

Evaluating optimal bed spacing for grafted watermelon production to combat *Fusarium Wilt*

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Introduction

- Watermelons are an important specialty crop in Maryland
- Fusarium wilt (*Fusarium oxysporum f. sp. niveum*)** is a major soilborne disease that can cause severe yield loss
- The pathogen can persist in soil for **up to 10 years**, making management difficult.
- Grafting seedless watermelon varieties onto resistant rootstocks is an effective management strategy
- Grafted plants are significantly more expensive
 - ~\$1.95 per grafted plant
 - ~\$0.57 per non-grafted plant

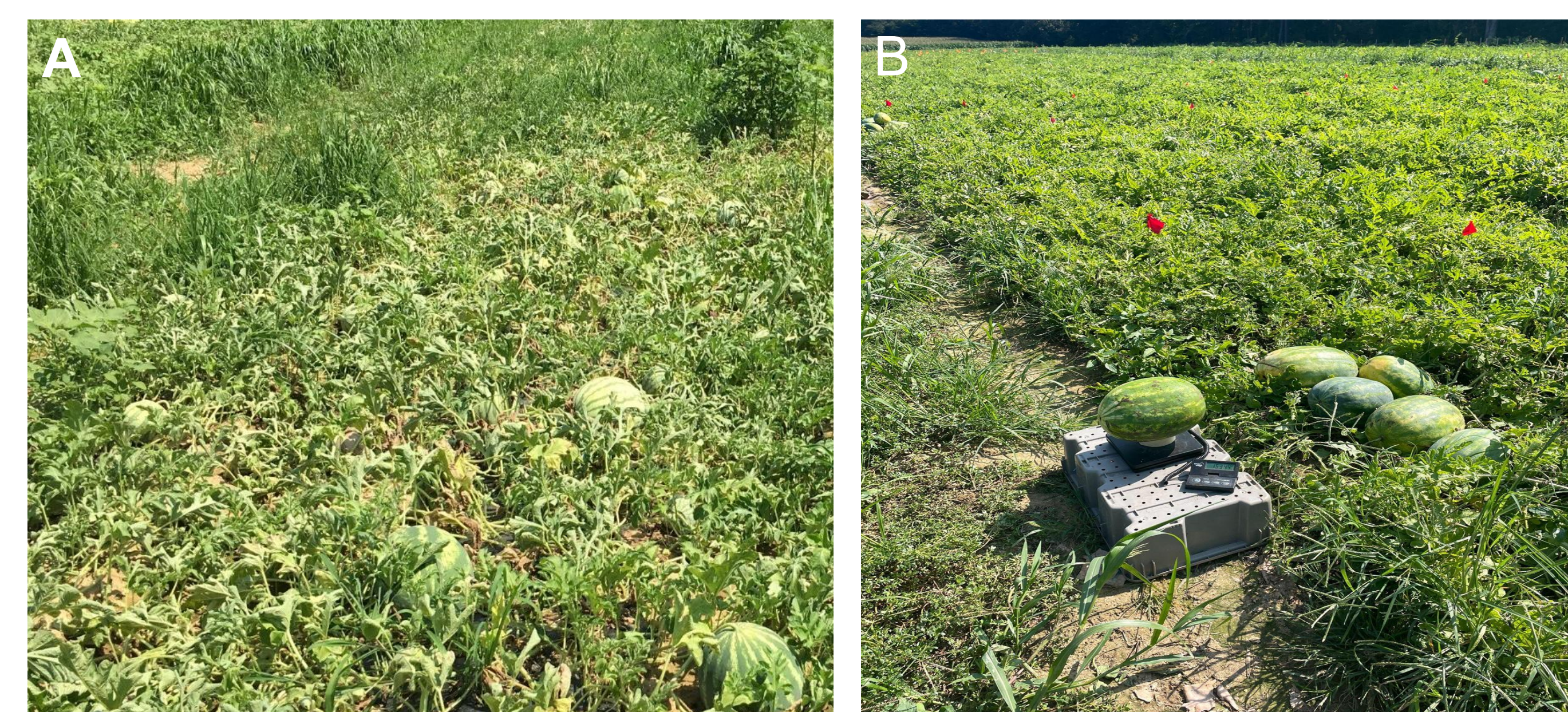


Fig 1) A) Fusarium wilt causing vine collapse in a watermelon field. B) Field sampling at the 2024 St. Mary's site.

Previous work

- 2020–2021: Grafting Trials**
 - Goal: evaluate grafting as a management strategy for Fusarium wilt
 - Conducted on farms in St. Mary's County, MD
 - Results:** grafted plants showed strong resistance to Fusarium wilt and greater plant vigor than non-grafted plants
- 2022–2023: Plant Spacing Trials**
 - In-row spacing treatments: 4 ft, 6 ft, and 8 ft
 - Trials conducted in St. Mary's and Wicomico Counties
 - Results:** grafted plants maintained yield at lower plant populations, and wider spacing produced larger fruit per plant
- Remaining Question**
 - Can bed spacing between rows be increased to reduce plastic mulch and drip tape costs without reducing yield?

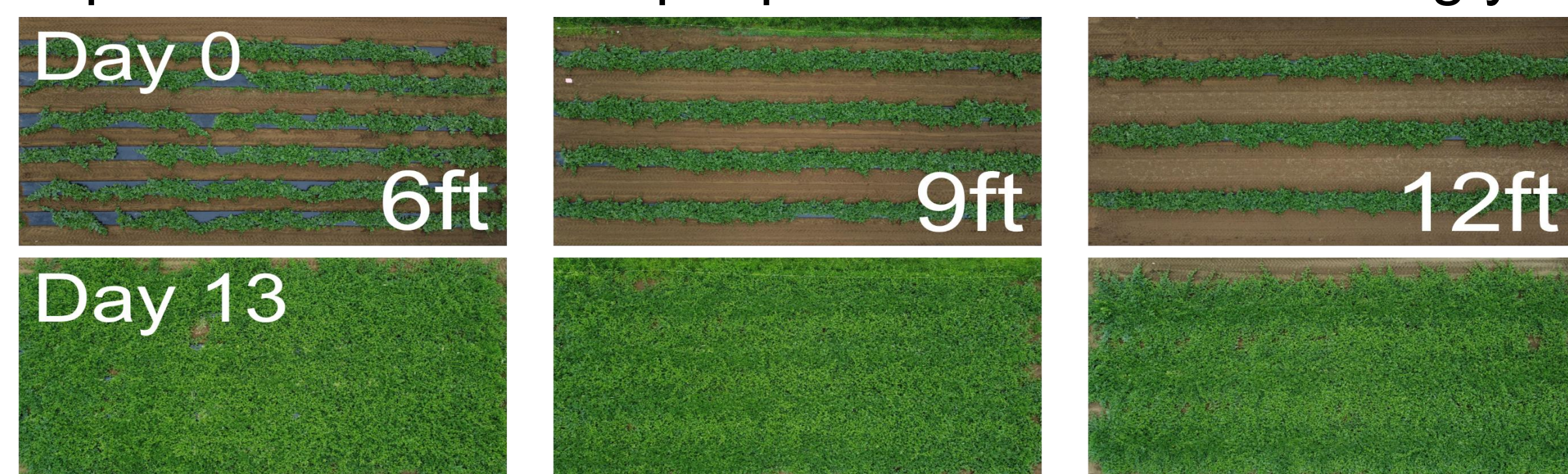


Fig 2) Canopy coverage of 6ft, 9ft, and 12ft bed spacing before plants leave plastic and 13 days after.

Hypotheses

- H₀** = Grafted seedless watermelons will have the same yields when grown at 6 ft, 9 ft, and 12 ft bed spacing.
- H₁** = Grafted seedless watermelons will not have the same yield across the three bed spacing treatments.

Experimental design & field work

- Plant Material**
 - Seedless watermelon used as the scion
 - Carolina Strongback was selected as the rootstock due to **positive performance in previous UME trials**, including strong resistance to Fusarium wilt and good plant vigor
- Locations**
 - Trials conducted during **2024–2025** in St. Mary's County and in 2025 Upper Marlboro, MD
- Bed Spacing Treatments**
 - 6ft, 9ft, & 12ft**
- Plant Population**
 - In-row plant spacing and total plant population were held constant across treatments at 1,089 plants per acre
 - Water was held constant using different drip tape emitter flow rates
- Experimental Layout**
 - Field trials established using a randomized complete block design in Upper Marlboro and a block design in St Mary's
- Measurements Collected**
 - Yield and yield date
 - Fruit number per plot
 - Average fruit weight
 - Canopy coverage

Conclusion

Bed spacing did not significantly affect total marketable yield across trial locations. Fruit weight and harvest distribution varied among sites and were not consistently influenced by bed spacing. These results suggest that growers may be able to increase the distance between beds without reducing yield when using grafted watermelon. Increasing bed spacing could lower production costs by reducing plastic mulch, drip tape, fumigant, and labor inputs while maintaining overall productivity and resistance to Fusarium wilt.

Results

- Yield**
 - Total yield per acre was **similar across all bed spacing treatments**
 - No consistent yield differences were observed between
 - 6ft**
 - 9ft**
 - 12ft** bed spacing
- Fruit Number by Week**
 - The number of fruit harvested per week was not consistent across years and locations
 - In 2024, 12ft spacing had the biggest first pick in St. Mary's, however, in 2025, 6ft spacing had the largest first pick, with 9ft and 12ft tying.
 - In 2025, 9ft spacing had the largest first pick with 12ft and 6ft tying in Upper Marlboro, with the remaining picks relatively close

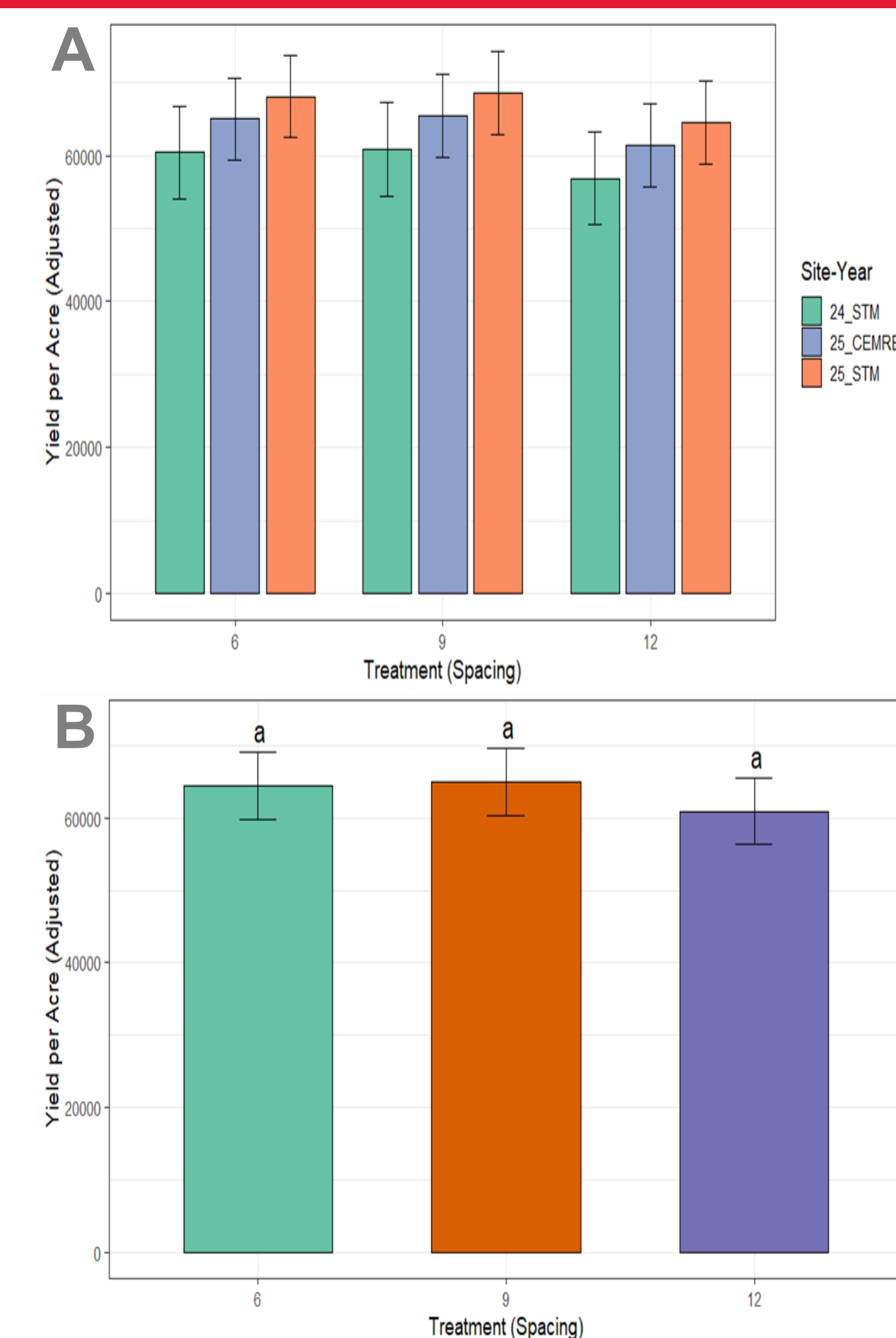


Fig 3) A) Yield per acre for each bed spacing treatment by site. B) Yield per acre combined across site years.

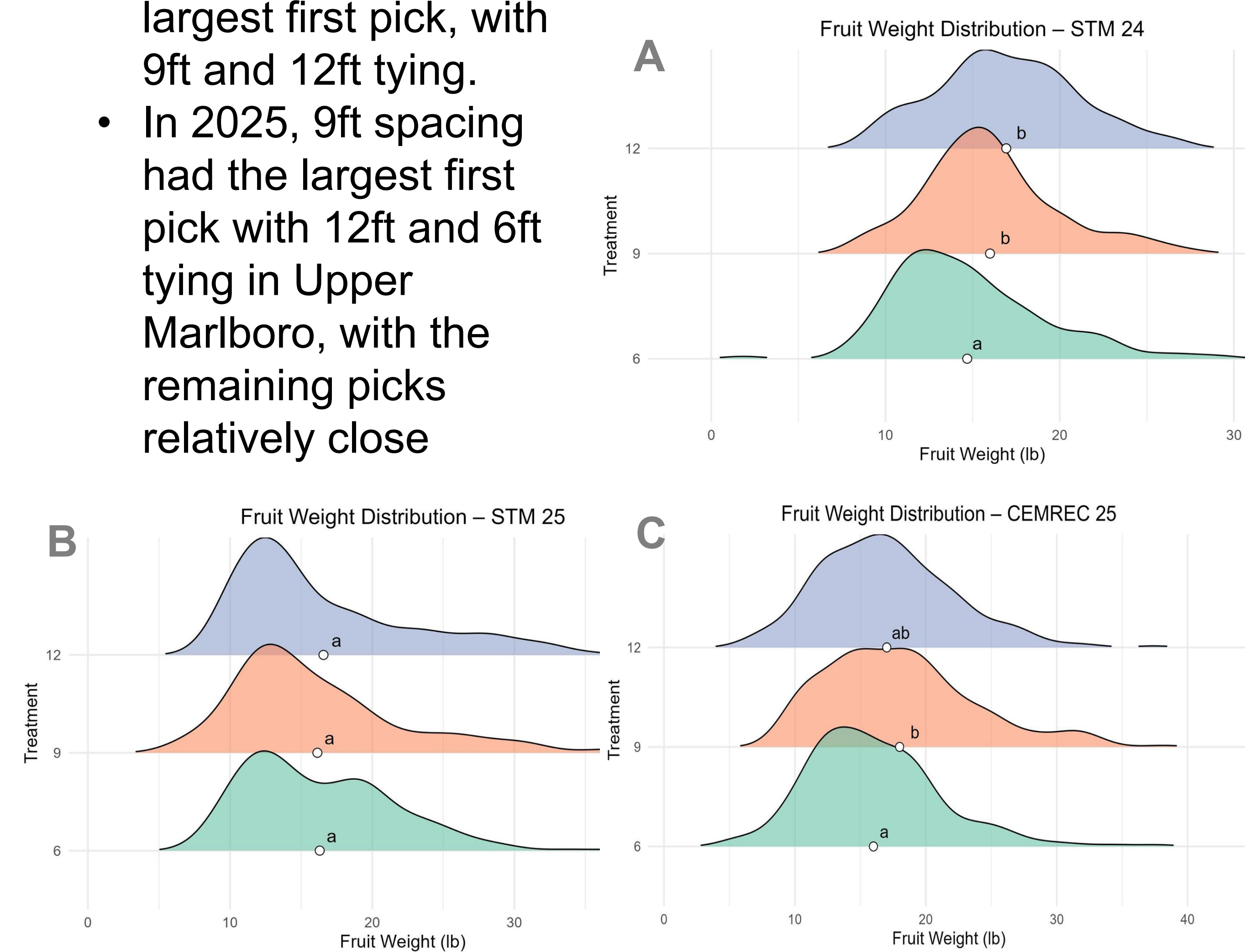


Fig 4) A) Fruit weight distribution St. Mary's 2024. B) Fruit weight distribution St. Mary's 2025. C) Fruit weight distribution Upper Marlboro 2025.

- Fruit Weight**
 - The weight of individual fruit harvested was not consistent across years and locations
 - In 2024, individual fruit weight was statistically lower for 6ft spacing in St Mary's, however, in 2025, there was no statistical difference between treatments
 - In 2025, 9ft spacing had the highest individual fruits, followed by 12ft and then 6ft at Upper Marlboro.

References: Sater, H., & Beale, B. 2024. *Grafted watermelon spacing study*. University of Maryland Extension; Louws, F. J., Rivard, C. L., & Kubota, C. (2010). *Grafting fruiting vegetables to manage soilborne pathogens, foliar pathogens, arthropods and weeds*. Scientia Horticulturae