

## **AGR1508: Developing nitrogen management recommendations for soybean production in Saskatchewan**

A project was initiated in 2015 to investigate soybean response to N fertilization strategies and granular inoculant rates under field conditions in Saskatchewan. Field trials were located at Indian Head, Outlook, and Melfort, and the treatments were four N fertilization strategies (0 N or 55 kg N ha<sup>-1</sup> as side-banded urea, side-banded ESN, or post-emergent dribble-banded UAN) and 4 granular inoculant rates (0, 1x, 2x, and 4x the label recommended rate). Seed in all treatments received a full rate of commercially applied liquid inoculant. The addition of supplemental granular inoculant increased yields at all locations except Outlook in 2016, where the site had a strong history of soybeans in rotation. At the responsive sites, yield increases with dual inoculation ranged from 12-53% and averaged 29%. Dual inoculation also consistently increased tissue and seed N, or protein, and in some cases responses to granular inoculant rates exceeding those required to maximize yield were observed. As a matter of interest, soybeans are tremendous users of N whereby, in the current trial, observed N exports (in the harvested seed) for the dual inoculated soybeans ranged from 152-273 kg N/ha and averaged 200 kg N/ha. While N fertilization sometimes resulted in increased above-ground biomass (particularly when residual N was low), this response rarely translated into a positive effect on seed yield and, when N was applied at seeding, appeared to negatively impact N fixation in some cases (i.e. Indian Head, 2015). The most compelling benefits to N fertilizer applications were observed at Indian Head but only occurred in the absence of granular inoculant and were strongest for late season (R2-R3 stage) surface applications of UAN. There were no yield benefits to N fertilization at Outlook or Melfort, regardless of the granular inoculant rate and, when the results from Indian Head were also taken into consideration, no benefits to N fertilizer in any cases where both liquid inoculant plus a 1x rate (or higher) of granular inoculant were applied. In general, these results are in agreement with most previous research suggesting that supplemental N fertilization for soybeans is not required under normal environmental conditions and with adequate inoculation. If nodulation is poor, yields may be at least partly recovered with late season surface applications of N during the early reproductive stages, prior to peak biomass application and N uptake. While the specific N formulation evaluated in the current trial was liquid UAN, similar results may be expected with other readily available (to plants) formulations such as granular urea or ammonium nitrate. This work is continuing at all three locations in 2017 with funding provided by the Saskatchewan Pulse Crop Development Board.