

## Optimum Soybean Seeding Rate when Using Cruiser Maxx and Precision Seeding

### Purpose:

This project was designed to 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. Traditional seed drills do a poor job of distributing seed evenly resulting in clumping of seed, leaving large gaps within the row. A planter allows for precise seed metering, resulting in more uniform stands. It also allows for 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 determine the most economic seeding rate when using precision seeding and Cruiser Maxx seed treatment.

### Methods:

Two large scale field trials with three replications were conducted in 2008. One trial was located near Lucan and the other near Atwood Ontario. Each plot within a trial was 20' wide with a length of 1000 feet, making each trial approximately 16 acres in size. Both 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. The yields were measured using a 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>Un. = Untreated seed, <sup>2</sup>CM. = Crusier Maxx Seed treatment

### Results and Summary:

The 2008 growing season was favorable for high yields. Above average rainfall during July and August and excellent fall weather was experienced at both sites. No significant insect or disease pressure was detected at either test location. On average the trials yielded over 50 bu/ac across all treatments. Yield results were extremely robust with a CV of 4.6% and 3.6% at the two sites.

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Figure #1 Trial Results

YIELD (bu/ac)	Lucan			Atwood			Average
	Rep1	Rep 2	Rep 3	Rep1	Rep 2	Rep 3	
<b>Treatment</b>							
7" Drill Untreated 100	46.12	44.65	42.45	mv	41.95	46.89	<b>44.41</b>
7" Drill Untreated 200	49.05	52.39	50.26	57.21	51.69	59.62	<b>53.37</b>
7" Drill Untreated 300	57.65	56.67	53.98	60.22	61.31	59.76	<b>58.27</b>
7" Drill Cruiser 100	45.71	mv	46.24	mv	43.36	50.24	<b>46.39</b>
7" Drill Cruiser 200	52.70	48.22	50.95	57.68	56.40	53.30	<b>53.21</b>
7" Drill Cruiser 300	56.67	55.09	54.63	60.81	58.82	60.50	<b>57.75</b>
15" Drill Cruiser 100	43.78	40.88	42.45	46.57	51.57	49.21	<b>45.74</b>
15" Drill Cruiser 200	mv	50.20	52.94	56.14	53.92	53.18	<b>53.28</b>
15" Planter Untreated 100	47.01	44.20	45.07	48.98	47.48	48.40	<b>46.86</b>
15" Planter Untreated 200	48.69	53.17	49.49	61.90	53.12	54.05	<b>53.40</b>
15" Planter Cruiser 100	46.49	46.07	42.88	46.52	46.73	47.70	<b>46.07</b>
15" Planter Cruiser 200	50.78	52.47	52.94	56.27	53.18	54.98	<b>53.44</b>
<b>PLANT STAND (30 Days after planting, plants/acre)</b>							
	Rep1	Rep 2	Rep 3	Rep1	Rep 2	Rep 3	Average
<b>Treatment</b>							
7" Drill Untreated 100	62883	62884	82303	81242	43155	76446	<b>68152</b>
7" Drill Untreated 200	109429	134397	154741	158132	175398	157824	<b>148320</b>
7" Drill Untreated 300	192348	237969	233962	234270	235811	285440	<b>236633</b>
7" Drill Cruiser 100	54252	mv	65896	74288	74288	63500	<b>66445</b>
7" Drill Cruiser 200	116519	134705	150118	172004	162448	199746	<b>155923</b>
7" Drill Cruiser 300	183101	284207	230880	289139	287289	259238	<b>255642</b>
15" Drill Cruiser 100	66273	69665	69665	119293	79539	74905	<b>79890</b>
15" Drill Cruiser 200	mv	116827	152892	173545	186183	140254	<b>153940</b>
15" Planter Untreated 100	76754	80145	91550	103264	100798	77679	<b>88365</b>
15" Planter Untreated 200	153509	162139	163372	175703	178000	195000	<b>171287</b>
15" Planter Cruiser 100	77370	90009	94016	108504	94017	92467	<b>92731</b>
15" Planter Cruiser 200	151350	158132	165839	182792	186143	165839	<b>168349</b>

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PLANT STAND (Pre-harvest, plants/acre)							Average
	Rep1	Rep 2	Rep 3	Rep1	Rep 2	Rep 3	
<b>Treatment</b>							
7" Drill Untreated 100	65759	61650	67815	59595	63705	67815	<b>64390</b>
7" Drill Untreated 200	113025	128500	123300	141795	113025	139740	<b>126564</b>
7" Drill Untreated 300	184950	160290	199335	168510	187005	199335	<b>183238</b>
7" Drill Cruiser 100	54200	mv	72500	88365	69870	73980	<b>71783</b>
7" Drill Cruiser 200	123300	102750	117135	150015	143575	133575	<b>128392</b>
7" Drill Cruiser 300	180840	191115	199335	205500	168510	191115	<b>189403</b>
15" Drill Cruiser 100	78090	123300	53429	65760	82200	69870	<b>78775</b>
15" Drill Cruiser 200	mv	94530	129465	143850	129465	168510	<b>133164</b>
15" Planter Untreated 100	73980	80145	98640	71925	76035	90420	<b>81858</b>
15" Planter Untreated 200	125355	163170	121245	125355	146180	156455	<b>139627</b>
15" Planter Cruiser 100	71925	86310	110970	84255	88365	76035	<b>86310</b>
15" Planter Cruiser 200	115080	113025	125223	143850	143850	156180	<b>132868</b>

### Stand Counts

#### 1) Cruiser Maxx:

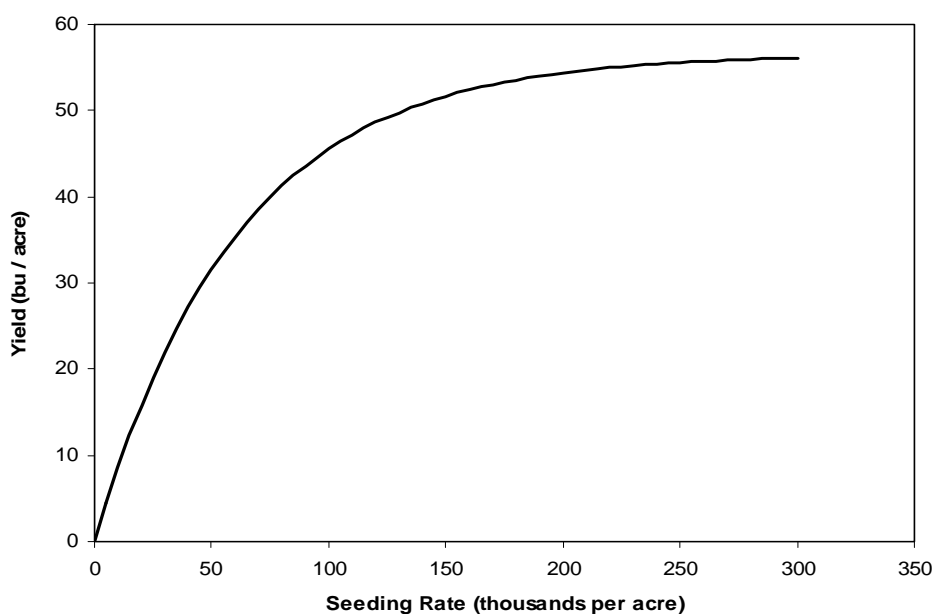
No significant differences in plant establishment (stand divided by seeding rate) was found at the Atwood location during the first stand count taken 30 days after planting. However, a difference in stand was found at the pre-harvest count. This could indicate that plant stand protection was provided past 30 days after seeding. The Cruiser Maxx had a stand of 76% compared to the untreated seed of 69% ( $P = 0.054$ ). In the 7.5" rows the Cruiser Maxx had a plant stand of 70% compared to the untreated which had a plant stand of 64% ( $P = 0.047$ ). No differences in stand establishment were found at the Lucan site.

#### 2) Equipment

At the Lucan location a difference in establishment was observed when comparing the planter to the drill. Across all the treatments the drill provided a stand of 70% while the planter had a stand of 85% ( $P = 0.002$ ). At the Atwood site a significant difference between the two seeding methods was also observed. The drill showed a plant stand of 67% while the planter showed a stand of 78% ( $P = 0.04$ ).

### Yields:

The impact of seeding rate was highly significant ( $P < 0.0001$ ) on yield, but none of the other factors (equipment, row width, or seed treatment) showed significant differences in yield. There were no interactions between population and the other factors tested. Both sites had similar results. A response curve is fitted to the data in Figure #2 ( $k$ -value = 0.0164). All data points (regardless of seed treatment or equipment fit well on the response curve).

**Figure #2: Soybean Yield Response (Average of Two Trials)**

Assuming a seed cost of \$40/unit, 2800 seeds/pound, a yield of 45 bu/ac, and a selling price of \$10/bu, the most economical seeding rate would have been 198,264 seeds/acre according to the above response curve. These results correlate with previous work conducted in Ontario which showed the most economical seeding rate on average for 7.5" rows was 195,000 seeds/acre (Earl, Bohner, 2007). At the higher yield potential experienced in 2008 (asymptotic yield of 56.5 bu/ac) the most economical seeding rate would have been 212,141 seeds/ac all other assumptions being the same. The lack of insect pressure, favorable growing conditions, and high yields in 2008 may have masked any yield differences in treatments. Soybeans are known to compensate for plant stand differences if growing conditions are favorable and the plants have the ability to fill gaps. This was the first year of a three-year project so additional data must be collected to make robust conclusions.

### Conclusions for 2008:

1. A plant stand advantage of 7% was observed with the use of Cruiser Maxx seed treatment compared to untreated seed at the Atwood site. This difference was found during the pre-harvest count. However, this plant stand difference was not large enough to impact yields in 2008. This difference in plant stand would indicate that a reduction in seeding rate may be possible when using a Cruiser Maxx even though in 2008 the stand differences were too small to make a statistically significant difference in yield. More site years are necessary to make robust recommendations. No difference in stand was found at the Lucan site.
2. When seeding with a planter unit compared to a drill a plant stand advantage of about 13% was observed on average in favor of the planter. This would indicate that seeding rates could be lowered when using a planter compared to a drill even though in 2008 the stand differences were too small to make a statistically significant difference on yield.

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3. Row width, seeding equipment, and seed treatment did not have a significant impact on yield. Soybeans yields increased significantly with higher seeding rates regardless of row width, seeding equipment, or seed treatment. The most economical seeding rate assuming a seed cost of \$40/unit, 2800 seeds/pound, and a yield of 45 bu/ac at a selling price of \$10/bu would be 198 264 seeds/acre.
4. Higher seeding rates resulted in slightly lower oil and higher protein levels.

### **Next Steps:**

These results indicate that further study is warranted to evaluate the possibility of lower seeding rates when using Cruiser Maxx and precision seeding.

### **Acknowledgements:**

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