MANAGEMENT OF REDBANDED STINK BUG IN MISSISSIPPI SOYBEAN PRODUCTION SYSTEMS

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Abstract

The redbanded stink bug, *Piezodorus guildinii* (Westwood), has recently become a significant pest of soybeans in Mississippi and throughout the southeastern United States. The first description of the redbanded stink bug originated from the Caribbean island of St. Vincent. The redbanded stink bug was first reported in the United States in the early 1970s, but the time of its arrival in North America is still unclear (Panizzi 2005). As of 2016, the redbanded stink bug has been recorded in several southern states including; Alabama, Florida, Louisiana, Mississippi, New Mexico, South Carolina, and Texas (Temple et al. 2013). Redbanded stink bugs are of particular concern because they appear to be much more damaging to seed than traditional species commonly found in the Mid-South. This study sought to evaluate insecticide efficacy and thresholds for redbanded stink bug in Mississippi soybean. In the insecticide efficacy trials, multiple insecticides effectively reduced pest numbers under economic threshold. Across several trial locations, tank mixing multiple insecticides provided better control than individual products. In the threshold study, late planted soybeans under immense pressure required seven applications at current economic threshold. When increased thresholds were implemented, soybean seed damage increased. Weekly sprays yielded significantly greater than other treatments but were not economically practical.

Introduction

Stinkbugs are the primary insect pest of soybeans grown in the southern U.S. Redbanded stinkbugs (RBSB) feed on the reproductive structures of soybean and are able to cause damage on plants approaching maturity (late R6 to R7) (Musser et al. 2011). In a study conducted by Corrêa-Ferreira and de Azevedo in Brazil, soybean plants infested with redbanded stinkbug had the lowest number of quality seed as compared to other stinkbugs including brown stinkbug and southern green stinkbug (2002). Under optimal conditions, redbanded stinkbugs complete a lifecycle in 37-39 days. An estimated four to eight generations per year occur with overlapping generations beginning in July (Panizzi and Smith 1977).

Action thresholds in Mississippi for redbanded stinkbug are lower than that of the traditional stinkbug complex (green, southern green and brown stinkbug), and control methods for infestations are recommended until the R7 growth stage of soybean (Catchot et al. 2019). There are many insecticidal control methods targeting stinkbugs. This study conducted in 2017 sought to evaluate performance on selected insecticides on redbanded stinkbug in Mississippi cultivated soybeans, and test various thresholds in high pressure situations.

Materials and Methods

Insecticide Efficacy Trial

Field studies were conducted in 2017 in Canton, MS. A randomized complete block design was implemented, and treatments of selected insecticides were applied when an economic threshold of 4 RBSB/ 25 sweeps was reached. Applied insecticides included: Skyraider 6.4 oz./ac., Orthene .75 lb./ac., Cobalt ADV 16 oz./ac., Cobalt ADV 24

oz./ac., Cobalt ADV 32 oz./ac., Orthene .75 lb./ac. + Bifenthrin 6.4 oz./ac., and Admire Pro 1.3 oz./ac. This also included an untreated check plot. A tractor mounted sprayer was used for all treatments calibrated at 10 GPA and 65 P.S.I with TX6 hollow cone nozzles. Plots were sampled 3,7, and 11 days after the initial applications (DA-A) to record pest numbers.

Threshold Evaluation Trial

This study was performed in Sidon, MS in 2017 using a randomized complete block design. Treatments consisted of weekly applications beginning at R2 growth stage, 2 RBSB/25 sweeps, 4 RBSB/25 sweeps, 6 RBSB/25 sweeps, 9 RBSB/25 sweeps, 12 RBSB/25 sweeps, 16 RBSB/25 sweeps and an untreated control. Plots were sampled weekly using 15 sweeps per center two rows. Plots were treated with Acephate .75 lb./ac. + Bifenthrin 6.4 oz./ac. when corresponding thresholds were reached based on a 4-replication average. Damaged seed percentages were calculated, and yield was taken for this trial. All treatments were delivered with a tractor mounted sprayer calibrated at 10 GPA and 65 P.S.I with TX6 hollow cone nozzles.

Data Analysis

Data were analyzed using SAS 9.4 using PROC GLIMMIX procedure. Means were separated using Fisher's Protected LSD at an α of 0.05.

Figures

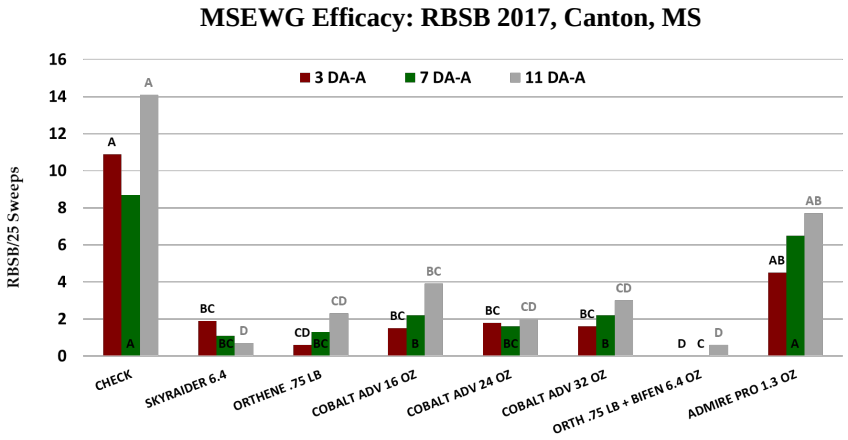

Fig.1: Insecticide efficacy trial in Canton, MS 2017

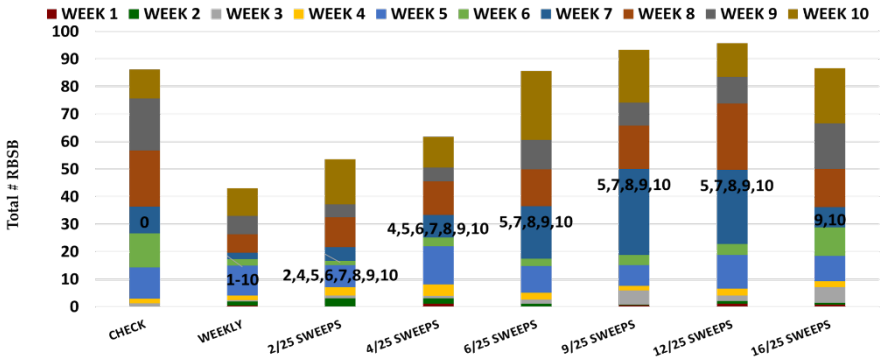

Fig.2: Threshold evaluation trail in Sidon, MS 2017
*Numbers denote the week individual treatments reached threshold

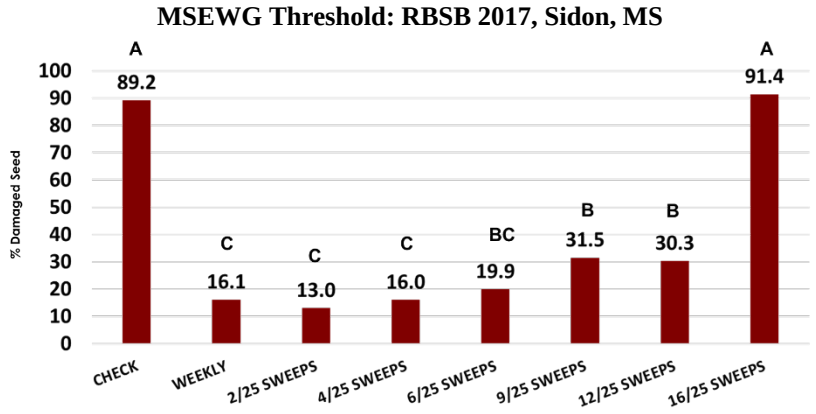

Fig. 3: Damaged seed percentage for the threshold evaluation trial in Sidon, MS 2017

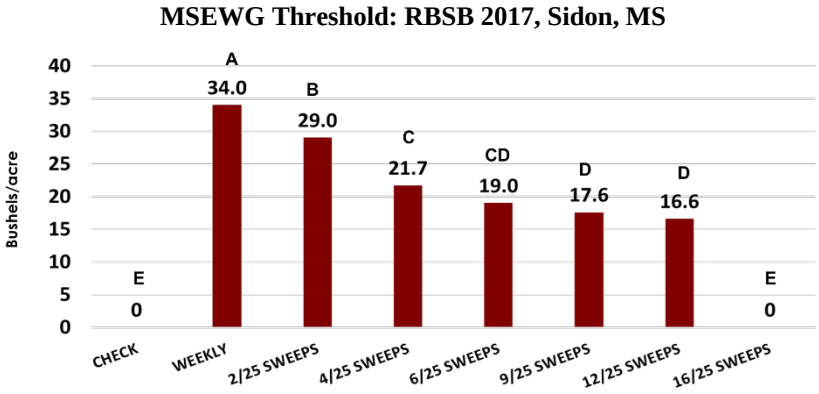

Fig. 4: Yield of threshold evaluation trial in Sidon, MS 2017

Results

Insecticide Efficacy Trial

The results from the insecticide efficacy trial conducted in Canton shows that many insecticides were successful in controlling redbanded stinkbug and sampled pest numbers were kept under the economic threshold of 4 redbanded stinkbugs per 25 sweeps in most cases (Fig. 1). Skyraider 6.4 oz./ac., Orthene .75lb./ac., Cobalt ADV 16 oz./ac., Cobalt ADV 24 oz./ac., Cobalt 32 oz./ac., and Orethene .75lb./ac. + Bifenthrin 6.4 oz./ac. treatments reduced pest numbers significantly less than the untreated control (check) after 3, 7, and 11 days after applications were made. Admire Pro 1.3 oz./ac. treatment had the least amount of control compared to the other insecticides and tank-mixtures at 3, 7, and 11 days after application (Fig. 1).

Threshold Evaluation Trial

Weekly applications beginning at R2 growth stage totaled 10 sprays and was the most successful at reducing the total number of redbanded stinkbug across a 10-week period (Fig. 2). Consequently, weekly applications yielded significantly higher than the other treatments (Fig. 4). 2 RBSB/25 sweep threshold required 8 applications over a 10-week period (Fig. 2). Seven applications were needed when the economic threshold of 4 RBSB/25 sweeps was implemented, and this treatment yielded the third best compared to the other threshold treatments (Fig. 2 & 4). 6 RBSB/25 sweeps, 9 RBSB/25 sweeps, and 12 RBSB/25 sweeps treatments did not reduce the total number of redbanded stinkbugs compared to the untreated control and required five applications each (Fig. 2). These three treatments all yielded the lowest across the treatments that were harvestable (Fig. 4). 16 RBSB/25 sweep treatment required two applications, and the damaged seed percentage for this treatment was not significantly different then the

untreated control (Fig. 2 & 3). Yield was not taken for the untreated control and 16 RBSB/ 25 sweeps threshold treatment because plots were unharvestable (Fig. 4).

Discussion

Apart from Admire Pro 1.3 oz./ac., many other selected insecticides successfully controlled redbanded stinkbug pest numbers. Tank-mixing insecticides with different modes of action proved to provide sufficient control on redbanded stink bugs and kept pest numbers under economic threshold at 3, 7, and 11 days after treatment. Soybeans for the threshold efficacy trial were planted later in the growing season than recommended in Mississippi to insure adequate pest pressure. Due to high redbanded stinkbug populations, current thresholds (4 RBSB/25 sweeps) required seven total applications across a 10-week period. Weekly applications beginning at R2 growth stage over a 10-week period yielded higher but is not economically feasible. Also, soybeans did not dry down properly when current recommended thresholds were used due to the immense redbanded stinkbug pressure and feeding in this study.

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