



RESULTS FROM KUDZU BUG RESEARCH–PROJECT 17-2016/17

Kudzu bug was first discovered on soybeans in Mississippi in 2013. Prior to this, it had been a significant insect pest on soybean in the Southeastern US since its discovery in Georgia in 2009.

To determine the potential for this insect to significantly damage Mississippi soybeans, and the potential need and treatments for kudzu bug control, Mr. William McRight, Jr., working under the direction of Major Professor Dr. Fred Musser at MSU, conducted experiments during the 2016 and 2017 growing seasons. The results of those experiments are reported in his thesis titled “Evaluation of kudzu bug as a pest in Mississippi soybean production systems” that was completed in May 2017. Those results are summarized here in three sections that correspond to chapters in that thesis.

Chapter II: Refining threshold and evaluating kudzu bug impact on vegetative stage soybean

- Experiments were conducted in Starkville, Miss. to develop an economic threshold for kudzu bug during vegetative soybean development. An early MG V soybean variety was planted on May 9 and June 20, 2016.
- Field cages were used to contain kudzu bug infestation levels of 0, 1, 3, 5, or 10 bugs/plant that were initiated at the cotyledon (May 16), V2 (May 24), and V4 (June 14) stages of soybean development in the early planting, and at the V2 stage (June 7) only in the June planting. Insects were kept in the cages to feed for 3 weeks. After this time, cages were removed and the plots were kept free of insects for the remainder of the growing season. At maturity, plants were harvested to determine

seed yield.

- For an unknown reason, nearly all kudzu bugs in the V2 infestations of both plantings died. Survival of insects the week after VC and V4 infestations declined to 21% and 37%, respectively.
- In both the VC and V4 infestations of all kudzu bug levels, there was no impact on soybean yield; i.e., the number of insects applied to the cages did not differ in their effect on seed yield.
- A survey conducted in 2017 indicated that kudzu bug prefers soybeans that are in reproductive phases.
- **These results indicate that economic damage from kudzu bug infestations during soybean vegetative development will be rare.**

Chapter III: Foliar and seed treatment insecticide efficacy on kudzu bug

- The efficacy of foliar insecticides against adult kudzu bugs and nymphs was tested in Starkville, Miss. during the 2016 and 2017 growing seasons. Tested insecticides were Belay (Clothianidin), Brigade 2 EC (Bifenthrin at low and high rates), Dimethoate 4 EC (Dimethoate), Karate Z 2.08 (Lambda-cyhalothrin), and Orthene 97 (Acephate) applied at the R3 reproductive stage. Leaf and petiole samples were collected from treated plots at 1 hour, and 1, 3, 5, 7, and 10 days after insecticide application to determine efficacy against adult and/or nymph kudzu bugs after 24 hours exposure to treated soybean tissue.
- In 2016, clothianidin, bifenthrin, and acephate provided at least 90% control of kudzu bug adults 24 hours after insecticide application; clothianidin provided 100% control. In 2017, clothianidin and acephate resulted in adult bug

mortality that was as good as or higher than that of all other insecticides at all times after application. Lambda-cyhalothrin provided the best overall control of kudzu bug nymphs through 7 days after application.

- The efficacy of insecticidal seed treatments against kudzu bug was tested in Stoneville and Starkville, Miss. in 2016 and 2017. At both locations, three seed treatments—imidacloprid, clothianidin, and thiamethoxam—were used on seed planted on June 30 and July 15, 2016 at Stoneville, and on July 5 (Stoneville) and June 26 (Starkville), 2017. In the 2016 trial at Stoneville, cages that covered soybean plants infested with two adult kudzu bugs at VC, V1, and V2 were used to allow bug feeding for 48 hours. After this time, cages were removed and bug mortality was rated. In the 2017 trials, adult kudzu bugs were allowed to feed on VC stage soybean stems that had been cut and brought into the laboratory. In both tests, kudzu bugs were rated for mortality after 24 hours. Separate tests were conducted with V1 and V2 stage soybean stems to determine duration of seed treatment efficacy.
- In 2016, thiamethoxam insecticide seed treatment resulted in 48% kudzu bug mortality vs. 34% in the untreated control. In 2017, no insecticide seed treatment resulted in higher mortality than that in the untreated control that received only a fungicide seed treatment.
- **These results indicate that foliar insecticides, particularly clothianidin and acephate on adults and lambda-cyhalothrin on nymphs, can be used to effectively control both adult and nymph kudzu bug that reaches threshold levels. These results also indicate that insecticide seed treatments are not an effective management option for controlling kudzu bug in the early vegetative stages of soybean.**

Chapter IV: Population density and natural enemies of kudzu bug in kudzu and soybean in Mississippi

- A survey was conducted in 10 northeastern and north-central Mississippi counties in 2017 to determine the population dynamics of kudzu bug on its two primary hosts, kudzu and soybean. Samples were taken every two weeks during early April-late October (kudzu) and late June–early October (soybeans) to detect kudzu bug adults, nymphs, and egg masses.
- Population densities of nymphs and adults in kudzu peaked in late July and late September, respectively, and declined thereafter. The peak for nymphs was rapid, while that for adults was gradual starting in late July.
- In soybeans, population densities for nymphs and adults peaked in early August and late September, respectively. The peak for nymphs (about 9/40 sweeps) was gradual starting in early July (0/40 sweeps), while that for adults (about 21/40 sweeps) was rapid starting in early September (about 6/40 sweeps). Number of egg masses peaked in early July at about 0.5/50 soybean leaves.
- The fungus *Beauveria bassiana* was found infecting kudzu bugs from late August through the remainder of the sampling periods for both kudzu and soybeans. The abundance of fungal mycelia varied with location but was never absent at any location. This fungus was not detected parasitizing kudzu bug eggs and no other natural enemies of the kudzu bug were detected during this survey.



Take Home Message

- There was no impact on soybean yield from kudzu bug infestations of up to 3 kudzu bugs/plant during early soybean vegetative stages in these experiments. Densities greater than this are expected to be a rare occurrence, especially since the kudzu bug prefers reproductive stage soybeans.
- Belay (Clothianidin) and Orthene (acephate) insecticides provided the highest mortality of kudzu bug in these experiments, and both adult and nymphs were easily controlled.
- Currently available neonicotinoid insecticide seed treatments did not provide significant control of adult kudzu bugs during early vegetative phases of soybeans. Thus, insecticide seed treatments are not recommended to control kudzu bugs in vegetative soybean.
- Only one fungal parasite was detected infecting kudzu bug adults (but not eggs).
- These results indicate that kudzu bug is more likely to be near or at treatment thresholds in late-planted soybean that will be in the preferred reproductive phases during August and September.
- It was noted that the surge in late-season adult bugs in later-maturing soybeans may have resulted from their aggregation into these unharvested fields from harvested fields of early-planted soybeans.
- According to these results and estimates of soybean yield loss attributed to insects in the [Midsouth Entomologist](#), the kudzu bug is not a major insect pest in the soybean-producing states of the Midsouthern US. However, sampling for this insect should be conducted each year to ensure its numbers do not exceed treatment thresholds reported [here](#) (pages 43-44).

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