Row Spacing and Seeding Rate Influence on Spring Canola Performance in the Northern Great Plains

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Narrow Row Spacing

- More uniform plant distribution (equal distance between plants) resulting in:
  - More efficient moisture, nutrient and light utilization.
- Less plant to plant competition.
- Quicker canopy closure / competition with weeds.

Wide Row Spacing

- Provides better residue clearance.
- Less soil disturbance / less power required
- More plant to plant competition within the row = thinner stems = more lodging.
- Delayed row closure – more weeds.

Previous Research

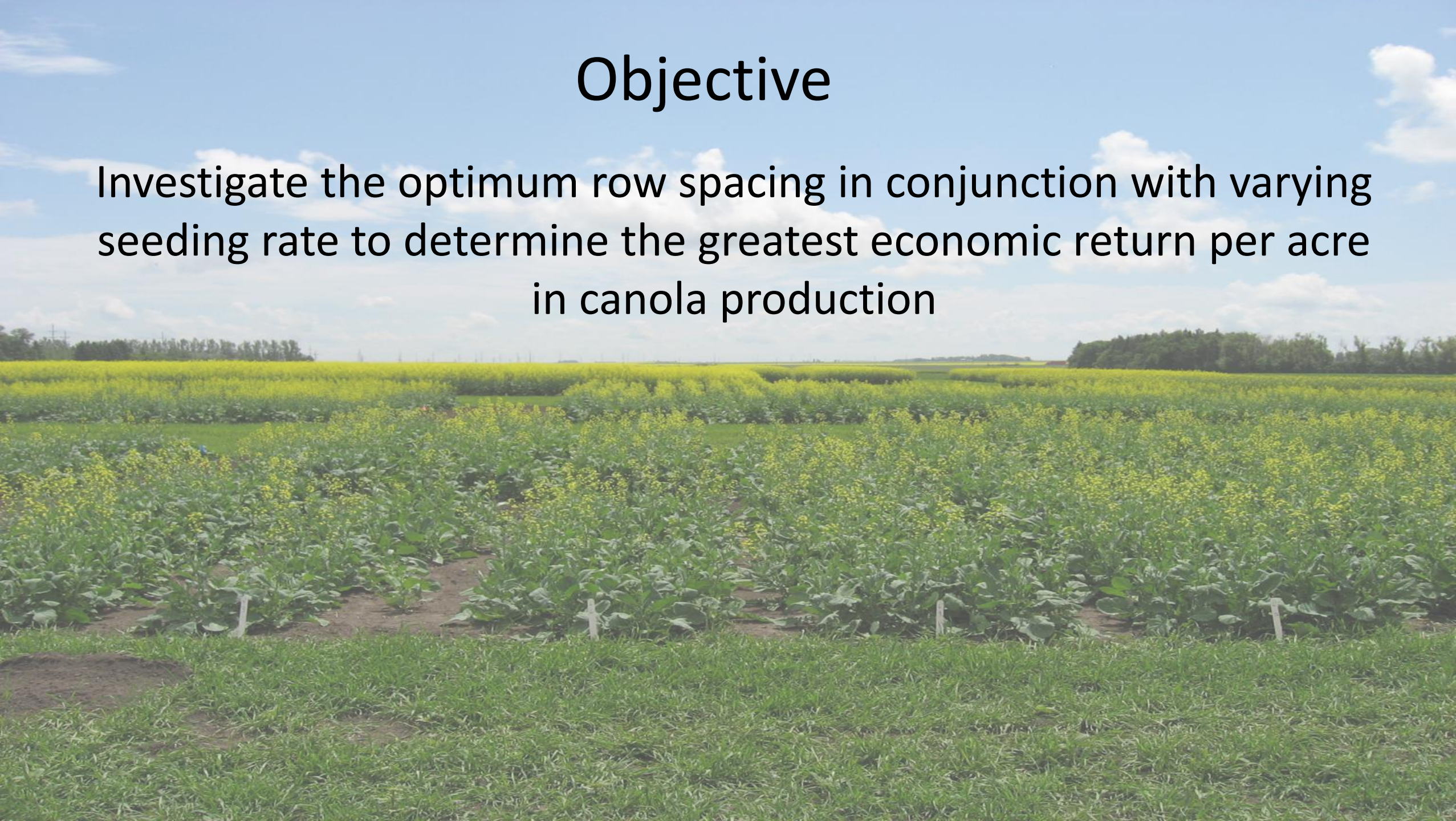
- Canada – Kondra (1975)
  - Row Width 6, 9, 12, 24 inches@ 2.5, 5.3, 10.7 lbs/a
    - Narrow row space at 5.3 lbs/a was optimum
- Canada – Christiansen and Drabble (1984)
  - No yield difference between 6 and 12 lbs/a
  - 9 inch row yield 11% less than 6 inch row
- Canada – Manitoba – Morris (1990)
  - 1.3 to 2.6 lbs/a – highest yield in 6 inch row
    - Lodging reduced in narrow rows

Previous Research

- Canada – Thomas (2003)
  - 15 site years – 6 and 12 inch rows yielded similar
- Canada – Sask. – Kutcher et al. (2013)
  - Row width 9, 12, 18, 24 @ 8, 16, 24 seed/ft^2 in No-Till
  - Yield decreased 11% from 9 to 24 inches,
  - No difference between seeding rate
- North Dakota – Johnson and Hanson (2003)
  - No difference in yield or oil content between 6 and 12 in rows
- North Dakota – Ericksmoen – Minot REC (2014)
  - Row width 7, 15, 30 inch. 30 inch significantly less than 7 & 15
  - Seeding rate 7 – 17 seeds/ft^2, No yield difference.
- North Dakota – Hanson (2013-2014)
  - RR and LL optimum seeding rate was 9-12 seeds/ft^2 for yield and net return/acre

Objective

Investigate the optimum row spacing in conjunction with varying seeding rate to determine the greatest economic return per acre in canola production



Materials and Methods

- Row spacing - 6, 12, and 24 inches
- Seeding rates – 3, 6, 9, 12 PLS/ft^2
- Design: Split plot – Row spacing – Main Plot, Seeding Rate – Subplot, 4 replications
- Variety: InVigor L140P
- Small plot planter, conventional tillage

Traits observed

- Spring stand count
- Harvest stand count
- % Cover
- Days to 100% Cover
- Days to first flower
- Days to end flower
- Flower duration

- Days to mature
- Plant height
- Lodging
- 1000 kwt
- Oil Content
- Yield
- Net return/a

Site locations

Langdon

- Planted May 12
- Replanted June 4 due to soil crusting and frost
- June 5 – 2.36 inches of rain in 2 hours
- Harvest Sept 24

- May - August
  - Rainfall - 11.06 inches
  - Temperature – Mean 62

Prosper

- Planted May 22
- Excellent stands
- Harvest Aug 22

- May – August
  - Rainfall - 15.09
  - Temperature – Mean 65

Canola Seeding Rates

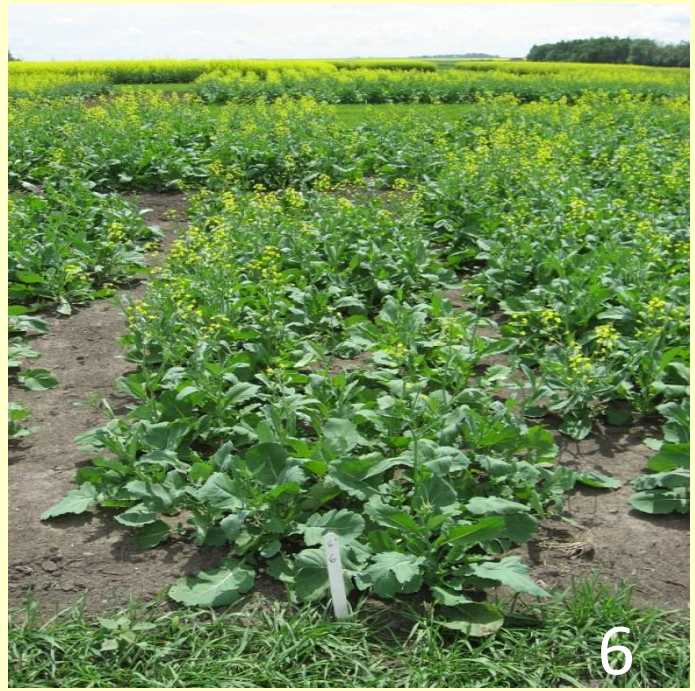
Seeds/ft^2	Lbs/A	Seed Cost/a	Seeds/A	Seeds per linear foot of row		
				6” row	12” row	24” row
3	1.3	16.47	130K	1.5	3.0	6.0
6	2.7	33.05	261K	3.0	6.0	12.0
9	4.0	49.52	392K	4.5	9.0	18.0
12	5.3	66.11	522K	6.0	12.0	24.0

Seed – Liberty Link L140P, Seed Cost – 12.38/ lb
1000 KWT – 4.55 g
Germination – 98%

- 6” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- June 18

- 12” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- June 18

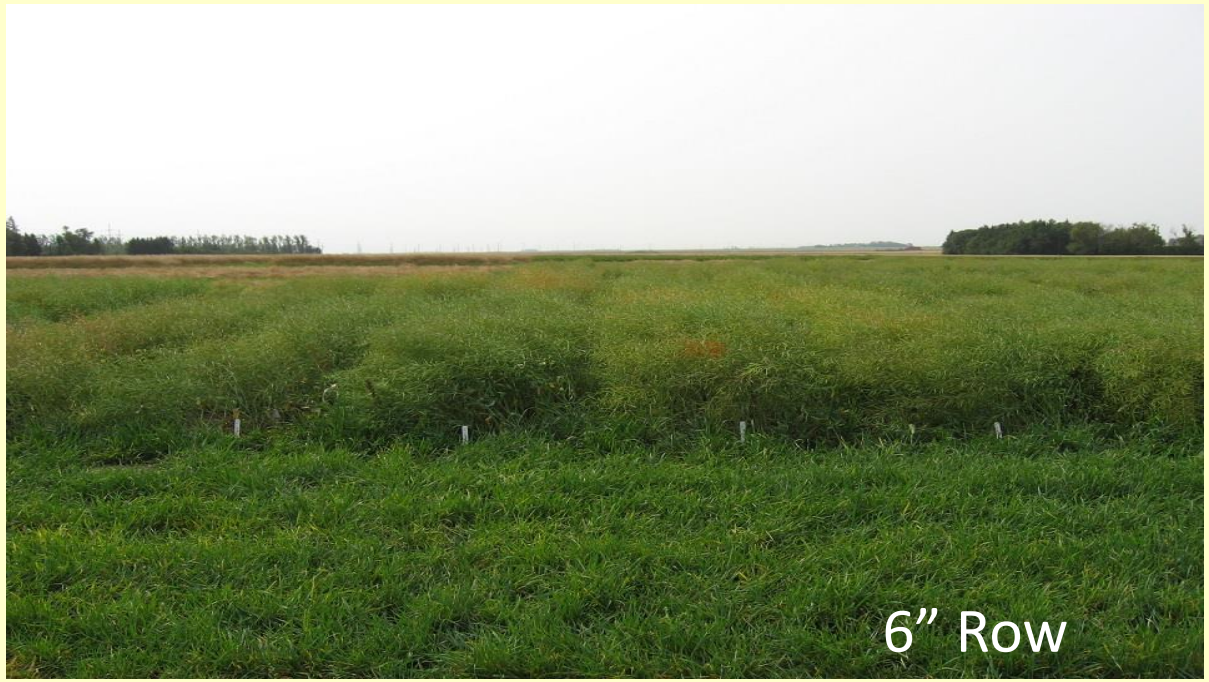
- 24” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- June 18



- 6” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- July 14

- 12” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- July 14

- 24” row spacing
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- July 14



- 6, 12, 24 in row
- 3, 6, 9, 12 PLS/ft^2 seeding rate
- September 11

Row width effects on various agronomic traits averaged across seeding rates - Langdon 2015

Row Width	Plants/4 ft linear row	Plts./ ft^2	Emerg. %	Row Cover-DAP
6	6.8	3.4	40	37
12	10.6	2.6	35	40
24	42.1	5.3	71	48
LSD 5%	4.1	0.7	10.9	5.2
RW	**	**	**	**
RW x SR	**	NS	NS	**

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
RW – Row width – main effect
RW x SR = Row width x seeding rate interaction

Row width effects on various agronomic traits averaged across seeding rates - Langdon 2015

Row Width	1st Flw DAP	DM DAP	Ht. In.	LGD 0-9	KWT g	Oil %
6	39.4	86.5	47.6	0	2.86	46.3
12	39.6	87.6	47.3	0.1	2.66	46.8
24	38.2	86.5	48.4	1.9	2.78	46.7
LSD 5%	0.6	NS	NS	0.8	NS	NS
RW	**	NS	NS	**	NS	NS
RW x SR	NS	NS	NS	NS	NS	NS

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
RW – Row width – main effect
RW x SR = Row width x seeding rate interaction

Seeding rate effects on various agronomic traits averaged across row widths - Langdon 2015

Seeding Rate	Plants/4 ft linear row	Plts./ ft^2	Emerg. %	Row Cover-DAP
3	7.6	1.5	42	49
6	18.3	3.4	57	43
9	22.6	4.2	47	38
12	30.8	6.0	50	37
LSD 5%	4.1	0.7	10.9	2.5
SR	**	**	NS	**
RW x SR	**	NS	NS	**

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
SR – Seeding Rate – main effect
RW x SR = Row width x seeding rate interaction

Seeding rate effects on various agronomic traits averaged across row widths - Langdon 2015

Seeding Rate	1st Flw DAP	DM DAP	Ht. In.	LGD 0-9	KWT g	Oil %
3	40.0	87.9	48.2	0.3	2.78	46.6
6	39.1	87.2	47.8	0.8	2.63	46.7
9	38.8	86.2	47.6	0.8	2.75	46.5
12	38.5	86.1	47.5	0.8	2.90	46.7
LSD 5%	0.6	NS	NS	NS	NS	NS
SR	**	**	NS	NS	NS	NS
RW x SR	NS	NS	NS	NS	NS	NS

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
SR – Seeding Rate – main effect
RW x SR = Row width x seeding rate interaction

Row width and seeding rate effects on yield and net return – Langdon 2015

Row Width	Yield lb/a	Net Return $/a	Seed Cost/a	Seeding Rate Plts/ft^2	Yield lbs/a	Net Return $/a
6	3203 ab	411 ab	16	3	2542 a	343 a
12	3334 b	429 b	33	6	3112 b	406 b
24	2840 a	359 a	49	9	3318 c	419 bc
			66	12	3530 d	432 c
LSD 5%	396	56			186	26
RW	*	*				
SR					**	**
RW x SR	**	**			**	**

Seed Price – L140P – 12.38 lb
Market Price – Oct 30 – 14.13/cwt
Net Return= (Yield x market price-) seed price

Row width effects on various agronomic traits, yield and net return averaged across seeding rate - Prosper 2015

Row Width	Plts./ ft^2	1st Flw DAP	LDG 0-9	Oil %	Yield lbs/a	Net Return$
6	9.3	41.0	2.2	32.9	2194 a	269 a
12	8.2	41.1	2.3	33.8	1891 b	226 b
24	7.2	40.9	2.3	32.8	1972 b	238 b
LSD 5%	0.9	NS	NS	0.7	108	16
RW	**	NS	NS	*	**	**
RW x SR	**	NS	NS	*	NS	NS

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
RW – Row width – main effect
RW x SR = Row width x seeding rate interaction

Seeding rate effects on various agronomic traits, yield and net return averaged across row widths - Prosper 2015

Seeding Rate	Plts./ ft^2	1st Flw DAP	LDG 0-9	Oil %	Yield lbs/a	Net Return$
3	3.8	41.8	3.8	33.0	1720 a	227 a
6	7.0	41.0	4.3	33.4	1985 b	247ab
9	9.9	40.7	4.8	33.0	2165 c	256 b
12	12.2	40.6	4.8	33.3	2206 c	245 ab
LSD 5%	1.2	0.4	0.5	NS	147	21
SR	**	**	**	NS	**	**
RW x SR	**	NS	NS	*	NS	NS

Significant at P≤ 0.05*
Significant at P≤ 0.01**
DAP-Days after planting
SR – Seeding Rate – main effect
RW x SR = Row width x seeding rate interaction

Conclusions

- Effects of row width and seeding rate on agronomic traits of flowering, maturity, plant height, kwt, oil and lodging were very small or non-significant.
- At Langdon, the optimum combination of row width and seeding rate for net return/a was 6 or 12” row spacing at seeded at 6-9 pls/ft^2.
- At Prosper, the optimum combination of row width and seeding rate for net return/a was a 6” row spacing seeded at 6-9 pls/ft^2.
- Plan to continue this trial again in 2016.

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