

Evaluating Dry Bean Inoculants

The Primo GX2/N Charge inoculant significantly improved dry bean nodulation and yield at Melita in 2020 and 2021 while no difference was observed at Carman from 2019-2021. The BOS peat inoculant was no different from the non-inoculated check.



Dry bean roots with nodulation.

OBSERVATIONS OF NODULATION

and lack of consistent yield response in N fertilizer studies has led to a re-evaluation of the contribution of biological N fixation to the N requirements of dry bean. Inoculation with effective rhizobia may improve N fixation and reduce N fertilizer use, however, commercial inoculants are not widely available nor commonly applied. Dry bean association with rhizobia can be highly specific and vary by both environment and variety. This apparent specificity and the overall low acreage of dry beans are limitations to inoculant development.

The objective of this research was to determine if any recently available dry bean inoculants improve nodulation and yield in pinto (Windbreaker and Vibrant), navy (T9905) and black beans (Eclipse), compared to non-inoculated, non-fertilized checks.

From 2019-2021 at Carman and Melita, inoculant products evaluated were BOS self-adhering peat inoculant and Primo GX2 granular inoculant

(later re-formulated and named N Charge), both containing *Rhizobium leguminosarium* biovar *phaseoli*. Residual soil nitrate-N ranged from 12-76 lbs/ac (0-24"). At flowering, dry bean nodulation was scored on a rating scale of 0-4, where 0 = no nodules, 1 = ≤5 nodules/plant, 2 = 6-10 nodules/plant, 3 = 11-20 nodules/plant and 4 = >20 nodules/plant.

At Carman in 2019, there were no significant effects of inoculant on nodulation incidence, score nor yield for pinto and black beans. Navy beans were unharvestable due to poor establishment.

At Carman and Melita in 2020 and 2021, inoculant products had the same effect across all three bean market classes, indicating that specificity among market classes is not an issue for inoculant products. Among market classes, 77-80% of bean plants developed N-fixing nodules. On average, the granular Primo GX2/N Charge inoculant resulted in more nodulated plants than the check and was similar to the BOS product.

At Carman in 2020 and 2021, nodulation scores were relatively low (1.2 on a scale of 0-4), which may be due to the site's low soil pH (≤6.0 in 0-6" depth). At this location, nodulation score and yield were the same for all treatments.

At Melita in 2020 and 2021, however, the Primo GX2/N Charge inoculant resulted in significantly greater nodulation scores (3.2) than both the BOS inoculant (2.7) and the untreated check (1.6), which were similar to one another. This in turn resulted in a significantly greater yield for beans treated with Primo GX2/N Charge inoculant, which improved yield by 543 lbs/ac (29% more than the check).

This research is continuing to test more dry bean inoculant options for Canadian farmers as products become available. Results from this research are being reviewed in conjunction with N fertility trials to update N management recommendations for dry beans in Manitoba. ▶

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Figure 1. Pinto, navy and black bean yield (lbs/ac) response to inoculant at Carman and Melita (2020 and 2021).



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DURATION 3 years

MPSG INVESTMENT \$140,000