BIOASSAYS TO EVALUATE RESISTANCE OF TOBACCO THRIPS TO INSECTICIDES

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Abstract

Foliar-applied insecticide treatments may be necessary to control thrips in cotton under severe infestations or when at-planting insecticide seed treatments do not provide satisfactory protection. Acephate has been the most commonly used foliar insecticide for many decades, but its performance in field trials has recently declined in Tennessee. Thus, the objective of this research was to assay the efficacy of selected insecticides on tobacco thrips (*Frankliniella fusca* (Hinds)) populations across the Mid-South and Southeast cotton production regions. In 2020 and 2021, leaf-dip bioassays were done on populations of tobacco thrips collected from wild hosts or cotton in Tennessee, Arkansas, Mississippi, Louisiana, Texas, Alabama, North Carolina, and Virginia. Bioassays were also performed on a North Carolina susceptible laboratory population that has been kept in a colony since 2013. Insecticides used in the leaf-dip bioassays included acephate, spinetoram, dicrotophos, lambda-cyhalothrin, and imidacloprid. Dose-response curves for acephate were completed on a tobacco thrips population from Tennessee that was collected from wild host plants and the North Carolina laboratory population. The LC_{50} (LB/A) for the Tennessee and North Carolina laboratory populations were 0.723 and 0.032, respectively. The results suggest that tobacco thrips have developed resistance to acephate; however, this resistance seems to be concentrated in areas of the upper Mid-South (Table 1 and 2). Further investigation is needed to identify the mechanism of thrips resistance to acephate. We thank the many collaborators who contributed this this effort.

Table 1. Discriminating dose bioassays done in 2020.

Population	Radiant 0.75 Oz/A[1]	Orthene 97 0.25 LB/A[2]	Bidrin 2 Oz/A[3]	Admire Pro 1.25 Oz/A[4]	Warrior 1.0 Oz/A[5]
NC Lab	100	92a	92	99a	99a
NC Fountain	-	96a	-	-	
NC LaGrange	100	92a	90	81ab	3c
NC Seaboard	100	89a	92	93a	49b
LA St. Joseph	-	89a	-	-	-
AL Tallassee	-	88a	-	-	-
MS Stoneville	-	79ab	92	60b	37b
MS Starkville	-	76ab	-	-	-
AR Tillar	-	68ab	-	-	-
AR Marianna	-	45b	-	-	-
P>F	-	<.0001	0.9908	0.0074	<.0001

Means within a column followed by a common letter are not significantly different. (Tukey's 0.05).
[1]Radiant (Dow AgroSciences LLC (Indianapolis, IN)) applied at listed rate contains 0.07 g AI L^{-1}
[2]Orthene 97 (AMVAC (Los Angeles, CA)) applied at listed rate contains 2.92 g AI L^{-1}
[3]Bidrin (AMVAC (Los Angeles, CA)) applied at listed rate contains 1.5 g AI L^{-1}
[4]Admire Pro (Bayer CropScience LP (Research Triangle Park, NC) applied at listed rate contains 0.54 g AI L^{-1}
[5]Warrior II (Syngenta Crop Protection LLC (Greensboro, NC)) applied at listed rate contains 0.20 g AI L^{-1}

Table 2. Discriminating dose bioassays done in 2021.

Population	Radiant 0.75 Oz/A[1]	Orthene 97 0.25 LB/A[2]	Bidrin 2 Oz/A[3]	Admire Pro 1.25 Oz/A[4]	Warrior 1.0 Oz/A[5]
NC Lab	-	91ab	-	94a	78a
NC Plymouth	100	94a	-	-	4c
NC Nash	-	93ab	-	-	-
TX Snook	100	93ab	-	-	50b
VA Suffolk	100	82ab	83a	57b	5c
MS Stoneville	100	79ab	-	-	
TN Milan	100	67bc	64ab	43bc	2c
TN Jackson-1	100	51c	48b	27c	0c
TN Jackson-2	100	47c	74ab	43bc	3c
TN Milan Wild-1	100	46c	-	-	-
TN Milan Wild-2	-	-	-	35bc	0c
AR Marianna	100	46c	-	-	-
P>F	-	<.0001	0.011	<.0001	<.0001

Means within a column followed by a common letter are not significantly different. (Tukey's 0.05).
[1]Radiant (Dow AgroSciences LLC (Indianapolis, IN)) applied at listed rate contains 0.07 g AI L^{-1}
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