

## MHPEC Research Summary 2019-2020

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Many thanks to our industry and grower cooperators!



Note: a complete report for all research projects can be found at [mbpotatoresearch.ca](http://mbpotatoresearch.ca) under the research reports tab.

### Field Variability Study:

Approximately 50 of 98 independent variables have been associated with yield variability with five years of data (23 fields), and the effect of each variable has been ranked in order of significance. **This completes the part of the project that identifies what causes variable yield, and the project now moves towards treating those causes.** The top three most significant source of yield variability across Manitoba potato farms are (in order of significance):

1. Verticillium wilt propagules in soil. The yield of over 10 oz tubers decreases as propagules rise over 30 per gram, and high Verticillium wilt pressure eliminates larger tuber sizes entirely.
2. Too little soil and petiole nitrogen at row closure. Row closure was approximately early July, which can also be measured as two months after planting or nearly 300 P-days in 2019. The percentage of yield that is 6-12 oz tubers appears to decrease when the soil has less than 120 lbs of N in a soil test.
3. Too little soil sulfur at row closure. The percentage of yield that is 6-12 oz tubers appears to decrease when the soil has less than 30 lbs of S in a soil test.

### Mustard Biofumigation Study:

This project was developed in 2018 to provide a tool for growers to decrease the number of Verticillium wilt propagules, called microsclerotia, in their soil to manage the disease.

**An updated list of recommendations for mustard biofumigation in Manitoba is available on [mbpotatoresearch.ca](http://mbpotatoresearch.ca). New practices are being developed to find the most opportune planting and incorporation dates for maximum biomass, ease of use, and avoiding flea beetles. If you are attempting to use mustard to control Verticillium, it is strongly recommended that you follow these practices to achieve the best possible result.**

Although only two fields survived to biofumigate in 2019, useful observations were still gathered to add to the collection of information that the project leads have amassed so far. Superficially, it

appears as if biofumigation did work to reduce *V. dahliae* microsclerotia in one field in 2019. More fields and years of study are necessary to assert if the biofumigation process can control Verticillium wilt of potato in Manitoba.

### **Nitrogen Study:**

The nitrogen remediation study was begun in 2018 with the goal of identifying a way to boost soil nitrogen at row closure. It is likely that securing one viable solution would lead to other options for various soil types. Two years of study at the CMCDC offsite have identified a statistically significant treatment effect on soil ( $P = 0.0003$ ) and petiole ( $P = 0.0003$ ) nitrogen availability at row closure based on supplying 120-280 lbs of ESN or urea (nonblended) preplant. You're reading that right - CMCDC has finally broken the curse of nonsignificant nitrogen results in potato research.

That being said, the current study replicated the same nitrogen problem that was observed in grower fields. While statistical yield effects were noted, no treatment supplied enough soil nitrogen at row closure to have at least 120 lbs of N in the soil to observe the yield boost that was forecast by the variability study.

Two approaches are being taken in 2020 to clarify these results. The first is to increase nitrogen rates up to 500 lbs of ESN or urea (nonblended) and install monitoring wells with the intent of monitoring leaching while boosting row closure soil nitrogen to observe the forecasted yield boost.

The second approach is to evaluate nitrogen blends with banded nitrogen treatments at plant, as well as possible fertigation practices. Different growers have suggested altering nitrogen blends or fertigating earlier in the season to boost row closure soil (and petiole) nitrogen. Further conversations are needed in 2020 to incorporate these ideas into subsequent experiments to resolve the issue of providing sufficient row closure nitrogen. If you have additional input, please don't hesitate to email Zack at [mhpec@outlook.com](mailto:mhpec@outlook.com)

### **Sulfur study:**

The sulfur remediation study was begun in 2019 and needs to continue for 2-3 years of study. The first year of study indicated that sulfur treatments had a significant effect on the amount of available soil sulfur at row closure ( $P = 0.0277$ ) and late bulking ( $P = 0.0079$ ), as well as petiole sulfate at row closure ( $P = 0.0002$ ). The effect of sulfur treatment on any yield parameter trended towards significance ( $P > 0.1$ ), but more years of study are necessary to solidify results. There was little yield benefit of increased sulfur treatments (100 lbs S) compared to low sulfur treatments (30 lbs S), regardless of product, indicating the lower rates may potentially provide the same benefit.