

## Increasing Profits through Precision Seeding and Seed Treatments (Interim Report)

### 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 precise seed metering resulting in more uniform stands and better depth control. 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 will assess (2008-2010) 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.

### Methods:

Two large scale field trials with 3 replications were conducted in 2008 and another 2 large scale replicated trials were conducted in 2009. One trial was located near Lucan and the other near Atwood Ontario in 2008 and one near Lucan and the other near Bornholm in 2009. Each plot within a trial was either 10' or 20' wide with a length of at least 1000 feet. All 4 sites were no-till. Drilled treatments were seeded with a 1560 John Deere no-till drill and the planter treatments were planted with a Kearney 15" vacuum planter. 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	-	-

<sup>1</sup>Untreated Seed <sup>2</sup>Cruiser Maxx Seed Treatment

### Results:

The 2009 growing season was cool and wet. Above average rainfall during July and August and excellent fall weather was experienced at both sites. No significant insect or disease pressure was detected in 2008 but soybean aphids were present late in the growing season in 2009. The Bornholm site reached threshold and was sprayed for aphids on August 20<sup>th</sup>. Results were robust with a yield C.V. of 4.2 in 2008 and 8.7 in 2009.

Crop Advances: Field Crop Reports 2009

**Table 1: 2008-2009 Trial Results**

Trt.	Equip.	Width	Seed Rate	Seed Trt. <sup>1</sup>	Yield (bu/ac)	% Oil	% Protein	% Estab. 30 <sup>2</sup>	% Estab. Final <sup>3</sup>	Sdwt. 100 <sup>4</sup>
1	drill	7	100	UT	39.7	20.4	40.5	64.9	58.7	15.9
2	drill	7	100	CM	40.4	20.5	40.4	64.3	66.7	16.1
3	drill	7	200	UT	47.5	20.2	40.9	70.4	60.6	16.0
4	drill	7	200	CM	47.7	20.4	40.9	73.8	62.9	15.9
5	drill	7	300	UT	51.1	20.2	41.0	72.5	63.3	16.0
6	drill	7	300	CM	51.4	20.2	41.1	80.1	69.3	16.2
7	drill	15	100	CM	40.2	20.4	40.4	73.4	72.3	16.2
8	drill	15	200	CM	46.3	20.3	40.7	71.9	66.8	16.3
9	planter	15	100	UT	41.8	20.4	40.5	78.6	77.2	16.0
10	planter	15	100	CM	41.8	20.4	40.7	84.0	80.2	15.9
11	planter	15	200	UT	48.2	20.1	40.9	77.1	68.6	15.6
12	planter	15	200	CM	48.7	20.2	40.8	78.3	68.0	16.0

<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

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

	Groups	Treatments Compared		Yield (bu/ac)	% Oil	% Protein	% Estab. 30 <sup>2</sup>	% Estab. Final <sup>3</sup>	Sdwt. 100 <sup>4</sup>
Drill Row Width	7"	2, 4	Signif <sup>2</sup>	44.0	20.4	40.6	69.0	64.8	16.0
	15"	7, 8		43.2	20.3	40.6	72.7	69.5	16.2
				NSD	NSD	NSD	NSD	NSD	NDS
Seeding Rate	100	1, 2, 7, 9, 10	Signif <sup>2</sup>	40.8	20.4	40.5	73.0	71.0	16.0
	200	3, 4, 8, 11, 12		47.7	20.2	40.8	74.3	65.4	16.0
				*	*	*	NSD	*	NDS
Drill vs Planter	Drill 15	7, 8	Signif <sup>2</sup>	43.2	20.3	40.6	72.7	69.5	16.2
	Planter 15	10, 12		45.2	20.3	40.8	81.1	74.1	15.9
				*	NSD	NSD	*	NSD	*
Drill 7 vs Plant 15	Drill 7	1, 2, 3, 4	Signif <sup>2</sup>	43.8	20.4	40.6	68.3	62.2	16.0
	Planter 15	9, 10, 11, 12		45.1	20.3	40.7	79.5	73.5	15.9
				*	NSD	NSD	*	*	NSD
Seed Trt.	Untreated	1, 3, 5, 9, 11	Signif <sup>2</sup>	45.6	20.3	40.7	72.7	65.7	15.9
	Cruiser Max	2, 4, 6, 10, 12		46.0	20.3	40.8	76.1	69.4	16.0
				NSD	NSD	NSD	NSD	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 5% confidence level

**Stand Counts:**

1) Cruiser Maxx:

No significant differences in plant establishment (stand divided by seeding rate) was found in 2009 during the first stand count taken 30 days after planting. However, a difference in stand was found at the pre-harvest count. This could indicate that plant stand protection was provided past 30 days after seeding. The Cruiser Maxx had a stand of 69% compared to the untreated seed of 63% (P = 0.05).

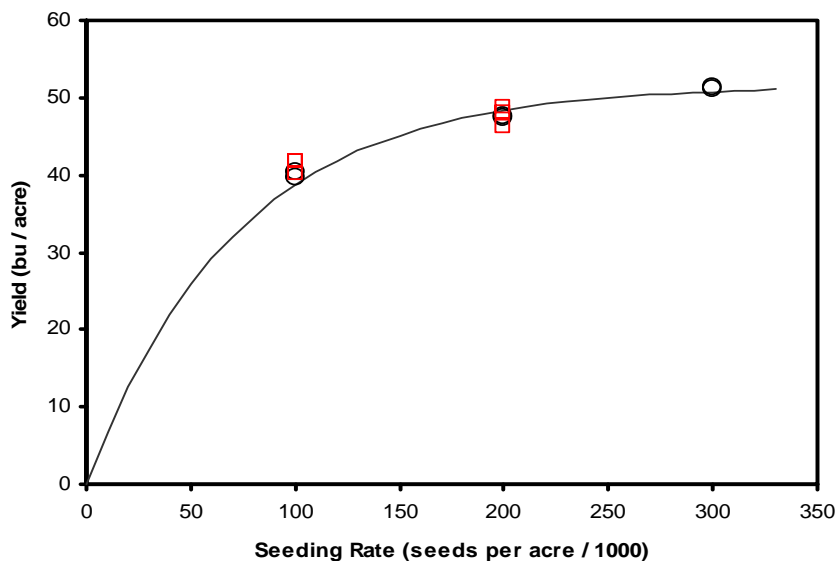
2) Equipment

The planter had a higher plant stand establishment in 15" rows compared to the 7.5" drill. The 7.5" drill provided a final stand of 59% while the planter had a stand of 71% (P = 0.0002) in 2009. Across the two years both the 30 days stand establishment and the final plant establishment was higher for the planter in 15" rows compared to the drill in 7.5" rows. Across both years the planter in 15" rows had a statistically better establishment than the drill in 15" rows.

**Yields:**

The impact of seeding rate was highly significant (P < 0.0001) on yield in 2008 and 2009. The planter also had a significant impact on yield. The planter in 15" rows compared to the drill in 15" rows yielded 45.2 bu/ac compared to 43.2 bu/ac. (P < 0.02) 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.

**Figure 1: Soybean Yield Responses to Seeding Rate in 2008-09\*.**



\* Black circles represent yields from 7.5" rows and red squares represent yields from 15" planted rows

Assuming a seed cost of \$45/unit, 2800 seeds/pound, a yield of 40 bu/ac, and a selling price of \$10/bu the most economical seeding rate would have been 205,078 seeds/acre according to the response curve in Figure 1. These results are in line with previous work conducted in Ontario which showed the most economical seeding rate on average for 7.5 inch rows was 195,000 seeds/acre. (Earl, Bohner, 2007)

Favourable growing conditions, high yields, and the lack of insect pressure in 2008-09 may have masked any large yield differences in treatments. Soybeans are known to compensate for plant stand differences if growing conditions are favourable and the plants have the ability to fill gaps. This was the second year of a 3 year project so additional data must be collected to make robust conclusions.

### **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. ( $P = 0.0001$ ) There was no effect of seed treatment or any other factor on oil.

<b>Seeding Rate</b>	<b>% Oil Content</b>
100,000 seeds/ac	20.4
200,000 seeds/ac	20.2

#### 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	40.5
200,000 seeds/ac	40.8

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.

#### 4) Seed Weight

There were no significant effects in 2009.

## Summary:

- 1) Soybean yields increased significantly with higher seeding rates. The most economical seeding rate for 7.5" was approximately 205,000 seeds/acre across these sites.
- 2) A plant stand advantage of 5.6% was observed with the use of Cruiser Maxx seed treatment compared to untreated seed in 2009. This difference was found during the pre-harvest count. This difference in plant stand would indicate that a reduction in seeding rate may be possible when using a Cruiser Maxx. More site years are necessary to make robust recommendations. There were no statistical yield differences when using the seed treatment over the untreated seed at these sites. It should be noted that no insect or significant disease pressure was apparent at these sites.
- 3) When seeding with a planter unit compared to a drill both in 15" rows a plant stand advantage of about 8% was observed in favour of the planter.
- 4) Yield improvements of about 2 bu/ac were observed when using a planter unit in 15" rows over a drill in 15" rows. The 15" planter yielded 1.3 bu/ac more than the 7.5" drill.

## Next Steps:

This was the second year of a 3 year project so additional data must be collected to make robust conclusions.

## Acknowledgements:

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