Reducing Weed Control Costs of Organic Watermelon Production using a Partial Season Weeding Regime and Compact Plants

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Sixty-one percent of U.S. watermelon is grown in the southern region, yet the region produces only one-fourth of U.S. organic watermelon. Furthermore, certified organic fruit is currently just one percent (1%) of the watermelon market share. Watermelon plants are especially weak weed competitors and organic weed control is estimated to cost 20x more than conventional herbicide programs. To support industry growth of organic watermelon in the South, research addressing organic weed management is necessary. In 2014 and 2015, an experiment to quantify the amount of hand weeding necessary to protect watermelon yield and to determine the suitability of a compact watermelon genotype for weed management in an organic system was conducted. The following factors were applied to 10-plant plots in a factorial arrangement: weeding duration (full season, half season, or no weeding); watermelon growth habit (traditional vine-type or compact-type); and in-row spacing (1 m or 0.5 m). At the time of fruit harvest, non-weeded plots had 78.8 and 87.0 weeds/m^2 and yield was reduced by 84% and 52% in 2014 and 2015, respectively. Weeding for only the first half of the season (once weekly for 4 weeks after transplant), resulted in the same yield as weed-free control plots despite total weed density of 9.8 and 7.0 weeds/m^2 at the time of fruit harvest in 2014 and 2015, respectively. This strategy reduced weeding cost by 43% and 62% depending on year or weed pressure. Compact plants reduced weeding costs by 15% and 25% in 2014 and 2015, respectively, when weeding was done for the whole growing season but no genotype difference was detected in the partial season weeding regime. Organic growers are recommended to use crop rotation and cover cropping to mitigate the increase in weed seedbank that a partial weeding regime may create.

Rootstock-imparted Water Use Efficiency in Grafted Heirloom Tomatoes

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Grafting tomatoes (*Solanum lycopersicum*) onto disease resistant rootstocks is an emerging practice for managing soil-borne pathogens. Many of these rootstocks also mitigate the effects of edaphic abiotic stress, expanding the role of grafting to improve crop resilience; however, the mechanisms that enable this tolerance remain unclear. The following on-farm study was conducted to compare production and water use efficiency of grafted tomatoes with rootstocks of differing root system morphologies to a non-grafted control. Grafted treatments included a non-grafted heirloom cultivar Cherokee Purple as well as 'Cherokee Purple' grafted onto 'Beaufort' and 'Shield' rootstocks. These two rootstocks were used as they have significantly different total root length, average root diameter, and specific root lengths. The study was conducted under a standard high tunnel protected plasticulture system. Drip irrigation was applied at two levels: normal (3 h every two days; 169.2 gal./100 ft.) or reduced (1.5 h every two days; 84.6 gal./100 ft.). The study followed a full factorial arrangement of the graft and irrigation experimental factors in a split-plot design with irrigation as the whole plot and graft as the split plot. The interaction of graft and irrigation was significant ($P < 0.05$) for total marketable weight, count, and irrigation water use efficiency. At normal irrigation, no differences were observed among grafted treatments. However, at reduced irrigation, 'Beaufort'-grafted plants had significantly higher marketable yield, fruit count, and irrigation water use efficiency than the other two treatments. Compared to the non-grafted control at normal irrigation, 'Beaufort'-grafted plants at reduced irrigation improved marketable yield by 36% and saved 4315 gallons of water per 100 ft. of irrigated bed. Consequently, water use efficiency was three times higher in 'Beaufort'-grafted plants at reduced irrigation than non-grafted at normal irrigation. These results indicate that grafting with 'Beaufort' rootstock may allow growers to reduce water inputs while maintaining high marketable yields.

Extension Section

Perceived Landscape Benefits Inform Home Irrigation Users' Water Conservation Behaviors

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Promoting the adoption of practices and technologies to address water availability is one of the most important contributions extension can make in solving complex water problems. Extension needs to utilize innovative approaches to encourage adoption of landscape water conservation practices and technologies. Social marketing can help extension encourage behavior change by positioning desired behaviors in terms of value to clientele. This study examined the relationship between perceived benefits provided by a resident's landscape and their current and intended future engagement in good irrigation practices. Findings revealed home irrigation users value aesthetics over other landscape benefits, but people who value landscape aesthetics were less likely to conserve water. We identified positive relationships between all of the eight perceived landscape benefits categories and current water conservation practices, meaning people who