# Vegetative Growth and Competitiveness of Common Cocklebur Resistant and Susceptible to Acetolactate synthase-inhibiting Herbicides

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Herbicide-resistant biotypes of weeds are an increasing threat to crop production. An understanding of the basic biology of resistant biotypes, including their growth and development relative to susceptible biotypes, may yield information helpful in the management of resistant biotypes. Greenhouse and growth chamber experiments were conducted to compare growth characteristics of biotypes of common cocklebur (*Xanthium strumarium* L.) that are resistant or susceptible to acetolactate synthase (ALS)-inhibiting herbicides. Averaged over two temperature regimes (24/18 °C and 34/24 °C day/night) under noncompetitive conditions, an ALS herbicide-susceptible (S) biotype produced more leaves, greater leaf area, and greater shoot dry biomass at 20 and 30 d after planting (DAP) than an ALS herbicide-resistant (R) biotype. By 40 DAP, leaf number, leaf area, leaf area ratio (LAR), leaf dry biomass, and shoot dry biomass were similar for R and S biotypes. Susceptible plants produced a greater root biomass, but R plants were taller at 40 DAP under noncompetitive conditions. Averaged across biotypes, relative growth rate (RGR) and photosynthetic net assimilation rate (NAR) were greater at the 24/18 °C temperature regime. Averaged across temperature regimes, RGR and NAR were 11 and 17% greater for the R biotype than the S biotype under noncompetitive conditions. Under intertypic competitive conditions, the biotypes were similar in height, but the S biotype had a greater leaf number per plant. Evaluation of replacement series diagrams and relative crowding coefficient (RCC) estimates suggest that the two biotypes did not differ competitively in leaf production or plant height. The R biotype demonstrated a statistically significant, but probably trivial, competitive disadvantage in leaf dry biomass ($t_{lof}$ = -4.55, $P$ = 0.01; $RCC_{R:S}$ = 0.73 ± 0.07) and shoot dry biomass production ($t_{lof}$ = -3.73, $P$ = 0.02; $RCC_{R:S}$ = 0.73 ± 0.08).