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Emergence, growth, and fecundity, of Palmer amaranth in Michigan corn and soybeans

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Field experiments were conducted near Middleville, MI in 2013 and 2014 to determine the influence of corn and soybean on the growth and development of Palmer amaranth for three cohorts. Growth parameters evaluated included emergence, growth rate, time to stages of reproduction, and seed production. Weekly emergence counts were taken in two established 0.25 m^2 quadrats in each plot throughout the growing season. Additionally, 10 plants in each plot were marked on 2-week intervals to establish three different cohorts (early, mid, and late). Height measurements to determine growth rate and visual evaluations for reproductive stages were taken biweekly and weekly for 2013 and 2014, respectively. At plant maturity above ground biomass was harvested for dry weight; for male plants maturity was determined when pollination ceased and females were deemed mature 3-weeks after the onset of black seed. Seeds were counted by hand threshing all female reproductive structures, and generating an average seed weight for each sample to determine overall seed production per plant. In both years, the relative growth rate (RGR) was similar for the early and late cohorts across both crops; however RGR was quicker for the mid-season cohort in the presence of soybean compared with corn. Biomass accumulation was over 5 times greater for Palmer amaranth in soybean compared with corn for the early emerging plants in both years. Palmer amaranth seed production was greatest for the early emerging plants compared with the mid-season, and late emerging plants. Similar to the trends for biomass and RGR, seed production was 9 times greater for Palmer amaranth grown in soybean compared with corn. Palmer amaranth produced seed in corn and soybean regardless of emergence time. However, this research indicates that in Michigan planting corn and delaying Palmer amaranth emergence for 8 weeks after planting can reduce seed production by greater than 80%.

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