Insecticide Tests for Control of the Tobacco Flea Beetle

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Table 1. Effectiveness of insecticides applied in the plantbed

Insecticide[a]	Feeding Punctures on Most Damaged Leaf 14 days[b]
1962	
Bayer 37344, 50% WP, 2 lbs.	15a
DDT 50% WP, 2 lbs.	17ab
Anti-resistant DDT, 50% WP, 2 lbs.	21ab
Carbaryl 50% WP, 2 lbs.	23ab
Zectran 25% WP, 2 lbs.	25b
GC-1283, 50% WP, 2 lbs.	56c
Check	103d
1963	
Bayer 37344, 50% WP, 2 lbs.	33a
DDT 50% WP, 2 lbs.	53b
MCA-600, 50% WP, 2 lbs.	62b
Carbaryl 50% WP	87c
Niagara 9203, 25% WP, 4 lbs.	92c
Niagara 9203, 25% WP, 2 lbs.	107c
Check	194d
1964	
Bayer 37344, 50% WP, 2 lbs.	28a
Bayer 37344, 5% D	29a
DDT 50% WP, 2 lbs.	34a
MCA-600, 50% WP, 2 lbs.	41b
SD-8447, 75% WP, 1½ lbs.	50c
Check	227d

[a] *Sprays: Added to 100 gallons of water and applied at the rate of 5 gallons per 100 square yards of plantbed area.*
Dust: 1½ pounds per 100 square yards.
[b] *Means followed by the same common letter are not significantly different at the 5% level by Duncan's multiple range test.*

Introduction

For many years the tobacco flea beetle, *Epitrix hirtipennis* (Melsheimer), has been a major problem on newly-set and field tobacco in Virginia. The insect is not always the most important pest in a given year; however, it is one of the most difficult for the grower to control.

The tobacco flea beetle damages newly-set tobacco in two ways: (1) the overwintered adults feed on the foliage, and (2) the developing larvae feed on the roots and stems. Damage is accelerated when there is a rainfall deficiency, particularly on heavy soils, and a combination of feeding by the adults and larvae may severely retard the growth of the plant. DDT has been employed in controlling flea beetles on newly-set tobacco since 1947, and it is the only insecticide recommended for use in the plantbed as a preplanting treatment. Since resistance to this insecticide might be forthcoming, studies have been continued in an effort to find an effective material which is chemically different from the chlorinated hydrocarbons. Such an insecticide should be one with low mammalian toxicity and it should provide long residual protection.

During late July and early August the second brood may severely damage the maturing leaves of field tobacco. The beetles move up the plant as harvesting of the leaves progresses; however, the most extensive damage occurs on the leaves from

the lower third of the plant. Dominick (1) reported difficulties in control of flea beetles with foliar applications of endrin, but obtained effective control with Guthion® (0,0-dimethyl S-(4-oxo-1,2,3-benzotriazin-3 (4H)-ylmethyl) phosphoro-dithioate), carbaryl and Zectran® (4-dimethylamino-3,5-xylyl methylcarbamate).

Table 2. Effectiveness of a single, timed application of various insecticides in reducing the population of second brood tobacco flea beetles on tobacco.

Insecticide Lbs. Active / Acre	Pre-treatment	Tobacco Flea Beetles per Plant[a] Days After Treatment 1	5	10	14
		1962			
Bayer 37344 WP, 1.0	46.5	0.3a	0.3a	1.0a	
Ethyl Guthion EC, 0.5	48.5	0.6a	0.7a	4.2a	
UC-8305 EC, 1.0	41.0	0.4a	10.8b	27.4b	
Endrin EC, 0.3	40.1	13.8b	26.2c	33.7c	
Check	45.2	46.0c	53.9d	43.7d	
		1963			
Bayer 37344 WP, 1.0	20.1	0.0a	0.2a	0.7a	3.7a
MCA-600 WP, 1.0	25.4	0.2a	0.4a	1.0ab	5.0ab
Bayer 37289 EC, 1.0	24.5	0.4a	2.6a	4.8ab	4.6a
Zectran EC, 0.75	24.8	0.1a	1.6a	6.6b	8.8b
Niagara 9203 WP, 0.5	30.0	2.1b	10.0b	25.8c	32.6c
Endrin EC, 0.3	26.0	9.2c	32.2c	49.1d	44.8d
Check	25.9	29.5d	56.5d	52.2d	55.9e
		1964			
Bayer 37344 WP, 1.0 + Diazinon EC, 0.5	18.7	0.0	0.3a	2.9a	
MCA-600 WP, 1.25 + Diazinon EC, 0.5	19.1	0.0	0.5a	3.1a	
Zectran EC, 0.75 + Diazinon EC, 0.5	17.9	0.0	0.5a	3.5a	
SD-8447 WP, 1.0 + Diazinon EC, 0.5	19.2	0.0	1.0a	5.4b	
Bayer 44646 WP, 1.0 + Diazinon EC, 0.5	18.7	0.0	1.9b	7.5c	
Diazinon EC, 1.0	21.3	0.1	6.9c	16.3d	
Check	20.7	22.1	19.7d	25.3e	

[a]*Means followed by the same common letter are not significantly different at the 5% level by Duncan's multiple range test.*

Methods and Materials

The test plots were four rows wide and 47 feet long. Treatments were replicated four times in complete randomized blocks, and there was an untreated row between plots. There were border rows on either side of the test field and six-foot alleyways separated replicates.

The insecticides for control of the tobacco flea beetle on newly-set tobacco were used in the plantbed prior to pulling the plants for transplanting to the field. Single nozzle, three-gallon sprayers were used in the application of the sprays, and the diluted insecticides were used at the rate of 5 gallons per 100 square yards of plantbed area. The dust was applied with a rotary, hand-operated duster at the rate of 1½ pounds of the formulation per 100 square yards. The efficiency of the insecticides was evaluated after 14 days by removing the most damaged leaf from each of 6 random plants selected from the two center rows of each plot and counting the feeding punctures.

In the tests for control of second brood beetles on large tobacco plants, the sprays were applied around August 1 of each year at a dosage of 25 gallous per acre. A 3-gallon, low-pressure sprayer equipped with a boom having three nozzles at 18-inch intervals was used. Mechanical spraying was simulated as the operator held the boom in a vertical position and walked along each side of the row at a set pace. This equipment gave excellent coverage from the ground to the top of the plant and there was little drift. The insecticide treatments were evaluated by making a pretreatment count and three or four post-treatment counts of flea beetles at intervals following the application.

The chemical names of proprietary materials, not having accepted common names, which were used in the tests are:

- Bayer 37344 (4-methylthio)-3,5-xylyl methylcarbamate)
- Bayer 44646 (4-dimethylamino-m-tolyl methylcarbamate)
- Bayer 37289 (0-ethyl 0-2,4,5-trichlorophenyl ethylphosphonothioate)
- Ethyl Guthion® (0,0-dimethyl S-4-oxo-1,2,3-benzotriazin-3-(4H)-ylmethyl phosphorodithiate)
- GC-1283 (dodecachlooctahydro-1,3,4-metheno-2H-cyclobuta (c.d.) pentalene)
- MCA-600 (4-benzothienyl-N-methylcarbamate)
- Niagara 9203 (0,0-dimethyl S-(2-oxo-3-benzoxazolinyl) methyl) phosphorothioate)
- SD-8447 (2-chlo-1-(2,4,5-trichlorophenyl) vinyl dimethyl ester)
- UC-8305 (P-chloro-2,4-dioxa-5 methyl-P-thiono-s-phosphabicyclo (4.4.0) decane)
- Zectran® (4-dimethylamino-3,5-xylyl methylcarbamate)

Also, the following insecticides were evaluated: anti-resistant DDT,[1] carbaryl, DDT, diazinon and endrin.

Newly-set Tobacco

Data from experiments conducted in 1962, 1963 and 1964 are presented in **Table 1.** Bayer 37344 applied as

[1]*Containing 50% DDT and 10% N, N-di-n-butal-p-chlorobenesulfinamide.*

a preplanting spray or dust in the plantbed proved equal to, or better than, DDT in preventing damage to newly-set tobacco. Anti-resistant DDT and DDT gave similar control. In 1963 under conditions of high infestation pressure, carbaryl was less effective than Bayer 37344 or MCA-600. GC-1283, Niagara 9203 and SD-8447 were all less effective than the other materials, but gave control superior to the check. At the dosage used, SD-8447 was the only insecticide which produced evidence of phytotoxicity.

Large Tobacco

Table 2 shows initial and residual flea beetle control on large tobacco plants following the use of a single timed application of various insecicides. Bayer 37344 and Ethyl Guthion were the most effective of the materials tested in 1962. UC-8305 gave excellent initial control, but a heavy population increase was recorded in the counts taken 10 days following treatment. Endrin gave poor control, although the results were superior to the check.

The tests in 1963 were conducted under ideal weather conditions inasmuch as no rain occurred during the course of the experiment. Under these conditions, Bayer 37344, MCA-600 and Bayer 37289 all provided excellent control for a period of 14 days. Even though the amount of toxicant was reduced, Zectran gave effective initial control; however, the population was slightly greater 10 and 14 days later than the above named insecticides. Niagara 9203 gave satisfactory initial control, but a heavy buildup of the insect occurred during the progress of the test. A high population of beetles developed in the endrin-treated plots.

In 1964 the green peach aphid, *Myzus persicae* (Sulzer), increased to damaging numbers in the test plots and diazinon was combined with non-diazinon insecticide treatments. Under the conditions of reduced flea beetle pressure, Bayer 37344, MCA-600 and Zectran plus diazinon all gave similar results; however, SD-8447 and Bayer 44646 plus diazinon were less effective. Diazinon at the 1.0 pound dosage gave good initial control but showed poor residual activity.

SD-8447 was responsible for moderate malformation of the immature leaves. None of the other insecticides exhibited any phytotoxic effects.

Literature Cited

1. Dominick, C. B. Tests with insecticides applied to the soil and foliage for tobacco flea beetle control *J. Econ. Entomol.* 55: 874-876. 1962.