

Soybean production in Saskatchewan has been negligible, primarily due to lack of varieties that matured early enough for the region; however, breeders have made tremendous progress in this regard and today Saskatchewan producers have dozens of suitable varieties to choose from. While still a relatively minor crop provincially, soybean acres initially moved into southeast SK within the last decade and since then have, to a limited extent, been adopted throughout much of the wetter growing regions of the province. The objective of this project was to improve upon current phosphorus (P) fertilizer recommendations for soybean production in SK. The project was conducted at Indian Head, Melfort, Scott, and Outlook from 2015-2017 for a total of 12 site-years. The treatments were three rates of P (22, 45 or 90 kg P₂O₅/ha) and three placement methods (seed-placed, side-banded or pre-seed broadcast) plus a control where no P fertilizer was applied.

Plant densities averaged across all site-years were similar with all P rate by placement combinations (45-48 plants/m²) except for the highest rate of seed-placed P (90 kg P₂O₅/ha) which was 18% lower (38 plants/m²). When the results were averaged across all twelve sites, yields increased linearly with increasing P rate from 2734 kg/ha to 2900+ kg/ha at 90 kg P₂O₅/ha with side-band and broadcast placement (~6% yield increase) as shown in Figure 1. The response was quadratic for seed-placed P with yields increasing in a similar manner to other placement methods up to 45 kg P₂O₅/ha but then declining back to a similar yield as the control when rates were increased further to 90 kg P₂O₅/ha. When comparing the overall yield responses to P fertilizer to residual Olsen-P levels for each of the individual sites, it was shown that the sites where positive responses occurred were always low in residual P (<15 ppm) but yield responses did not always occur in low P soils. Crop removal ranged from 16-55 kg P₂O₅/ha (14-49 lb/ac) with an overall average of 39 kg P₂O₅/ha (35 lb/ac).

Appropriate phosphorous rates depend on both the potential soybean yields that can be expected and the long-term fertility goals for the field in question. If the objective is to maintain soil P over the long-term, rates should be approximately equal to crop removal.

In terms of safe rates of seed-applied phosphorus, while it was often minor, stand reduction with seed-placed P was detected approximately 50% of the time but was generally only large enough to be of concern at the highest rate of 90 kg P₂O₅/ha. Responses to seed-placed P were never better than side-banded or broadcast P and, when averaged across all sites, yields were reduced at the highest rate of seed-placed P. These results suggest the current recommendation of no more than 10-20 kg P₂O₅/ha seed-placed may be more conservative than necessary. However, side-banding is still a preferable method for applying P, especially at high rates. While soybeans responded well to broadcast P, this is still not considered an ideal option from either a fertilizer efficiency or environmental perspective.

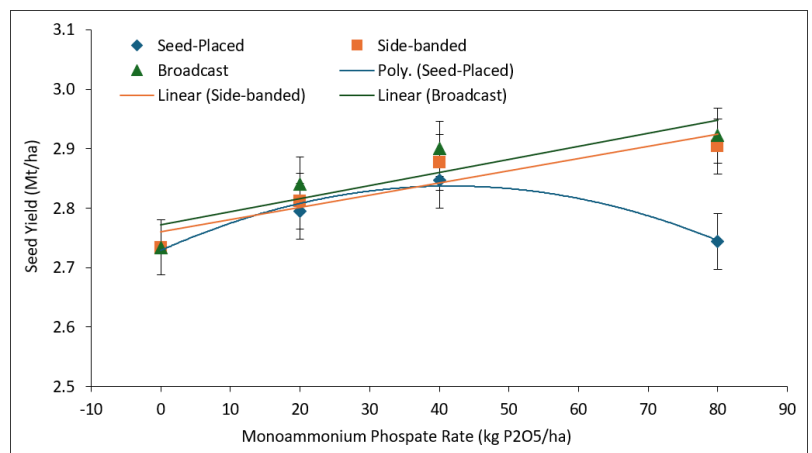


Figure 1. Phosphorus placement and rate effects on soybean seed yield averaged across 12 site-years in Saskatchewan.

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