

Lentils are one of the most important pulse crop options in Saskatchewan, especially in drier regions such as the Brown and Dark Brown soil zones, but also in transitional areas of the Black soil zone. This project was initiated to demonstrate the responses of lentil to rhizobial inoculation, starter nitrogen (N) applications, and phosphorus (P) fertilization for a range of soil climatic zones in Saskatchewan. Field trials with small red lentils were conducted at Indian Head (thin black soil zone), Scott (dark brown soil zone), and Swift Current (brown soil zone) in 2021 and 2022. The treatments were combinations of P fertilizer rates (MAP), granular rhizobial inoculant (Nodulator Duo SCG), and supplementary N fertilizer (urea) applied either at the time of seeding (side-banded) or as an in-season broadcast application targeted for the bud formation stage prior to flowering. Where supplemental N was applied, the total N rate was 55 kg N/ha, adjusted for N provided by the MAP. Data from Scott and Swift Current in 2021 were removed due to poor environmental conditions and high variability.

Emergence was not affected by the treatments in any site-year. Yields increased with P fertilizer at 3 of 4 site-years, with the strongest responses observed at Indian Head, a modest response at Scott, and no response at Swift Current (Figure 1). Residual P was extremely low at Indian Head (both years), slightly higher but still deficient at Scott, and approaching sufficiency at Swift Current. No yield benefits to rhizobial inoculation were detected at any location. Yield responses to extra N were inconsistent and small but detected at Swift Current and Indian Head in 2022. With low organic matter, coarse soil texture, and low residual N, Swift Current was the best candidate for supplemental N to be beneficial. The fertility treatments had no impact on seed weight and seed protein at any location.

In conclusion, we recommend applying P fertilizer rates that meet or exceed expected removal, depending on soil test levels and objectives, to achieve optimum yields without depleting soil fertility. An exception would be soils that are already high in P, in which case low rates of starter P are likely adequate. We hesitate to suggest that growers may not need to inoculate, as biological N fixation is critical for profitable lentil production and naturally occurring populations of *Rhizobium leguminosarum* may vary across the landscape and from year-to-year. We would not recommend applying N fertilizer beyond what is supplied by modest rates of P and sulfur products; however, responses could occur in coarse textured soils with low in both organic matter and residual N.

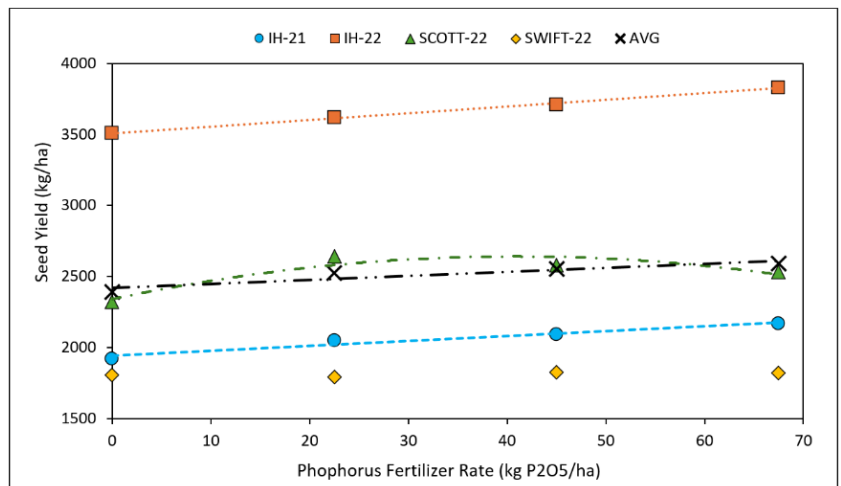


Figure 1. Lentil seed yield response to phosphorus fertilizer rates at Indian Head (2021 and 2022), Scott (2022), and Swift Current (2022). Only the linear response at Indian Head was significant ( $P < 0.001$ ).

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