EFFECT OF FLOODING PERIOD AND SEED BURIAL DEPTH ON PALMER AMARANTH SEED GERMINATION

L.X. Franca
D.M. Dodds,
S.S. Davis,
J.J. Williams
J. McNeal
B. Norris
Mississippi State University
Starkville, MS

Palmer amaranth (*Amaranhus palmeri* S. Wats.) is an extremely prolific seed producer with a single female plant capable of producing up to 600,000 seeds per plant under favorable conditions. Palmer amaranth seed production of 312,000 and 500,000 seeds per plant has been reported when plants were competing with soybeans and cotton, respectively. Seed germination and viability is dependent on factors such as soil moisture, oxygen availability and quality, temperature, light exposure, microbial activity, and burial depth. Flooding conditions create an unfavorable environment for most weed species, which typically results in reduced seed germination and emergence. Flooding is a common practice in most rice (*Oryza sativa* L.) fields in the Lower Mississippi Alluvial Valley. Fall-winter flooding is an effective practice for rice straw decomposition and waterfowl habitat. Nevertheless, limited research is available regarding the effects of fall-winter flooding and seed burial depth on Palmer amaranth seed germination in Mississippi.

Experiments were conducted in 2016 and 2017 at the R. R. Foil Plant Research Center in Starkville, MS to evaluate the effect of flooding period and Palmer amaranth seed burial depth on seed germination. Flood simulation was conducted using 27 L buckets containing 30 cm of soil plus 15 cm of water. 500-micron pore opening mesh bags measuring 64 cm^2 containing 20 grams of soil were used to store 100 viable Palmer amaranth seeds for the duration of the experiment. Three soil textures were used, a Leeper silty clay loam, a Dundee silty loam, and a Brooksville silty clay. Mesh bags were placed at soil surface as well as buried at 15 cm depth and subjected to six flooding periods which included, no-flooding, 1 month (October), 2 months (October-November), 3 months (October-December), 4 months (October-January), and 5 months (October-February). Following each flooding period, seeds were removed from the experimental area, enumerated under a microscope, and characterized as normal or damaged. Following characterization, seeds were germinated in a growth chamber under 35-30°C day-night temperatures with 14-10 hours day-night period. Seeds were considered germinated when radicle length was equal or longer than 1 mm. Data were subjected to analysis of variance using PROC MIXED procedure in SAS® v. 9.4 and means were separated using Fisher s Protected LSD at ±=0.05.

Flooding periods of 4 and 5 months resulted in the greatest amount of damaged Palmer amaranth seeds. Additionally, Palmer amaranth seed germination was reduced by 25% when data was pooled over all flooded treatments. No differences on Palmer amaranth seed germination were observed due to soil texture (P = 0.1660). Moreover, germination of damaged seeds only accounted for 2.4 and 0.8% of total germination in no-flooding and flooding treatments, respectively. Palmer amaranth seed viability was significantly greater when buried at 15.2 cm compared to 0 cm in no-flooding conditions (P d 0.0001). However, seed burial did not affect Palmer amaranth germination in flooded treatments.