EVALUATION OF INSECTICIDE SEED TREATMENTS IN FURROW IRRIGATED RICE FOR CONTROL OF RICE BILLBUG, *SPHENOPHORUS PERTINAX,* IN ARKANSAS

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Abstract

Arkansas rice producers have increased furrow irrigated rice production acreage as a way to reduce labor and tillage, and easily rotate crops. The elimination of a flood across the field has made rice more susceptible to rice billbug (*Sphenophorus pertinax*). Historically, this insect has been considered a minor pest in traditional flood irrigated production systems, occurring primarily on the levees in the field. Rice billbugs feed on the roots and tillers of rice plants, causing dead tillers and rice panicles to abort, resulting in direct yield loss. As furrow irrigated rice acreage continues to increase in Arkansas, a cost-effective management strategy for rice billbug is needed. An experiment was conducted in 2020 to evaluate the effectiveness of insecticide seed treatments for control of rice billbug. Neonicotinoid and diamide insecticide seed treatments, alone and in combination were included in the study. Rice plots were monitored throughout the growing season for rice billbug damage. Multiple sampling methods were tested to correlate rice billbug damage to grain yield. When signs of billbug feeding appeared, rice was sampled by counting total tillers and damaged tillers in five linear feet per plot. After panicle emergence, the number of blank heads per five linear feet within a plot were also recorded. Sampling using the destructive method shows a general trend between treatments, but optimal timing needs to be evaluated. Plots with a seed treatment containing a neonicotinoid in combination with Fortenza, resulted in yields greater than the untreated check or the neonicotinoid seed treatment Cruisermaxx alone. Seed treatments containing Cruisermaxx in combination with Dermacor, also showed significant yield increases when compared to stand alone treatment of Cruisermaxx.

Introduction

Furrow irrigated rice acreage has been increasing in Arkansas over the past five years. In this production system, there is no standing water across the top third of the field, which has altered the pest complex for rice. Rice billbug (*Sphenophorus pertinax*), has commonly been considered a minor insect pest in the traditional flooded rice system, typically only feeding on rice found on the levee. Billbugs are restricted to the levee rice due to the inhabitable environment when a permanent flood is present. In the furrow irrigated system, the top third of the field has become optimal for rice billbug inhabitance, and rice planted in this zone is more susceptible to billbug feeding. Little to no published research exists for management of rice billbug. Furrow irrigated rice acreage in Arkansas is steadily increasing, which makes it imperative that management strategies for rice billbug are found.

Methods

An experiment was conducted in 2020 at one furrow irrigated rice location in Jackson County, Arkansas. RiceTec RT7301 conventional long grain hybrid was planted on 4 April. All rice was treated with a base fungicide package consisting of sedaxane, mefenoxam, azoxystrobin, and fludioxonil Plot size was 16 rows on 7.5 in spacing by 16.5 ft. Treatments consisted of single insecticide seed treatments as well as combinations of base treatments. All treatments as well as an untreated check were arranged as a randomized complete block with four replications (Table 1). Two sampling methods were tested to measure yield losses associated with rice billbug feeding. Prior to reproductive stages, destructive sampling was implemented by removing rice plants in a designated 5 linear feet, total tillers, as well as tillers showing symptoms commonly associated with billbug feeding were counted. At panicle emergence, total panicle and blank panicle counts were recorded for 5 linear feet per plot. All plots were harvested using a plot combine equipped with a harvest master system. Data was analyzed in PROC GLIMMIX with SAS v 9.4 at an alpha level of 0.05.

Results

Significant differences between treatments were observed using the destructive sampling method. CruiserMaxx+Nipsit and Nipsit+Dermacor showed the lowest mean tiller damage and received significantly less tiller feeding than the untreated or CruiserMaxx alone. (Figure 1). No significant differences were observed when analyzing blank panicle sampling (Figure 2). When analyzing grain yield, plots receiving a seed treatment containing solely CruiserMaxx, or CruiserMaxx in combination with Nipsit showed no differences when compared to the untreated check (Figure 3). Seed treatments receiving CruiserMaxx in combination with Dermacor showed significant yield increases when compared to CruiserMaxx alone, or treatments receiving no insecticide.

Table 1. Trade Names, Rates, and insecticide class included in analysis.

Trade Name (Common Name)	Rate (oz/cwt)	Insecticide Class
CruiserMaxx Rice (Thiamethoxam,)	7 (oz/cwt)	Neonicotinoid
Nipsit Inside (Clothianidin)	2.9 (oz/cwt)	Neonicotinoid
Dermacor X-100 (Chlorantraniliprole)	5 (oz/cwt)	Diamide
Fortenza (Cyantraniliprole)	3.47 (oz/cwt)	Diamide
Regent (Fipronil)	8 (oz/cwt)	Phenylpyrazole

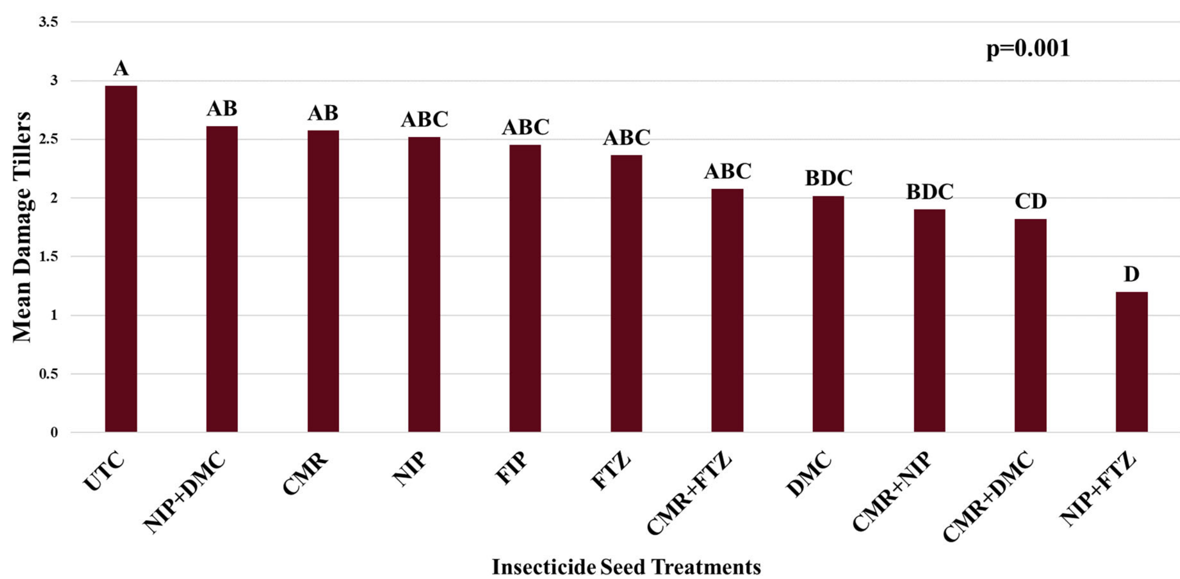

Figure 1. Destructive sampling methods showing percent tiller damage of insecticide seed treatment classes for control of rice billbug,

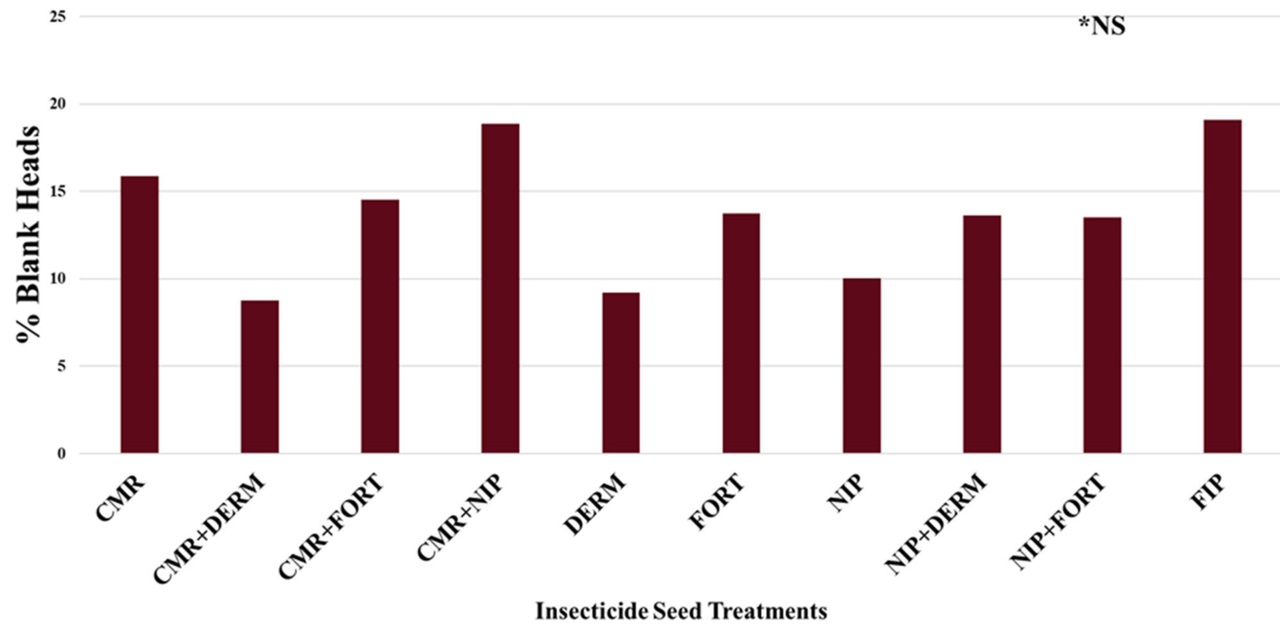

Figure 2. Blank panicle samplings of selected insecticide seed treatments for control of rice billbug.

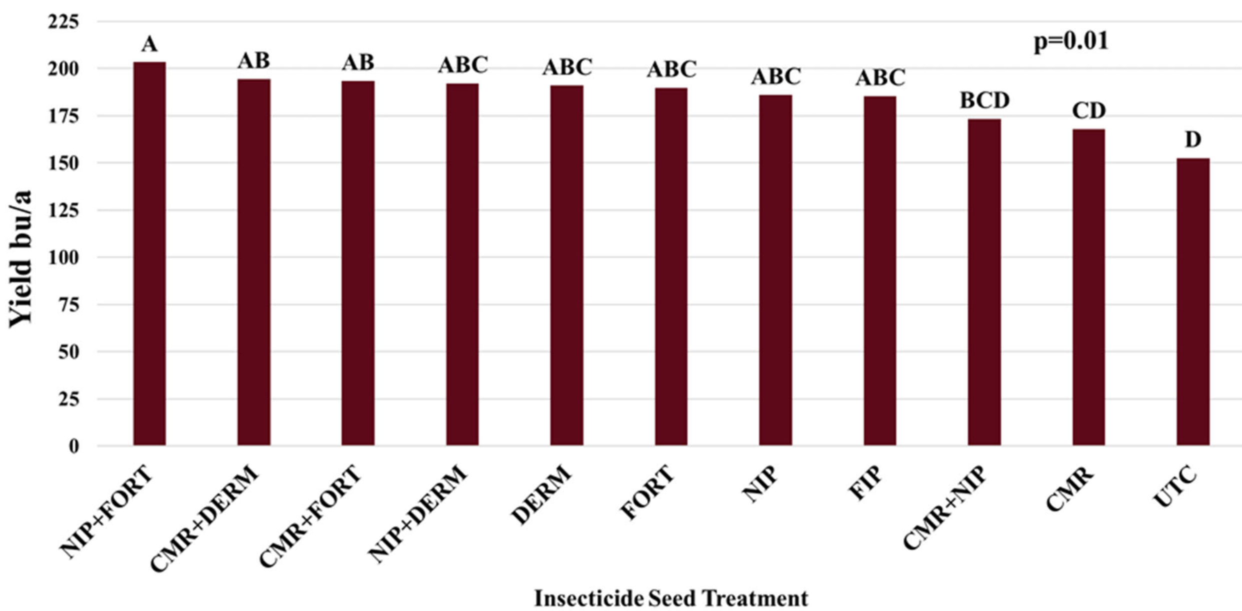

Figure 3. Rice grain yield of selected insecticide seed treatments for control of rice billbug

Summary

Preliminary data suggests that combining neonicotinoid and diamide seed treatments provide greater suppression of billbug when compared to single product seed treatments. A combination of a neonicotinoid and a diamide may improve suppression of billbug. Treatment combinations containing Nipsit + Fortenza and CruiserMaxx + Dermacor resulted in greater grain yields than untreated plots or rice receiving the product CruiserMaxx alone. Damage tiller sampling showed some similarities between treatments when compared to yield. Nipsit + Fortenza and CruiserMaxx + Dermacor treatments showed the highest mean yields, with the lowest amount of mean tiller damage. Sampling using the damage tiller methods is promising, but the optimal timing of damaged tiller sampling needs to be refined, because earlier sampling will allow undeveloped damage tillers to be accounted for. No reduction in blank heads were observed for any treatment. This suggest that blank head counts alone do not correlate with grain yield, and other sampling methods will have to be evaluated. One possible explanation for the lack of differences is that tillers infested by billbug never developed enough to produce a blank head. This could explain why yield and blank head counts cannot be the primary sampling method to evaluate billbug damage.

Acknowledgments

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