Seedrow Placement Effects of Different N Rates on Optimum and Deep Seeded Canola Using Knives and Shovels

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BACKGROUND

- There are about 3.5 million ha of agricultural land under canola production in the Canadian prairies, of which 1.6 million ha are in Saskatchewan, and it is the major cash crop in the Parkland zone.
- One pass seeding and fertilizer application reduces time, cost and equipment needs for seeding, tillage intensity and soil water loss, but it needs relatively larger, complex and expensive seeding equipment for placement of seed and fertilizer in separate bands.
- To avoid or inabilty to incur extra cost on seeding equipment, many producers tend to place the fertilizer in the seedrow band, which has the potential to reduce emergence and yield.
- Deeper than optimum depths tends to reduce the tolerance of seedlings to any stress, and deep seeding has been observed to reduce emergence, delay maturity and reduce yield.
- Width of the seedrow band and type of seedrow opener have been observed to influence the rate of N which can be safely placed in the seedrow.
- Generally wider the seedrow band, higher the rate of N that can be seedrow placed without any seedling injury.

OBJECTIVE

- To compare seedling emergence, seed yield and seed quality of optimum and deep seeded canola with different combinations of seed/fertilizer placements.

MATERIALS AND METHODS

• Location:	Melfort
• Soil:	Black Chernozem
• Mean Precipitation:	450 mm
• Growing Season:	May to September
• Canola Cultivar:	Quest (*B. napus*)
• Rates of N:	0, 40, 80, 120 kg N/ha
• Source of N:	46-0-0 and 34-0-0
• Types of Openers:	Knife and Shovel
• N Placements:	Seedrow and Sideband
• Band Widths:	Knife = 2 cm Shovel = 22 cm
• Other Fertilizers:	Blanket Application of P, K and S Fertilizers

- Data Recorded: Seedling Emergence Seed Yield, Protein Content and Oil Content

SUMMARY AND CONCLUSION

- Sideband placement of N had no effect on emergence, markedly increased seed yield and tended to increase thousand kernel weight (TKW), bushel weight (BW), and protein content of seed while it tended to reduce oil content of seed.
- Seedrow placement of N generally reduced emergence and seed yield compared to sideband placement and the the effect tended to be more severe at higher N rate, but its effect on the TKW, BW, protein content and oil content of seed was not consistent.
- Deep seeding reduced emergence and seed yield in many cases but it did not produce consistent effect on the seed parameters.
- Use of knives tended to be better at low rates of N and optimum seeding depth.
- In general, the negative impact of seedrow placement compared to sideband placement of N became more severe with deep seeding, higher N rate and knives.
- In conclusion, sideband placement of N and seeding with knives at optimum seeding depth was considered as a combination of choice for the N rates used in this study.

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Seed yield of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1997.

	Seed yield (kg/ha) at N rates (kg			
Treatme	**0**			**12**
46 - 0 - 0 sideband		**210**	**211**	**220**
46 - 0 - 0 seedplaced -		**190**	**213**	**2150**
46 - 0 - 0 seedplaced -		**201**	**205**	**205**
34 - 0 - 0 seedplaced -		**186**	**200**	**1882**
34 - 0 - 0 seedplaced -		**211**	**214**	**1993**
CONTROL – knives	**120**			
CONTROL -	**126**			

Plant emergence of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1997.

	Plant emergence (#/m^2) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		13	14	12
46 - 0 - 0 seedplaced -		11		
46 - 0 - 0 seedplaced -		13	12	10
34 - 0 - 0 seed placed -		11		
34 - 0 - 0 seedplaced -		12	11	76
CONTROL –	12			
CONTROL –	10			

Seed yield of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1997.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		244	225	186
46 - 0 - 0 seedplaced -		213	142	134
46 - 0 - 0 seedplaced -		224	223	176
34 - 0 - 0 seedplaced -		167	138	114
34 - 0 - 0 seedplaced -		201	235	207
CONTROL – knives	127			
CONTROL –	141			

Plant emergence of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1997.

	Plant emergence (#/m^2) at N rates			
Treatme	0			12
46 - 0 - 0 sideband		12		
46 - 0 - 0 seedplaced -				9
46 - 0 - 0 seedplaced -		13	10	
34 - 0 - 0 seedplaced -				0
34 - 0 - 0 seedplaced -		9		
CONTROL –	3			
CONTROL –	6			

Seed yield of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1998.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		177	206	229
46 - 0 - 0 seedplaced -		161	146	963
46 - 0 - 0 seedplaced -		190	204	195
34 - 0 - 0 seedplaced -		153	169	120
34 - 0 - 0 seedplaced -		173	197	195
CONTROL – knives	133			
CONTROL – shovels	152			

Plant emergence of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1998.

	Plant emergence (#/m^2) at N rates			
Treatme	0			12
46 - 0 - 0 sideband		12	12	13
46 - 0 - 0 seedplaced -				
46 - 0 - 0 seedplaced -		10		
34 - 0 - 0 seedplaced -				
34 - 0 - 0 seedplaced -				10
CONTROL – knives	16			
CONTROL –	10			

Seed yield of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1998.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		165	163	168
46 - 0 - 0 seedplaced -		146	107	562
46 - 0 - 0 seedplaced -		103		452
34 - 0 - 0 seedplaced -		119		709
34 - 0 - 0 seedplaced -				533
CONTROL – knives	106			
CONTROL – shovels				

Plant emergence of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1998.

	Plant emergence (#/m^2) at N rates (kg N/ha)	
Treatme	0	12
46 - 0 - 0 sideband		
46 - 0 - 0 seedplaced -		
46 - 0 - 0 seedplaced -		
34 - 0 - 0 seedplaced -		7
34 - 0 - 0 seedplaced -		9
CONTROL – knives	6	
CONTROL –	2	

Seed yield of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1999.

	Seed yield (kg/ha) at N rates (kg		
Treatme	0		12
46 - 0 - 0 sideband	165	193	216
46 - 0 - 0 seedplaced -	185	183	166
46 - 0 - 0 seedplaced -	176	176	200
34 - 0 - 0 seedplaced -	171	207	209
34 - 0 - 0 seedplaced -	173	196	191
CONTROL –	112		
CONTROL – shovels	125		

Plant emergence of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1999.

	Plant emergence (#/m^2) at N rates			
Treatme	0			12
46 - 0 - 0 sideband		23	22	21
46 - 0 - 0 seedplaced -		20	12	
46 - 0 - 0 seedplaced -		18	17	16
34 - 0 - 0 seedplaced -		16		
34 - 0 - 0 seedplaced -		23	20	16
CONTROL – knives	24			
CONTROL – shovels	22			

Seed yield of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1999.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		212	197	193
46 - 0 - 0 seedplaced -		191	153	125
46 - 0 - 0 seedplaced -		186	206	202
34 - 0 - 0 seedplaced -		168	133	748
34 - 0 - 0 seedplaced -		164	178	182
CONTROL – knives				
CONTROL –	106			

Plant emergence of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 1999.

	Plant emergence (#/m^2) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		22	20	16
46 - 0 - 0 seedplaced -		16	7	
46 - 0 - 0 seedplaced -		11	13	11
34 - 0 - 0 seedplaced -		12		
34 - 0 - 0 seedplaced -		13	11	
CONTROL – knives	21			
CONTROL – shovels	14			

Seed yield of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 2000.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		183	210	222
46 - 0 - 0 seedplaced -		187	240	246
46 - 0 - 0 seedplaced -		191	203	243
34 - 0 - 0 seedplaced -		201	244	264
34 - 0 - 0 seedplaced -		190	230	240
CONTROL –	141			
CONTROL –	155			

Plant emergence of optimum seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 2000.

	Plant emergence (#/m^2) at N rates			
Treatme	0			12
46 - 0 - 0 sideband		23	20	22
46 - 0 - 0 seedplaced -		16	17	11
46 - 0 - 0 seedplaced -		15	15	17
34 - 0 - 0 seedplaced -		19	16	12
34 - 0 - 0 seedplaced -		18	18	16
CONTROL –	24			
CONTROL – shovels	22			

Seed yield of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 2000.

	Seed yield (kg/ha) at N rates (kg			
Treatme	0			12
46 - 0 - 0 sideband		208	226	239
46 - 0 - 0 seedplaced -		220	221	201
46 - 0 - 0 seedplaced -		175	201	200
34 - 0 - 0 seedplaced -		182	233	223
34 - 0 - 0 seedplaced -		155	212	219
CONTROL –	134			
CONTROL –	116			

Plant emergence of deep seeded canola with urea and ammonium nitrate applied at different rates using knives and shovels at Melfort in 2000.

	Plant emergence (#/m^2) at N rates			
Treatme	**0**			**12**
46 - 0 - 0 sideband		**18**	**17**	**15**
46 - 0 - 0 seedplaced -		**20**	**10**	
46 - 0 - 0 seedplaced -		**13**	**12**	**12**
34 - 0 - 0 seedplaced -		**15**	**10**	
34 - 0 - 0 seedplaced -		**12**	**13**	**11**
CONTROL –	**13**			
CONTROL –	**12**			