



## Mississippi Corn Promotion Board 2020 Progress Report

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**Title:** Investigation of Palmer Amaranth Resistance to Mesotrione (Group 27: HPPD inhibitors) in Mississippi

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### Project Summary

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Mesotrione (Callisto) and atrazine are two herbicides that can be applied either preemergence (PRE) or postemergence (POST) in corn to control many broadleaf weeds. Although Mesotrione and atrazine have different target sites for herbicidal activity, they both affect the efficiency of electron transport in photosystem II (PSII) of herbicide sensitive plants. Palmer amaranth is one of the most common, troublesome, and economically damaging agronomic weeds throughout the southern United States. Palmer amaranth's ability to quickly develop resistance to herbicides is a major reason. One of the most critical issues for weed scientists today is the management of herbicide-resistant weeds. Herbicide-resistant Palmer amaranth (pigweed) is the greatest pest problem for corn, cotton, and soybean producers. A greenhouse research was conducted at the Delta Research and Extension Center in 2020, to investigate possible Palmer amaranth resistance to Mesotrione and its distribution in Mississippi.

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### Project Results/Outcomes

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Palmer amaranth from various counties of Mississippi were sampled in 2017. Seedheads from about 52 samples (from different county) were processed to obtain clean seed. Seeds were planted on August 31, 2020 in a tray and emerged on September 2. Seedlings were thinned to about 100 plants per population and sprayed at 2- to 4-leaf stage on September 24 with the field use rate of Mesotrione at 3 oz/A + COC at 1% v/v. Palmer injury/control was scored visually on a scale of 0-100% (0 = no injury or control and 100 = dead), using the corresponding nontreated check for each population as reference. The percentage of Palmer amaranth that survived from Mesotrione application was calculated based on the number of plants sprayed.

In 2020 Palmer amaranth population screening from different county (52 populations) in Mississippi (step one of this project), some of the Palmer amaranth populations out of 52 samples tested had survivors ranging from 3 to 50% from 1 X rate (3 oz/A) of Mesotrione application. Palmer amaranth injury/control from Mesotrione application was less than 60% for the Bolivar-1, Bolivar-2, Bolivar-4, Holmes-1, Leflore-3, Sunflower-3, Warren-3, and Washington-5 counties (ranging from 23 to 53% survivor). The survivors will be transplanted to bigger pots to produce enough seeds for verification if these were truly resistant (for future research: does response in 2021). The results of this experiment will help to combat the suspected Mesotrione -resistant Palmer amaranth in order to facilitate the solution of current weed problems and to communicate the results to stakeholders, but also to preserve the existing and new technologies for as long as possible.

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## Project Results/Outcomes

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Figure 1. Palmer amaranth populations planted on August 31, 2020 and emerged on September 2.



Figure 1. Response of Palmer amaranth populations from various county of Mississippi to Mesotrione application on September 24, 2020 (showing some survivors).

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## Project Impacts/Benefits

The data obtained will facilitate the solution of current weed problems and will help preserve the existing and new technologies for as long as possible.

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## Project Deliverables

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