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## A case of territorial spread of *Panonychus ulmi* (Koch) in Israel (\*)

Since its beginning some 30 years ago and until 1963, the intensive apple industry of Israel was entirely free of one of the most serious and widespread pests of apple, and deciduous fruit trees in general, the Fruit Tree or European Red Mite, *Panonychus ulmi* (Koch).

According to BLAIR and GROVES (1952), *P. ulmi* occurs in all fruit-growing areas of the world with the exception of South Africa, between the latitudes 30 and 60°, in both hemispheres. PRITCHARD and BAKER (1952) state that it appears to be principally holarctic in distribution. The area of its origin is considered to be northern or central Europe (BALACHOWSKY and MESNIL, 1935). It was mentioned early from Italy, Sweden and central European countries. In 1911 it was first found in America, in Oregon (EWING 1912), and has long been established as a most serious pest in the United States of America and in Canada. While a major pest elsewhere in the state, it does not occur in mountain apple orchards in southern California (BARNES and MADSEN, 1961).

According to CUTRIGHT (1963), it has also been reported from Algeria, Japan, Asiatic Russia, South Africa, and Chile.

*P. ulmi* is not mentioned among the plant-feeding mites of Cyprus (GEORGHIOU, 1959). In earlier publications, TALHOUK did not mention it among the pests of plants in Lebanon (1950) or Syria (1954). However, in a later supplementary list (TALHOUK, 1961), it is mentioned as a very serious pest of apple in Lebanon. Its spread was caused by extensive planting and, as a result of unreasonable use of broad-range insecticides against such pest as the codling moth and aphids, a high

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degree of resistance to almost all acaricides and insecticides has developed, and its natural enemies are doomed (TALHOUK, 1963).

In Lebanon, *P. ulmi* is the most important of three species of red mites attacking the apple; under the optimal conditions for multiplication of red mites prevailing there, apple culture has become economically problematical. Incidentally, *P. ulmi* is also one of the most important pests of grape vines in Lebanon (ZOEBELEIN, 1963).

Israel has an 88 km long frontier with Lebanon, the eastern part of which borders on Upper Galilee, which is the most important apple-growing area of the country (about one third of the total apple acreage). *P. ulmi* had never been recorded in Israel until July 1963, when the authors found and identified it on apple trees at Dan, near the easternmost end of the Lebanese-Israeli border (33°15' northern latitude) (PLAUT, 1963).

Later in the same year, serious outbreaks of the pest were recorded at seven additional localities, of which Neot Mordekhi, in the Huleh Valley, is the farthest removed from the possible sources of infestation — 10 km from Dan and 7 km from the nearest Lebanese border, near Mis el Jebel.

In the following winter (1963/4), only single winter eggs could be found in the infested groves in the plain between Dan and Neot Mordekhi (75-200 m elevation), but dense concentrations were found in the mountains bordering to the west; on apples at Misgav'Am (840 m) and on peaches at Margaliyot (660 m).

During 1964, outbreaks were recorded at 20 localities, including all those infested in 1963. The pest spread to Mahanayim (270 m), to the south of Neot Mordekhi, leaving a gap of 15 km with many apple growes where no outbreak of *P. ulmi* was recorded, but which were heavily infected by *Tetranychus cinnabarinus* Boisd. resistant to Difocol. To the southwest it reached Sasa (800 m), 22 km from Neot Mordekhi, in the central mountainous part of Upper Galilee (Fig. 1). During the winter of 1964/5, dense concentrations of eggs were found only at Amir (75 m).

Apples and apple stock infested with eggs are easily carried from one location to another, which may account for the almost cosmopolitan distribution of *P. ulmi* (GARMAN and TOWNSEND, 1938). In our case, this means cannot be responsible for the gradual spread from the northernmost tip of the country southwards. It may be mentioned here that apple fruits carrying eggs of *P. ulmi* have been intercepted at points of entry into the country (e.g. Haifa port), and many eggs must have

been thus « imported » into Israel in the course of the years without giving rise to populations in groves.

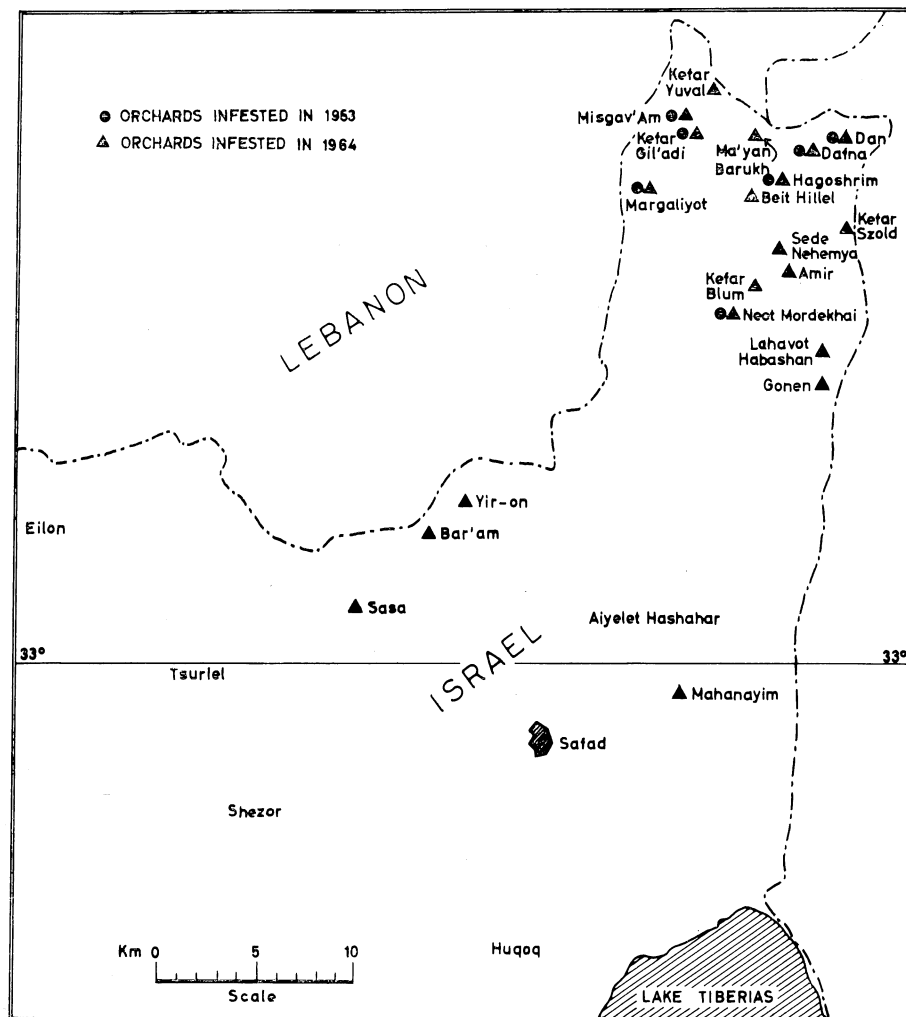


Fig. 1 - Spread of *Panonychus ulmi* (Koch) during 1963 and 1964 in Israel.

MARLÉ (1951) studied the dispersal of *P. ulmi* in Britain under field and laboratory conditions. She concluded that the mites — mainly adult females — on overpopulated leaves tend to descend on silken threads, especially in still, dry and warm air, to be carried off and float.

TABLE I. - Use of insecticides and acaricides in 56 and 47 bearing apple groves, respectively, during the fruit bearing season of 1962

Average number of sprays (in brackets-maxima)																	
Dipterex	Dimecron	Diazinon	Guthion	Parathion	Diversa	Sevin	DDT	Methoxychlor	Lead arsenate	Cryolite	Nicotina	Average insecticide applications	Dicofol	Morocide	Tedion	Aramite	Average acaricide applications
3.7 (11)	3.0 (7)	1.9 (5)	1.1	0.3	1.3*	0.4	0.6	0.1	0.3	0.1	0.02	12.8	2.2	1.7**	0.7	0.05	4.6

\* 0.4 Ethion, 0.4 Delnav, 0.3 Malathion, 0.2 Nuvan, 0.05 Metaisosystox.

\*\* One third of the total number of applications.

FLESHNER et al. (1956), in a study of air drift of four species of mites in California, found that in a mass wind-borne migration of *Panonychus citri* (McG.), females were carried by gentle breezes from grove to nearby grove, thus starting new infestations. COAD (1931), using special traps attached to airplane wings, collected mites (undetermined species) at an altitude of 10,000 feet.

The fact that mites may be carried and spread by any agent moving from tree to tree or from grove to grove — such as birds, men and mechanical equipment — need not be emphasized.

It seems quite reasonable to assume that the definite spreading tendency of about 10-20 km per season during 1963 and 1964 is a result of the typical wind-borne dispersal; at this speed of coherent spread, plus incidental dissemination, the entire apple-growing industry of Israel will soon have to live with this pest. From what is known from Lebanon, the mite's country of origin, and the tight pesticide spray schedule customary in Israel (Table 1), resistance to acaricides by *P. ulmi* is almost certain to constitute one of the more serious problems of pest control in deciduous fruit and grape growing in Israel in the near future.

#### SUMMARY

The groves and vineyards of Israel were free of *P. ulmi*, until in 1963 an infestation was found in an apple grove at Dan, near the eastern end of the

Lebanese border. Later in the same year the pest was recorded at six additional localities, all within a radius of 10 km from Dan. In 1964, outbreaks were recorded at 20 localities, including those of 1963, the additional ones being situated up to 15 and 22 km respectively to the south and southwest of the southernmost infestation of 1963.

### RIASSUNTO

Fino al 1963 i frutteti ed i vigneti di Israele erano esenti da *P. ulmi* quando si verificò una prima infestazione in un meleto a Dan, in prossimità della frontiera orientale libanese. Nello stesso anno il fitofago fu reperito in altri sei frutteti posti in un raggio di 10 km intorno a Dan e nel 1964 i reperti furono una ventina, in località situate fino a 15 km sud e 22 km sud-est dal focolaio di infestazione più meridionale osservato nel 1963.

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## DISCUSSION

DICKER: Could the recent presence of infestations result from the development of resistance to acaricides rather from a new introduction of *P. ulmi*?

PLAUT: This seems not to be the case. The first infestation was on the Lebanese border and spread from there coherently. In our work with *Tetranychus cinnabarinus* during many years no individual of *P. ulmi* was detected.

RAMBIER: Existe-t-il en Israel *Panonychus citri*?

PLAUT: It has never been recorded.