Investigating the impact of plant spacing on yields of Sweetpotato in organic systems

SARE PROJECT GS17-175

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ABSTRACT

The sweetpotato fresh markets and processing industries are enlarging due to the development of new and improved value-added products. Sweetpotato production in Tennessee, however, is believed to have declined since 1980 and currently certified organic sweetpotato production is below consumer demand. A preliminary trial was conducted in the fall of 2017 on the certified organic research farm at Tennessee State University, Nashville, Tennessee. The effect of 12" in row plant to plant spacing on the yield performance of cv. Beauregard, Centennial and Covington was measured. A randomized block design was implemented using 36" wide beds with 108" spacing between rows and cultivars. Cultivars were grown with strict adherence to the rules of the national organic standards board (NOSB). Data was collected on the root number, sizes and yields of sweetpotato. Marketable yields were highest in the Covington followed by the Beauregard and Centennial varieties respectively. Of the three varieties, Covington also had the highest U.S. no 1 and least number of U.S. no 2, Meanwhile jumbo-sized roots were observed only in Beauregard cultivar. In the summer of 2018 the effects of 8", 14" and 18" row plant spacing on the yield performance of cv. Beauregard, Centennial and Covington will be measured and compared. The findings from this study would provide sweetpotato growers with desired information on yield performance of the crop in organic farming systems to adequately measure market value and hence profitability. Information gathered will be shared with farmers, researchers and stakeholders during small farm expo, field day and conference presentation.

INTRODUCTION

The goal of this research project was to investigate the impact of plant spacing on yield performance of sweetpotato varieties in an organic management system in Tennessee and to share our findings with farmers, researchers and stakeholders. The sweetpotato crop is increasing in popularity because of its nutritional value, wide range of flesh-color types being introduced from all over the world, low cost of production, ability to grow well on marginal lands with little amounts of water and its sweet taste. The findings of this study would contribute to and help fill in existing knowledge gaps on how yield production of various sweetpotato cultivars in sustainable farming systems are affected differential plant spacing.

OBJECTIVE

Determine the impact of the plant spacing pattern (12" in-row) on yield, number and sizes of three sweetpotato varieties grown in an organic management system.

MATERIALS AND METHOD

- Land was cultivated, ploughed and prepared for planting using a bush hug, a tractor roto-tiller. Ridger and bed maker was used to make furrows in May 2017.
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MATERIALS AND METHOD

- Slips of Beauregard, Covington and Centennial were transplanted from readily available raised slips from the preceding years growing season in greenhouse pots and then transferred to field.
- 10 plants in each cultivar spaced 12" apart in-row. Each sweetpotato bed was 36" wide with 108" spacing in-between the beds or rows and between cultivars
- Drip irrigation system and wheat straw mulch cover laid.
- Weeding was done by hand in between plants and with a tractor between beds at intervals throughout growing season
- Shortly before harvest, sweetpotato vines were trimmed, and roots harvested with potato digger in October
- Data collection commenced after sorting and grading roots as per USDA standards into different groups in the marketable and cull category. Soil testing was done after harvest.

On analysis, the average soil pH of our field plot was determined to be 6.1. Soil organic matter was 2.33%. Supply of the nutrients phosphorous (534 lbs./acre) and potassium (376 lbs./acre) was very high in the soil and further application of the nutrients was not recommended, since further additions may have created nutrient imbalances. The availability of the secondary/micro-nutrients i.e. Calcium (3211 lbs./acre), Magnesium (225 lbs./acre), Zinc (8.3 lbs./acre), Iron (22 lbs./acre) and Manganese (31 lbs./acre) were found to be sufficient and in an adequate supply for plant utilization.

Figure 1. Sweetpotato slips in growing in field and roots during harvest. From left to right: sweetpotato slips with wheat straw mulch covering; potato digger during harvest.

RESULTS

Figure 2. Sweetpotato cultivars. From left to right: Beauregard, Centennial and Covington

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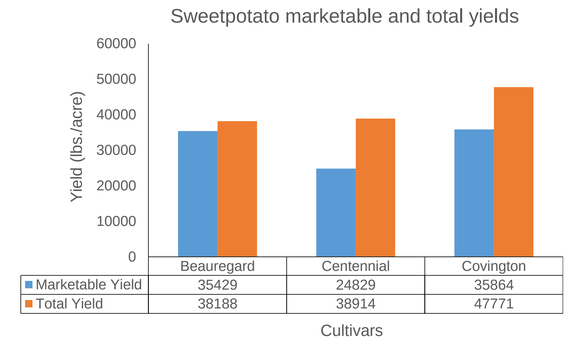

Figure 3. Sweetpotato yields

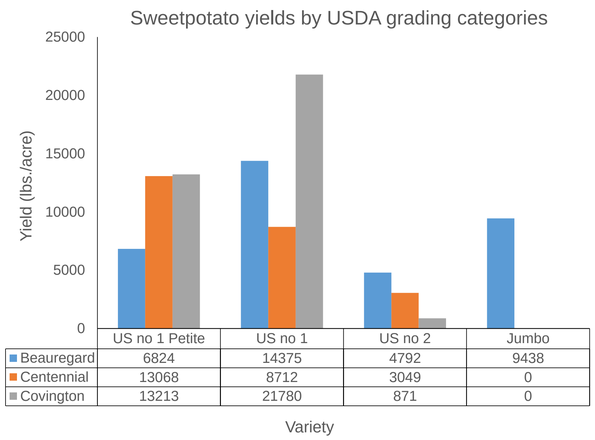

Figure 4. Sweetpotato yield by grades

CONCLUSION

- Highest number of marketable roots were observed in the Covington cultivar (35,864 lbs./acre). Centennial had the most percentage of culls/unmarketable roots (36%).
- No serious incidence of pest and disease was observed
- A tour and a of the organic sweetpotato field and variety trial was held shortly before harvest with fourteen participants including farmers, researchers and stakeholders with two farmers reporting changes in knowledge and awareness.
- In a second field trial in 2018, we would access the effect of three other plant spacing patterns (18", 14" and 18" in-row) on yield, number and sizes of three sweetpotato varieties grown in an organic management system and results would be shared

REFERENCE

- Nwosisi, S. and Nandwani, D. (2017). Yield performance of organic sweetpotatoes in various mulches. Horticulturae. DOI 10.3390/horticulturae

CONCLUSION

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