

EVALUATION OF INSECTICIDES FOR THRIPS AND TARNISHED PLANT BUG MANAGEMENT ON COTTON IN MISSISSIPPI 2001

Jack T. Reed¹, D. Bao¹, and C. S. Jackson¹

¹ Department of Entomology & Plant Pathology; Mississippi State University; Mississippi State, MS 39762

ABSTRACT: The purpose of this trial was to evaluate insecticides for control of thrips and tarnished plant bugs on cotton. Tests were planted at the Plant Science North Farm at Mississippi State University. Insecticides were applied by spray tractor on 5/29/01 for thrips, and on 7/17/01 for the plant bug portion of the trial. Insecticide treatments and respective rates (lb ai/acre except DR-A-034) were: Karate Z 2.08 EC, 0.03 lb; Asana XL 0.66 EC, 0.036 lb; Baythroid 2 EC, 0.033 lb; Capture 2 EC, 0.06 lb; Decis 1.5 EC, 0.023 lb; Fury 1.5 EC, 0.045 lb; Bidrin 8 EC, 0.4 lb. Orthene 75 SP, 0.3 lb; MP 4 EC, 0.4 lb; Karate Z 2.08 CS, 0.03 lb + Centric 40 WG, 0.047 lb; Leverage 2.7 SE, 0.063 lb; and DR-A-034 5EC, 2 gal/100 gal.

Thrips populations were low and no significant crop related effects from thrips occurred. Methyl parathion and DR-A-034, an experimental product, were ineffective for thrips control. Other compounds were similarly effective, however by 6/4/01, the Orthene treatment was statistically equal to the Water check.

For the tarnished plant bug portion of the trial, tarnished plant bugs were reared on artificial diet from bugs collected in the spring from wild hosts and caged in cloth sleeve cages after plots were sprayed and the spray had dried. Bugs were also caged on leaf disks cut 3 days after spraying to estimate residual insecticide activity. Results indicate that all compounds provided 80% or greater control except Bidrin (76.2 %) of plant bugs in the cage trial, and that DR-A-034 was essentially the same as the water-treated check. Karate Z had 100 % mortality in the leaf-disk residual activity test. Other compounds ranged from 50 to 87% mortality except methyl parathion, Orthene, and DR-A-034. These compounds resulted in less than 31% mortality in the leaf-disk bioassay.

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MATERIALS AND METHODS: The statistical design was randomized complete block with 4 replicates. Cotton, variety ST 4892 BR untreated, was planted at the Plant Science North Farm at Mississippi State University on 5/03/01 at a seed rate of 3 per ft. Plots were four rows wide and 50 ft (15.2 m) long, arranged with four rows of untreated cotton between plots and a planted 10 foot buffer at the end of each plot. Insecticides for control of thrips were applied on 5/29/01 with a high-clearance plot spray tractor with nozzles (Spray Systems, Tx4, hollow cone) spaced for a 38-in (96.5 cm) row spacing at 19-in (48.3 cm) centers with one nozzle directly over the row and one directly between rows. The carrier was water, and the volumetric application rate was 10 gallons (37.8L) per acre. Wind speed, temperature and relative humidity at time of application was 0 to 2 mph, 84^oF and 41.2%, respectively. After 48hr, five plants from each plot were cut and transferred into a plastic bag for transport to the lab. The samples were then washed in a Clorox-detergent solution to remove the thrips from the plants. Thrips and other arthropods were transferred onto a filter paper for identification and counting by use of a dissection microscope.

An additional spray targeting tarnished plant bugs was applied on 7/17/01. Wind speed, temperature and relative humidity at second application was 0 to 1.3 mph, 86^oF and 49.7%, respectively. Cloth sleeves, two per plot, were used to enclose the upper portions of treated plants and thus cage tarnished plant bugs on the plants. The sleeves were placed over the plants, secured with elastic fasteners, gathered at the point of fastening, and completely covered with aluminum foil before spraying. After the spray application was dry, the aluminum foil was removed. Then each sleeve was extended, 10 tarnished plant bugs were placed inside, and the upper end was closed with an elastic fastener or string. These plants were cut after 48 hours and searched for survivors. Plant bugs used in sleeve cages were supplied by Gast Rearing laboratory when they were third instar and were offspring of field collected adults. Additionally, the test for the residual activity of the compounds was made by taking leaf discs (100mm) from leaves that were sprayed (ie. near the top of the plant), and caging 5 third instar nymphs per petri dish, with 10 nymphs per plot (40 per treatment). Yield was estimated by mechanically harvesting the center two rows of each plot and converting the yield to pounds of seed cotton per acre.

RESULTS AND DISCUSSION: The average number of immature thrips on plants in the water-treatment were 8.9 thrips per five plants for the sampling period of the study. Most insecticide treatments reduced thrips numbers below threshold through 6/01/01 except DR-A-034. This compound is supposed to have little residual. Immature thrips numbers in DR-A-034, Methyl Parathion, and Orthene had the highest number of thrips on 6/04/01 and did not differ from the untreated plots. The field cage trial resulted in a very high percent mortality of 3rd instar plant bugs in most plots as compared with untreated plots and all compounds. Under the conditions of this test over a 48 hour period, all treatments provided more than 85 percent mortality of tarnished plant bugs except DR-A-034 (16% mortality) and Bidrin (76.2% mortality). The untreated plots were significantly different from other treated plots. Although populations of plant bugs in the field were low, sweep net samples were made and the main beneficials in this trial were lady beetles. The results of DR-A-34 on third instar tarnished plant bug nymphs placed on leaf discs indicated no control. Pyrethroids resulted in 50-100% mortality of nymphs caged for 48h, and organophosphates resulted in 17-75% mortality. The organophosphate standard, Bidrin, resulted in 76% mortality. Thus pyrethroids indicated good residual for nymphal plant bug control for at least five days after treatment in this trial. There were no differences in yield between treatments, however most insecticide treatments yielded numerically higher yields than the untreated plots. Results from the trial are presented in Tables 1 to 6.

Table 1. Mean of insects per five plants, MSU location, June 1, 2001.

Treatment	Rate	Immature thrips	Tobacco thrips	Flower thrips	Western Flower thrips	Soybean thrips
Karate Z 2.08 EC	0.03 lb ai/ac	1.3 b	0.0 e	0.0 a	0.0 a	0.0 a
Asana XL 0.66 EC	0.036 lb ai/ac	1.5 b	0.0 e	0.0 a	0.0 a	0.0 a
Baythroid 2 EC	0.033 lb ai/ac	0.3 b	0.0 e	0.0 a	0.0 a	0.0 a
Capture 2 EC	0.06 lb ai/ac	0.5 b	0.0 e	0.0 a	0.0 a	0.0 a
Decis 1.5 EC	0.023 lb ai/ac	1.0 b	0.0 e	0.0 a	0.0 a	0.0 a
Fury 1.5 EC	0.045 lb ai/ac	0.8 b	0.0 e	0.3 a	0.0 a	0.0 a
Bidrin 8 EC	0.4 lb ai/ac	3.3 b	1.5 cd	0.5 a	0.0 a	0.0 a
Orthene 75 SP	0.3 lb ai/ac	1.0 b	0.5 de	0.3 a	0.0 a	0.0 a
MP 4 EC	0.4 lb ai/ac	7.0 a	2.0 bc	0.0 a	0.0 a	0.0 a
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac 0.047 lb ai/ac	0.0 b	0.0 e	0.0 a	0.0 a	0.0 a
Leverage 2.7 SE	0.063 lb ai/ac	0.5 b	0.0 e	0.0 a	0.0 a	0.0 a
DR-A-034 5 EC	2 gal/100 gal	6.8 a	3.0 ab	0.0 a	0.0 a	0.0 a
Water		8.0 a	3.5 a	0.5 a	0.0 a	0.0 a
LSD (P=.05)		3.45	1.08	0.55	0.00	0.00
Treatment Prob(F)		0.0001	0.0001	0.4439	1.0000	1.0000

Means within a column not sharing a common letter differ significantly (P=.05, LSD).

Table 2. Mean of insects per five plants, MSU location, June 4, 2001

Treatment	Rate	Immature thrips	Tobacco thrips	Flower thrips	Western Flower thrips	Soybean thrips
Karate Z 2.08 EC	0.03 lb ai/ac	1.5 c	1.0 cd	0.0 a	0.0 a	0.0 a
Asana XL 0.66 EC	0.036 lb ai/ac	2.0 c	0.5 d	0.3 a	0.3 a	0.3 a
Baythroid 2 EC	0.033 lb ai/ac	1.0 c	1.7 cd	0.0 a	0.0 a	0.0 a
Capture 2 EC	0.06 lb ai/ac	1.8 c	3.3 bc	0.0 a	0.0 a	0.0 a
Decis 1.5 EC	0.023 lb ai/ac	1.8 c	3.0 bcd	0.0 a	0.3 a	0.0 a
Fury 1.5 EC	0.045 lb ai/ac	1.8 c	2.3 cd	0.0 a	0.0 a	0.0 a
Bidrin 8 EC	0.4 lb ai/ac	4.0 c	2.0 cd	0.3 a	0.0 a	0.5 a
Orthene 75 SP	0.3 lb ai/ac	5.8 bc	0.5 d	0.3 a	0.3 a	0.3 a
MP 4 EC	0.4 lb ai/ac	12.0 ab	6.8 a	0.3 a	0.3 a	0.5 a
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac 0.047 lb ai/ac	0.0 c	1.3 cd	0.0 a	0.0 a	0.0 a
Leverage 2.7 SE	0.063 lb ai/ac	0.8 c	1.0 cd	0.3 a	0.0 a	0.0 a
DR-A-034 5 EC	2 gal/100 gal	14.5 a	5.0 ab	0.3 a	0.0 a	0.0 a
Water		10.8 ab	5.3 ab	0.0 a	0.3 a	0.0 a
LSD (P=.05)		6.45	2.75	0.51	0.44	0.45
Treatment Prob(F)		0.0002	0.0003	0.8785	0.7455	0.1563

Means within a column not sharing a common letter differ significantly (P=.05, LSD).

Table 3. Mean of insects per five plants, MSU location, June 8, 2001.

Treatment	Rate	Immature thrips	Tobacco thrips	Flower thrips	Western Flower thrips	Soybean thrips
Karate Z 2.08 EC	0.03 lb ai/ac	0.3 b	0.5 b	0.0 a	0.0 a	0.0 a
Asana XL 0.66 EC	0.036 lb ai/ac	1.0 b	0.3 b	0.0 a	0.0 a	0.0 a
Baythroid 2 EC	0.033 lb ai/ac	0.3 b	0.3 b	0.0 a	0.0 a	0.0 a
Capture 2 EC	0.06 lb ai/ac	0.3 b	0.0 b	0.0 a	0.3 a	0.0 a
Decis 1.5 EC	0.023 lb ai/ac	1.3 b	0.3 b	0.0 a	0.0 a	0.0 a
Fury 1.5 EC	0.045 lb ai/ac	1.8 b	0.0 b	0.0 a	0.0 a	0.0 a
Bidrin 8 EC	0.4 lb ai/ac	1.8 b	0.3 b	0.3 a	0.0 a	0.0 a
Orthene 75 SP	0.3 lb ai/ac	1.8 b	0.0 b	0.0 a	0.0 a	0.0 a
MP 4 EC	0.4 lb ai/ac	2.8 b	0.0 b	0.0 a	0.0 a	0.3 a
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac 0.047 lb ai/ac	1.3 b	0.8 b	0.0 a	0.0 a	0.0 a
Leverage 2.7 SE	0.063 lb ai/ac	0.3 b	2.3 a	0.0 a	0.0 a	1.3 a
DR-A-034 5 EC	2 gal/100 gal	2.8 b	0.8 b	0.3 a	0.0 a	0.3 a
Water		7.8 a	0.3 b	0.0 a	0.0 a	0.0 a
LSD (P=.05)		2.54	1.44	0.28	0.20	1.02
Treatment Prob(F)		0.0001	0.1843	0.5629	0.4685	0.5114

Means within a column not sharing a common letter differ significantly (P=.05, LSD).

Table 4. Mean Number of insects per 25 sweeps, MSU location, July 11, 2001.

Treatment	Rate	Tarnished Plant Bug Nymphs	Tarnished Plant Bug Adults	Lady Beetles	Bigeyed Bugs
Karate Z 2.08 EC	0.03 lb ai/ac	0.0 a	0.8 a	3.5 a	0.5 a
Asana XL 0.66 EC	0.036 lb ai/ac	0.0 a	0.5 a	3.8 a	0.5 a
Baythroid 2 EC	0.033 lb ai/ac	0.0 a	0.8 a	2.8 a	0.0 a
Capture 2 EC	0.06 lb ai/ac	0.0 a	0.5 a	0.5 a	0.3 a
Decis 1.5 EC	0.023 lb ai/ac	0.0 a	0.5 a	3.0 a	0.3 a
Fury 1.5 EC	0.045 lb ai/ac	0.0 a	0.3 a	3.3 a	0.5 a
Bidrin 8 EC	0.4 lb ai/ac	0.0 a	0.3 a	2.0 a	0.5 a
Orthene 75 SP	0.3 lb ai/ac	0.0 a	0.0 a	3.3 a	0.3 a
MP 4 EC	0.4 lb ai/ac	0.5 a	0.3 a	1.3 a	0.3 a
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac 0.047 lb ai/ac	0.0 a	0.5 a	2.3 a	0.3 a
Leverage 2.7 SE	0.063 lb ai/ac	0.0 a	0.0 a	1.3 a	0.0 a
DR-A-034 5 EC	2 gal/100 gal	0.0 a	0.5 a	3.8 a	0.3 a
Water		0.0 a	0.5 a	2.0 a	0.3 a
LSD (P=.05)		0.40	1.05	2.36	0.86
Treatment Prob(F)		0.4685	0.9413	0.1278	0.9790

Means within a column not sharing a common letter differ significantly (P=.05, LSD).

Table 5. Mean Number of insects per 25 sweeps, MSU location, July 20, 2001.

Treatment	Rate	Tarnished Plant Bug Nymph	Tarnished Plant Bug Adult	Lady Beetle	Bigeyed Bugs
Karate Z 2.08 EC	0.03 lb ai/ac	0.0 a	0.0 a	1.0 cd	0.0 a
Asana XL 0.66 EC	0.036 lb ai/ac	0.0 a	0.0 a	2.3 abc	0.0 a
Baythroid 2 EC	0.033 lb ai/ac	0.0 a	0.0 a	1.5 cd	0.0 a
Capture 2 EC	0.06 lb ai/ac	0.0 a	0.0 a	1.5 cd	0.0 a
Decis 1.5 EC	0.023 lb ai/ac	0.0 a	0.0 a	0.5 d	0.0 a
Fury 1.5 EC	0.045 lb ai/ac	0.0 a	0.0 a	0.8 cd	0.0 a
Bidrin 8 EC	0.4 lb ai/ac	0.0 a	0.0 a	1.8 bcd	0.0 a
Orthene 75 SP	0.3 lb ai/ac	0.0 a	0.3 a	3.5 a	0.0 a
MP 4 EC	0.4 lb ai/ac	0.0 a	0.0 a	2.3 abc	0.0 a
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac	0.0 a	0.0 a	1.5 cd	0.0 a
Leverage 2.7 SE	0.047 lb ai/ac	0.0 a	0.3 a	0.5 d	0.0 a
DR-A-034 5 EC	0.063 lb ai/ac	0.0 a	0.0 a	2.3 abc	0.0 a
Water	2 gal/100 gal	0.0 a	0.0 a	3.3 ab	0.0 a
LSD (P=.05)		0.00	0.28	1.68	0.00
Treatment Prob(F)		1.0000	0.5629	0.0118	1.0000

Means within a column not sharing a common letter differ significantly (P=.05, LSD).

Table 6. Result of Plant Bug Cage Trial and Leaf-disk Bioassay, MSU Location.

Treatment	Rate	Percent mortality cage trial	Mean number of moribund bugs leaf-disk bioassay	Percent Mortality ¹ Leaf-disk bioassay
		Jul-19-01	Jul-22-01	Jul-22-01
Karate Z 2.08 EC	0.03 lb ai/ac	91.8 a	18.1 bc	100.0 a
Asana XL 0.66 EC	0.036 lb ai/ac	84.5 a	19.5 bc	70.7 abc
Baythroid 2 EC	0.033 lb ai/ac	85.7 a	14.0 bc	50.3 bcd
Capture 2 EC	0.06 lb ai/ac	96.8 a	7.4 c	50.3 bcd
Decis 1.5 EC	0.023 lb ai/ac	88.0 a	7.0 c	50.0 bcd
Fury 1.5 EC	0.045 lb ai/ac	89.4 a	17.0 bc	86.6 ab
Bidrin 8 EC	0.4 lb ai/ac	76.2 ab	3.1 c	75.9 ab
Orthene 75 SP	0.3 lb ai/ac	89.2 a	0.0 c	30.0 cd
MP 4 EC	0.4 lb ai/ac	98.4 a	3.2 c	17.0 d
Karate Z 2.08 CS + Centric 40 WG	0.03 lb ai/ac	88.8 ab	4.0 a	83.3 ab
Leverage 2.7 SE	0.047 lb ai/ac	83.5 a	30.0 ab	80.0 ab
DR-A-034 5 EC	0.063 lb ai/ac	16.9 c	0.0 c	20.0 d
Water	2 gal/100 gal	56.8 b	0.0 c	26.6 d
LSD (P=.05)		27.253	18.1 bc	41.164
Treatment Prob(F)		0.001	0.0086	0.0023

Means within a column and date not sharing a common letter differ significantly (P=.05, LSD).

¹Includes moribund and dead individuals.