

Canola requires a relatively large amount of phosphorus (P) to reach maximum yield potential compared to cereals. To satisfy this P requirement in the year of application, farmers often apply P at rates that exceed the maximum recommended safe rate. Most farmers in western Canada apply this P fertilizer in or near the seed row due to efficiency and convenience.

However, high rates of seed-placed P fertilizer may cause seedling damage resulting in delayed emergence, reduced plant stand, non-uniform crop maturity, and impacts grain yield and seed quality. This is because canola is relatively sensitive to seed-placed P fertilizer.

The maximum recommended safe rates of P for canola are limited to 15-20 kg P₂O₅ ha⁻¹ of monoammonium phosphate (MAP) with knife openers with 1" spread, 9" row spacing and good to excellent soil moisture in Saskatchewan. This may limit yield potential of canola on soils with low P levels (Canola Council of Canada, 2013). However, recent research has shown that hybrid *Brassica napus* cultivars are more tolerant of seed-placed fertilizers than other Brassica crops and did not show injury with up to 30-40 kg P₂O₅ ha⁻¹ under laboratory conditions. This may be because the nutritional benefit of the additional P offset any negative effects on seedling emergence.

Traditionally, high seeding rates could be used to offset reductions in plant stand caused by fertilizer toxicity; however, farmers are reducing seeding rates in an effort to reduce input costs. This study was therefore conducted to evaluate the risks and benefits of a range of seed-placed P rates at different seeding rates in hybrid canola (L130).

The demonstration was conducted at the AAFC Scott Research Farm in 2015. The study was a 4 x 4 factorial design arranged as a randomized complete block design with four replicates. The first factor was seeding rate (30, 60, 90, 120 seeds/m²) and the second factor was the rate of P (0, 20, 40, 80 kg P₂O₅).

Seeding rate had a significant effect on plant density with the highest seeding rate of 120 seeds m⁻² resulting in 77 plants m⁻², while the lowest seeding rate of 30 seeds m⁻² resulted in the 19 plants m⁻².

Phosphorus rate also had a significant effect on plant density, with a decline in density to 45 plants m⁻² and 37 plants m⁻² at 40 kg P₂O₅ and 80 kg P₂O₅, respectively (Table 1).

Seeding rate of 95 seeds m⁻² resulted in the maximum yield of 3238 kg/ha, while 90 seeds m⁻² resulted in the highest TKW of 3.4 g (Figure 1). In contrast, the P rate on yield and TKW were not highly correlated, as the highest yield of 3238 kg/ha was obtained

using 63 kg P₂O₅, while the TKW was the highest (3.4g) when 30 kg P₂O₅ was seed placed.

Table 1: Effects of seeding rate, phosphorus rate and their interaction on measured response variables in canola at Scott, SK in the 2015 growing season

Effects	Seeding Rate (SR)	P ₂ O ₅ Rate (PR)	SR x PR
Plant density	<.0001	<.0001	0.0986
Days to Maturity	<.0001	<.0001	0.0510
Yield (kg/ha)	<.0001	<.0001	0.2474
TKW (g/1000s)	0.0003	<.0001	0.2474
Green seed (%)	0.0700	0.6054	0.6262

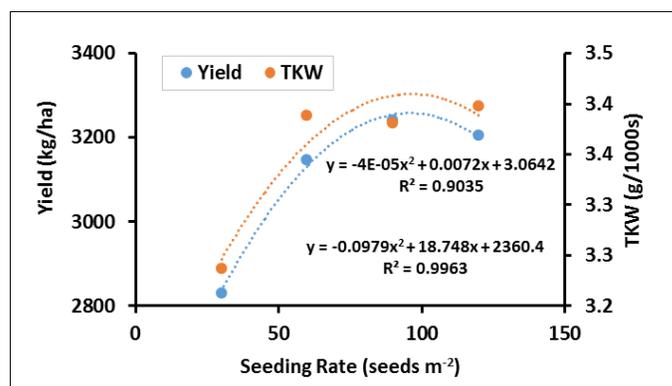


Figure 1. The effect of seeding rate (seeds m⁻²) on canola yield and thousand kernel weight (TKW) at Scott SK, 2015.

In conclusion, this project demonstrated that canola grain yield and seed quality are responsive to both seeding rates and seed-placed P fertilizer. Increasing the seeding rate from 30 to 90 seeds m⁻² significantly increased yield by 13 %. As approximately only 50 % of the seeds will successfully establish, it is critical to ensure that the final plant stand ranges between 70 to 80 plants m⁻². The effect of P on seed quality and yield were not consistent, as maximum yield was achieved with 63 kg P₂O₅, while 30 kg P₂O₅ resulted in the highest TKW. Although most recommendations suggest that the ideal safe rate for seed-placed P is around 17-22 kg/ha, this study found that 30 kg P₂O₅ could safely be placed with the seed. This might indicate that, hybrids such as L130 may possibly be more tolerant to higher rates of P₂O₅.

Read the full report at: <http://www.westernappliedresearch.com/research/warc-annual-reports/2015/>

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