2020

Evaluating the Impact of Grafting on Local Tomato Production in Nebraska

Raihanah Hassim
University of Nebraska-Lincoln

Samuel E. Wortman
University of Nebraska-Lincoln

Ashley A. Thompson
Oregon State University

Stacy A. Adams
University of Nebraska-Lincoln

Evaluating the Impact of Grafting in Local Tomato Production

Raihanah Hassim[1] , Sam E. Wortman[1] , Ashley A. Thompson[2] and Stacey Adams[1]
[1]University of Nebraska- Lincoln, [2]Oregon State University

UNIVERSITY of NEBRASKA LINCOLN

Introduction

Grafting has been successfully used in vegetables production like tomato, pepper, eggplant, cucumber and watermelon. Other than its usefulness for managing soil-borne diseases, studies had shown that grafting with rootstocks like 'Maxifort' and 'Estamino' can improve nutrient uptake and yield. Besides, grafting creates a total new plant with combined desirable above ground and below ground attributes from selected scion and root-stock plants (Djidonouet al 2017). However, only few studies assess the effects of grafting and soil fertility management on yield of open field-grown tomatoes in the Midwest, specifically in Nebraska. Thus, there is a need to better document the effects of grafting tomato cultivars onto hybrid tomato rootstocks on tomato productivity.

Objective

To assess and better document the effects of grafting on yield of open field grown tomatoes in Nebraska.

Figure 1. Grafting, trellising, and sorting processes

Methods

In 2018 and 2019, two determinant fresh market tomatoes, 'Nebraska Wedding' and 'BHN-589' were grafted onto two rootstocks, 'Estamino' and 'Maxifort' (Table 1). Non-grafted 'Nebraska Wedding' and 'BHN-589' plants were controls. Plants were grown at three different locations (Fig. 2): (1) Lincoln, NE, (2) North Platte, NE, and (3) Dwight, NE as a randomize complete block design. In 2019, five tomato plant replicates of the six grafting treatments received one of two fertilizer treatments (0% and 100%).

Data Collection:

- Tomatoes were harvested weekly and bi-weekly during later season at each location.
- Yield was determined by weighing all tomatoes from each five plants experimental unit.
- Each site was analyzed separately and all interaction effects were analyzed.

Table 1. Grafting treatments

Rootstocks
Non-grafted Nebraska Wedding (NW-NON)
Non-grafted BHN-589 (BHN-NON)
Nebraska Wedding grafted to Estamino (NW-EST)
Nebraska Wedding grafted to Maxifort (NW-MAX)
BHN-589 grafted to Estamino (BHN-EST)
BHN-589 grafted to Maxifort (BHN-MAX)

Figure 2. Location of the study

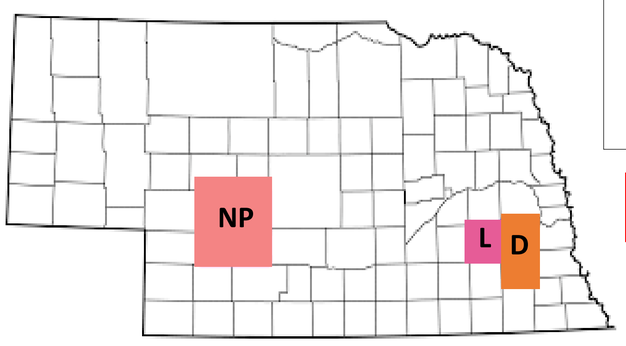
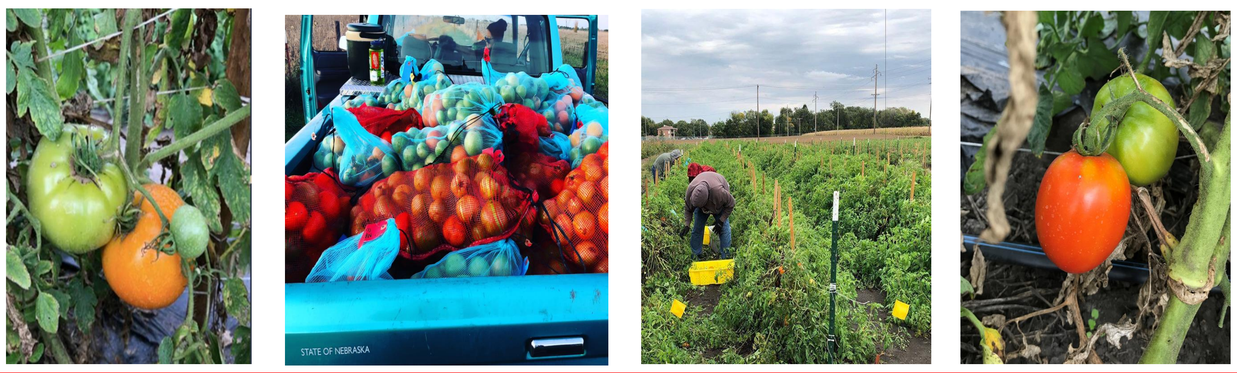


Table 2. Location description

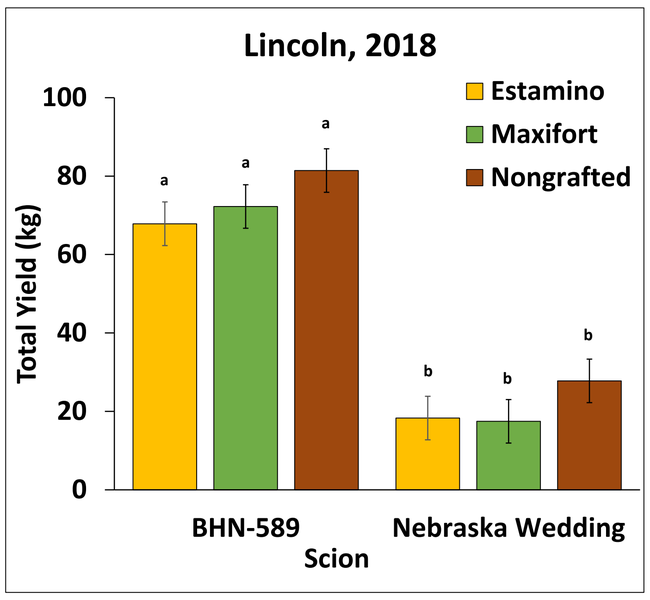
Location	NO_3-N (ppm)	OM %	CEC (me/100g)	Average Annual Precipitation (inches)	Soil Type	pH
Lincoln, NE	9.5	19.7	19.7	28.9	Silty Clay Loam	6.4
North Platte, NE	4.65	8.6	8.6	20.77	Cozard Silt Loam	6.8
Dwight, NE	23.7	18.6	18.6	29	Hasting Silt Loam	5.65

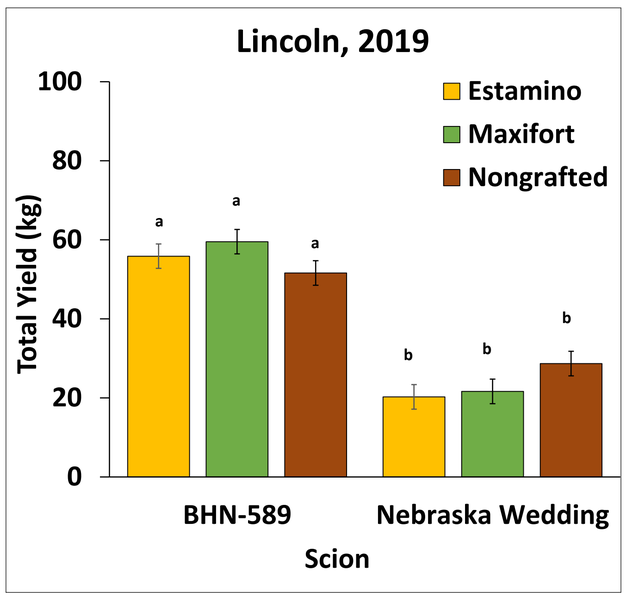
Figure 3. Harvesting processes

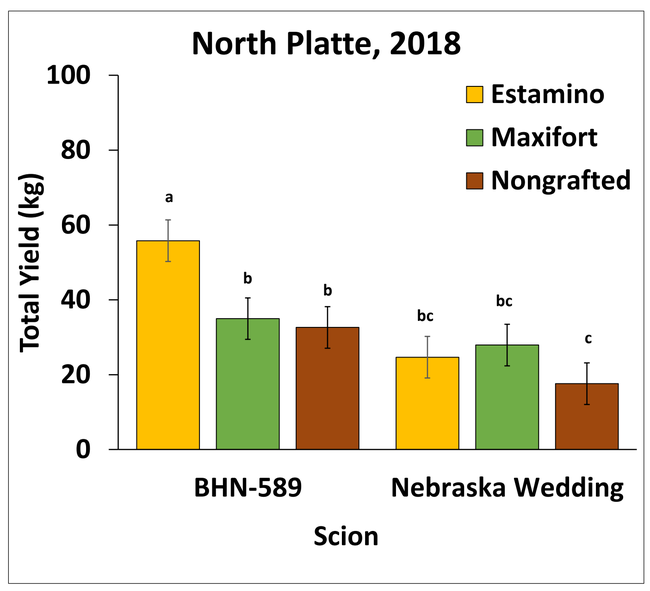


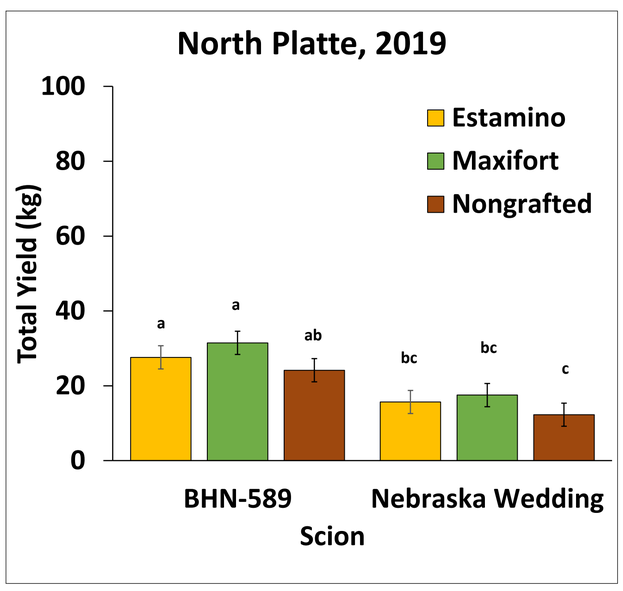
Results

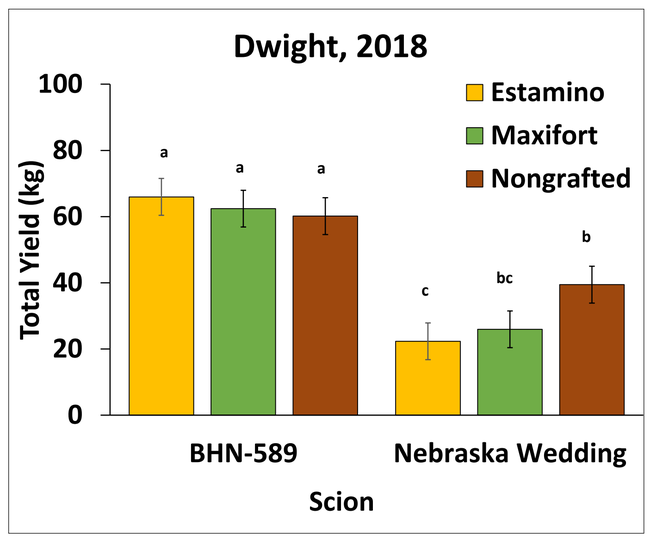
- Overall, we found that there was no consistent improvement in total yield for any of the grafting treatments.
- We also noted that the estimated total mean yield of BHN 589 is at least 50% more than Nebraska Wedding in both years at all three locations.
- In 2019, fertilizer treatments did not affect tomato yield in any location, therefore total yield were plotted against the grafting treatments.

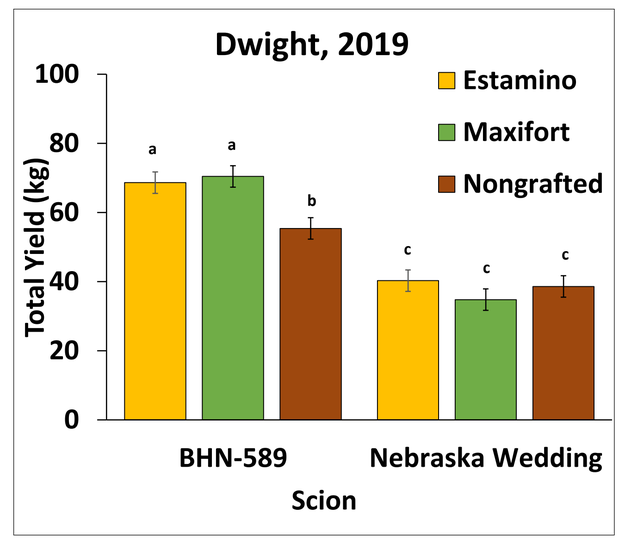












Conclusion

- Grafting might not necessarily improve yield here in Nebraska.
- More studies are required on rootstocks like Maxifort and Estamino to make a solid conclusion on their productivity especially in field setting.
- In order to relate soil conditions and weather with the productivity of grafted tomatoes, more research needs to be done on grafted tomatoes in Nebraska.

Figure 4. Transplanting processes

Acknowledgement and Reference

- This project is based on research hat was partially supported by the Nebraska Agricultural Experiment Station with funding from the Hatch Act (accession1014303) through the USDA National Institute of Food and Agriculture (NIFA), and he USDA AMS Specialty Crop Block Grant Program and Nebraska Department of Agriculture.
- Djidonou, Desire & Zhao, Xin & Brecht, Jeffrey & M. Cordasco, Kim. (2017). Influence of Interspecific Hybrid Rootstocks on Tomato Growth, Nutrient Accumulation, Yield, and Fruit Composition under Greenhouse Conditions. HortTechnology. 27. 868-877. 10.21273/HORTTECH03810-17.