Final Report

on

"Seed Placement of Nitrogen for Canola"

(Project # CA95-15)

prepared for

Canola Council of Canada

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prepared by

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March, 1996

1. METHODS

Samples of Elstow, Scott, Asquith, Naicam and Yorkton soils were obtained at locations from Naicam to Scott. The characteristics of the soils are presented in Table 1. Clay content ranged from 9 to 27% and organic matter content from 3.4 to 7.8%. The pH of the soils ranged from 5.2 to 8.0.

Table 1. Analyses of soils used.

Soil	pH	Organic matter (%)	Cation exchange capacity (me/100 g)	% clay	Available nutrients (ppm)			
					NO_3-N	P	K	SO_4^--S
Naicam (NC)	7.7	7.8	37	27	24	17	538	24
Yorkton (YK)	8.0	6.2	32	22	12	41	141	16
Scott (ST)	5.2	6.9	26	23	19	60	615	9
Elstow (EW)	7.4	4.7	26	26	8	35	675	12
Asquith (AQ)	5.6	3.4	13	9	3	23	413	6

Soils were air-dried and placed in growth chamber trays of dimensions 30 cm by 60 cm and a depth of about 6 cm soil was placed in the trays.

The soil was wet to field capacity and allowed to equilibrate. In the moist soil, furrows were opened to a uniform depth and the appropriate quantities of seed and fertilizer material were placed in the furrow. The entire tray was then covered with moist peat. The moist peat prevented evaporation of water from the soil and allowed germination to take place in much the same way as it would take place in the field in years when rainfall did not occur immediately after seeding.

Observations were made of emergence of the various plant species each day until the conclusion of the experiment which was usually from 21 to 30 days after seeding.

2. RESULTS

The results of the seed placed urea experiment are presented in Table 2. For canola, the 80 lb N rate prevented any germination, and the 40 lb/acre N rate allowed only minimal germination. The 20 lb/acre N rate created reductions that would be considered serious, particularly for the Naicam and Yorkton soils.

Table 2. Effect of urea nitrogen fertilizer on % emergence of canola, peas and wheat.

N rate (lbs/acre)	Soil type			
	Elstow	Scott	Naicam	Yorkton
	% emergence			
CANOLA				
0	88	59	65	77
20	65	53	24	41
40	24	18	6	12
80	0	0	0	0
PEAS				
0	36	57	43	43
20	29	43	29	7
40	7	36	14	14
80	0	14	0	14
WHEAT				
0	100	100	100	100
20	100	96	96	96
40	91	100	86	91
80	55	64	36	32

The results for peas were very similar to that of canola. In general, the results with peas were more variable and difficult to interpret than the other two crops. For wheat, rates up to 40 lb N/acre created no germination problems under the conditions of this experiment, but 80 lb N/acre resulted in a more than 50% reduction in stand establishment.

The data from the urea and ammonium sulphate and urea-ammonium sulphate fertilizers are presented in Table 3. The soil used in this experiment was Elstow; and for canola and wheat, the data in this experiment are almost identical to that obtained in the urea experiment (Table 2). The nitrogen effect on seedling emergence was essentially the same for urea, ammonium sulphate or urea-ammonium sulphate mixed fertilizers.

Table 3. Effect of nitrogen fertilizers on % emergence of canola, peas and wheat.

N rate (lbs/acre)	Urea	Ammonium sulphate	Urea ammonium sulphate
	---------- % emergence ----------		
CANOLA			
0	71	82	88
20	77	71	65
40	24	59	41
80	0	24	12
PEAS			
0	79	64	50
20	64	57	64
40	43	29	36
80	21	21	7
WHEAT			
0	100	96	100
20	96	96	100
40	96	86	86
80	55	91	73

Urea (46-0-0)
Ammonium sulphate (20-0-024)
Urea ammonium sulphate (34-0-0-11; blend urea + ammonium sulphate)

The data for the seed placed P and K experiment are presented in Table 4. Seed placed K up to 80 lbs K_2O/acre had minimal effects on wheat. For canola, rates greater than 20 lbs K_2O/acre resulted in some reduction and the highest rate nearly prevented

Table 4. Effect of seed placed P and K on % emergence of canola, peas and wheat.

K_2O rate (lbs/acre)	Asquith soil	Naicam soil	P_2O_5 rate (lbs/acre)	Asquith soil	Naicam soil
	---- % emergence ----			---- % emergence ----	
CANOLA			*CANOLA*		
0	82	82	0	77	76
20	82	82	20	59	65
40	71	53	40	65	53
80	53	71	80	18	29
160	12	29	160	6	6
PEAS			*PEAS*		
0	71	57	0	64	43
20	57	50	20	50	43
40	71	50	40	50	21
80	57	43	80	36	14
160	21	7	160	14	7
WHEAT			*WHEAT*		
0	100	100	0	100	100
20	96	96	20	96	96
40	96	91	40	96	100
80	86	86	80	82	96
160	55	46	160	64	82

Potassium source: Potassium chloride (0-0-60) Phosphate source: Monoammonium phosphate (11-55-0)

germination. For peas, the data were not conclusive but rates up to 40 lbs K_2O/acre did not appear to cause serious reductions in plant stands.

For the phosphate experiment (Table 4), rates of phosphate up to 40 lbs P_2O_5/acre had little effect on wheat and rates greater than 80 lbs P_2O_5/acre were required before serious plant stand reductions with wheat took place. For canola, rates greater than 40 lbs P_2O_5/acre caused serious reductions in plant population. For peas, germination was incomplete even with no fertilizer additions, so the breakpoint is difficult to establish based on that data.

The complete fertilizer experiments (Table 5) showed that rates of 50 lbs/acre of product caused only small reductions in emergence for all crops. The 100 lbs/acre rate of product resulted in serious reductions in emergence for canola and peas. For canola the negative impact of the 100 lbs/acre rate was particularly noted at the 8 day count (Table 6).

Table 5. Effect of seed placed complete fertilizers on % emergence of canola, peas and wheat (final data - day 14).

Rate of 13-14-15-12 fertilizer (lbs/acre)	Asquith soil	Naicam soil	Rate of 13-14-15-12 fertilizer (lbs/acre)	Asquith soil	Naicam soil
	---- % emergence ----			---- % emergence ----	
CANOLA			*CANOLA*		
0	82	94	0	94	100
50	77	100	50	77	77
100	65	88	100	71	82
200	53	71	200	35	47
PEAS			*PEAS*		
0	67	78	0	83	67
50	72	83	50	72	61
100	50	67	100	39	44
200	33	50	200	17	28
WHEAT			*WHEAT*		
0	96	100	0	96	96
50	91	100	50	91	96
100	86	96	100	82	91
200	73	91	200	73	59

The data from the complete fertilizer experiment emphasizes the fact that seed placed fertilizer can cause serious delays in germination and emergence. Such delays may not be noticed in farmers fields if appropriate check strips are not available.

Table 6. Effect of seed placed complete fertilizers on % emergence of canola, peas and wheat (interim data - day 8).

Rate of 13-14-15-12 fertilizer (lbs/acre)	Asquith soil	Naicam soil	Rate of 13-14-15-12 fertilizer (lbs/acre)	Asquith soil	Naicam soil
	---- % emergence ----			---- % emergence ----	
CANOLA			*CANOLA*		
0	82	88	0	88	94
50	77	102	50	77	71
100	47	71	100	59	65
200	29	65	200	29	35
PEAS			*PEAS*		
0	61	67	0	72	61
50	61	67	50	56	39
100	50	61	100	28	33
200	22	22	200	11	11
WHEAT			*WHEAT*		
0	96	100	0	91	91
50	86	91	50	82	77
100	82	91	100	68	68
200	46	77	200	55	32

3. CONCLUSIONS

At a constant rate of N, urea, ammonium sulphate and urea ammonium sulphate fertilizers have similar effects on germination and emergence of canola, peas and wheat.

At a constant rate of actual nutrient (P_2O_5 or K_2O), monoammonium phosphate and potassium chloride have similar effects on germination of canola, peas and wheat.

Complete fertilizers such as 18-18-20-0 or 13-14-15-12 can be safely seed placed at 50 lbs/acre for canola or peas or 100 lbs/acre for wheat.