GROWTH AND YIELD OF DIRECT SEEDED GUAYULE UNDER SDI AND FURROW IRRIGATION

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Guayule (*Parthenium argentatum* A. Gray) commercialization depends on economical plant production. Establishment costs can be reduced significantly when direct seeding is used instead of transplanting. Since direct-seeded and transplanted guayule plants develop different root structures, they are also expected to have different soil water extraction patterns and thus soil water management requirements. The objective of this study was to evaluate and compare production parameters (biomass, rubber, content, resin content and yield) of guayule irrigated with five different irrigation rates (six treatments) including five with subsurface drip irrigation (SDI) at levels of 50-150% replacement of estimated soil water depletion (SWD) (and denoted as D50-D150, respectively). There was also one treatment (100% replace of SWD) grown with furrow irrigation (denoted as F100). Calculations were made in a root zone soil water balance model. The experiment was repeated in two fields: one in Maricopa, AZ with sandy loam soil and the other in Eloy, AZ with a clay soil. The experiments consisted of 18 plots (6 treatments x 3 replicates). Each plot had 6 beds with 40” spacing at MAC and 8 beds at Eloy. Each bed was 1.02 m wide and 75 m long. The experiment was based on a split-plot design with location as the main plot. The sub-plots (irrigation treatment) were arranged in a randomized complete block design, where the two fields were divided into three blocks and the six treatments were randomly distributed inside each block. The 2-year experiment was initiated on April 20, 2018 at MAC and on April 17, 2018 in Eloy. In both locations, guayule variety AZ-2 was direct-seeded on raised beds spaced 1.02 m apart (20-30 cm on top and 15-20 cm high). A 4-row planter was used to plant the seeds, one row per bed. After planting, sprinkler systems were installed to irrigate the two fields during the first two weeks. The total water applied through the sprinkler system was 296 mm at MAC and 317 mm in Eloy. Prior to initiating treatments, all SDI plots received equal amounts (a total of 887 mm for MAC and 954 mm for Eloy). Treatments started in late-July and early-August at MAC and Eloy, respectively. Total irrigation applied April through December 2018 to D100 and F100 were 1543 mm and 1571 mm, respectively, for MAC and 1512 mm and 1470 mm, respectively, in Eloy. Whole plant samples were harvested in late March 2019 (≈11 months after planting). Results indicate that rubber and resin content decreased with increasing water application rate. Biomass and rubber and resin yields were higher at MAC than Eloy for all treatments except the F100, which had higher biomass and resin yield in Eloy. The highest rubber and resin yields for MAC were in the D75 treatment but were not significantly different from the yields in of treatments except the D50. In general, MAC sandy loam soil had higher rubber and resin yields than the heavy clay soil in Eloy.

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