

On-Farm Evaluations of Single vs. Double Inoculation Strategies in Eastern Manitoba

Only two of 25 on-farm trials showed higher soybean yield with double versus single inoculation on fields with at least two years history of soybean in eastern Manitoba.

ADEQUATE NODULATION IS required for soybeans to acquire a large proportion of their nitrogen (N) requirements through biological N fixation. Because the soybean-specific N-fixing bacteria (*Bradyrhizobium japonicum*) is not native to Prairie soils, supplemental inoculation with products containing compatible rhizobia is required for soybeans grown on land with a limited history of soybean. The conventional practice for inoculating soybeans in Manitoba, typically referred to as “double inoculation,” uses two inoculant formulations or placements, i.e. use of a seed applied liquid inoculant plus an in-furrow granular or liquid inoculant to ensure adequate levels of rhizobium are introduced in the case that a single inoculant failed due to desiccation or bridging in the tank. Other more established soybean growing regions of the Northern Great Plains mainly use a single inoculant or no inoculant at all. As soybean field history continues to grow in Manitoba and because the cost of inoculant ranges from \$3–4/ac for liquid, to \$10–12/ac for granular, there was a need to develop a local data set on the agronomic and economic implications of single and double inoculation strategies.

Twenty-five on-farm field trials were established from 2013 to 2015 comparing single inoculation (seed applied liquid only) vs. double inoculation (seed applied liquid with the addition of in-furrow granular or liquid inoculant) in Eastern Manitoba on fields with a history of at least two soybean crops. At each site, the farmer replicated each treatment strip six times. Averaged across all 25 on-farm trials, soybeans yielded 37.5 bu/ac and

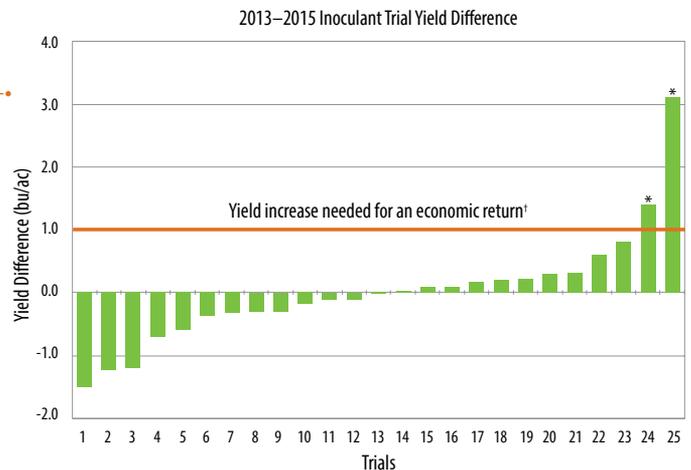
there was no yield benefit to double inoculation over single inoculation. At individual trial sites, there was only a statistically significant and economic yield response to double inoculation at two of 25 trials (see graph below). There was no specific response factor (seeding date, plant population, soil fertility, pH, salts, or inoculant product) that we found to explain the two responsive sites.

Overall, the frequency of yield response to seed applied liquid plus in-furrow inoculation (double inoculation) was low for fields with soybean history. These results have been incorporated into new production recommendations found in MPSG’s *Soybean Fertility Fact Sheet* to help farmers assess the risk of moving towards a single inoculation strategy on a field-by-field basis based on field history and risk factors. The practice of double inoculation is still encouraged for fields with little or no soybean history. In addition to the

25 trials in this study, two trial locations did not meet the criteria of at least two previous soybean crops in the field history, and were excluded from this analysis. In these two trials, there was a significant yield advantage to the double inoculation strategy supporting the current double inoculation strategy for fields with less than two previous soybean crops.

This inoculant trial will be tested on-farm in western Manitoba starting in 2017. Current research is also underway to validate a soil test to determine the levels of rhizobia present in soils from Manitoba fields after soybeans have been grown for more than two years. In addition, a new on-farm trial was initiated in 2016 comparing the use of a single seed applied liquid inoculant vs. no inoculant on fields that have had at least three successful soybean crops. ▶

Yield difference between 25 on-farm trials comparing seed planted with and without in-furrow inoculant from 2013 to 2015.



*Denotes statistically significant yield increase p<0.05.

†Economic return based on \$10/ac cost of granular inoculant and \$10/bu price for soybeans

PRINCIPAL INVESTIGATOR Manitoba Pulse & Soybean Growers

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MPSG INVESTMENT \$97,650

DURATION 3.5 years



on-farm network