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Panonychus citri (MacGregor) (Tetranychidae) and *Eriophyes medicaginis* K. (Eriophyidae): Two Important Phytophagous Mites Recorded for the First Time in Greece¹

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ABSTRACT

Panonychus citri (MacGregor) one of the most important phytophagous mites in many parts of the world, has been collected from citrus trees in various localities of county Preveza, Heperos, Greece. This mite has been, possibly, introduced to Greece via Albania. Another phytophagous mite, *Eriophyes medicaginis* Keifer, well known to cause witches' broom on alfalfa, has been collected from *Medicago sativa* L. in the counties Attiki and Boiotia of central Greece. In a two year study on arthropods associated with alfalfa at the Kopais region of Boiotia, *E. medicaginis* was found to be constant and recedent in both years. High population densities were observed during the period mid-September to mid-March.

Introduction

Acari include some of the most important plant parasites of many crops all over the world. The agricultural importance of phytophagous mites are even greater in countries like Greece, where the climatic conditions favour their development.

Panonychus citri (MacGregor), known as the citrus red mite, occurs in many citrus growing areas of the world. It feeds on leaves, fruits and sometimes on green twigs causing discolorations. Severe infestation of this mite can cause heavy defoliation and fruit drop, twig die-back and even death of trees especially under water stress conditions (Jeppson et al. 1975). In Europe, *P. citri* was first recorded in Yugoslavia (Mijuskovic 1953). A distribution map of the pest, issued by the Commonwealth Institute of Entomology in 1964, indicates the European USSR as a host country as well. In 1959 it has been found in France (Rambier 1965), while in 1972 it was collected from citrus growing areas of Central Italy (Ciampolini and Rota 1973).

Eriophyes medicaginis K., known as alfalfa broom or bud mite, has been recorded from Au-

stralia, North America, India and Bulgaria (Davis et al. 1982). It causes virosis like symptoms to alfalfa which lead to dwarfed plants and bunched and malformed foliage. The intensity of the symptoms is directly related to the mite population density and the recovery of affected plants is slow even after the recovery of the mites (Stubbs and Meagher 1965). Ridland and Halloran (1980), however, state that the severity of the symptoms to alfalfa is not related to the total mite population but rather to the distribution of the mites on the plants. Besides the damage it causes, nothing is known about any other aspects of its biology or ecology.

Materials and Methods

Following information that *P. citri* was apparently present in Albania, it was decided to pursue a small survey in a citrus growing area of Heperos, Greece, in July 1986.

In Greece, *E. medicaginis* was noticed by the senior author to occur on *Medicago* sp. in the fields of the Athens College of Agricultural Sciences, in November 1978. In 1984 it was also found in the Kopais region where a study on the whole arthropod fauna of alfalfa plantations was undertaken. The present data were collected from an old alfalfa plantation during the period April 1984-April 1986.

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The alfalfa study plot received the usual cultural treatments: P fertilizer in February and cut of the aerial part of the plants on 3 July, 7 August, 7 September and 4 October 1985 and on 16 May, 10 June, 9 July, 6 August, 16 September and 24 October 1986. The meteorological data of the area are given in Figs. 1 and 2. On each sampling date (35 in total) twelve

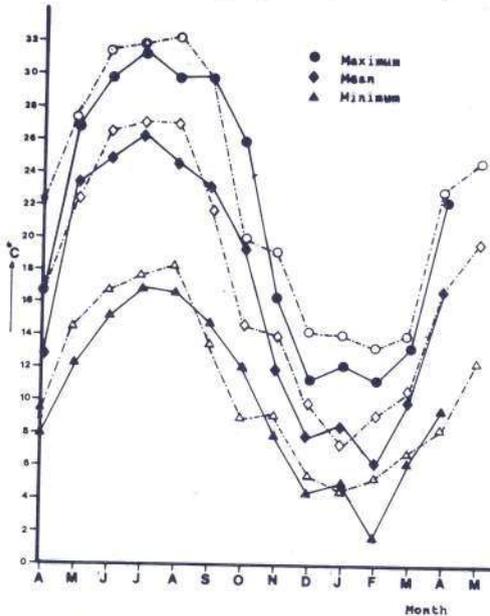


FIG. 1. Mean monthly maximum, minimum and mean air temperature at Kopais, Boiotia during the period April 1984 to March 1985 (solid symbols) and April 1985 to April 1986 (open symbols).

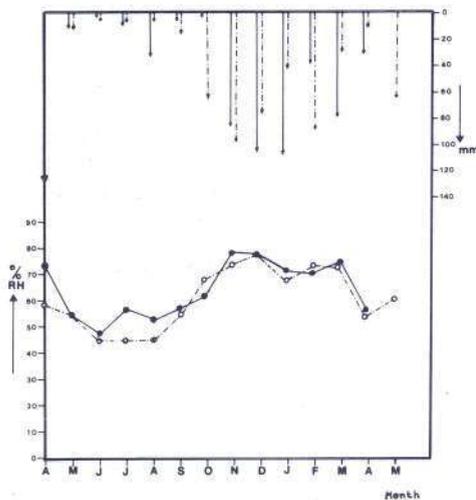


FIG. 2. Mean monthly relative humidity and total monthly rainfall at Kopais, Boiotia during the period April 1984 to March 1985 (solid symbols) and April 1985 to April 1986 (open symbols).

samples of the aerial part of *Medicago sativa* L. were taken at random from an area of approximately 1000 m², at 15-30 day intervals. Each sample, comprised 6-10 stems, brought to the laboratory with the minimum disturbance and delay and placed on a Berlese-Tullgren apparatus for the extraction of the arthropod fauna (Curry 1976). To avoid the harmful effect of heat on the mites, the light intensity and thus the temperature in the apparatus was gradually increased by means of a dimmer unit during the course of extraction. To assess the importance of each taxon, such criteria as relative abundance (dominance) and frequency (constancy) had been employed. Those criteria have been extensively used by many workers (Weis-Fogh 1948, Curry 1973, Emmanouel et al. 1985).

Results and Discussion

Panonychus citri

It was found to occur on orange and lemon trees in many localities of the coastal region of county Preveza. In some cases, mixed infestations with *Tetranychus cinnabarinus* (Bois.) and *T. urticae* Koch were observed. The somehow similar colour of *P. citri* and *T. cinnabarinus* may account to the fact that the former species had remained unnoticed by the local agronomists. Although a detailed survey to study the distribution of this mite to the rest of the country is certainly needed, its absence in samples taken for other reasons from citrus trees of Southern Greece, allow the conclusion that the introduction of *P. citri* to Greece was made via Albania. As the pest is known since a long time in Turkey, it is necessary to survey the Greek islands close to that country in order to find out possible introduction from there, as well. Besides citrus, this mite has other plant hosts, i.e. rose, almond, pear, castor bean and several broad-leaf evergreen ornamentals (Jeppson et al. 1975). It is advisable therefore, those plants to be also included in a future survey.

Because of its economic importance *P. citri* has been intensively studied in many countries. It produces many overlapping generations throughout the year. On orange trees usually there are 2 peaks in the population, one in spring or early summer and one in autumn or early winter when the new growth during the plant growth cycles occurs (Jeppson et al. 1975). Various species of predaceous insects and mites feed on and a few pathogens are known to infest *P. citri* (Mc Murtry 1985). This mite is a serious problem mainly when broad-spectrum insecticides are used to control other citrus pests. The key, therefore, to management of *P. citri* lies in promoting either the use of selective pesticides which are not toxic to natural enemies or a general reduction in the use of pesti-

cides (Mc Murtry 1985). Considering that *P. citri* thrives in regions with moderate temperatures and relative humidities (Keetch 1971), it is possible that in Greece it will be of major concern to rather northern and coastal regions than to southern or continental ones.

Eriophyes medicaginis

It was found on 9 out of 16 and on 13 out of 19 sampling dates during the first and the second year of this study, respectively. Taking into account the whole arthropod fauna detected, which comprised 57 and 60 taxa on each year, respectively, *E. medicaginis* was found to be constant and recedent in both years (Table 1). Fig. 3 shows the populations

TABLE 1. The relative abundance (R.A.) and frequency (F.) of *E. medicaginis* collected from an old established alfalfa plantation at Kopais, Boiotia during the period April 1984 - April 1986.

	R.A.	F.
1984-1985	0.69 (= recedent)	56.25 (= constant)
1985-1986	0.77 (= recedent)	68.42 (= constant)

trends of this mite. It is evident that high population densities occurred during the period mid-September to mid-March in both years. The highest

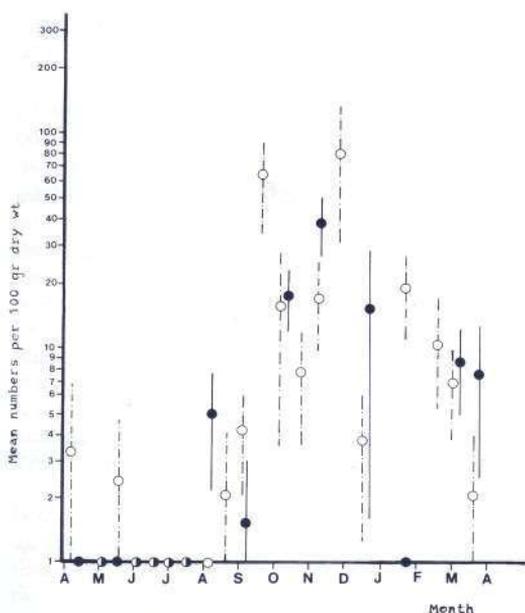


FIG. 3. Seasonal fluctuations in the mean numbers per 100 gr dry wt (\pm S.E.) of *Eriophyes medicaginis* recorded from an old established alfalfa plantation at Kopais, Boiotia during the period April 1984 - March 1985 (solid symbols) and April 1985-April 1986 (open symbols).

mean numbers of mites recorded were 38 ± 11 and 82 ± 50 per 100 gr d.w. in November and December of the first and second year of the study, respectively. During the summer months the mite was almost absent which coincides with the frequent cut of alfalfa and prevailing hot and dry conditions in the area (Figs. 1, 2). It is possible that *E. medicaginis*, like many eriophyids, avoids the direct sunlight and prefers environments with high relative humidities. It was observed by us to occur on the growing points of the plants, which surely accounts for its reduction in numbers after the cut of the plant. It is therefore reasonable to say that, in situations where only a few or no cuts take place, as in the case of alfalfa seed production, high population densities will be developed which may lead to greater damage.

Further studies on distribution, bioecology and economic importance of this mite are certainly needed in Greece. Studies in Australia showed a significant reduction in dry weight of alfalfa and clover caused by this pest (Ridland and Halloran 1979, 1980 a, b, 1981). This must be of special concern to countries like Greece where those plants are essential for the development of stock breeding.

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KEY WORDS: *Panonychus citri*, *Eriophyes medicaginis*, Citrus, *Medicago sativa*, Citrus red mite, Alfalfa broom or bud mite, Phytophagous mites in Greece

***Panonychus citri* (Mac Gregor) (Tetranychidae) και *Eriophyes medicaginis* K. (Eriophyidae): Δύο Σπυδαία Φυτοφάγα Ακάρεα που Αναφέρονται για Πρώτη Φορά στην Ελλάδα**

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ΠΕΡΙΛΗΨΗ

Το *Panonychus citri* (Mac Gregor) ένα πολύ σπυδαίο φυτοφάγο άκαρι σε πολλά μέρη του κόσμου, ευρέθηκε σε εσπεριδοειδή του νομού Πρεβέζης στην Ήπειρο. Ο εχθρός αυτός πιθανώς να εισήλθε στην Ελλάδα από την Αλβανία. Ένα άλλο φυτοφάγο είδος το *Eriophyes medicaginis* K., γνωστό σαν αίτιο σκούπας της μάγισσας στη μηδική, ευρέθηκε στο φυτό *Medicago sativa* στους νομούς Αττικής και Βοιωτίας. Σε διετή μελέτη που αφορούσε τα αρθρόποδα της μηδικής στην Κωπαΐδα Βοιωτίας το *E. medicaginis* ευρίσκετο σε σταθερούς και ασήμαντους πληθυσμούς και στα δύο έτη. Οι υψηλότεροι πληθυσμοί παρατηρήθηκαν κατά την περίοδο μέσα Σεπτεμβρίου – μέσα Μαρτίου.