Effective Fertilizer Placement For Canola[1]

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For the past two decades, WCFL agronomists have established hundreds of field research trials designed to discover the most effective methods of fertilizer application. The bulk of these trials have been conducted using cereals as a test crop. However, in recent years, more emphasis has been placed on developing more effective fertilization packages for canola. In this report, we will highlight some of the more significant findings of this research effort on this increasingly important western Canadian crop. It would appear that canola is very responsive to management. It is also interesting that significantly higher yields can routinely be obtained in research plots then are usually achieved in farm fields.

Extra Fertilizer For Canola Grown on Summerfallow

A significant amount of canola produced in western Canada is grown on fields that were summerfallowed in the previous year. Under these conditions, most farmers assumed that this crop is adequately supplied with nitrogen. Soil test summaries confirm that in almost 1/3 of the cases, the nitrogen levels in summer-fallowed fields are actually inadequate for top yields of most crops. Because canola responds to higher fertility levels than cereal crops, this is potentially a more serious problem for this crop. The declining levels of soil organic matter of western Canadian soils and the associated reduction in the amount of nitrogen released during the fallow period would suggest that the need for additional nitrogen for canola grown on summerfallow will become more common in the future.

The potential benefits of applying extra fertilizer to canola grown on a summerfallow given favourable growing season climatic conditions is illustrated in the data presented in Table 1. It is obvious that this crop can profitably respond to higher levels of fertility than cereal crops. In this case, the extra 50 lbs of N/acre was about as effective applied by broadcasting as by deep banding

This site was also very phosphate responsive. Application of the traditional maximum seedrow application (i.e. 20 lbs P_2O_5/acre) increased yields by about 5 1/2 bushels/acre. The application of an additional 50 lbs/acre of P_2O_5 was quite effective regardless of whether it was applied by broadcasting or deep banding.

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The very top yields were achieved using a combination of deep banded N and P_2O_5 plus an application of drill-in phosphate which boosted yields to an impressive 49.4 bushels/acre. It is interesting to note that at this site, application of drill-in phosphate alone resulted in a yield of 28.6 bushels/acre which exceeded the provincial average of 21 bushels/acre.

Table 1: Response of Canola Grown on Summerfallow to Various Methods of Nitrogen and Phosphate Placement.

Treatment	Yield (Bushels/Acre) No Starter	Starter
Check	23.2	28.6
N BC	27.8	36.2
N Band	28.4	34.6
N-P BC	42.0	44.0
N-P Band	44.8	49.4
Average	33.2	38.6

Fertilizer rates: Pre-plant N - 50 lbs/acre
Pre-plant P_2O_5 - 50 lbs/acre
Starter P_2O_5 - 20 lbs/acre

Drill-in Versus Deep Banded Phosphate

It is generally assumed that drill-in phosphate is more effective than phosphate that is deep banded with nitrogen for canola. Data presented in Table 2 illustrates that this is not necessarily always the case. In this trial, in terms of response to phosphate, the traditional seedrow application was consistently less effective. Despite the excellent yields that were achieved, this crop was grown through periods of moisture stress that occurred in southern Alberta during the summer of 1983. Because this crop was planted at the recommended depth of 3/4"-1", it is quite likely that the drill-in applied phosphate could have been

Table 2: Response of Canola to Rate and Method of Phosphate Placement.

Rate of P_2O_5 (kg/ha)	Yield Increase (Bushels/Acre) Band	Drill-in
10	0.7	0.5
20	3.9	0.7
30	5.5	1.2
40	4.5	2.3
50	4.5	1.4
Average	3.8	1.2

Note: Absolute check yield - 13.7 bushels/acre
Nitrogen check yield - 36.6 bushels/acre
Nitrogen applied by deep banding at 120 kg N/ha in the spring of the year.

stranded in a dry surface layer of soil at critical times during the growing season. Drill-in phosphate may have been more effective if the surface layer had remained moist throughout the growing season.

Split Applications of Phosphate For Canola

It is normally recommended that not more than 20 lbs of P_2O_5/acre is applied directly in the seedrow. Additional phosphate may be required to achieve top yields. In such cases, it is obvious that a pre-plant application of phosphate will be required. In these situations, there exists the concern about whether or not to retain some phosphate for the seedrow application. The data presented in Table 3 is typical of the results obtained in a number of dryland and irrigated trials where the ratio between the pre-plant and drill-in application was varied. It is quite obvious that top yields were achieved when the phosphate was split between the drill-in and deep band application. It should be kept in mind that the source of phosphate used in this study was mono-calcium phosphate. The usual source of fertilizer phosphate (i.e. mono-ammonium phosphate) would be more harmful applied directly in the seedrow. Therefore, we would recommend that not more than 20 lbs of P_2O_5/acre be applied directly in the seedrow despite the fact that the data suggests 28 kg of P_2O_5/hectare applied in the seedrow was more effective. It is worth pointing out that on average, the pre-plant deep banded treatments were about 7 1/2 bushels/acre more effective than the pre-plant broadcast treatments in this irrigated canola trial. All of the pre-plant treatments were fall applied.

Table 3: Response of Irrigated Canola To Variations in Proportion of Drill-in and Pre-Plant Applied Phosphate

Pre-Plant & Drill-in Treatments (kg/ha)	Yield (Bushels/Acre) Band	Broadcast
1) 0-0-0	20.3	
2) 120-0-0	37.8	32.5
3) 120-0-0 + 50	41.4	35.7
4) 120-10-0 + 40	42.8	34.4
5) 120-20-0 + 30	43.7	33.4
6) 120-30-0 + 20	42.4	35.3
7) 120-40-0 + 10	42.3	34.8
8) 120-50-0 + 0	40.5	33.4
Average	41.6	34.2

+ Indicates rate of drill-in P_2O_5 (kg/ha)
Note: Pre-plant treatments were fall applied.

Nitrogen Interference With P-Uptake From Bands

Research conducted by WCFL agronomists has established that there can be some delay in P-uptake by cereal crops from a common N-P deep band at rates approaching 90-100 lbs N/acre applied in bands spaced 12" apart. This delay can be quite critical from freshly applied bands, but can be insignificant from bands that are allowed to mellow for a period of 3 weeks. Based on preliminary field observations, it would appear that the potential for reduced P-uptake from common N-P bands may be even greater for canola than in the case of cereal crops.

The effect of this potential problem is illustrated in Table 4 where it is apparent that at higher rates of nitrogen applied by deep banding, the early application of P was most effective. As the period of time between banding and seeding was reduced, deep banded phosphate applied in a common N-P band became less effective.

Table 4: Influence of Time Between Banding and Seeding Operations on Response to P Applied in a Common N-P Band

Number of Days Banding Preceeded Seeding	Phosphate Response (kg/ha)
20	0.10
10	0.08
0	0.00

Note: Data based on average results of two trials. Fertilizer applied at the rate of 120 kg N/ha and 50 kg P_2O_5/ha.

Summary

Canola is very responsive to seedbed management and to effective fertilizer placement in particular. For top yields, a high percentage of the fertilizer required should be applied by deep banding in the fall of the year. Fall fertilizer application can be the key to achieving a superior quality (i.e. firm and moist) seedbed that can enable a farmer to plant the crop earlier and at a shallower depth. About 1/3 - 1/4 of the phosphate required should be retained for application in the seedrow as a "starter" or "pop-up" fertilizer to help the canola crop to become established early in the growing season. Farmers should not overlook the potential benefits of applying extra N or N & P for the purpose of helping to achieve higher production of canola grown on summerfallow.