 15" row	20.9

2) Protein

Considered across locations, seed treatments, row widths and equipment types, the effect of seeding rate on protein was significant. (P = <0.0001)

<b>Seeding Rate</b>	<b>% Protein Content</b>
100,000 seeds/ac	40.4
200,000 seeds/ac	40.7

These results are consistent with previous findings that higher seeding rates can result in lower oil and higher protein. There was no effect of seed treatment or any other factor on protein.

3) Disease Rating

There were no significant effects. (data not shown)

4) Seed Weight

Cruiser Maxx seed treatment provided slightly larger seed size as did the higher seeding rate.

<b>Seeding Rate</b>	<b>100 Seed Weight (g)</b>
100,000 seeds/ac	16.0
200,000 seeds/ac	16.2

<b>Seed Treatment</b>	<b>100 Seed Weight (g)</b>
Untreated	16.0
Cruiser Maxx	16.2

**Summary:**

- 1) Soybean yields increased significantly with higher seeding rates. The most economical seeding rate for 7.5" was approximately 186,000 seeds/acre across these sites.
- 2) A plant stand advantage of 6.7% were observed with the use of CruiserMaxx seed treatment at the preharvest stand count. This increased plant stand provides strong evidence that lower seeding rates are possible with the use of CruiserMaxx seed treatment. A yield benefit of 0.9 bu/ac was found in this study.
- 3) When seeding with a planter unit compared to a drill both in 15" rows a plant stand advantage of 5.2% was observed in favour of the planter. A yield advantage of nearly 1.8 bu/ac was also observed.

## Crop Advances: Field Crop Reports

- 4) The 15" planter showed a higher stand establishment over the 7.5" drill by 7.3% 30 days after seeding. There was a slight yield advantage of the 15" planter over the 7.5" drill by 0.8 bu/ac.
- 5) Higher seeding rates provided higher yields, protein and seed weights, but lower oil content.

### **Next Steps:**

This project is now complete.

### **Acknowledgements:**

We would like to thank the cooperators who lent their time and land to the project. We would also like to acknowledge AAC, GFO, Syngenta, and OSCIA for their support of this project.

### **Project Contacts:**

Horst Bohner, OMAFRA, 581 Huron St., Stratford, ON N5A 5T8

Ph: 519-271-0280; Fax: 519-273-5278; e-mail: [horst.bohner@ontario.ca](mailto:horst.bohner@ontario.ca)

Hugh J. Earl, Associate Professor, Dept. of Plant Agriculture, Crop Science Building  
University of Guelph, Guelph, ON N1G 2W1

Ph: 519-824-4120, Extension: 58568; e-mail: [hjearl@uoguelph.ca](mailto:hjearl@uoguelph.ca)