

Soybeans have become an increasingly popular crop option in southeast Saskatchewan with dramatic improvements in short season varieties. While soybeans are not a particularly difficult crop to grow, even under no-till management, adequate inoculation is critical to produce this crop successfully, especially in fields without a history of soybean production. The objective of this project was to improve upon current nitrogen (N) management recommendations for soybean production in Saskatchewan. This project was conducted at Indian Head, Melfort, and Outlook from 2015 -2017 for a total of nine site-years. Only one site, Outlook 2016, had a previous history of soybean production in 2010 and 2013. The treatments evaluated were four N fertilizer treatments (0 N or 55 kg N ha⁻¹ as side-banded urea, side-banded ESN® or post-emergent surface dribble-banded UAN) and four granular inoculant rates (0, 1x, 2x and 4x the label recommended rate of 4.5 kg/ha). All treatments received seed-applied inoculant and surface-dribble band UAN was targeted for early pod fill (R2-R3) stage.

At the 8 sites with no previous soybean history, there were strong yield responses to dual inoculation with a mean overall benefit of 497 kg/ha or 24% compared to no granular inoculant (Figure 1). At 5/8 sites, there was no benefit to increasing rates beyond the 1x label rate but at 3 sites (all in 2017) there was evidence of stronger responses. The Outlook 2016 site with a history of soybeans was analyzed separately and was found to be no practical benefit to dual inoculation for that site. The benefits to starter N were inconsistent across the 8 sites and only observed in the absence of granular inoculant when nodulation was presumably inadequate to meet the N needs of the crop. Starter N had a negative impact on nodulation in double inoculated treatments. Top-dressing UAN at early pod fill increased yields by 368 kg/ha (18%) when no granular inoculant was applied, but inadequately nodulated soybeans never yielded as high as those with good

inoculation. Depending on yield, 81-242 kg N/ha was removed in the harvested seed with an overall average of 158 kg N/ha. Seed protein levels increased with granular inoculant in a similar manner to yield, with the greatest increase going from the 0 to 1x inoculant rate. Starter or in-crop N was not beneficial to seed protein when inoculation was adequate and sometimes led to lower seed N concentrations.

The observed N removal and estimated peak uptake of soybeans in this study clearly illustrated the need for strong nodulation and N fixation to produce high yields. In well inoculated soybeans, starter N resulted in added cost without yield benefit and therefore cannot be recommended. The results support the recommendation of dual inoculation (liquid plus at least 1x rate of granular inoculant) in fields with limited history of soybean production. While in fields with a history of soybeans, the potential benefit to dual inoculation is smaller.

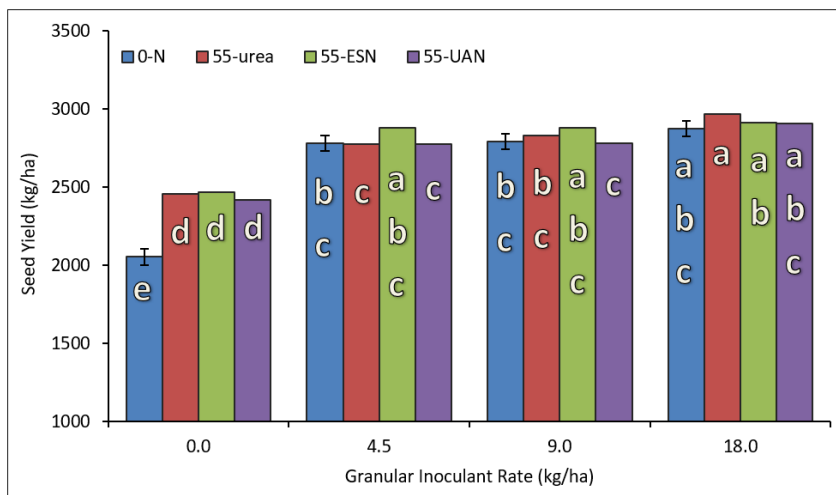


Figure 1. Average soybean yield response to contrasting N management strategies and dual inoculation across 8 site-years in SK (all sites had no previous history of soybeans).

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