

# Response of Russet Burbank Potatoes to Manganese Fertilizer on Silt-Loam, Calcareous Soils



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## Introduction

Manganese (Mn) has a vital role in plant development by influencing photosynthesis and lignin synthesis. Availability of Mn can be limited in calcareous soils, frequently causing Mn deficiency in plants. This study is being conducted to observe the response of Russet Burbank potatoes grown in calcareous soils to various Mn fertilizer treatments. Responses will be measured as:

- NDVI for vegetative response
- Tuber yield and quality

## Materials and Methods

- The experiment was conducted with a randomized complete block design with 6 treatments and 6 replications.
- Soil type was a Pocatello variant silt loam.
- Soil samples were collected prior to planting to determine initial fertility levels.
- Each treatment included a base fertilizer mix of AMS (21-0-0-24S), MAP (11-52-0), KCl (0-0-60), boron 14.5%, zinc 36%, and copper 25%.
- Treatments were 1) control, 2) base fertilizer with no Mn added, 3) MnSO<sub>4</sub> at 0.44 kg Mn ha<sup>-1</sup> (Standard), 4) MnSO<sub>4</sub> at 6.55 kg Mn ha<sup>-1</sup> (High), 5) GET<sup>®</sup> dry fertilizer at 0.44 kg Mn ha<sup>-1</sup>, and 6) Wolf Trax<sup>®</sup> dry fertilizer at 0.44 kg Mn ha<sup>-1</sup>.
- A CropScan<sup>®</sup> multispectral radiometer was used to calculate NDVI.
- The middle 6.1 m from the center two rows of each plot were harvested.
- Tubers were weighed and sized to determine yield and quality.
- Statistical analyses were conducted using IBM<sup>®</sup> SPSS<sup>®</sup> Statistics 23.0.

## Results and Discussion

- Initial soil sample test reported 1.6 mg Mn kg<sup>-1</sup>, classified as “very low”.
- NDVI results showed no differences among the Wolf Trax<sup>®</sup>, GET<sup>®</sup>, and high Mn treatments, with a slight decrease for the control and no Mn added. The standard Mn treatment had the lowest NDVI values.
- High Mn, GET<sup>®</sup>, and Wolf Trax<sup>®</sup> appeared to provide a healthier canopy and greener vegetation than the standard Mn, suggesting more chlorophyll was present in these treatments.
- Yield, quality and tuber mass showed no differences among the Mn treatments.
- Although the Mn appeared to improve the canopy and vegetation, these factors did not improve yield, quality or tuber mass. Response to Mn and other micronutrients can be difficult to measure. Additionally, Mn fertilizer rates may have been too low to have significant effect on growth and tuber development

## Figures



Figure 1. Normalized Difference Vegetative Index (NDVI)

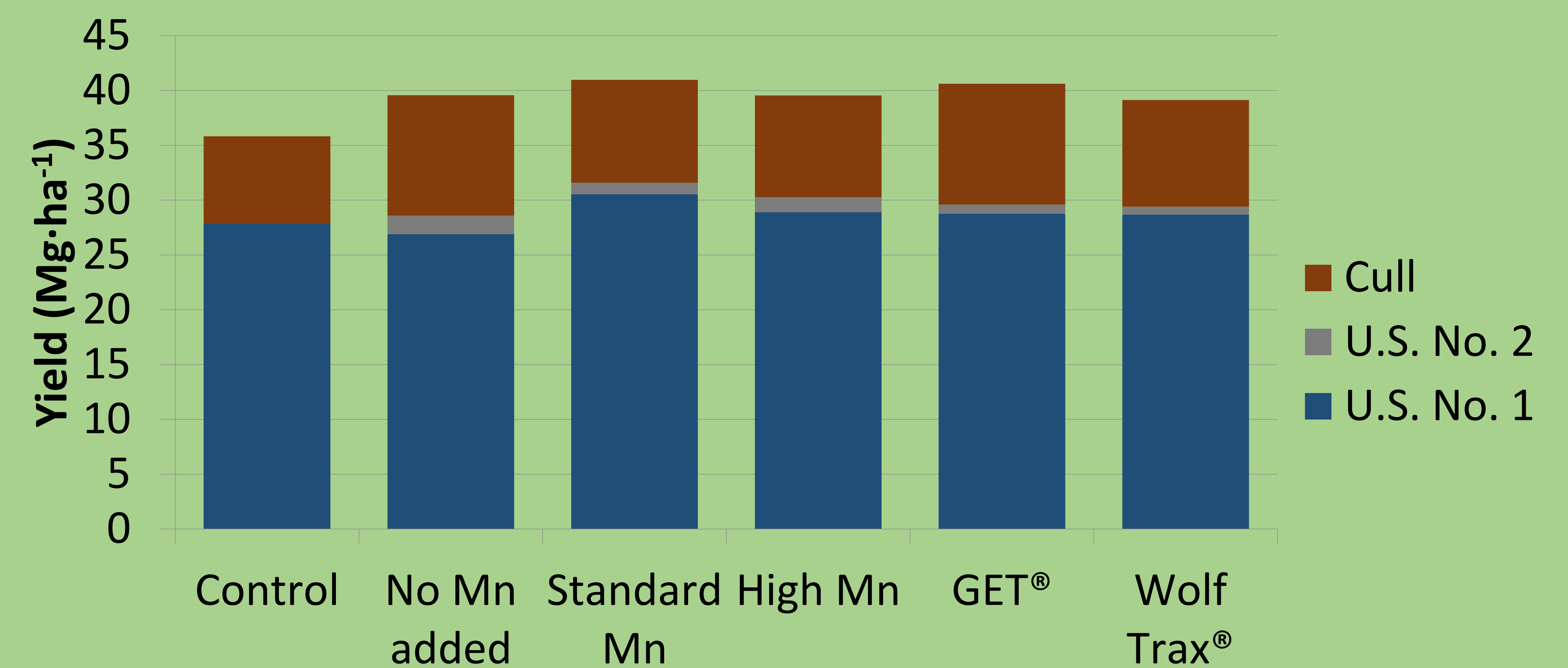


Figure 2. Total yield and market quality of tubers.

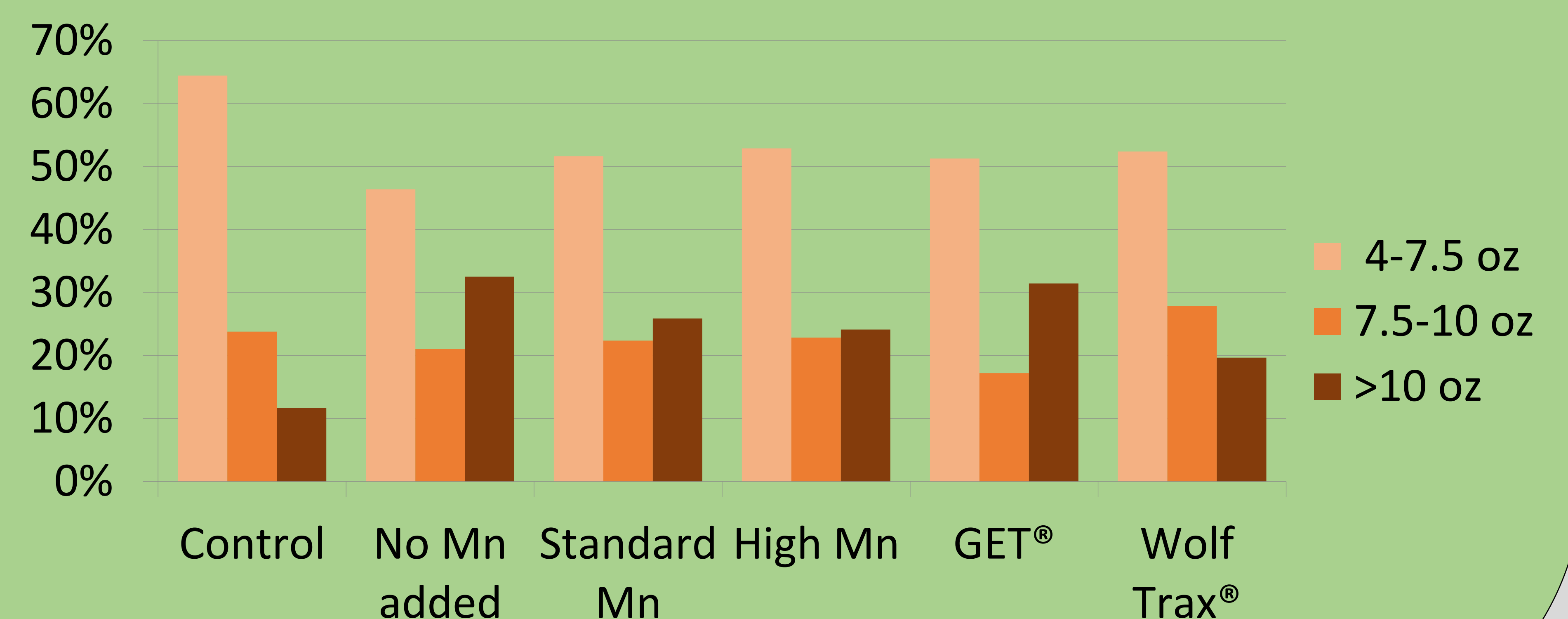


Figure 3. Percentage of three different sizes of U.S. No. 1 grade tubers.

## Conclusion

- GET<sup>®</sup> and Wolf Trax<sup>®</sup> possibly helped provide a greener, healthier vegetation.
- Neither GET<sup>®</sup> nor Wolf Trax<sup>®</sup> improved tuber yield, mass or quality over the control.

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