USE OF FATTY ALCOHOL TREATMENT TO INCREASE TOTAL NONSTRUCTURAL CARBOHYDRATES IN WATERMELON ROOTSTOCK SEEDLINGS

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Grafting is important in watermelon production in that it offers a successful control of soil-borne disease without the use of soil fumigants, most notably methyl bromide. However, grafting is not a practice that has yet been implemented in United States commercial watermelon production. This is a result of the increased cost of producing grafted plants as well as the increased labor required to maintain rootstock regrowth. Rootstock regrowth is a serious problem because it competes with the watermelon scion for nutrients and light and, in severest cases, could result in scion abortion. Previous research has shown that application of a dilute solution of fatty alcohol product to the meristematic area of the rootstock seedling successfully plasmolyses the meristematic cells, decapitating the seedling while leaving the hypocotyl and cotyledons intact for successful grafting. In addition to removing the meristem and preventing rootstock regrowth, this chemical decapitation of the rootstock could, over time, allow the rootstock to store more carbohydrates in the hypocotyl, resulting in an increased graft success rate.

Seedlings of bottle gourd and interspecific hybrid squash were treated with a dilute fatty alcohol solution on the same day, and an equal subset were harvested on 1, 7, 14, and 21 days post treatment (DPT). Hypocotyls and cotyledons were harvested and the following measurements were taken: fresh weight, length, width, and cotyledon area. Tissue was then dried in an oven at 50^{o}C for 72 hours, when hypocotyl and cotyledon dry weights were taken. The dried hypocotyls or cotyledons of five plants was combined, ground, and frozen until assayed. 70 mg of tissue was used to assay for total nonstructural carbohydrates (TNC) according to the protocol by Zhao et al. (2010). Both cotyledon and hypocotyl sizes, as well as fresh and dry weights, increased in both rootstocks. TNC amounts also increased linearly through 1, 7, and 14 DPT in both rootstocks, but leveled off at 21 DPT in the interspecific hybrid squash. This increase in TNC, as well as the increases in rootstock seedling size, illustrates the effectiveness of the use of fatty alcohols to prepare rootstock seedlings for grafting.

Literature Cited

Zhao, D., MacKown, C.T., Starks, P.J., Kindiger, B.K., 2010. Rapid Analysis of Nonstructural Carbohydrate Components in Grass Forage Using Microplate Enzymatic Assays. Crop Science. 50:1537-1545