

Demonstrating the Efficacy of Foliar-Applied Nitrogen Fixing Bacteria for Canola



Objective:

- To demonstrate the effects of commercially available, foliar-applied nitrogen (N) fixing bacteria products under a range of N fertility levels in canola.

Trial Design:

- Sites included all eight AgriARM sites: Scott, Indian Head, Melfort, Outlook, Prince Albert, Redvers, Swift Current and Yorkton, SK in 2023.
- Data from Scott, Prince Albert and Swift Current was analyzed separately from the main data set.

Table 1. Treatment list for "Demonstrating the Efficacy of Foliar-Applied Nitrogen Fixing Bacteria for Wheat" at all eight AgriARM sites done in 2023.

#	Nitrogen Fertility (soil + fert)	Biological Foliar Treatment
1)	Low (53 lbs total N/ac)	None
2)		Envita
3)		Utrisha-N
4)	Medium (98 lbs total N/ac)	None
5)		Envita
6)		Utrisha-N
7)	High (143 lbs total N/ac)	None
8)		Envita
9)		Utrisha-N

*Foliar treatments were applied at the 4-6 leaf stage.

Results:

- Yield was affected by both site ($P < 0.001$) and N level ($P < 0.001$); however, N response was consistent across sites with yield increasing with higher N rates.
- When combined together, fertilizer response on yield was quadratic ($P = 0.024$) due to slightly diminishing returns going from the medium to high N fertilizer levels.
- Averaged across the five sites (IH, ME, OL, RV, and YK) in the combined analyses, foliar treatment had no impact on canola yields.

- However, the marginally significant ($P = 0.076$) S x F interaction could justify a closer look at individual sites. This interaction appeared to be primarily due to Outlook, where Utrisha-N yielded higher than Envita, but neither differed from the untreated control (Fig. 2; Table 9 in full report).
- The effect of foliar treatment on protein was not significant ($P = 0.676$) and nor any combination.
- Foliar treatments had no impact on seed oil concentration and seed protein regardless of location or N level.

Conclusions:

We observed the expected increases in seed yield and protein concentrations along with reductions in seed oil concentrations with the addition of N fertilizer in the form of the side-banded urea. We did not, however, observe any effects on these variables that could indicate improved N status or biological N₂ fixation associated with the foliar applications of the biological products demonstrated in this project. This was the case, regardless of the environmental conditions encountered (i.e., site) or overall N fertility level (i.e., N fertilizer rate). While we cannot rule out that positive responses might occur with either different crop types or under environmental conditions that were not met in the current project, we did our best to allow the foliar products to succeed. This included careful storage of the products, using distilled water as a carrier, ensuring adequate water volumes, attempting to apply the biological products during cooler conditions, and testing them under N limiting conditions. With all this in mind, we recommend that farmers avoid reducing their N fertilizer rates when using biological products intended to improve N nutrition in crop production and utilize untreated check strips to confirm whether or not they are realizing any benefits on their own farms.

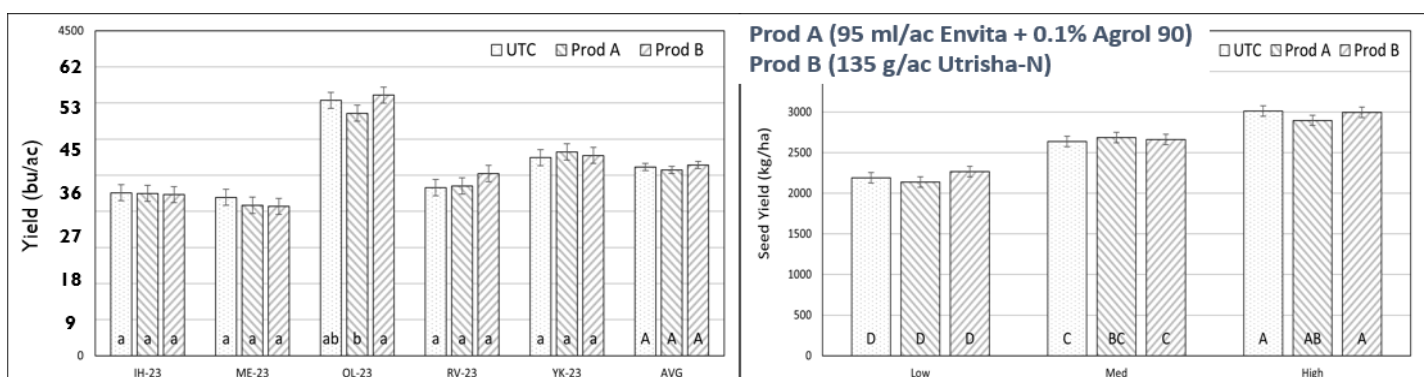


Figure 1a, b. & Foliar-applied nitrogen (N) fixing bacteria treatment effects on canola seed yields for individual sites and averaged across sites. Foliar-applied nitrogen N bacteria treatment effects on canola seed yields averaged across nitrogen levels. Error bars are S.E.M. and values within a site denoted by the same letter do not significantly differ (Tukey's, $P \leq 0.05$).

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