

**Palmer amaranth growth and fecundity in competition with various row crops in North Carolina. D.J. Mahoney, D.L. Jordan, A.T. Hare, N.R. Burgos, K.M. Jennings, R.G. Leon, and M.C. Vann.**

Palmer amaranth (*Amaranthus palmeri* S. Wats.) is regarded as one of the most troublesome weeds in crop production due to its rapid growth rate, competitive abilities, and immense fecundity that can replenish the soil seed bank in a single generation. Research has been conducted on the growth and fecundity of Palmer amaranth; however, the majority of work occurred in the midwestern and mid-southern states. Additionally, these parameters have mostly been evaluated when Palmer amaranth is not competing with crops or only in one cropping system. Therefore, research was conducted to determine the growth and fecundity of Palmer amaranth in competition with various row crops in North Carolina to address these knowledge gaps. Corn, cotton, peanut, and soybean were planted in two fields at the Upper Coastal Plain Research Station (Rocky Mount, NC) into conventionally-prepared seed beds on 91-cm spacings. A randomized complete block design was utilized in order to allow for direct comparison of Palmer amaranth growth and fecundity across crops. One week after planting (WAP), eight Palmer amaranth seedlings were selected per plot with a 2 m<sup>2</sup> weed-free area (only crop competition) to mitigate weed competition. Eight were selected to ensure at both male and female plants were available for season long measurements. Two WAP, the selected plants were covered with cups and the field was treated with glyphosate plus glufosinate (868 + 451 g ae/ai ha<sup>-1</sup>) in corn and cotton. In soybean, only glyphosate (1,104 g ha<sup>-1</sup>) was applied while paraquat plus bentazon (140 + 561 g ha<sup>-1</sup>) was utilized in peanut. Plots were kept weed-free by hoeing and hand-weeding beyond these applications. Height and width of Palmer amaranth were measured eight times throughout the season with biomass measured in September. Female plants were collected and dried at the Method Road Greenhouse Complex (Raleigh, NC) in order to determine seed production.

The main effects of crop and gender were significant with respect to at-harvest plant height. When averaged over gender, Palmer amaranth which emerged with corn (219 cm) was taller than cotton (199 cm). Palmer amaranth height in peanut (177 cm) and soybean (174 cm) were similar and less than the two aforementioned systems. Pooled over crop, female plant height (200 cm) exceeded their male (184 cm) counterparts. When Palmer amaranth height to width ratio was analyzed, corn > soybean > cotton = peanut at every time point. A crop by gender interaction was significant for at-harvest Palmer amaranth biomass. Female plants in cotton (2,014 g) and peanut (1,879 g) were greater than their male counterparts (934 and 879 g, respectively). Male and female plants in corn (77 and 195 g, respectively) and soybean (258 and 434 g, respectively) were similar and less than the aforementioned plants. Preliminary seed production estimates revealed Palmer amaranth plants in cotton and peanut produced approximately 625,500 and 569,900 seeds plant<sup>-1</sup>, respectively. When competing with soybean, female plants produced approximately 213,500 seeds plant<sup>-1</sup> while in corn, production was approximately 65,800 seeds plant<sup>-1</sup>. These data suggest, corn and

soybean are more competitive with Palmer amaranth than cotton and soybean. It may be hypothesized that Palmer amaranth had to focus photosynthetic energy growing taller (height to width ratio) with corn and soybean to compete for sunlight thus reducing biomass and seed production compared to cotton and peanut. The data illustrate the critical need for controlling Palmer amaranth in crop production because of immense fecundity. It also suggests that in fields where Palmer amaranth is more problematic, corn or soybean provide increased competition compared to cotton and peanut which may be implemented into a more thorough integrated weed management plan.