



Department of

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Optimizing watermelon grafting to enhance grafting efficiency and its impact on fruit maturity and quality

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Abstract

Although grafting can increase commercial watermelon production by overcoming biotic and abiotic stresses, it is not widely used in the U.S., in part due to the cost of transplants. The splice grafting method where both cotyledons are removed from the rootstock could significantly increase grafting efficiency, eliminate rootstock regrowth, and reduce cost of watermelon transplant production. However, the success rate of splice-grafted watermelon has been very low. This study evaluated the survival of splice-grafted transplants in the greenhouse following the external application of sucrose in combination with antitranspirant solution to the rootstock seedlings before grafting. Survival was 91% for the plants that received sucrose solution + antitranspirant, compared with 67% for plants receiving sucrose alone and 25% for plants that received only water. In addition, this study found that splice-grafted watermelon performed similarly to one-cotyledon grafted (standard watermelon grafting method) and nongrafted watermelon plants in field production. Another field study was conducted to evaluate the combination of four different rootstocks and two types of plastic mulch (black and clear) on fruit maturity, yield and quality when plants were exposed to *Verticillium dahliae*. Seedless watermelon 'Secretariat' was grafted onto rootstocks *Lagenaria siceraria* 'Pelop', *Benincasa hispida* 'Round', and two interspecific hybrid squash *Cucurbita maxima* x *C. moschata* 'Super Shintosa' and 'Tetsukabuto', with nongrafted 'Secretariat' as the control. Grafting did decrease disease severity and increase fruit yield compared to the nongrafted treatment, and 5 *V. dahliae* colony-forming units (cfu)·g⁻¹ of soil may be the minimum level for impact on watermelon fruit yield. Grafting increased flesh firmness but did not alter other fruit quality attributes. These results indicate that grafted watermelon has the potential to increase watermelon yield when there is disease pressure from *V. dahliae*. and the use of splice grafting, could help increase the adoption of grafted watermelon plants in the U.S.