

RELATIONSHIPS AMONG SWEET CORN CANOPY TRAITS AND COMPETITIVE ABILITY. Yim F. So* (1), Martin M. Williams II (2), Jerald K. Pataky (1), and Adam Davis (2), Univ. of Illinois, Urbana, IL 61801 (1), Invasive Weed Management Unit, USDA-ARS, Urbana, IL 61801. (2).

Sweet corn canopy development influences crop competitive ability, as measured by the crop's ability to maintain yield in the presence of weeds (crop tolerance - CT) and the crop's ability to reduce weed growth and fitness (weed suppressive ability - WSA). A quantitative understanding of relationships among phenomorphological traits and competitive ability could lead to improvements in weed management in sweet corn. Twenty three commercially available sweet corn hybrids from nine seed companies were grown in the presence and absence of wild proso millet in Urbana, Illinois in 2006 and 2007. Seventeen weed-free crop traits were measured from emergence to maturity, and CT and WSA of each hybrid was determined relative to competitor-free controls. Hybrids were chosen based on *a priori* qualitative observations of variation in canopy architecture and stress tolerance. Hybrids differed for all traits, including: seedling vigor, chlorophyll content, leaf angle (upright to horizontal), height (122 to 252 cm), leaf area index (LAI, 2.0 to 6.7, intercepted light (PAR, 42 to 98%), shoot biomass (34 to 247 g per plant), per plant leaf area (1,050 to 11,000 cm² per plant), thermal time to silking (503 to 721 growing degree days, GDD) and maturity (760 to 941 GDD). A principal component factor analysis revealed that seven of the seventeen weed-free crop traits measured near or after anthesis loaded highly (0.62 to 0.91) into the first factor, including height, shoot biomass, per plant leaf area LAI, and intercepted PAR, as well as thermal time to silking and maturity. All seven factors were highly correlated (0.42 to 0.90) and were interpreted as a 'late canopy and maturity' factor. Five of the seventeen traits formed two additional principal factors that were a 'seedling vigor' factor and an 'early canopy' factor. Relationships between principal factors and competitive abilities were analyzed by least-square linear regression. The 'late canopy and maturity' factor was significant for all measures of CT. Both the 'seedling vigor' factor and the 'early canopy' factor related to WSA. Based on these results, we conclude that crop traits that are associated with early canopy development relate consistently to WSA, while traits associated with late-season canopy development and morphology are most relevant to measures of CT.