Mississippi Corn Promotion Board
2022 Progress Report

Project Title:

Management of Stored Grain Insect Pests of Field Corn

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Project Summary (Issue/Response)

The increase in corn production and grain production in general has also resulted in an increase in on-farm grain storage. Numerous insects can infest stored grain in Mississippi. Many of these are beetle and weevil species, but several caterpillars can also infest stored grain. The risk of insect infestations when storing grain on-farm can vary depending on the level of site and grain bin sanitation, the length of grain storage, and the use of preventative treatments including insecticide application to the empty grain bin and/or insecticide grain protectants (applied directly to the grain). Typically, the risk of infestation/damage is relatively low with short term grain storage (till late winter/early spring). However, if winter conditions are mild insects that infest stored grain could remain active. Also, some producers are holding grain for longer periods of time for marketing purposes. The longer grain is stored, the greater the risk of insect infestations. Currently, little research is being conducted on stored grain insect pests in Mississippi or the Mid-South.

The 2021 trial was set up during Jan 2021 due to issues in obtaining plastic drums to store the grain. Treatments included Actellic (pirimiphos-methyl), Sensat (spinosad), Suspend (deltamethrin), aluminum phosphide fumigant, Diacon IGR Plus (methoprene plus deltamethrin), and an untreated control. The aluminum phosphide drums were fumigated ca. monthly following the May, Jun, Jul, Aug, Sep, and Oct sample dates.

Treatments included in the 2022 trial were Actellic (pirimiphos-methyl), Sensat (spinosad), Suspend (deltamethrin), aluminum phosphide fumigant, Suspend (deltamethrin) plus PBO (insecticide synergist), and an untreated control. The aluminum phosphide drums were fumigated ca. monthly following the May, Jun, Jul, Aug, Sep, and Oct sample dates. During 2022, after grain moisture and insect densities were determined, the grain samples were stored in a freezer for ca. two weeks. Approximately 8 oz (volume) of grain from each plot was placed in plastic containers, sieved to remove any existing insects, and infested with ten maize weevils from our laboratory colony. This weevil colony was obtained from the University of Georgia in 2019 and has not been exposed to insecticides for at least four years. Weevil mortality was determined after seven days of exposure.

Project Results/Outcomes

For the 2021 trial, maize/rice weevil densities were low during Mar through Jun (<5 per sample) (data not shown). During Jul weevil densities were >9 per sample in the Suspend, Diacon IGR plus, and untreated plots. During Aug only Actellic and Aluminum phosphide maintained weevil densities below 9 per sample. In the Sep and Oct samples, weevil densities exceeded 25 per sample in all plots, except those that received aluminum phosphide fumigation. During Nov through Feb, only the aluminum phosphide treatment reduced weevil densities below those in the untreated control

For the 2022 trial, maize/rice weevil densities were low during Nov through May (<3 per sample) (Figure 1). During Jul weevil densities were >8 per sample in the Suspend, and untreated plots. During Aug and Sep Actellic, Sensat, Suspend plus PBO, and Aluminum phosphide maintained weevil densities below 3 per sample. During Oct Actellic, Sensat, and Aluminum phosphide maintained weevil densities below 2 per sample. The addition of the insecticide synergist PBO (piperonyl butoxide) to Suspend (deltamethrin) substantially improved performance. Results from the laboratory bioassays with rice weevil followed similar trends as those for the 'field' study (data not shown). From Mar to Aug, Actellic, Sensat, and Suspend plus PBO resulted in greater mortality than Suspend alone. Also Sensat resulted in >50% from March through October.

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Project Results

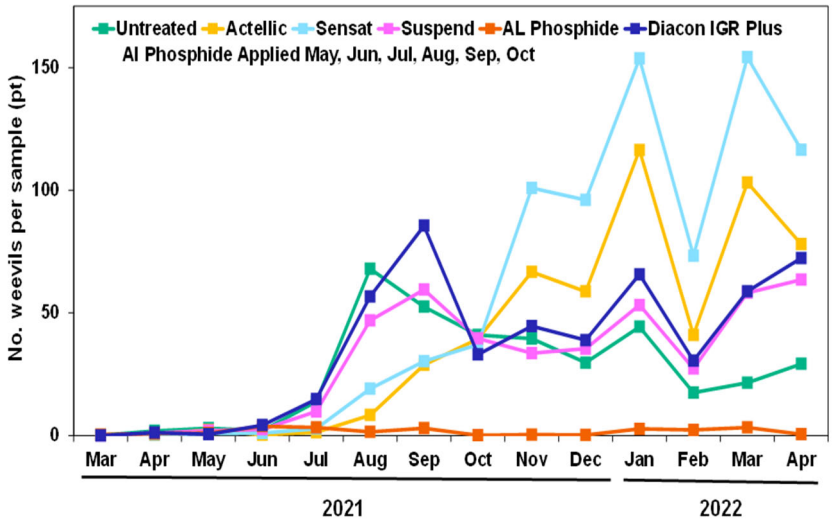

Figure 1. Impact of selected stored grain insect pest management on maize/rice weevil densities during Mar 2021 to Apr 2022. This trial was initiated during Jan 2021.

Project Impacts/Benefits

These studies demonstrate the performance of stored grain insect management tools under Mississippi conditions. As growers store grain for longer periods of time, information from these studies will be to assist them in managing insect pests to preserve the value of stored grain.

Project Deliverables

Results have also been shared with consultants and growers to aid in management decisions for stored grain insect pests.

Graphics

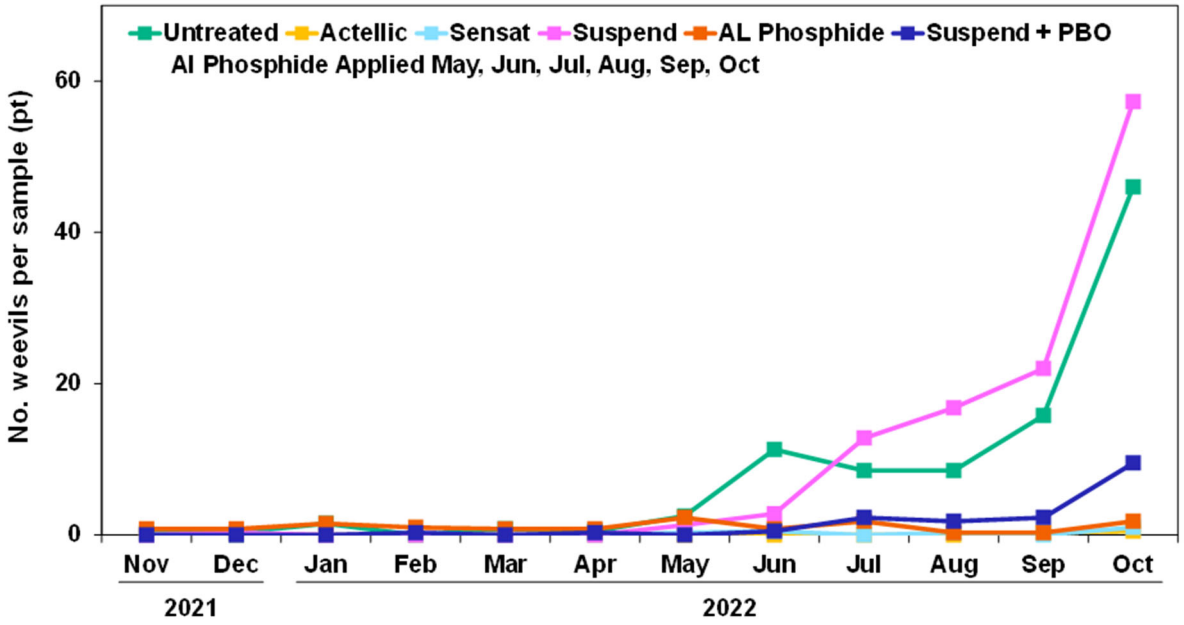

Figure 2. Impact of selected stored grain insect pest management on maize/rice weevil densities during Nov 2021 to Oct 2022. This trial was initiated during Oct 2021.

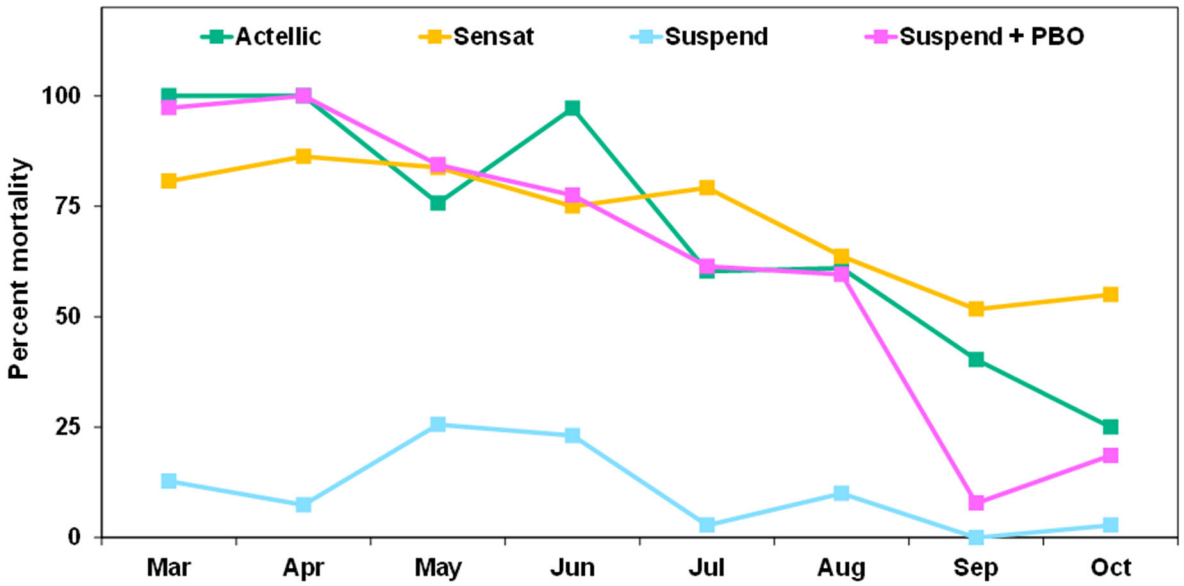

Figure 3. Mortality of maize weevils from laboratory colony exposed to treated grain collected during March through October 2022 from the trial initiated during October 2021.