WEED MANAGEMENT AND CROP INJURY WHEN INTERCROPPING MELONS AND COTTON

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Abstract

Traditionally, spring planted melon crops in southern Georgia are harvested by July allowing that land to be planted to sorghum. Returns on sorghum following cantaloupe are often marginal, prompting growers to seek other potential crops and strategies that may generate greater revenue; one such strategy is a melon-cotton intercropping system. Land preparation, fertilizer, and irrigation are in place for the melons; therefore, intercropping cotton could potentially increase resource efficiency and improve grower profit. The objectives of this research were to (1) Identify herbicide systems to manage troublesome weeds in melon-cotton intercropping production and to (2) determine the profitability of melon-cotton intercropping versus a monoculture of melons or cotton.

Two separate field studies were conducted at Ty Ty, Georgia on a Tifton loamy sand during 2011. Cantaloupe or watermelon was transplanted into a 0.8 mil plastic mulch having an 18 inch wide bed top. Plots were 6 feet wide and 40 feet long with a single row of cantaloupe or watermelon placed 2 or 3 feet apart, respectively. Overhead irrigation was the primary source of irrigation. Each study consisted of two planting dates for melon-cotton intercropping and three herbicide systems with a non-treated control included for comparison. All preplant herbicides were applied broadcast and then overhead irrigation was used to wash the herbicides off the mulch prior to transplanting. Cotton plantings for each planting date were made when the initial melon vine reached the mulch edge just prior to touching the soil. The cotton cultivar, PHY 499 WRF was planted on 36 inch row spacing, using a 2-row planter centered over the plastic mulch. Additionally, cotton and melons alone were planted for each planting date to serve as a yield standard against intercropping systems. Melons grown in monoculture received ethalfluralin (0.75 lbs ai/A) + fomesafen (0.25 lbs ai/A) preplant. Herbicide systems for monoculture cotton included sequential applications of glufosinate + *S*-metolachlor or glyphosate + acetochlor at recommended rates when sensitive weeds were less than three inches tall. Intercropping systems were managed for melon production until harvest in late June. Immediately following melon harvest, vines were desiccated and weeds and cotton were treated with the first topical applications of glyphosate + acetochlor and a second topical application of glufosinate. A layby application of glufosinate + diuron was made just prior to cotton canopy closure. Palmer amaranth control, melon and cotton injury, cotton height, and melon vine length were recorded throughout the season. Cantaloupe and watermelon were harvested 9 and 3 times, respectively, by hand while cotton was harvested with a spindle picker designed for plot harvesting.

Cantaloupe-cotton Intercropping Study:
Athena cantaloupe were transplanted on April 5, 2011 (planting date 1) and April 20, 2011 (planting date 2). Preplant herbicides applied within each plating date (April 3 and April 17) included ethalfluralin (0.75 lbs ai/A) or ethalfluralin + fomesafen (0.25 lbs ai/A). One additional treatment included ethalfluralin + fomesafen preplant followed by halosulfuron (0.032 lbs ai/A) + a non-ionic surfactant (0.25 % v/v) applied topically to cantaloupe 10 days after transplanting.

Immediately prior to cantaloupe harvest and combined over planting dates, Palmer amaranth control with ethalfluralin alone was 55%. Fomesafen systems controlled Palmer amaranth greater than 95%. Cotton injury was only noted with halosulfuron, resulting in a 12% reduction in cotton plant height 2 weeks after cotton planting with no injury noted at 4 weeks after planting. Cantaloupe yield was similar for intercropping systems including fomesafen or fomesafen + halosulfuron and cantaloupe monoculture (9,672-10,030 fruit/A). Lower yields were noted in the ethalfluralin only intercropping system (7,093 fruit/A) due to poor Palmer amaranth control. Lint cotton yield ranged from 1,665 to 1,684 lbs/A in the cantaloupe-cotton intercropping systems that included fomesafen or fomesafen + halosulfuron and yield was similar to cotton grown in monoculture (1728 lbs/A).

Watermelon-cotton Intercropping Study*:*

Melody (seedless) watermelon was transplanted on March 23, 2011 (planting date 1) and April 7, 2011 (planting date 2). For pollination purposes the cultivar Sangria was transplanted every fourth plant. Watermelon-cotton herbicide systems included preplant applications of ethalfluralin (0.75 lbs ai/A), ethalfluralin + fomesafen (0.25 lbs ai/A), or ethalfluralin + fomesafen + terbacil (0.2 lbs ai/A).

Palmer amaranth control prior to watermelon harvest was 56% with ethalfluralin alone. Intercropping systems including fomesafen (86%) and fomesafen + halosulfuron (92%) were more effective. Watermelon injury was not observed. However, treatments that included terbacil resulted in undesirable cotton injury (96%) while no other herbicide system injured cotton.

Watermelon yield was similar for intercropping systems including fomesafen or fomesafen + terbacil and watermelon monoculture, ranging from 49,597-50082 lbs/A, when combined over planting dates. Poor weed control using ethalfluralin alone resulted in a significant reduction in watermelon yield (18,812 lbs/A).

Only cotton grown in monoculture and cotton intercropped using the ethalfluralin + fomesafen systems were harvestable due to Palmer amaranth infestations. Cotton yield from intercropped systems were 14-24% less than monoculture cotton yield.

Value of Intercropping Systems Including Reflex vs. Monoculture Systems:

When calculating value of the products generated from each crop minus the cost to produce each crop, intercropping cantaloupe and cotton increased total value/acre 11-14% when compared to cantaloupe grown in monoculture and 776-808% when compared to cotton grown in monoculture. Intercropping watermelon and cotton increased total value/acre 24% when compared to watermelon grown in monoculture and 384% when compared to cotton grown in monoculture.

Conclusion

Results indicate that herbicide options do exist for melon-cotton intercropping systems, however fomesafen is not currently registered for use in watermelon or cantaloupe and neither halosulfuron nor ethalfluralin are currently registered for use in cotton. These data suggest that melon-cotton intercropping systems would improve grower profitability when compared to monoculture production practices. Future efforts will focus on obtaining registrations for fomesafen use in watermelon and cantaloupe as well as preplant applications of halosulfuron and ethalfluralin for cotton. A full economic budget comparison of these systems will be conducted after replication of these studies in 2012.