

CORN AND PALMER AMARANTH INTERACTIONS IN DRYLAND AND IRRIGATED ENVIRONMENTS. Dwain M. Rule and J. Anita Dille, Graduate Research Assistant and Associate Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506-5501.

Palmer amaranth is a competitive weed in corn fields in the Great Plains of the United States. A field experiment was conducted in 2005 at the Department of Agronomy Ashland Bottoms Research Farm, near Manhattan, KS. The objective of the experiment was to monitor corn and Palmer amaranth competition under two soil moisture environments. The experiment was established on Eudora silt loam soil consisting of coarse-silty, mixed, superactive, mesic Fluventic Hapludoll with characteristics of 2.0 % organic matter, 28 % sand, 56 % silt, and 16 % clay. The field had crop nutrients applied according to the Kansas State Soil Fertility Recommendation Guidelines, except for nitrogen, which was applied at 224 kg N ha⁻¹. The previous crop was soybean, and field preparations included field cultivation and pre-plant furrowed rows. Corn hybrid 'DKC60-19RR' was planted at 76,600 seeds ha⁻¹ on May 6, with a 0.76 cm row spacing. Palmer amaranth was seeded by hand in a 12 cm band over the corn rows and hand thinned to treatment weed densities. The experiment was a split-plot design with the whole plot treatments dryland and well watered furrow irrigation. Within each soil moisture environment (whole-plot treatment), four sub-plot treatments were established including monoculture corn, monoculture Palmer amaranth at 1 plant m⁻¹ of row, and two mixtures of crop and Palmer amaranth with 1 and 4 weeds m⁻¹ of row. Treatments were replicated four times and arranged in a randomized complete block. Each treatment plot was four corn rows wide and 17 m long to allow for eleven destructive plant harvests (20, 26, 31, 35, 40, 45, 49, 55, 60 and 130 days after planting), final corn yield, and yield components to be measured. Soil water content and soil temperature were measured using Campbell Scientific, Inc. CS605 TDR probes and CS 107 probes, respectively. The probes were placed within a subset of plots to determine soil water content at 15 and 30 cm depth between corn and Palmer amaranth plants and beside monoculture corn and Palmer amaranth plants. Palmer amaranth began to interfere with corn growth reducing plant biomass at 49 days after planting in both environments. Palmer amaranth height, leaf area, and plant biomass were reduced with corn interference. Treatment soil water content level varied based on plant water usage and plant canopy. Soil water content decreased as Palmer amaranth density increased with corn, but soil water content levels were higher in monoculture Palmer amaranth in both environments due to no corn competition. The results of this study seem to mechanistically explain the competition for water between corn and Palmer amaranth. The information collected from this experiment will be used to improve crop-weed competition models and ultimately, optimized weed management decisions in diverse environments.