

## XV CANOPY MANIPULATION TRIAL

**Objective:** Compare the effects of various planting dates and seeding rates on yield, maturity, insects and disease on *B. napus* canola.

**Background:** European research (Scott *et al*, 1999) indicates that canola yields could be related to canopy structure after flowering. Thinner canopies allow more light to penetrate lower pods resulting in increased yield due to translocation of photosynthates from pod hulls. Also, excessive vegetative growth can deplete soil moisture and nutrients resulting in poor pod formation and filling. Seeding rate studies have been conducted throughout western Canada under various weed and disease pressures. The introduction of hybrids and herbicide-tolerant canola varieties has improved weed control, which lessens the need for higher plant populations. Weather conditions often contribute to increased lodging and sclerotinia. Reducing plant stands may lessen the risk of these factors. However lower plant densities bring higher risks due to increased weed competition, later maturity, green seed and insects (ie. root maggots).

Recent seeding date research indicates that early spring or fall dormant seeded canola often leads to increased yields over normal seeding dates.

**Methodology:** The canopy manipulation trial was conducted as a RCB design. The variety InVigor 2663 was used. Early seeding was conducted as early as possible. Normal seeding was considered seven to 14 days after early seeding.

The trial consisted of the following treatments:

1. Early planting date @ 1.0 lb/ac swath @ 30 to 40% SCC on main stem
2. Early planting date @ 1.0 lb/ac
3. Early planting date @ 3.0 lbs/ac
4. Early planting date @ 5.0 lbs/ac
5. Normal planting date @ 1.0 lb/ac swath @ 30 to 40% SCC on main stem
6. Normal planting date @ 1.0 lb/ac
7. Normal planting date @ 3.0 lbs/ac
8. Normal planting date @ 5.0 lbs/ac (check)

Weeds were removed at the recommended leaf stage with Liberty and/or Select. Fertilizer rates were applied based on a 25% probability of precipitation according to soil test results. Corn cob grit was used to bulk up the 1 lb/ac and 3 lb/ac seeding rates. All other agronomic practices were similar for all treatments.

Swathing in this trial commenced when the main stem was at 30 to 40% seed colour change (SCC) unless the seeds in the pods on the side branches were translucent and soft. In this case, swathing was delayed until the seeds in the side branches were firm. The exceptions to this were treatments #1 and #5, which were swathed at 30 to 40% SCC on the main stem.

**Western Canadian Summary:**

CPC Location	Dauphin, MB		Yorkton, SK		Beiseker, AB		Lethbridge (Irr), AB		Dawson Creek B.C.		Thief River Falls, MN	
	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD	NYD	CMD*
<b>CANOPY MANIPULATION TRIAL</b>												
Early 1 lb/ac (30 to 40% SCC)	23.4	118	19.9	41	31.8	163	37.0	191	35.2	132	22.5	33
Early planting at 1 lb/ac	21.0	96	20.4	46	36.3	226	42.4	235	-	-	24.2	42
Early planting at 3 lb/ac	32.2	188	21.7	57	26.7	124	51.4	320	44.9	206	31.3	69
Early planting at 5 lb/ac	35.4	207	23.7	74	19.5	53	51.6	314	47.4	218	33.4	69
Normal 1 lb/ac (30 to 40% SCC)	22.8	112	24.6	84	37.6	211	42.2	238	29.0	107	31.7	82
Normal planting at 1 lb/ac	21.3	99	26.1	97	38.3	233	45.5	262	-	-	34.9	100
Normal planting at 3 lb/ac	36.8	229	26.6	106	26.7	113	52.3	328	33.9	135	36.5	98
Normal planting at 5 lb/ac (check)	37.7	227	27.1	110	23.8	91	57.2	364	34.6	136	35.5	82
LSD (bu/ac)	4.45		2.18		2.88		3.95		6.0		2.97	
CV (%)	12.7		7.5		7.9		7.5		13.7		7.8	

Note: NYD - Net Yield Data (bu/ac), CMD - Contribution Margin Data (\$/ac)  
 SCC = Seed Colour Change

\* Note: Thief River Falls Contribution Margins are in US\$

**Discussion:**

Differences were significant between planting dates and among seeding rates at most sites. With the exception of the Beiseker site, yield was usually higher at the 3 and 5 lb/ac seeding rates. The 1 lb/ac seeding rate rarely reached complete canopy closure and resulted in delayed maturity and increased branching at all sites. This contributed to increased weed pressure, due to lack of crop competition. Low seeding rates had increased lodging at the majority of the sites. "The plant grew too big for its branches". Seed colour change evaluation and swathability were more difficult at the lower plant densities. Due to low disease pressure, there were no noticeable differences in sclerotinia stem rot infection at all locations. Low plant populations are more susceptible to stresses that cause mortality (e.g., spring frost, insect damage). Achieving plant populations of 60-160 plants/m<sup>2</sup> allow for plant loss due to stress. It is important to realize that seeding rates are not as important as the plant populations produced.

## DAUPHIN

### Methodology:

The early-planted treatments were seeded on May 14, and the normal planting date was May 28. Actual seeding rates were 1.0, 3.0 and 4.9 lb/ac, with corncob grit used as a bulking agent for the 1.0 lb/ac rate. All treatments were seeded at a depth of  $\frac{3}{4}$  to 1" into good soil moisture. In-crop weed control included one application of Liberty (1.35 L/ac) at the 2 to 3-leaf stage of the crop. No fungicide was applied to this trial. All other agronomic practices were performed as described in the *Site Information*.

### Observations:

Cold temperatures predominated during the week following the early date of planting, and emergence of these plots took close to two weeks. Emergence was much better for the normal planting date treatments, as moisture conditions were still good and temperatures were warmer. Weed densities in all treatments were light to moderate and the single application of Liberty provided good control. Some flea beetle damage was observed on all treatments, but action threshold levels were not achieved. Wet conditions in June created the potential for sclerotinia, but drier conditions throughout July reduced the risk from this disease. Disease incidence was generally low at the time of swathing.

### Results: (a) Plant stand measurements

CANOPY MANIPULATION TRIAL						
Dauphin, MB						
System	Emergence Counts Plants/m <sup>2</sup>	Harvest Counts Plants/m <sup>2</sup>	Plant Height (cm)	Lodging Ratio (%)	# Primary Branches	# Secondary Branches
<b>Early Planting Date</b>						
1 lb/ac (30-40% SCC)	14	11	91	58	9.3	25.8
1 lb/ac	19	16	91	58	9.3	25.8
3 lb/ac	59	55	116	67	6.3	7.0
5 lb/ac	81	71	120	70	6.0	4.8
<b>Normal Planting Date</b>						
1 lb/ac (30-40% SCC)	26	19	105	86	6.8	8.0
1 lb/ac	28	18	105	86	6.8	8.0
3 lb/ac	81	59	120	88	6.0	4.0
5 lb/ac (check)	115	88	105	91	5.3	1.5
LSD	14.0	11.9	8.2	10.4	0.80	5.27
CV%	22	23	6	11	9.5	40.9

SCC - Seed Colour Change

**Results: (b) Yield and quality data**

<b>CANOPY MANIPULATION TRIAL</b>								
<b>Dauphin, MB</b>								
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>1,000 Kernel Weight (g)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
<b>Early Planting Date</b>								
1 lb/ac (30-40% SCC)	62	23.4	117.87	43.6	3.5	1197	97	1
1 lb/ac	56	21.0	96.27	43.6	3.6	1228	100	1
3 lb/ac	85	32.2	187.94	42.8	3.5	1135	91	1
5 lb/ac	94	35.4	206.66	43.2	3.4	1135	91	1
<b>Normal Planting Date</b>								
1 lb/ac (30-40% SCC)	60	22.8	112.47	43.6	3.4	1205	91	1
1 lb/ac	56	21.3	98.97	43.8	3.2	1246	94	1
3 lb/ac	98	36.8	229.34	45.2	3.6	1190	90	1
5 lb/ac (check)	100	37.7	227.36	45.0	3.8	1190	90	1
LSD		4.45		0.70	0.23			
CV%		12.7		1.3	5.5			

SCC - Seed Colour Change

**Discussion:**

Emergence rates were lower for the early planting date than the normal date, for any given seeding rate. This could be attributed to the colder soil temperatures at that time which slowed emergence considerably. Emergence levels within each date correlated with seeding rates. The early planting date treatments had more lodging and produced more primary and secondary branches than the normal date for each seeding rate, due to lower plant densities. The lower seeding rates within each date were generally shorter, with more lodging and more branches than higher seeding rates.

The 5.0 lb/ac seeding rate gave the highest yield for both planting dates, but the advantage was only significant over the 1.0 lb/ac treatments. Delaying swathing of the 1.0 lb/ac seeding rate had no significant impact on yield. For each seeding rate the normal date tended to yield better than the early date, but this was only significant at 3.0 lb/ac. The normal date tended to produce higher oil contents than the early date. Higher seeding rates improved oil content and thousand-kernel weight for the normal date, but this trend did not occur at the early date. Lower plant densities produced from the lower seeding rates led to delayed maturity, but there was no impact on grade. The normal date tended to give better economic returns than the early date for each seeding rate. The 1.0 lb/ac seeding rate reduced contribution margins for both planting dates, in spite of the savings in seed cost.

## **YORKTON**

### **Methodology:**

Planting took place on May 9 (early planted treatments) and May 24 (normal planted treatments). A fertilizer blend of 7-30-10-0 (actual) was seed-placed for all treatments. Liberty (1.35 L/ac or 10 ac/jug) and Select (0.025 L/ac or 120 ac/case) were applied as a tank mix at the 2 to 3-leaf stage of the crop. Normal planted treatments received a burnoff of Roundup Transorb (0.5 L/ac) on May 31.

### **Observations:**

Cool and dry growing conditions resulted in slow and uneven emergence for early-planted treatments. Emergence reached 70% by May 24. Flea beetle pressure was high (5 to 7 flea beetles/plant) to extreme (11 to 14 flea beetles/plant) in many areas of the early-planted treatments during early plant development. Leaf damage had exceeded action thresholds in many areas within seven days of emergence. Matador was applied on June 1 to all early-planted treatments. The insecticide worked well in terms of contact control on actively feeding flea beetles, but residual (vapour) control was reduced by rain the next day. A second application (June 5) of Matador was required due to continuous flea beetle damage. A third application of an insecticide (Sevin XLR) was required June 13 to early planted 1.0 lb/ac treatments due to persistent flea beetle pressure. Herbicide efficacy was generally very good. However, there was a second flush of grassy weeds due to reduced plant stands.

Normal planted treatments emerged on June 6. Flea beetle pressure was high in many areas of the normal planted treatments during early plant development. High flea beetle pressure warranted two applications (June 9 and 13) of Sevin XLR on the 1.0 lb/ac treatments, and one application (June 13) on the 3.0 lb/ac and 5.0 lb/ac treatments. These treatments recovered more quickly than the early-planted treatments.

**Results: (a) Plant stand measurements**

<b>CANOPY MANIPULATION TRIAL Yorkton, SK</b>			
<b>Treatment</b>	<b>Emergence Counts Plants/m<sup>2</sup> (May 30)</b>	<b>Emergence Counts Plants/m<sup>2</sup> (June 11)</b>	<b>Harvest Counts Plants/m<sup>2</sup> (August 29)</b>
<b>Early Planting Date</b>			
1 lb/ac (30-40% SCC)	25	14	17
1 lb/ac	24	14	16
3 lb/ac	53	34	48
5 lb/ac	89	56	68
<b>Normal Planting Date</b>			
1 lb/ac (30-40% SCC)	N/A	27	24
1 lb/ac	N/A	25	21
3 lb/ac	N/A	59	66
5 lb/ac (check)	N/A	86	95

SCC - Seed Colour Change  
N/A – not applicable

**Results: (b) Plant measurements**

<b>CANOPY MANIPULATION TRIAL Yorkton, SK</b>					
<b>Treatment</b>	<b>Plant Height (cm)</b>	<b>Lodging Ratio (%)</b>	<b>SCC on Main stem to achieve 35% SCC of whole plant</b>	<b># Primary Branches</b>	<b># Primary Branches</b>
<b>Early Planting Date</b>					
1 lb/ac (30-40% SCC)	70	71	N/A	15	8
1 lb/ac	70	71	70	14	7
3 lb/ac	88	88	40	7	2
5 lb/ac	98	99	35	4	1
<b>Normal Planting Date</b>					
1 lb/ac (30-40% SCC)	82	82	N/A	12	6
1 lb/ac	84	84	70	11	6
3 lb/ac	96	96	40	6	2
5 lb/ac (check)	98	98	35	3	1

SCC - Seed Colour Change  
N/A – not applicable

**Results: (c) Yield and quality data**

<b>CANOPY MANIPULATION TRIAL Yorkton, SK</b>								
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>1,000 Kernel Weight (g)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
<b>Early Planting Date</b>								
1 lb/ac (30-40% SCC)	73	19.9	41.08	45.1	3.8	1068	101	1
1 lb/ac	75	20.4	45.58	44.7	3.8	1068	101	1
3 lb/ac	80	21.7	56.59	44.7	3.6	1030	96	1
5 lb/ac	87	23.7	74.34	45.4	3.5	1010	94	1
<b>Normal Planting Date</b>								
1 lb/ac (30-40% SCC)	91	24.6	83.72	46.6	4.0	1201	102	1
1 lb/ac	96	26.1	97.22	46.9	4.1	1201	102	1
3 lb/ac	98	26.6	105.85	46.8	3.9	1160	98	1
5 lb/ac (check)	100	27.1	110.10	46.9	3.6	1108	94	1
LSD any treatment		2.59		1.16				
LSD seeding rate within seeding date		2.18		1.05				
CV%				1.88				

SCC - Seed Colour Change

**Discussion:**

Lodging ratios, maturity and branching increased as seeding rates were lowered, while plant height decreased, regardless of planting date. Flea beetle damage contributed to reduced plant stands and increased branching in early-planted treatments. There was no significant difference in yield between the 3.0 and 5.0 lb/ac seeding rates in either planting date. However, the 5.0 lb/ac seeding rate yielded significantly higher than the 1.0 lb/ac (30-40% SCC) seeding rate for both planting dates. Normal planting date treatments were significantly higher yielding than respective early-planted treatments for each seeding rate. Contribution margins reflected differences in yield, seed bulking costs, seed costs and pesticide costs. There were significant differences in oil content between planting dates.

## BEISEKER

### Methodology:

All treatments were planted according to protocol on May 24 and May 29. All treatments were sprayed with a Liberty (1.35 L/ac) and Select (0.025 L/ac) tank mix. No foliar insecticides or fungicides were used in this trial.

### Observations:

Rain after planting combined with warm soil temperatures resulted in excellent emergence. However, growing conditions were fair due to dry conditions. The heat of July created stress on the plants within all treatments. Treatments with high plant populations suffered the most. During the heat of the day plants would become wilted and gray in colour. Weed control was excellent across all treatments and no secondary weed flushes occurred. The 3.0 and 5.0 lb/ac treatments flowered during the hotter temperatures of July. The 1.0 lb/ac treatments flowered later in the season and were able to take advantage of rains and cooler weather conditions in early August. Due to the dry conditions prior to and during flowering sclerotinia was not a problem. Insect levels were minimal with the exception of grasshoppers near the end of pod filling. However, grasshopper pod damage was minimal. Maturity was delayed due to the cooler weather in August and September.

### Results: (a) Plant stand measurements

CANOPY MANIPULATION TRIAL						
Beiseker, AB						
Treatment	Emergence Counts Plants/m <sup>2</sup>	Harvest Counts Plants/m <sup>2</sup>	Plant Height (cm)	Lodging Ratio (%)	# Primary Branches	# Secondary Branches
<b>Early Planting Date</b>						
1 lb/ac (30-40% SCC)	32	30	44	73	11	6
1 lb/ac	32	32	44	77	11	6
3 lb/ac	86	86	41	80	5	3
5 lb/ac	129	120	36	84	4	0
<b>Normal Planting Date</b>						
1 lb/ac (30-40% SCC)	38	38	43	82	9	7
1 lb/ac	37	35	42	82	9	7
3 lb/ac	93	90	40	81	6	3
5 lb/ac (check)	138	130	36	73	4	0

SCC - Seed Colour Change

**Results: (b) Yield and quality data**

<b>CANOPY MANIPULATION TRIAL Beiseker, AB</b>								
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>1,000 Kernel Weight (g)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
<b>Early Planting Date</b>								
1 lb/ac (30-40% SCC)	134	31.8	162.90	42.0	4.5	1114	103	3
1 lb/ac	153	36.3	225.66	42.7	4.6	1136	107	1
3 lb/ac	112	26.7	12369	42.2	4.6	1119	104	2
5 lb/ac	82	19.5	53.14	41.6	4.8	1119	104	2
<b>Normal Planting Date</b>								
1 lb/ac (30-40% SCC)	158	37.6	211.04	42.4	4.3	1104	97	2
1 lb/ac	161	38.3	232.56	42.2	4.1	1133	102	2
3 lb/ac	112	26.7	112.74	41.5	4.3	1114	99	2
5 lb/ac (check)	100	23.8	90.59	41.2	4.5	1114	99	2
LSD		2.88		0.57				
CV%		7.9		1.1				

SCC - Seed Colour Change

**Discussion:**

Yields differing by 2.88 bu/ac or more were significant. There were significant yield differences when comparing seeding rate within a planting date. The 1.0 lb/ac treatment yielded the highest for each planting date. This yield advantage was attributed to the plant populations of the treatment. Dry weather led to severe competition for available nutrients and moisture. The interplant competition was less under lower plant populations, which allowed the plants to flourish. **In no way do the results recommend seeding at 1.0 lb/ac.** The 1 lb/ac (30-40% SCC on the main stem) treatment yielded significantly lower than the 1 lb/ac treatment in the early-planted treatment. In the normal planting date treatments the 1 lb/ac (30-40% SCC on the main stem) treatment yielded lower but not significantly. This illustrates the importance of looking at the whole plant when assessing the maturity. Oil content decreased as seeding rates increased in both planting dates. Differences of 0.57% in oil content were significant.

## LETHBRIDGE (IRRIGATION)

**Methodology:** All treatments were planted according to protocol on May 15 and May 21. All treatments were sprayed with a Liberty (1.35 L/ac) and Select (0.025 L/ac) tank mix. A subsequent application of Lontrel (0.2 L/ac) was spot sprayed to control Canada thistle. The plots were sprayed with Decis 5EC (0.05 L/ac) to control the cabbage seedpod weevil.

**Observations:** Cool weather conditions slowed emergence. Plant counts in the 1.0 lb/ac treatments were low and highly variable, and the crop never reached canopy closure. Weed control was excellent after spraying for all treatments. Subsequent flushes competed with the canola in the 1.0 lb/ac treatments. The 3.0 lb/ac and 5.0 lb/ac treatments were more competitive and very few weeds were visible later in the growing season. Some sow thistle and Canada thistle emerged in areas where Lontrel was not sprayed. Insect pressure was variable and was more noticeable in the early-planted treatments than in the later planted treatments. Petal testing conducted at flowering indicated minimal risk for sclerotinia infection and the disease was not observed at swathing. The 1.0 lb/ac treatments had minimal stubble to anchor the swath. The windstorms of September flipped swaths and some shelling occurred. The 3.0 lb/ac and 5.0 lb/ac treatments remained anchored.

### Results: (a) Plant stand measurements

CANOPY MANIPULATION TRIAL Lethbridge (Irrigation), AB						
Treatment	Emergence Counts Plants/m <sup>2</sup>	Harvest Counts Plants/m <sup>2</sup>	Plant Height (cm)	Lodging Ratio (%)	# Primary Branches	# Secondary Branches
<b>Early Planting Date</b>						
1 lb/ac (30-40% SCC)	17	15	44	59	9	19
1 lb/ac	19	18	43	61	8	16
3 lb/ac	49	45	42	60	7	6
5 lb/ac	130	110	39	65	5	1
<b>Normal Planting Date</b>						
1 lb/ac (30-40% SCC)	32	30	48	54	10	12
1 lb/ac	26	25	45	60	8	12
3 lb/ac	62	60	43	62	4	4
5 lb/ac (check)	111	102	44	55	4	2

SCC - Seed Colour Change

**Results: (b) Yield and quality data**

<b>CANOPY MANIPULATION TRIAL Lethbridge (Irrigation), AB</b>								
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>1,000 Kernel Weight (g)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
<b>Early Planting Date</b>								
1 lb/ac (30-40% SCC)	65	37.0	191.10	44.1	4.4	1213	116	1
1 lb/ac	74	42.4	234.50	44.3	4.5	1252	122	1
3 lb/ac	90	51.4	320.15	44.3	4.4	1135	105	1
5 lb/ac	90	51.6	314.11	45.1	4.0	1135	105	1
<b>Normal Planting Date</b>								
1 lb/ac (30-40% SCC)	74	42.2	238.10	45.0	4.2	1187	109	1
1 lb/ac	80	45.5	262.40	44.7	4.1	1223	114	1
3 lb/ac	91	52.3	328.25	45.0	4.3	1196	111	1
5 lb/ac (check)	100	57.2	364.51	45.5	4.4	1216	113	1
LSD		3.95		0.63				
CV%		7.5		1.1				

SCC - Seed Colour Change

**Discussion:**

Yield differences of 3.95 bu/ac or more were significant. The 5.0 lb/ac normal planted treatment had the highest yield and greatest contribution margin. The 1.0 lb/ac treatments had the lowest yields. The plant populations in the 1.0 lb/ac treatments were marginal. Weeds were the biggest problem in the 1.0 lb/ac treatments, regardless of planting date. Even with applications of Liberty and Select and spot spraying of Lontrel, weeds such as sow thistle, redroot pigweed and volunteer wheat continued to emerge and compete against the canola resulting in very weedy plots with dockage levels ranging from 6% to 20%.

Delaying swathing in the 1.0 lb/ac treatments improved yield, but this advantage was only significant for the early planting date. This illustrates the importance of looking at the whole plant when assessing maturity.

## DAWSON CREEK

**Methodology:** This trial was seeded on May 26 and June 3. In-crop weed control was achieved with a tank mix of Liberty (1.35 L/ac) and Select (0.025 L/ac). The 1.0 lb/ac treatments were eliminated due to lateness in the season and the potential for frost.

**Observations:** The early date of May 26 was later than planned due to poor environmental conditions and a snowfall in mid May. As a result, the normal planting date was delayed until early June. Therefore, the normal planting dates were not given the opportunity to fully mature due to the potential of fall frost.

### Results: (a) Plant stand measurements

CANOPY MANIPULATION TRIAL Dawson Creek, B.C.						
Treatment	Emergence Counts Plants/m <sup>2</sup>	Harvest Counts Plants/m <sup>2</sup>	Plant Height (cm)	Lodging Ratio (%)	# Primary Branches	# Secondary Branches
<b>Early Planting Date</b>						
1 lb/ac (30-40% SCC)	20	15	118	80	10	95
3 lb/ac	37	36	118	84	7	12
5 lb/ac	86	87	99	87	5	4
<b>Normal Planting Date</b>						
1 lb/ac (30-40% SCC)	27	21	122	88	7	21
3 lb/ac	46	56	117	90	5	9
5 lb/ac (check)	68	70	115	86	3	4

SCC - Seed Colour Change

**Results: (b) Yield and quality data**

<b>CANOPY MANIPULATION TRIAL Dawson Creek, B.C.</b>								
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>1,000 Kernel Weight (g)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
<b>Early Planting Date</b>								
1 lb/ac (30-40% SCC)	102	35.2	131.64	N/A	N/A	1019	117	sample
3 lb/ac	130	44.9	206.06	N/A	N/A	1005	113	sample
5 lb/ac	137	47.4	218.49	N/A	N/A	1005	113	sample
<b>Normal Planting Date</b>								
1 lb/ac (30-40% SCC)	84	29.0	107.15	N/A	N/A	937	109	sample
3 lb/ac	98	33.9	134.89	N/A	N/A	937	109	sample
5 lb/ac (check)	100	34.6	135.56	N/A	N/A	937	109	sample
LSD		6.0						
CV%		13.7						

SCC - Seed Colour Change  
N/A - not available

**Discussion:**

Plant height and branching increased as seeding rates were lowered. The early 3.0 lb/ac and 5.0 lb/ac yielded significantly higher than all other treatments. Contribution margins reflected differences in yield, seed bulking costs and seed costs.