Research Note

CHEMICAL CONTROL OF LIRIOMYZA SATIVAE *AND OF LEPIDOPTERA LARVAE ON TOMATO*[1]

Vegetables are widely cultivated in Puerto Rico, especially on the southern coast. One of the most cultivated is tomato, with a production of 136,000 qq. for 1984-85, which represents 38% of the local consumption.[2] The production of better quality vegetables in Puerto Rico is being limited by a series of factors, among which are diseases and insect pests. The most common insects that affect the tomato plant are the leafminer, *Liriomyza sativae* Blanchard, and lepidopterous insects such as *Heliothis* spp., *Spodoptera* spp., *Pseudoplusia* spp., *Manduca sexta* (L.) and *Keiferia lycopersicella* (Walsingham). Therefore, the objective of the experiment reported here was to evaluate several pesticides for the control of these pests.

A field experiment was established (1982) at the Agricultural Research and Development Center of Fortuna, Juana Díaz, with tomato var. Tropic, to evaluate fenvalerate (Pydrin) at 0.32 and 0.64 pt/acre; permethrin (Ambush) at 0.4 and 0.8 pt/acre; acephate (Orthene) at 0.66 and 1.32 lb/acre; metamidophos (Monitor) at 1.0 and 2.0 pt/acre; chlorpyrifos (Lorsban) at 1.0 and 2.0 pt/acre; carbofuran (Furadan) at 20 and 40 lb/acre; and ethroprop (Mocap) at 20 and 40 lb/acre, in a complete randomized block design with 4 replications. The experimental block consisted of three 20-foot rows spaced 3 feet apart with 1.5 foot between plants within the rows. The plants were staked 2 weeks after transplanting. The plots were fertilized and irrigated as recommended for this crop in the area. The application of the insecticides began when there was a heavy infestation of *L. sativae* (20 to 30 mines per 10 leaves) and was continued weekly for 6 weeks. All the foliar treatments were applied with a knapsack sprayer. Soil was treated around each plant 1 month after planting and 2 weeks after that application (carbofuran) and preplanting (ethroprop). Leafminer infestations (number of mines/10 leaves/plot) and lepidopterous insects (number of larvae/plant/plot) were counted weekly. Tomatoes were harvested during the summer. All the fruits were counted and weighed, and sorted as commercial and non-commercial.

The results indicate that all the insecticides effectively controlled the leafminer (table 1). We obtained significant differences with fenvalerate at both rates and permethrin at 0.4 pt/acre. All the other treatments are statistically equal except acephate, with which there was the greatest number of mines. Results from previous years showed that permethrin effectively controlled the leafminer.[3] All the foliar treatments, except metamidophos at 2.0 pt/acre, effectively controlled *Pseudoplusia* spp. and *Manduca sexta*. The larvae of *Heliothis* spp. and *Spodoptera* spp. were present in very low numbers. All the plots treated with the insecticide-nematicides showed the greatest infestation of leafminer and lepidopterous insects (table 1). The yield of commercial tomatoes from plots treated with acephate at 0.66 lb/acre was significantly higher than that of the other treatments (table 1). The second best treat-

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[2]Medrano Vaquero, H. A., 1986. Situación económica de la Empresa de Hortalizas. Reunión Anual de las Empresas-Hortalizas, 13 de marzo de 1986, Juana Díaz.

[3]Acosta, N., C. Cruz and E. Abreu, 1984. Chemical control of nematodes and insects in tomato. *J. Agric. Univ. P. R.* 58 (1): 79-86.

TABLE 1.—*Evaluation of pesticides for the control of the vegetable leafminer,* Liriomyza sativae, *and of lepidopterous pests*[1] *on tomato var. Tropic*

Treatment/acre	Mines/ 10 leaves[2]	No. lepidoptera larvae/10 plants[2]	Yield/plot[2]	
			No. of fruits	Weight
				kg
Fenvalerate 2.4E/0.32 pt	0.8 b[3]	0 d[3]	268.25 bc	54.48 c[3]
Fenvalerate 2.4/0.64 pt	0 b[3]	0 d[3]	279.25 cd	39.50 b
Permethrin 2E/0.4 pt	2.0 b[3]	0 d[3]	320.75 cd	43.73 b
Permethrin 2E/0.8 pt	4.0 ab	0 d[3]	375.50 e	49.18 bc
Acephate 75S/0.66 lb	18.6 a	4.7 d[3]	487.25 f[3]	60.33 d[3]
Acephate 75S/1.32 lbs	11.4 ab	0.7 d[3]	417.00 ef	48.15 bc
Metamidophos 4E/1.0 pt	11.8 ab	1.7 d[3]	417.80 ef	42.35 b
Metamidophos 4E/2.0 pt	7.2 ab	10.0 cd[3]	346.00 de	44.80 bc
Chlorpyrifos 4EC/1.0 pt	10.0 ab	0 d[3]	349.00 e	43.03 b
Chlorpyrifos 4EC/2.0 pt	6.8 ab	0 d[3]	404.30 e	48.58 bc
Carbofuran 10G/20 lbs	14.2 ab	33.7 c	213.80 ab	28.85 a
Carbofuran 10G/40 lbs	10.4 ab	68.0 b	217.30 ab	26.63 a
Ethroprop 10G/20 lbs	9.8 ab	46.8 c	218.00 ab	20.18 a
Ethroprop 10G/40 lbs	15.4 ab	32.0 cd	198.50 ab	24.63 a
Check	3.2 ab	90.7 a	160.50 a	20.75 a

[1] *Manduca sexta* and *Pseudoplusia* spp.

[2] All values followed by the same letter/s do not differ significantly at p = 0.01 (Duncan Multiple Test).

[3] Significant at the 1% level.

ment was fenvalerate at the rate of 0.32 pt/acre. The other insecticides did not show a significant increase in yield. Plots treated with acephate at 0.66 lb/acre also produced the greatest number of commercial fruit. The lowest tomato yield was obtained in the plots treated with nematicides and the check. The foliar treatments showed a significant increase of yield in comparison with the check. The regression analysis and the *t*-test showed a significant value only where the lepidopterous insects were present. There is a direct relation between the number of larvae of lepidoptera present and yield, so the decrease in yield is attributed to the presence of these insects. The number of mines (mines/leaves/plot) vs. yield was not significant. That means that in this experiment there is no relation between the number of mines (mines/leaves/plot) in the field and yield. The erratic occurrence of the leafminer in Puerto Rico indicates that other factors, such as the stage of the plant and natural enemies, have to be considered before establishing economic thresholds and a correlation of mined leaves and yield loss.

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