Phosphate Fertilizer Placement for Flax

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Most agricultural seeders used in western Canada are designed to place phosphate fertilizer with the seed. This method of application produced favourable results for cereals. However, small seeded oilseeds such as flax have relatively low tolerance to phosphate fertilizers when placed directly with the seed. Recent work by Ukrainetz (1975) showed that placement of phosphate fertilizer below and to the side of the seed led to favourable yield responses in flax. The objective of this study was to see how recommended cultivars of flax respond to banding of varying levels of phosphate fertilizer below the seed.

MATERIALS AND METHODS

A split plot design was used with the six cultivars (Dufferin, Linott, Noralta, Norland, Raja and Redwood 65) as main plots and five levels of phosphate fertilizer (0, 32, 64, 96 and 127 kg/ha) as subplots. The source of phosphate was monoammonium phosphate 11-55-0. A four row plot seeder with 30.5 cm spacing was used to place the fertilizer. The phosphate levels are expressed on a rate per row basis comparative to a 18 cm row spacing. A bar was dragged to cover and pack the soil. The seed was then drilled in above the fertilizer band by following in the furrows with the same seeder. The separation between the seed and fertilizer was variable throughout the experiment but averaged 2.5 cm. The test was seeded into summerfallow and rapeseed stubble at two dates, May 20 and June 14. The texture of the summerfallow (top 15 cm) varied from a silt loam to a silty clay loam. The soil P test was 38 kg/ha. The rapeseed stubble had a silt loam texture with a P test of 52.7 kg/ha. Nitrogen levels at all sites were in excess of 134 kg/ha.

RESULTS AND DISCUSSION

There was no reduction in plant numbers among levels of treatment indicating that there was no damage to the flax seedlings. Treated plots showed an increase in height over the respective control plots in all experiments. There was a reduction in days to flower between the control and the first level of phosphate fertilizer but little difference among levels of phosphate fertilizer. A similar trend was apparent in the days to maturity (Table 1).

Table 1. Days to maturity of flax for varying levels of phosphate fertilizer placed below the seed.

P_2O_5 kg/ha	May 20 Fallow	June 14 Fallow	May 20 Stubble
0	92 a*	106 a	85 a
32	88 b	103 c	84 b
64	88 b	104 b	84 b
96	88 b	103 c	84 b
127	88 b	102 d	84 b

* Values within each column followed by the same letter are not significantly different (P=0.01) according to the Bayesian L.S.D.

Both early seeded experiments showed a small increase in 1000 seed weight from the control to the treated levels. The late seeded experiment showed no increase in 1000 seed weight.

All experiments showed a significant increase in yield between the control and the first level of phosphate fertilizer (Table 2). The increases in yield by additional fertilizer were smaller than the original boost although in many cases still significant. The June 14 stubble experiment was discarded due to lack of moisture.

Table 2. Yield of flax at varying levels of phosphate fertilizer placed below the seed.

Rate kg/ha	Yield kg/ha		
	May 20 Fallow	June 14 Fallow	May 20 Stubble
0	1210 d	860 b	348 d
32	1336 bc*	938 a	463 c
64	1311 c	985 a	470 c
96	1376 ab	990 a	512 b
127	1409 a	989 a	584 a
C.V.	7.6	12.7	14.0

* Values within each column followed by the same letter are not significantly different (P=0.05) according to the Bayesian L.S.D.

There are different responses to the phosphate fertilizer by the flax cultivars. Linott and Norland showed no increase in yield between the control and the different levels of phosphate (Table 3). The other cultivars used showed varying responses to the phosphate fertilizer when seeded May 20 on fallow.

The June 14 fallow experiment and the May 20 stubble experiment also showed a cultivar by phosphate fertilizer rate interaction.

Table 3. Yields of the six flax cultivars seeded on fallow on May 20 at varying levels of phosphate fertilizer placed below the seed.

P_2O_5 kg/ha	Yield kg/ha					
	Linott	Red-65	Dufferin	Noralta	Norland	Raja
0	1160 a*	1278 b	1334 b	1132 b	1223 a	1146 b
32	1237 a	1405 ab	1427 ab	1339 a	1342 a	1275 ab
64	1191 a	1373 ab	1497 ab	1380 a	1343 a	1309 a
96	1305 a	1420 ab	1555 a	1363 a	1348 a	1270 ab
127	1296 a	1487 a	1571 a	1465 a	1314 a	1332 a

* Values within each column followed by the same letter are not significantly different (P=0.05) according to the Bayesian L.S.D.

REFERENCES

Ukrainetz, H., R.J. Soper and M. Nyborg. 1975 Oilseed and pulse crops in western Canada - A Symposium. Modern Press, Saskatoon, Sask., pp. 325-374.