

North Central Canola Region Research Report of Progress

Title: Effect of Phosphorus Placement, Seeding Rate, and Row Spacing on Canola

Investigators: Paul Hendrickson and Bob Henson

Justification

The adoption of direct seeding in recent years has led to the development of new fertilizer application techniques, such as mid-row banding. Mid-row banding usually involves adding an independent opener between every seed row or every second seed row. Some no-till drills with 7.5 or 10 inch row spacing have the capability to direct the seed to every other row while placing the fertilizer in the openers between the seed rows. The large distance between the seed and fertilizer allows any rate of fertilizer to be applied with no risk of seed damage. Since phosphorus is relatively immobile, the distance from the seedling root could be a problem.

Objectives

Projects were initiated at the Carrington Research Extension Center to evaluate 1) the effectiveness of mid-row banding phosphorus fertilizer between every seed row and 2) the yield response of canola planted in wider rows.

Phosphorus Placement

Studies were established using conventional tillage practices at two locations (Q3 and Landon E) to compare the agronomic performance of different phosphorus rates and application methods. The application methods were: 1) in-row, 2) mid-row band, 3) in-row + mid-row band, and 4) broadcast. The phosphorus rates were: 1) 0 lb, 2) 22.5 lb, 3) 45 lb, and 4) 90 lb phosphate /acre. The phosphorous source was 11-52-0. A soil test the previous fall indicated 11 ppm (Olsen) phosphate at Q3 (medium) and 4 ppm (very low) at Landon E. Canola 'Invigor 4870' was seeded April 25, 2006 at a rate of 8 pure lives seeds/ft² in 14 inch rows. The in-row and mid-row band applications were applied at seeding. The broadcast application was incorporated prior to seeding. Sufficient preplant nitrogen was applied to minimize any effect that the additional nitrogen applied with the phosphorus may have. The trials were harvested August 3.

Significant stand losses were observed when 172 lb/ac of 11-52-0 (19 lb N and 90 lb P₂O₅/ac) were applied in the seed row (Data not shown). This is consistent with NDSU recommended limits for the amount of N + K²O that may be placed with the seed.

The phosphorus rates and placement methods did not affect plant height, days to physiological maturity, test weight or oil content. The days to bloom and bloom duration were delayed one day when no fertilizer was applied (Data not shown).

Seed yields at Q were lower when the fertilizer was applied in-row when compared to the broadcast and every-row applications (Table 1). This is mainly due to the low yield (870 lb/ac) when the high rate of fertilizer was applied in the seed row. At Landon E the fertilizer placement had no effect on yield.

At Q, seed yields increased up to the 22.5 lb/acre phosphorus rate while at Landon E seed yields increased as the phosphorus rate increased to 45 lb P₂O₅/ac (Table 2). This is consistent with fertilizer recommendations for each field. A reduction in seed yield occurred with the 90 lb P₂O₅/ac rate at Q. This is mainly due to the 55% and 23% stand loss in the in-row and every-row placement, respectively.

Table 1.

Placement	Q	Landon E
	Seed Yield	
	lb/ac	
In-Row	1144	1169
Mid-Row	1260	1104
Broadcast	1317	1131
Every-row	1337	1277
LSD 0.05	143	NS

Table 2.

Phosphorus	Q	Landon E
Rate	Seed Yield	
lb P ₂ O ₅ /ac	lb/ac	
0	1198	834
22.5	1358	1148
45	1321	1382
90	1180	1316
LSD 0.05	143	213

Row Spacing

A trial was initiated to study the effect of row spacing and seeding rate in two canola hybrids with contrasting plant types. ‘Invigor 4870’ (large plant type) and ‘Hyola 357 Magnum’ (small plant type) were seeded April 25 in 7 and 14 inch rows at rates of 7 and 14 live seeds/ft². The seeding rate in pounds of seed per acre was 2.7 and 5.4 lb for Invigor 4870 and 3.6 and 7.1 lb for Hyola 357 Magnum. The trial was harvested Aug 3.

The row spacing and seeding rate did not affect days to bloom, days to physiological maturity, plant lodging, seed weight, test weight and oil content for each hybrid. Hyola 357 Magnum bloomed 9 days earlier than Invigor 4870. There was a hybrid by row spacing interaction for bloom duration. The bloom duration for Hyola 357 Magnum was 22 days regardless of row spacing, while the bloom duration was 20 days when Invigor 4870 was planted in 7-inch rows compared to 18 days when planted in 14-inc rows (LSD = 1). For seed yield, there was a hybrid by row spacing interaction. Yields averaged 1649 lb/acre for Invigor 4870 planted in 7 or 14 inch rows and Hyola 357 planted in 7 inch rows compared to 1284 lb/acre when Hyola 357 was planted in 14 inch rows (LSD = 298). When averaged over row spacing and hybrid type, seed yield increased from 1142 lb /ac to 1673 lb /ac when the seeding rate increased from 7 to 14 live seeds/ft² (LSD=210).

Publications and Abstracts

Hendrickson, P. and S. Schaubert. 2006. Effect of Phosphorus Placement, Seeding Rate, and Row Spacing on Canola American Society of Agronomy. November 12-16. Indianapolis, Indiana. Abstr.