A Historical Look at Rice Insecticide Seed Treatments from 2007 to 2013: Where Are We Now?


ABSTRACT

The use of insecticide seed treatments (ISTs) for control of rice water weevil, *Lissorhoptrus oryzophilus*, and grape colaspis, *Colaspis brunnea*, by growers has increased rapidly since their introduction in 2007. The purpose of this paper is to give an overview of the work that was done to develop our knowledge base and recommendations for use by rice growers in Arkansas. The objectives of our trials were to evaluate the efficacy of selected insecticide seed treatments, find the correct rates of ISTs, evaluate new formulations, assess ISTs on different seeding rates and cultivars, as well as combining an IST and/or foliar applications. Our studies also indicated that ISTs can enhance plant stands and vigor as well as provide control of the rice water weevil and grape colaspis, subsequently resulting in increased yields for rice producers in Arkansas.

INTRODUCTION

In 2005 with the loss of Icon (fipronil) seed treatment, due to a voluntary withdrawal of the label by the company, rice growers had very few options for control of the major insect pests of rice, the grape colaspis (GC, *Colaspis brunnea*), referred to by many growers as the “lespedeza worm,” and, the rice water weevil (RWW, *Lissorhoptrus oryzae*). Both of these pests have the potential to substantially reduce plant stand and subsequent yield in any given year. Prior to the development of new insecticide seed treatments (ISTs) in 2007, there were few options for control of these key pests. Draining the field after infestation is still one of the most effective options, but the high cost of pumping in recent years has deterred growers from this practice (Thompson et
Applying foliar insecticide has also been used as a means to control adult RWW and GC; however, difficulty in timing the application properly results in ~ 50% effectiveness (Fig. 1).

Cruiser® 5FS (Syngenta Crop Protection) and Dermacor® X-100 (DuPont) were granted full labels for use during the spring of 2010. In the U.S., prior to 2010, an extensive testing program was conducted through Experimental Use Permits (EUP). In 2008, Arkansas received a Section 18 with Louisiana and Mississippi for Dermacor and we were able to observe the product in large block trials to verify small block test results (Wilf et al., 2009a, 2009b, 2009c). In 2009, Dermacor received a full label and Arkansas was the only state granted a Section 18 for Cruiser. We were able to compare Cruiser to Dermacor and untreated checks in several locations across the rice growing area of the state in large and small plot trials (Wilf et al., 2010a, 2010b; Fortner et al., 2011a, 2011b, 2011c, 2011d, 2011e). In 2011, a third seed treatment, NipsIt Inside, became available on limited acreage; an EUP was granted on 40,000 acres of which 20,000 was allotted in Arkansas. The opportunity to evaluate this product in small plots as well as on grower fields across the state provided a good opportunity to evaluate the product on large plot trials in the state (Lorenz et al., 2012; Plummer et al., 2012; Taillon et al., 2012). NipsIt Inside (Valent) received a full label for use in the fall of 2012 (Everett et al., 2013; Taillon et al., 2013a, 2013b). In 2011, the Cruiser formulation was changed to Cruiser Maxx Rice which includes a premix of Cruiser and fungicides.

PROCEDURES

Experiments and demonstrations were conducted from 2007 to 2013 on numerous grower fields across the state, the Pine Tree Research Station, near Colt, Ark., and the Rice Research Extension Center, near Stuttgart, Ark. These trials consisted of small plot replicated experiments and large plot demonstration trials and the comments on these seed treatments herein, are based on these observations. In these trials we have used seeding rates ranging from 20 lb/acre to 120 lb/acre. We have observed these seed treatments on conventional, Clearfield, and hybrid types of rice. The selection of locations was based on fields with a history of problems with either grape colaspis or rice water weevil. However, we did not experience insect problems in every field.

Core samples (4-inch diameter) were collected at 3 to 5 weeks post flood and transported to the laboratory. Samples were washed through a 0.25-inch screen into a 40-mesh sieve to collect RWW and GC larvae. The sieves were placed in a 5% salt water solution and the numbers of larvae that floated to the surface were counted. At the end of the season, plots were harvested and yields were measured and converted to bushels per acre. Data is processed using the latest version of Agriculture Research Manager (Gylling Data Management, Inc., Brookings, S.D.), analysis of variance, and Duncan’s New Multiple Range Test ($P = 0.10$).
RESULTS AND DISCUSSION

Throughout the testing of these seed treatments, we have seen a general trend to improve stand count and vigor in many fields with the use of seed treatments (Fig. 1). Seed treatments have increased stand counts in many trials as much as 10% to 20% above the untreated check. We have also documented increased plant height in some fields (Fig. 2). The amount of vigor seen may be dependent on many factors including pest pressure, environmental conditions, and seed quality. Many times we have observed under stressful conditions the seed treatment helped to moderate or buffer stress. The insecticide seed treatments have continued to provide good control of RWW in Arkansas. Percent control over the 3 years averaged 74% control depending on initial larval densities. Seed treatments provide good control when moderate populations of RWW are present on roots (Figs. 3 and 4). When higher populations occur (>20 larvae/core), NipsIt Inside and Cruiser provide adequate control while Dermacor provides a slightly higher level of control. Each of the seed treatments provided benefits in terms of yield (Fig. 5). Over the 5 year period, Dermacor provided a 7 bu/acre yield increase, Cruiser provided a 6 bu/acre yield increase, and NipsIt Inside provided a 6 bu/acre increase. Based on the yield results shown in the figures below, Dermacor, Cruiser, and NipsIt provided a 75%, 73%, and 81% probability of a net return, respectively.

Based on these results, insecticidal seed treatments are recommended for RWW control in Arkansas. Cruiser and NipsIt Inside are recommended for GC control and Dermacor for suppression of GC.

SIGNIFICANCE OF FINDINGS

Since our work with insecticide seed treatments began in 2007, we have seen consistent value with these products. Insecticide seed treatments are easily applied and give producers a more reliable option against RWW and GC compared to foliar applications. This body of work has helped develop our recommendations to the rice producers of Arkansas.

ACKNOWLEDGMENTS

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LITERATURE CITED


Fig. 1. Stand counts for selected insecticide seed treatments, number of plants/10 row-ft. Prairie County, Price Farm, 2008.

Fig. 2. Vigor rating for selected seed treatments, average plant height of 5 plants/10 row-ft. Prairie County, Price Farm, 2008.
Fig. 3. Insect counts for selected insecticide seed treatments, rice water weevils/4 cores. Conventional seeding rate summary across 4 locations, 2010.

Fig. 4. Insect counts for selected insecticide seed treatments, grape colaspis/4 cores. St. Francis County, DuPont (Pine Tree, Ark.) 2009.
Fig. 5. Harvest data for selected insecticide seed treatments, bu/acre. Conventional seeding rate summary across locations, 2010.