

Canola is known to be a large user of phosphorus and it is well documented that high rates of seed-placed P fertilizer can reduce seedling survival and establishment in canola. Phosphorus is a critical component of the plant metabolism as it plays a role in basic functions such as respiration and photosynthesis. Low phosphorus availability at the early developmental stages of the plant can have detrimental effects on an appropriate crop growth even if adequate levels are supplied at a later stage. While P fertilizer will typically result in higher canola seed yields when residual levels of this nutrient are low, often the response is most evident early in the season when more vigorous growth is frequently observed with P fertilization. This is sometimes referred to as a 'pop-up' effect and is usually attributed specifically to seed-placed P fertilizer; however, yields do not typically differ between commonly recommended placement methods when using safe rates.

The purpose of this trial is to demonstrate 4R principles for phosphorus (P) in canola with a focus on using the right rate, right placement and right timing of application. Formulations were not a part of this demonstration because our drills are not equipped for liquid products and the granular alternatives are either not widely utilized or contain multiple nutrients.

The demonstration was arranged as a randomized complete block design with four replicates at Scott in 2017. The treatments consisted of fertilizer P rate and fertilizer placement to result in a total of seven treatments. Prior to seeding, soil samples were collected at two depth increments (0-15 cm and 15-60 cm) in order to determine fertilizer rates recommendations. The trial was sown on wheat stubble using an R-tech drill with 10-inch row spacing. The canola variety was Liberty Link 140P and was seeded at 115 seeds/m². Weeds and disease were controlled using registered herbicides and foliar fungicide.

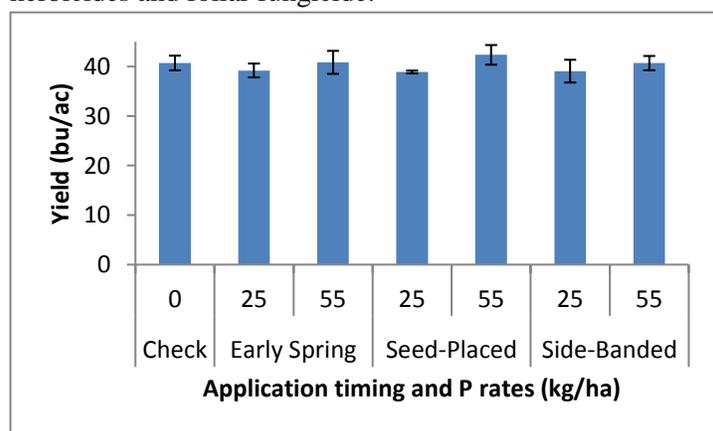


Figure 1: Canola yield (bu/ac) as a response to P placement, application timing and rate.

There were no differences detected among phosphorus rates ($P= 0.545$), placement ($P= 0.8221$), or interaction between rates and placement ($P= 0.7097$). These results suggest that phosphorus is not a limiting factor in the area as yield was not affected.

P ₂ O ₅ rate (kg/ha)	Application time and placement	Plant density (plants/m ²)	Yield (bu/ac)	NDVI 1	NDVI 2
0	-	59 ± 1.0 ^a	41 ± 1.5 ^a	0.33 ± 0.01 ^a	0.58 ± 0.02 ^b
25	Early spring broadcast (starter)	51 ± 3.6 ^a	39 ± 1.4 ^a	0.34 ± 0.01 ^a	0.61 ± 0.02 ^{ab}
55	Early spring broadcast (replacement)	54 ± 6.9 ^a	41 ± 2.3 ^a	0.36 ± 0.01 ^a	0.65 ± 0.02 ^a
25	Seed-placed (starter)	56 ± 5.3 ^a	39 ± 0.3 ^a	0.35 ± 0.01 ^a	0.65 ± 0.02 ^a
55	Seed-placed (replacement)	56 ± 5.0 ^a	42 ± 2.0 ^a	0.37 ± 0.01 ^a	0.66 ± 0.01 ^a
25	Side-banded (starter)	50 ± 6.8 ^a	39 ± 2.3 ^a	0.33 ± 0.00 ^a	0.58 ± 0.01 ^b
55	Side-banded (replacement)	46 ± 4.5 ^a	41 ± 1.4 ^a	0.34 ± 0.01 ^a	0.61 ± 0.01 ^{ab}

Figure 2. Phosphorus rates, application timing and placement effects on plant density, yield and normalized vegetation index of canola at Scott, SK in 2017.

The results of this trial have provided some beneficial information regarding P fertilization placement regardless of the lack of response among treatments. The probability of having a lower plant stand due to seed-placed P is minimal and the possible yield benefits are high. The lack of yield response to P can be attributed to the residual P levels in the soil. The second measurement of NDVI shows that the plant is able to utilize P more effectively when this element is close to the seed.

Full report at:

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