

SHORT COMMUNICATION

New Records of Tetranychidae (Prostigmata) in avocado crops in Crete, GreeceD. Bitsakis¹, I. Petrakis¹, Th. Stathakis², E. Kapaxidi^{3*}, K. Varikou¹ and D. Papachristos⁴

Summary In April 2024, infestation was recorded on leaves of avocado trees, bearing brown necrotic spots on the upper surface of the leaves and/or whitish, almost circular spots on the underside, in Zou-naki, Crete, Greece. In September of the same year, infestation of different symptomatology was observed, consisting of a bronze tone at the upper surface of the leaves, in an avocado orchard in Ayia village, Crete. A microscopic examination of infested leaves revealed the presence of mites which were identified as *Oligonychus (Olygonychus) perseae* Tuttle, Baker and Abbatiello and *Oligonychus (Olygonychus) punicae* (Hirst) (Prostigmata: Tetranychidae) which are both first recorded in Greece. By autumn of 2024, the perseae mite rapidly spread across nearly all regions where avocados are cultivated in the western and coastal part of Crete. Up to date, nearly one year after the first detection of these mite species, infestations of *O. (O.) perseae* remains below economic thresholds, whereas *O. (O.) punicae* is found in a few orchards and in limited populations (end of 2025).

Additional keywords: avocado pests, economic pest, invasion, Tetranychidae

Introduction

Avocado (*Persea americana* Mill.) is one of the most socioeconomically important tree crops in tropical and sub-tropical regions, demonstrating good adaptation to these climatic conditions (Bhore *et al.*, 2021).

In Greece, commercial avocado production is concentrated in the western part of Crete, where the climate and soil conditions are particularly suitable. Over the past decade, many traditional crops, such as citrus and olive trees in Chania prefecture, Crete, have become less profitable and have been increasingly replaced with avocado which

is well suited to local climatic conditions. Increase of public awareness (farmers and consumers) of its nutritional value has contributed to the increase of the production levels of avocado over the last decade in Crete (Kourgialas and Dokou, 2021). In 2018, avocado fruit production in Greece reached 6,633 tons per year, with approximately 90% of this output originating from the prefecture of Chania. During the same period, the total cultivated avocado area in Chania was 550 ha, producing 6,300 tons annually, representing a 4.7% increase in fruit production compared with 2017–2018 (Antonopoulou, 2022). Recently, the estimated cultivated area of avocado was 1.096.2 ha with an annual production of 9.573 tons (8.2.25, INCO-FRUIT HELLAS based on ELSTAT). The most common cultivated avocado varieties in the region are Hass, Fuerte, and Zutano (Tzatzani *et al.*, 2023).

The only tetranychid mite preciously recorded from Greece in avocado, is *Tetranychus urticae* Koch, without causing serious economic damage to the crop (Papaioannou-Souliotis *et al.*, 1994). Therefore, the aim of this study was to conduct a brief survey

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to determine tetranychid mites infesting avocado trees in Greece.

Materials and Methods

Avocado trees with infested leaves were observed in orchards located in Zounaki and Ayia village, Crete, Greece, in April and September of 2024, respectively. For the identification of the pest, a sample of at least 50 leaves were collected from various avocado trees of each orchard. The examination of the samples was conducted under a dissecting microscope at the magnification of ($\times 20$). Mites were collected directly from the infested leaves using a fine brush and were stored in 70% ethanol in Eppendorf® tubes. Identification was carried out at the Laboratory of Acarology and Agricultural Zoology of Benaki Phytopathological Institute (BPI). Permanent mounts were made of all collected specimens using Hoyer's medium, after cleansing with lactic acid for 48 hours in 50°C. Photos of the mounded mites were taken with an Euromex Camera model CMEX 5.0 adapted to the microscope. For the identification of the mites the original description and available redescriptions were used for each species.

Results

Oligonychus (Olygonychus) perseae Tuttle, Baker and Abbatiello, 1976

In April 2024, infested leaves of avocado were observed during inspections in a mixed orchard of orange and avocado trees, in Zounaki of Chania, Crete (35° 28' 58.64" N–23° 49' 41.63" E-84m). The infested avocado trees were about 10-15 years old (cv. Hass and Fuerte) while avocado plantations of certified trees imported from Spain and subsequently purchased from a local nursery, were established in the broader area since 2022.

The recorded symptoms of the infested avocado leaves displayed circular necrotic spots on the underside surface and chlorotic

yellow on the upper leaf surface (Figs 1, 2,3). The symptomatology looked like the typical infestation of the perseae mite, which forms circular colonies beneath protective dense webbing on the underside surface of leaves, by its feeding. These colonies are formed along midribs and veins and produce characteristic circular necrotic spots. All life stages are mainly inhabited in the nests, which serve as a site for feeding, mating, reproduction and development.

All adult individuals were identified as *Oligonychus (Olygonychus) perseae* Tuttle, Baker and Abbatiello, based on their mor-



Figure 1. Colony of *Oligonychus (O.) perseae* on the lower surface of the leaf showing eggs and various mobile stages (larval and nymphal stages).



Figure 2. Characteristic necrotic spots on the lower surface of avocado leaf.



Figure 3. Avocado tree infested by *Oligonychus (O.) perseae*.



Figure 4. *Oligonychus (O.) perseae* female.

phological characteristics (Figs 4, 5), using the original description of the species by Tuttle *et al.*, 1976.

Following the initial detection of the perseae mite in Zounaki in April 2024, the infestation expanded rapidly to other avocado orchards in the region within the same growing season. By autumn 2024, the species was widely spread and established in orchards of western and coastal Crete, including the areas of Agia, Mournies, Tavronitis, Nerokourou, and Alikianos, where the majority of avocado cultivation is concentrated. In contrast, no infestations were documented in Apokoronas or Rethymno (until October 2025), where avocado cultivation occurs only in small, isolated orchards, up to date (Fig. 6).

***Oligonychus (Oligonychus) punicae* (Hirst, 1926)**

During inspection of an avocado orchard in Agia village (35° 29' 00. 36" N–23° 56' 57. 63" E–53m), a different symptom was observed, described as a bronze discoloration on the upper surface of the leaves (Fig. 7).

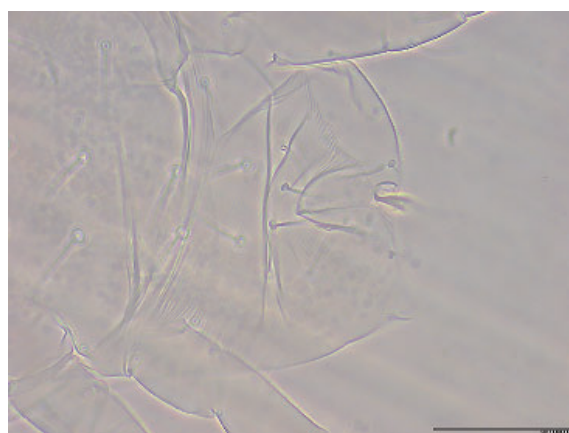


Figure 5. *Oligonychus (O.) perseae* male aedeagus.

After stereoscope examination, another species of Tetranychidae was detected, forming a distinctly different community structure from *O. (O.) perseae*. In this case, numerous adult individuals were distributed across the leaf surface, intermingled with orange-brown eggs, immature stages, secretions, exuviae, feeding damage (circular leaf lesions), and webbing. Based on the observed symptoms, it was suspected that the mite was the tetranychoid mite known as “avoca-

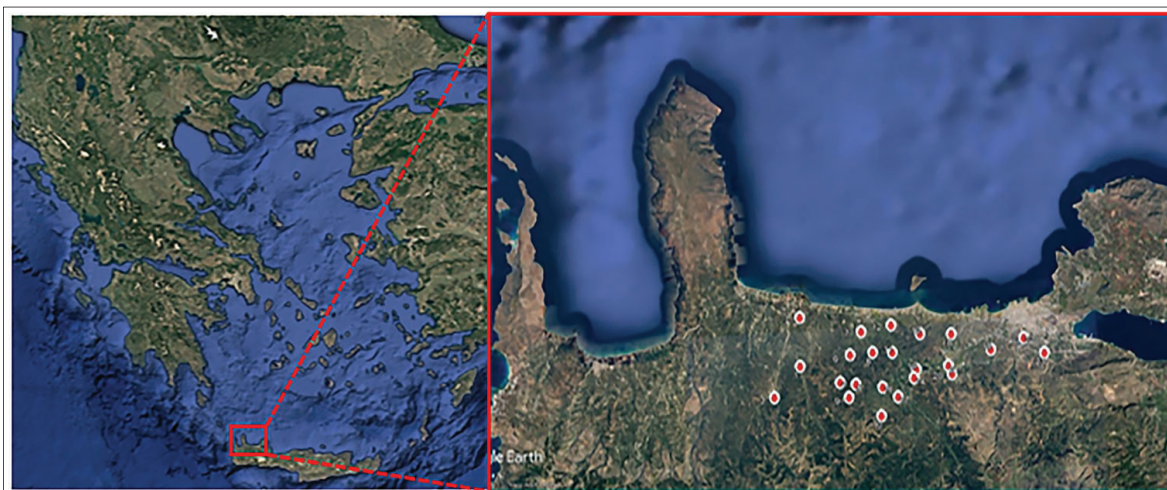


Figure 6. Avocado cultivation areas infested by the perseae mite in western region of Crete Island, Chania prefecture, Greece (Source: Google Earth). The left panel shows the map of Greece, indicating the infested avocado area within the red square.



Figure 7. Characteristic bronze discoloration on the upper surface of avocado leaf caused by *Oligonychus (O.) punicae*.

do brown mite". Individuals of all specimens were identified as *Oligonychus (Olygonychus) punicae* (Hirst), based on their morphological characteristics (Figs 8, 9), using the original description (Hirst, 1926) and available re-descriptions (Mushtaq *et al.*, 2023).



Figure 8. *Oligonychus (O.) punicae* female.



Figure 9. *Oligonychus (O.) punicae* male aedeagus.

Discussion

Persea mite and avocado brown mite are considered important avocado pests (Torres et al., 2023; González-Hernández et al., 2024). Although both mite species inhabit avocado leaves, they occupy distinct microhabitats and exhibit different ecological behaviors thereby minimizing direct interspecific competition. *Oligonychus (O.) perseae* resides on the underside of leaves constructing dense webbing that provides significant protection from natural enemies while *Oligonychus (O.) punicae* colonizes the upper leaf surface, without dense webbing, making it more vulnerable to predation by beneficial arthropods (Fleschner et al., 1956). This spatial and structural segregation likely facilitates coexistence among the species by reducing overlap in resource use and exposure to natural enemies.

Management recommendations provided to avocado growers were limited to pruning to increase light penetration within the tree canopy, application of pollen spot solutions to attract beneficial arthropods (Montserrat et al., 2012) and the release of *Neoseiulus californicus* (McGregor) as biocontrol agent (Hoddle et al., 1999, 2000). In addition, *Euseius (=Iphiseius) degenerans* (Berlese) was frequently recorded, particularly in mite-infested avocado orchards located near citrus or well-pruned avocado trees in sites with wild vegetation beneath the canopy. It is

important to note that, as of 2025, the only acaricides approved in Greece for avocado cultivation are potassium salts of fatty acids and paraffin oil, since prior to the appearance of *O. (O.) perseae* the crop was totally free from arthropod pests; the only insects observed on the canopy were non-feeding visitors (resting individuals) or a few small-sized immature stages of e.g. white flies trying to establish. At present, nearly one year after the first detection of mite infestations, injury levels in orchards affected by *O. (O.) perseae* remain below economic thresholds while *O. (O.) punicae* is found in a few orchards and in limited populations. However, a few growers reported localized leaf drop and a reduction in avocado fruit size.

Both mites were likely introduced in Chania Crete through the import of certified avocado plants from Spain, where the mites were already present (Alcázar et al. 2005, Boyero et al., 2014; Torres et al., 2023) due to inadequate spraying of the imported material. This is attributed to the fact that in all cases of the avocado orchards infested by the persea mite, the growers have purchased certified avocado trees from Spain through local nurseries. To prevent further spread and introduction of other economically pests, it is essential the regulations governing certified avocado plants to be revised in Greece, and the imported material to be treated by pesticides. In the case of mites, it is proposed to apply acaricide to the imported material before the trees are given to the growers, with a second application by the grower before planting.

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ΣΥΝΤΟΜΗ ΑΝΑΚΟΙΝΩΣΗ

Νέες αναφορές ειδών της οικογένειας Tetranychidae σε αβοκάντο, στο Νομό Χανίων

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Περίληψη Τον Απρίλιο του 2024, παρατηρήθηκαν σε δένδρα αβοκάντο στην περιοχή Ζουνάκι (Χανιά, Κρήτη) καστανές νεκρωτικές κηλίδες στην άνω επιφάνεια των φύλλων ή/και υπόλευκες, σχεδόν κυκλικές κηλίδες στην κάτω επιφάνεια. Τον Σεπτέμβριο του ίδιου έτους, στην περιοχή Αγυά, καταγράφηκε ένα διαφορετικό σύμπτωμα, το οποίο συνίστατο σε μπρούτζινο μεταχρωματισμό στην άνω επιφάνεια των φύλλων του αβοκάντο. Η εργαστηριακή εξέταση των συλλεχθέντων προσβεβλημένων φύλλων αποκάλυψε την παρουσία ακάρεων, τα οποία ταυτοποιήθηκαν ως *Oligonychus (Oligonychus) perseae* Tuttle, Baker and Abbatiello και *Oligonychus (Oligonychus) punicae* (Hirst) (Prostigmata: Tetranychidae), και αναφέρονται για πρώτη φορά στην Ελλάδα. Μέχρι το φθινόπωρο του ίδιου έτους, το άκαρι *O. (O.) perseae* εξαπλώθηκε ταχύτατα σε σχεδόν όλες τις περιοχές όπου καλλιεργείται το αβοκάντο στο δυτικό και παράκτιο τμήμα της Κρήτης. Μέχρι σήμερα, σχεδόν ένα έτος μετά την πρώτη ανίχνευση των ειδών αυτών, οι προσβολές του *O. (O.) perseae* παραμένουν κάτω από τα οικονομικά όρια ζημιάς, ενώ το *O. (O.) punicae* εντοπίζεται σε λίγους οπωρώνες και σε περιορισμένους πληθυσμούς (τέλος 2025).

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