CORN YIELD LOSS PARTITIONED AMONG WATER, NITROGEN, AND PALMER AMARANTH STRESSES. Ella K. Ruf and J. Anita Dille, Graduate Student and Associate Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

Corn yield loss can be attributed to many factors such as water stress, nitrogen stress, and weed pressure. Field experiments were conducted near Manhattan, KS during 2005 and 2006 to evaluate the growth and production of corn grown at three nitrogen (N) levels and Palmer amaranth (PA) when grown alone and in competition with each other in two moisture environments. The objective was to determine the influence of increasing PA density on corn yield in furrow irrigated versus dryland conditions, and with varying nitrogen rates of 0, 112, and 224 kg ha^{-1}. In both years, DKC 60-19 RR corn was planted at a seeding rate of 76,600 seeds ha^{-1} and PA was over seeded into each plot as appropriate. Plots were hand thinned to desired PA densities of 0, 1, 4, and 8 plants m^{-1} row corn. Corn ears were hand harvested on 10-8-05 and 10-4-06 from a 4-row meter harvest area located in the center 2 rows of each plot. Ears were then shelled and grain weight, test weight, and moisture were recorded, and yield was adjusted to 15.5% moisture. Corn yield as a function of N rate and PA density were found to have significant interactions with the moisture environment in each year. Corn yields in 2005 ranged from an average 15,435 kg ha^{-1} in the high N rate, weed free, irrigated environment to an average of 3,714 kg ha^{-1} in the low N rate, dryland, high PA density environment. In 2006, yields ranged from an average 16,108 kg ha^{-1} for the high N rate, weed free, irrigated environment to an average of 762 kg ha^{-1} at the low N rate, dryland, high PA density environment with two of the four plots having no yield. Corn grain from 2005 was analyzed using ^{13}C discrimination by Dr. Sharon Clay from South Dakota State University and this analysis allowed for partitioning of the water and N stresses. Analysis revealed that even under the high N rate (224 kg ha^{-1}) significant water stress occurred in the dryland environment whereas in the irrigated environment, minimal N stress was observed. This is consistent with other work published by Dr. Clay. Corn grain from 2006 will also be sent to Dr. Clay for the same analysis. In Kansas, water stress clearly dictated corn yield potential, followed by the presence of PA causing more impact on corn yield than that of available N.

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