

RESEARCH UPDATE



Canola Response to Seeding Density

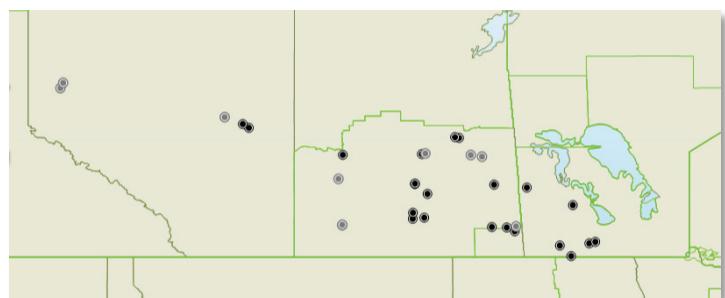
2013

Rationale and Objective

- Seeding rate in canola is an important agronomic decision in determining final yield.
- Many factors that contribute to canola yield, such as time to maturity, weed control/crop competition, lodging, swathability and harvestability, are influenced by plant density.
- Basing canola seeding rate on seed weight (lbs/acre) is not ideal with current hybrids due to variation in seed size.
- Seeding rate decisions need to be focused around targeting the correct number of plants per square foot (plant density) at approximately 21 days after emergence.
- Research has shown that the critical level of plant density in canola to minimize risk of yield loss is 4.6 plants per square foot (50 plants/square meter) (Shirliffe, 2009).
- Trials were conducted in 2012 and 2013 to evaluate plant density effects on canola performance and yield, as well as seeding rates necessary to achieve targeted densities.

Study Description

- Locations:** 26 across Western Canada
Years: 2012 and 2013
Targeted Plant Densities: 5.1, 8.5 and 11.9 plants/ft²
 (55, 92 and 128 plants/m²)
Pioneer® Brand Canola Hybrids: 2012: 45H29 (5.9 TSW)
 2013: 45S52 (5.5 TSW)



Locations of field-scale seeding rate trials conducted in Western Canada in 2012 and 2013.

Results

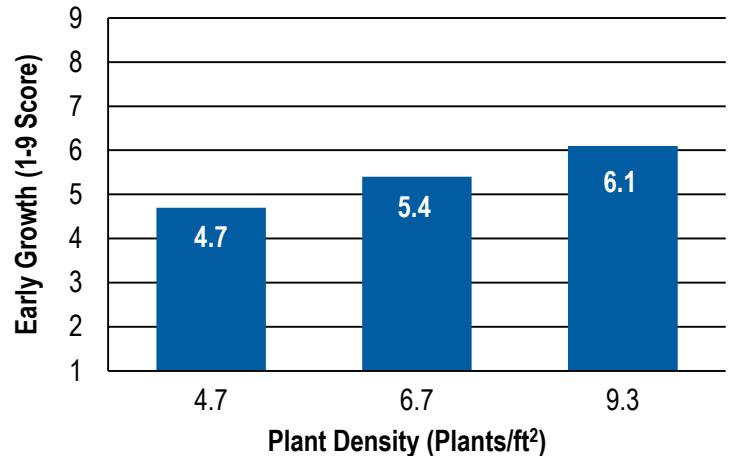
- A high degree of variability in plant density was observed across study locations, with actual plant density often differing from targeted densities.
- In plots at the 8.5 plants/square foot target plant density, 10% of locations had plant stands below the critical level of 4.6 plants/ft², and another 29% of the locations had density levels low enough to pose a moderate risk of yield reduction.

Variability in actual plant density at the 8.5 ft² target density.
 (Density counts taken at 21 locations.)

Number of Locations	Plant Density Range (Plants/ft ²)	Risk of Yield Reduction
2	4.3 to 4.4	High Risk
6	4.7 to 5.3	Moderate Risk
13	6.5 to 8.9	Low Risk

- As the number of plants per area increased, the observed early growth also increased – indicating an increased ability to withstand stress at the time of emergence.

Effect of Plant Density on Early Growth*



* Early Growth: 9 = Excellent; 1 = Poor. Recorded when plants were at the 4-6 leaf stage. Rating based upon relative plant health and leaf size. Early growth ratings taken at 15 locations.

Results (Continued)



4.7 plants/ft². Seed survival averaged 85% over 23 site locations.



6.7 plants/ft². Seed survival averaged 75% over 23 site locations.



9.3 plants/ft². Seed survival averaged 74% over 23 site locations.

Seed Survival (%) = 80%

Thousand Seed Weight (grams)	Seeding Rates (lb/ac)					
	3	4	5	6	7	8
2.5	10.0	13.3	16.7	20.0	23.3	26.7
3	8.3	11.1	13.9	16.7	19.5	22.2
3.5	7.1	9.5	11.9	14.3	16.7	19.1
4	6.3	8.3	10.4	12.5	14.6	16.7
4.5	5.6	7.4	9.3	11.1	13.0	14.8
5	5.0	6.7	8.3	10.0	11.7	13.3
5.5	4.5	6.1	7.6	9.1	10.6	12.1
6	4.2	5.6	6.9	8.3	9.7	11.1

Seed Survival (%) = 70%

Thousand Seed Weight (grams)	Seeding Rates (lb/ac)					
	3	4	5	6	7	8
2.5	8.8	11.7	14.6	17.5	20.4	23.3
3	7.3	9.7	12.2	14.6	17.0	19.5
3.5	6.3	8.3	10.4	12.5	14.6	16.7
4	5.5	7.3	9.1	10.9	12.8	14.6
4.5	4.9	6.5	8.1	9.7	11.3	13.0
5	4.4	5.8	7.3	8.8	10.2	11.7
5.5	4.0	5.3	6.6	8.0	9.3	10.6
6	3.6	4.9	6.1	7.3	8.5	9.7

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4.5	4.9	6.5	8.1	9.7	11.3	13.0
5	4.4	5.8	7.3	8.8	10.2	11.7
5.5	4.0	5.3	6.6	8.0	9.3	10.6
6	3.6	4.9	6.1	7.3	8.5	9.7

Summary

- Seed survival over 2012 and 2013 growing seasons in the trial locations was high at over 70%. Weather throughout the 2012 and 2013 growing seasons created excellent conditions for canola emergence due to the ideal amount of moisture available in the early part of the season throughout most of Western Canada.
- Days to maturity was shown to decrease as plant density increased. The open space left around plants with a low seeding density results in more room for plant growth and branching, which results in an increased number of days to maturity.
- Early growth was evaluated at 15 locations. Results showed seedling early season growth increased as plant density increased.
- A plant density of 6.5 to 9.5 plants/ft² resulted in less lodging, improved swathability and harvestability, and reduced risk for sclerotinia when compared to plant stands greater than 10 plants/ft².
- A plant stand of 6.5 to 9.5 plants/ft² also reduced risk of yield loss and provided earlier maturity, better overall weed control and excellent early growth when compared to the high risk plant densities of 5 plants/ft² or less.
- In summary, results illustrated that to achieve maximum return on investment and minimize risk, a plant stand density of 6.5 to 9.5 plants/ft² remains an ideal recommendation even with larger seed size.

Shirtliffe, S. 2009. Determining the economic plant density in canola. University of Saskatchewan. Published in 2009 and based on summary data from 35 experiments. Project Code: CARP 2006-08 www.saskcanola.com.

Pioneer® brand products are provided subject to the terms and conditions of purchase which are part of the labeling and purchase documents. 2012 and 2013 data are based on average of all comparisons made in 26 locations through Nov. 30, 2013. Multi-year and multi-location is a better predictor of future performance. Do not use these or any other data from a limited number of trials as a significant factor in product selection. Product responses are variable and subject to a variety of environmental, disease, and pest pressures. Individual results may vary.