Tests with Insecticides for Control of the Green Peach Aphid on Flue-cured Tobacco

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The green peach aphid, *Myzus persicae* (Sulzer), has increased in importance as a pest of flue-cured tobacco in Virginia during recent years. Field observation indicated that the insect persisted and reproduced on tobacco under conditions of higher temperatures than had previously been observed (Dominick, unpublished). Damaging aphid infestations often occurred following the use of several early applications of some of the approved insecticides for control of foliage-feeding Lepidopters; however, multiple treatments are not recommended or generally needed. Large populations of aphids frequently result in severe damage to the leaves on the lower half of the plant.

The presence of large populations of aphids on mature tobacco plants tends to make control with conventional equipment difficult, and often most of the damage has occurred before control operations are undertaken. Thus, more effective measures for controlling the green peach aphid are needed. Studies have been continued on the employment of insecticides as foliar sprays before the insect has increased to damaging numbers, and on the use of systemic insecticides in the granulated form as preplanting soil treatments. The work herein reported was conducted at Chatham, Virginia from 1962 through 1965.

Method and Materials

The experimental tests were of the randomized block design and replicated 3 times. The susceptible variety of tobacco, Matthews 611, was employed in all experiments and plants were set at 22 in. in the row with rows 48 in. apart. The foliage spray plots were 42 ft. long by 3 rows wide and were located on either Mayodan or Cecil sandy loam soil. Plots were separated by an untreated row and there were border rows on either side of the test field. Studies by Dominick (1960) and Thurston (1965) indicated that the green peach aphid population on tobacco increased with repeated applications of carbaryl. To insure a more general infestation on all plants, the tobacco was sprayed in 1964 and 1965 with carbaryl, 3 times at weekly intervals beginning 4 weeks after transplanting. The first application was applied at 0.4 lb per acre and the 2 subsequent applications at 0.8 lb per acre.

The foliage spray treatments were applied before the tobacco plants had been topped and before the insect had increased to damaging numbers. The sprays were applied at 25 gal. per acre with a 3-gal., low-pressure sprayer equipped with a boom having 3 nozzles spaced at 18 in. intervals which directed the spray toward the side of the plant. Each side of the row was sprayed and mechanical spraying was simulated as the operator held the boom in a vertical position and walked along the row at a set pace. The insecticides were evaluated by making pre-treatment and post-treatment aphid counts at intervals on 6 plants at random from the center row of each plot. In 1964 and 1965 heavy reinfestation pressure occurred from the check and border rows, and a second application was made after 18 days, but aphid population counts were not taken. The check plots and border rows were sprayed with dimethoate at a dosage of 0.5 lb per acre 6 days later to prevent excessive damage to this tobacco.

In 1964 and 1965 the tobacco was harvested from the treated and untreated plots at intervals as the leaves matured, and they were tagged and kept separate during curing and sorting. The tobacco from each plot was graded by a U.S. Government grader and per acre values were calculated using the average market price for each grade. Since other tobacco insects were not present in significant numbers to cause economic damage, differences in yield and value, if any, were assumed to be due to damage resulting from the green peach aphid.

Pre-planting broadcast soil tests were conducted in 1964 and 1965. The plots were 6 rows wide and 24 ft. long and they were separated on all sides by an untreated area without tobacco 6 ft. wide. Granulated insecticides were applied on May 8 of each year at the rate of 2 to 3 lb. of the toxicant per acre. Materials were broadcast with a rotary duster and immediately disked into the upper 4 in. of the soil. Tobacco plants were set in mid-May and no foliage insecticides were used during the course of the season. Aphid population counts were made utilizing 6 marked plants from the two center rows of each plot at weekly intervals, beginning on June 17 and ending on July 31; however, only the 3 last

counts are shown in Table 2. Due to the large increase of the green peach aphid in some treatments, the population was rated according to a visual estimate of the aphids on 10 plants at random in each plot 12 weeks after they were transplanted.

Duncan's multiple range tests were employed to evaluate differences between treatment means.

The insecticides used in the tests were: diazinon, dimethoate, disulfoton, dimetilan, endosulfan, phorate, phosphamidon and oxydemeton-methyl. The chemical names of proprietary products used not having common names were:

Amer. Cyan. 47031, 2-(diethoxyphosphinylimino)-1,3-dithiolane

Amer. Cyan. 47470, 2-(diethoxyphosphinylimino)-4-methyl-1, 3-dithiolane

Gen. Chem. 6506, 0,0-dimethyl-0-(4-methylmercaptophenyl) phosphate

Niagara 10242, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate

Niagara 9203, 0,0-dimethyl S- (2-oxo-3-benzoxazolinyl) methyl phosphorothioate

Niagara 5767, 5-methoxy-2-(dimethoxyphosphinylthiomethyl) pyrone-4

Union Car. 21149, 2-methyl-2-(methylthio) propionaldehyde 0-(methylcarbamoyl) oxime

Union Car. 8305, P-chloro-2,4-dioxa-5-methyl-P-thiono-3-phosphabicyclo (4.4.0) decane.

Shell Dev. 9129, 3-hydroxy-N-methylcrotonamide dimethyl phosphate

Foliage Applications

In 1962 dimethoate, phosphamidon, Union Carbide 8305 and Niagara 5767 were used at 0.5 lb/acre, (Table 1). Under the conditions of a medium population of the green peach aphid, the insecticides gave excellent control and statistically were similar in effectiveness. Aphid populations remained at a low level after 7 days in all of the treated plots.

In the 1963 tests, Union Carbide 8305 and Niagara 9203 were compared with endosulfan, a recommended material for aphids on tobacco. The aphid populations after 2 and 7 days following treatment with Niagara 9203 were higher than in the plots treated with the other two materials, although these differences were not statistically significant.

Two systemics, oxydemetonmethyl and SD-9129, were compared with diazinon and endosulfan in the experiment conducted in 1964. After 9

Table 1. Control of the green peach aphid on flue-cured tobacco with insecticides applied to the foliage[a]

Insecticide	Toxicant/acre (lb)	No. green peach aphids/plant Pre-treatment	Days after treatment 2	7	9	Yield/acre (lb)	Value/acre[b] ($)
			1962				
Phosphamidon EC	0.5	513	1a	1a			
Dimethoate EC	0.5	212	1a	1a			
Union Carbide 8305 EC	0.5	235	1a	0a			
Niagara 5767 SP	0.5	130	4a	3a			
Check		127	180b	539b			
			1963				
Union Carbide 8305 EC	0.5	309	3a	7a			
Endosulfan EC	0.75	190	6a	10a			
Niagara 9203 WP	0.5	324	76a	136a			
Check		268	389b	1519b			
			1964				
Oxydemetonmethyl EC	0.5	680	0a		12a	1943a	1000a
SD-9129 EC	0.5	552	1a		31a	1631b	832ab
Diazinon EC	0.5	814	1a		55a	1694b	820ab
Endosulfan EC	0.75	467	7a		99a	1630b	810ab
Check		392	932b		4395b	1183c	491c
			1965				
Oxydemetonmethyl EC	0.5	343	0a	6a		1803a	1157a
Dimethoate EC	0.5	258	1a	3a		1695a	1114a
SD-9129 EC	0.5	189	0a	6a		1758a	1130a
Dimethoate EC	0.25	288	4a	11a		1710a	1114a
Diazinon EC	0.5	220	3a	27a		1695a	1100a
Check		226	319b	3362b		1250b	790b

[a] *Means followed by the same common letter are not significantly different at the 5% level.*
[b] *Average market price for each government grade.*

Table 2. The green peach aphid on flue-cured tobacco following soil treatment with systemic insecticides

Insecticide lb/acre (active)	Mean number of aphids/plant[a] Weeks after transplanting 8	9	10	Rating[b] 12
	1964			
Amer. Cyan. 47031, 2	7	4	2a	1
Disulfoton, 2	30	14	12a	1
Dimetilan, 2	24	35	51a	2
Phorate, 2	47	61	77a	2
Niagara 10242, 2	54	117	305b	4
Check	13	27	106a	3
	1965			
Amer. Cyan. 47031, 2	1	1	1a	1
Amer. Cyan. 47470, 2	1	0	1a	1
UC-21149, 3	1	3	2a	1
GC-6506, 2	19	60	36a	2
Niagara 10242, 2	10	91	266a	3
Check	22	46	50a	2

[a] *Means followed by the same common letter are not significantly different at the 5% level.*
[b] *Population rated according to: 1 = very light; 2 = light; 3 = moderate and 4 = heavy 12 weeks after transplanting.*

days the population increase was greater in plots in which the non-systemics were used, but statistically these materials were similar in effectiveness. The aphid population in the check plots increased to high numbers. The yield of the tobacco harvested from the oxydemetonmethyl plots was significantly greater than that harvested from the SD-9129, diazinon and endosulfan treated plots, although the value was not significantly different. The yield and value of tobacco harvested from the check plots were greatly reduced.

In the 1965 experiment, oxydemetonmethyl, SD-9129, dimethoate at two rates and diazinon gave excellent control. The aphid population after 7 days in the diazinon-treated plots was slightly greater than in those treated with the systemics, but differences were not significant. A heavy population of aphids developed in the check plots. Yield and value data collected from the insecticide treatments were statistically similar, but they were highly superior to the untreated check. None of the insecticides produced adverse phytotoxic effects at the dosages employed and under the conditions used.

Pre-planting Soil Treatments

The green peach aphid population in tobacco plots treated before planting with systemic insecticides is given in **Table 2.** The 1964 data indicate less population increase after 10 weeks in plots treated with Amer. Cyan. 47031 and disulfoton; but statistically they were similar to dimetilan, phorate and the untreated check. The visual rating 12 weeks after transplanting showed Amer. Cyan. 47031 and disulfoton to be the most effective of the materials tested. Dimetilan and phorate were next in order of effectiveness. A heavy damaging population of the green peach aphid developed in the Niagara 10242 plots and the insect was moderately abundant on the plants in the untreated check.

In 1965 the differences in the aphid population among the various treatments were not significant 10 weeks after transplanting; however, the population in the Niagara 10242 plots was substantially larger. According to the visual rating 12 weeks after transplanting there were very few aphids in plots treated with Amer. Cyan. 47031 and Amer. Cyan. 47470, and they were light in plots treated with UC-21149. Aphids were also light in the GC-6506 plots and the untreated check, but moderately abundant in those treated with Niagara 10242. None of the insecticides produced any evidence of phytotoxicity during either year.

Literature Cited

1. Dominick, C. B. Experiments for early-season control of the green peach aphid on tobacco. *J. Econ. Entomol.* 53: 1099-1101. 1960.
2. Thurston, Richard. Effects of insecticides on the green peach aphid, *Myzus persicae* (Sulzer), infesting burley tobacco. *J. Econ. Entomol.* 58: 1127-1130. 1965.