



Survey of Insecticide Efficacy on Three-Cornered Alfalfa Hopper

Authored by Sierra Bradley, Graduate Research Assistant, Department of Entomology, Virginia Tech; and Thomas Kuhar, Professor and Applied Vegetable Entomologist, Department of Entomology, Virginia Tech

Introduction

Spissistilus fetinus (Say) (Hemiptera: Membracidae) is a pest of various legume crops, including peanuts, soybeans, and alfalfa (Beyer et al. 2017), as well as other cultivated plants, such as grapes (Flasco et al. 2021). Commonly known as the three-cornered alfalfa hopper (TCAH), this pest ranges from the Midwest to the southeast U.S. (Beyer et al. 2017). TCAH are native to Virginia but have only become a problem in recent years (Musser et al. 2019 and 2020). TCAH are phloem feeders with piercing-sucking mouthparts and will typically girdle a plant's stem (Mitchell & Newsom 1984), reducing the stem's stability and increasing the plant's risk of lodging (Sparks & Boethel 1987). In order to determine the best management strategies for TCAH, a summary of past insecticide efficacy trials was made.

Description

TCAH have a triangular or wedge-shaped pronotum as adults (Fig. 1). Nymphs develop through five instars (Wildermuth 1915), and early instars are light green or tan and are covered in dorsal spines (Fig. 2., Beyer et al. 2017). As they grow, TCAH become greener and begin to lose their spines. Nymphs and adults have piercing-sucking mouthparts and feed on the phloem of plants (Beyer et al. 2017).



Figure 1. Adult three-cornered alfalfa hopper. (JC Jones, South Carolina)



Figure 2. Three-cornered alfalfa hopper nymph. (Drees)

Methods

A compilation of insecticide treatments on soybeans, alfalfa, or peanuts to determine their efficacy in reducing TCAH was created using data published in the journal *Arthropod Management Tests*. Only studies completed after 1980 were used. Studies with low TCAH pretreatment populations were omitted. Insecticides that are not registered in Virginia were also omitted. All treatments recorded were tested in the field. A summary was then written to determine the percentage of trials that were effective in controlling TCAH for each product.

Results

Overall, the top performing insecticides against TCAH were the pyrethroids Baythroid XL and Brigade, along with Sivanto, and the combo products Endigo ZC, and Leverage 360, which combined a neonicotinoid with a pyrethroid. Insecticides that also resulted in significant control in >50% of trials included Asana XL, Orthene, Mustang Max, Warrior/Karate, Prevathon, and Steward.

Table 1. Efficacy of insecticides against three-cornered alfalfa hoppers as shown by percentage of successful trials published in *Arthropod Management Tests*.

Product	Active Ingredient (IRAC Group)	# trials	% trials reporting significant control
Baythroid XL	Beta-Cyfluthrin (3)	6	100%
Brigade	bifenthrin (3A)	1	100%
Sivanto	flupyradifurone (4D)	1	100%
Endigo ZC	lambda-cyhalothrin (3A) + thiamethoxam (4A)	2	100%
Leverage 360	imidacloprid (4A) + beta-cyfluthrin (3A)	1	100%
Asana XL	esfenvalerate (3A)	11	82%
Orthene	acephate (1B)	16	81%
Mustang Maxx	zeta-cypermethrin (3A)	8	75%
Warrior II/Karate Z	lambda-cyhalothrin (3A)	15	67%
Prevathon	chlorantraniliprole (28)	3	67%
Steward	indoxacarb (22A)	2	50%
Dimethoate	dimethoate (1B)	2	0%
Lannate	methomyl (1A)	11	1%
Intrepid 2F	methoxyfenozide (18)	2	0%

Source: Data obtained from Arthropod Management Tests focused on insecticide efficacy against the three-cornered alfalfa hopper.

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