PLANTING SEED MASS INFLUENCES EARLY SEASON CROP GROWTH CHARACTERISTICS

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Abstract

Seed characteristics such as seed mass and composition can influence seedling vigor and possibly seedling growth response to temperature. Previous research has demonstrated the importance of seed reserve that is a source of energy for early season seedling growth. The amount of seed reserve is a function of seed size. It was hypothesized that large seeded cotton cultivars or species would demonstrate greater early season vigor, especially under cool early season temperatures, thereby promoting early season seedling and crop growth. To test this hypothesis, a small (DP1614; 72 mg seed^{-1}) and large (DP1612; 94 mg seed^{-1}) seeded Upland cultivar and a Pima cultivar (DP348; 138 mg seed^{-1}) were planted on three different dates to generate differences in temperature conditions. Field measurements consisted of destructively harvesting plants from two meter sections from each plot and measuring total leaf area, leaf dry weights, and stem dry weights. These measurements were used to calculate the following crop growth indices between 21 and 35 DAP: Crop Growth Rate (CGR), Net Assimilation Rate (NAR), and average Leaf Area Index (LAI). Growth analysis results showed that CGR and LAI for large seeded cultivars were significantly higher for the large seeded than the small seeded cultivar for first two planting dates. For the first planting date, CGR and LAI for the Pima cultivar was significantly ($p= 0.0021$ and $p= 0.0004$, resp.) higher than the large seeded upland cotton cultivar. Overall, NAR for both upland cultivars was higher than the Pima cultivar for all planting dates. The study indicated that larger seeded varieties exhibited greater early season crop vigor, as evidenced by higher CGR especially under early season planting conditions when compared to small seeded cultivars. These differences in early crop growth were primarily associated with differences in leaf area development rather than photosynthetic efficiency of the canopy.