

## Investigations on resistance of the green peach aphid (*Myzus persicae*) (Sulzer) against insecticides on tobacco growing areas in Aegean Region

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### Ö z e t

#### Ege Bölgesi tütün dikim alanlarında *Myzus persicae* (Sulzer)'nin insektisitlere karşı gösterdiği direnç üzerinde araştırmalar

Ege Bölgesi tütün dikim alanlarında bulunan yaprak bitlerinin, savaşında uzun zamandan beri kullanılmakta olan Ethyl (Folidol E. 605) ve Methyl (Folidol M. 35) parathion'lar ile Metamidophos (Tamaron 50 LC.) preparatlarına karşı direnç kazanıp kazanmadıklarını saptamak amacı ile 1973-1977 yılları arasında laboratuvarında direnç denemeleri açılmıştır. Aydın, Balıkesir, Çanakkale, Denizli, İzmir, Manisa, Muğla ve Uşak illerini temsil edebilecek şekilde toplanan örneklerle yürütülen denemelerde, yaprak bitlerinin adı geçen ilaçlara karşı belirli oranlarda direnç kazanmış oldukları saptanmıştır.

### Introduction

Tobacco is one of the most important industrial plant of our country. It is cultivated in an area of about 300.000 hectares every year and, more than 300.000 tons of tobacco is being produced (Anonymous, 1974). Generally, tobacco is cultivated in Aegean, Marmara, Black Sea Regions and in the southern and south eastern parts of Turkey in small family farms. Turkish tobacco which is cured outside under the sun, is known for its special smell, yellowish color, low nicotine content, softness and good taste.

Up to this time, there has not been any important problems in this field of tobacco growing. However, it can be said that there are some difficulties in the control of its pests. For example, the effectiveness of some organo-phosphorous insecticides used against the aphids were found to be less than

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before (Karman, 1965) \*. It is thought that the lessening of the effectiveness may be caused by the resistance of the aphids to the insecticide used for their control (Zümreoğlu, 1972)\*\*. For this reason, resistance trials were conducted in the laboratory with the specimens collected from Aegean Region.

### Material and methods

Ethyl (Folidol E. 605) and Methyl (Folidol M. 35) parathions have been using for a long time against the aphids in the region. Metamidophos (Tamaron 50 LC.) has also been using against this pest since three years as well as the others. For this reason, the experiments were carried out by using these three insecticides.

The laboratory trials were applied to the specimens those were collected from 2 or 5 villages of 8 towns in Aydın, 7 towns in Balıkesir, 2 towns in Çanakkale, 5 towns in Denizli, 16 towns in İzmir, 13 towns in Manisa, 3 towns in Muğla and 5 towns in Uşak in 1973-1977. The experiments were conducted in randomized block desing with 22 characters (8, 6 and 7 different concentrations for Ethyl, Methyl parathions and Metamidophos respectively + 1 control) and 3 replications by using deeping method. Sandovit 01 % was added to all of the solutions in order to spread the insecticides in low concentrations. In the tests Perspex tray were used (Fig. 1). There were thirty holes on the tray which were connected each other by cotton thread to get the leaves wet (Fig. 1 a). The ends of the cotton treads were put into the water. The clean tobacco leaves were out by their special cutter and they were dipped into these concentrations mentioned above. 15 wingless aphids were put on every treated leaf were placed in special rings on perspex tray (Fig. 1 b). Then the rings were closed (Fig. 1 c). After that, the tray were transferred to the culturing room kept at  $25 \pm 1^{\circ}\text{C}$  and 70 % humidity.

Alive aphids were counted 24 hours after the applications. Lethal doses ( $\text{LD}_{50}$ ) of the insecticides were calculated by using Probit analysis method (Düzgüneş ve Düzgüneş, 1958). The rates of resistance were found according to the resistance rate formula of Finney (1964). No susceptible strain of the aphids was found in the region. For this reason, the lowest lethal doses ( $\text{LD}_{50}$ ) obtained for each insecticides among the towns, were accepted as susceptible strains and these lowest lethal doses were used for comparison in order to find the rate of the resistance.

\* Karman, M., 1965. Türkiye'de aphid'lerin parathion'a karşı direnci. Bornova Bölge Zirai Mücadele Araştırma Enstitüsü (Unpublished).

\*\* Zümreoğlu, S., 1972. Ege Bölgesi tütün dikim alanlarında bitki bitine [*Myzus persicae* (Sulz.) ] karşı ilaç denemesi ve biyolojik aktivite kontrolü. Bornova Bölge Zirai Mücadele Araştırma Enstitüsü Proje E. 110.383. Çalışma raporu (Unpublished).

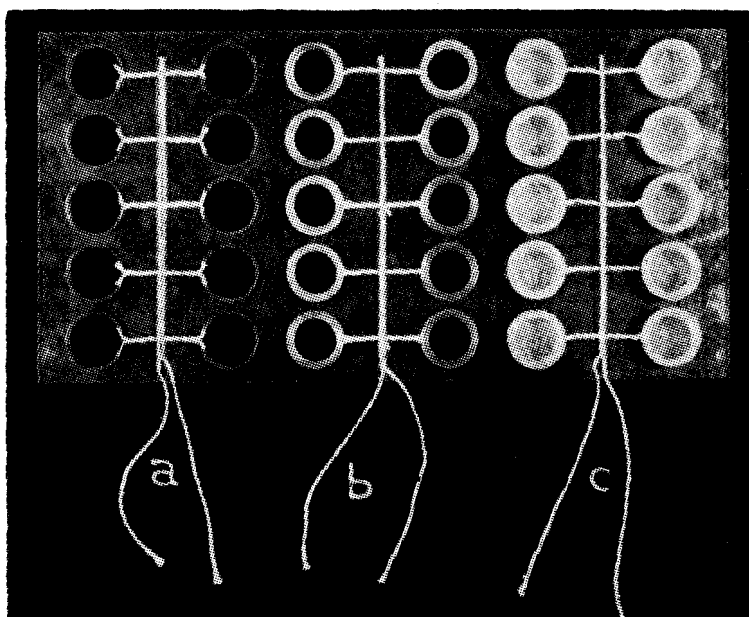


Fig. 1. General view of perspex tray

- a) holes and cotton treads, b) rings on the holes
- c) covered rings.

## Results and discussion

The results of the experiments are given in Table 1.

Table 1. The insecticides tested, their LD<sub>50</sub> and the rates of resistance on the specimens collected from various locations.

Locations		Ethyl parathion		Methyl parathion		Metamidophos	
Provinces	Towns	LD <sub>50</sub>	Resistance rates	LD <sub>50</sub>	Resistance rates	LD <sub>50</sub>	Resistance rates
Aydın	Bozdoğan	15.14	2.3	43.65	42.4	15.85	5.8
	Kuşadası	12.02	1.8	13.18	12.8	15.14	5.5
	Germencik	13.49	2.0	46.78	45.4	15.40	5.5
	Karacasu	6.60	—	21.38	2.1	26.30	9.6
	Söke	10.24	1.5	22.39	21.7	21.88	7.9
	Çine	12.59	1.9	34.68	33.7	12.88	4.7
	Merkez	13.80	2.1	36.31	35.2	7.96	2.9
	Kuyucak	29.52	4.5	33.22	32.2	28.19	10.2
Balıkesir	Savaştepe	16.60	2.5	17.38	16.9	8.32	2.3
	Erdek	12.88	1.9	93.32	90.6	2.75	—
	Sındırgı	12.88	1.9	15.85	15.4	4.57	1.7
	Bigadiç	11.75	1.8	302.00	293.2	9.12	3.3
	Gönen	11.50	1.7	47.87	46.5	8.91	9.2
	Merkez	89.22	13.51	100.00	97.1	9.12	3.3
	Manyas	13.81	2.1	46.78	45.4	12.02	4.4
Çanakkale	Yenice	9.33	1.4	64.56	62.7	12.59	4.6
	Çan	10.24	1.5	13.49	13.1	9.12	3.1
İzmir	Foça	39.81	6.0	1.3	—	26.91	9.8
	Bergama	47.87	7.2	46.78	45.4	23.99	8.7
	Ödemiş	23.44	3.5	95.50	92.7	10.71	3.9
	Tire	23.44	3.5	85.12	82.6	9.33	3.4
	Kemalpaşa	28.19	4.3	20.44	19.8	25.12	9.1
	Torbali	24.55	3.7	22.39	21.7	14.45	5.2
	Kiraz	21.38	3.2	29.52	28.7	24.09	8.3
	Çeşme	26.91	4.1	33.12	32.1	15.85	5.8
	Selçuk	31.62	4.8	58.89	57.2	21.38	7.8
	Seferihisar	33.88	5.1	4.57	4.4	29.52	10.7
	Bayındır	21.38	3.2	51.29	40.8	24.55	8.9
	Dikili	28.84	4.4	276.05	268.0	37.16	13.5
	Kınık	33.88	5.1	47.87	64.5	21.38	7.8
	Karaburun	24.55	3.7	66.07	64.1	20.91	7.6
	Urla	28.19	4.3	29.52	28.7	19.05	6.9
	Menemen	47.87	7.2	50.12	48.7	22.39	8.1

Table 1 (Continued)

Locations		Ethyl parathion		Methyl parathion		Metamidophos	
Provinces	Towns	LD <sub>50</sub>	Resistance rates	LD <sub>50</sub>	Resistance rates	LD <sub>50</sub>	Resistance rates
Manisa	Merkez	14.79	2.2	18.62	18.1	60.26	21.9
	Akhisar	100.00	1.5	17.79	17.3	5.25	1.9
	Kula	21.38	3.2	12.02	11.7	13.80	5.0
	Alaşehir	16.22	2.4	39.81	38.6	14.13	5.1
	Salihli	19.50	2.9	25.70	24.9	19.14	7.0
	Sarıgöl	14.13	2.1	67.62	65.6	19.50	7.1
	Selendi	10.47	1.6	6.17	6.0	15.14	5.5
	Kırkağaç	33.12	5.0	15.14	14.7	6.47	1.7
	Turgutlu	12.59	1.9	53.70	52.1	11.73	4.3
	Demirci	15.85	2.4	32.36	31.4	15.85	5.8
	Gördes	17.33	2.6	43.65	42.4	16.60	6.0
	Saruhanlı	18.20	2.7	75.88	73.7	7.59	2.8
Soma	56.24	8.5	13.18	12.8	9.12	3.3	
Denizli	Acıpayam	8.79	—	13.01	1.3	10.00	2.3
	Buldan	11.38	1.3	30.34	3.0	24.07	5.5
	Çal	13.13	1.5	155.90	15.6	12.99	3.0
	Kale	17.89	2.0	102.35	10.2	12.76	2.9
	Tavas	16.16	1.8	10.00	—	15.56	3.6
Muğla	Fethiye	16.61	1.9	113.19	11.3	10.00	2.0
	Merkez	16.02	1.8	61.39	6.1	10.00	2.3
	Milâs	9.29	1.0	69.59	6.9	9.03	2.1
Uşak	Eşme	12.66	1.4	124.51	12.4	16.34	3.8
	Karahallı	10.00	1.1	102.10	10.2	5.46	1.2
	Merkez	12.12	1.4	151.40	15.1	12.56	2.9
	Sivashi	11.43	1.3	108.00	10.8	9.16	2.1
	Ulubey	9.25	1.0	142.50	14.2	4.34	—

As shown in Table 1, the aphids in tobacco planting areas in Karacasu (Aydın), in Foça (Izmir) and in Erdek (Balıkesir) were found susceptible to Ethyl, Methyl parathions and Metamidophos respectively. The lethal doses (LD<sub>50</sub>) were calculated as 6.60 for Ethyl, 1.03 for Methyl and 2.75 for Metamidophos respectively. The places where the aphids have much resistance against the insecticides mentioned above were found as Center and Bigadiç towns of Balıkesir, Center town of Manisa. In these places the aphids showed 13.5, 293.2 and 21.9 times more resistance, as compared to the susceptible strain to Ethyl, Methyl parathions and Metamidophos respectively. The rates of resistance among the other towns were changed in rates according to the susceptible strains.

As a conclusion, it can be said that the aphids have gained resistance to Ethyl, especially to Methyl parathion in these 8 provinces. It was also observed that there is a trend of resistance is likely may become establish against Metamidophos.

Accordingly, it is a general agreement that parathion compounds definitely not to be used against the aphids and Metamidophos and should not be applied more than twice in a season in this region.

### **Summary**

The resistance tests were carried out in laboratory to investigate whether the aphids have resistance or not to Ethyl (Folidol E. 605), Methyl (Folidol M. 35) and Metamidophos (Tamaron 50 LC.) compounds which have being used for a long time against this insect in Aegean Region in 1973-1977. These tests conducted with the specimens collected from various locations of Aydın, Balıkesir, Çanakkale, Denizli, İzmir, Manisa, Muğla and Uşak. The results showed that aphids have gained resistance against the insecticides mentioned above.

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