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Full Length Research Paper

Mite (Acari) fauna of some cultivated plants from Kahramanmaraş, Turkey

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Surveys were conducted to identify mite (*Acari*) species from cultivated plants in Kahramanmaraş, Turkey. Phytophagous and predatory mite species on vegetables and fruit trees were collected during 1997–2000. Phytophagous mites, *Tetranychus turkestani* (Ugarov and Nikolski) and *Tetranychus cinnabarinus* Boisduval, were obtained from eggplant, bean, and cucumber. Predatory mites *Phytoseius finitimus* Ribaga and *Amblyseius andersoni* (Chant) (Acari: Phytoseiidae) were identified from eggplant and cucumber, respectively. Predatory mite species from mixed fruit orchards belong to the family Phytoseiidae. These species were named *Typhlodromus (Anthoseius) bagdasarjani* (Wainstein and Arutunjan), *Euseius finlandicus* Oudemans, *Kampimodromus aberrans* (Oudemans), *Paraseiulus soleiger* (Ribaga), *Paraseiulus subsoleiger* Wainstein, *Paraseiulus triporus* (Chant and Yoshida-Shaul), *P. finitimus* on grape, quince, walnut, mulberry, persimmon, peach, and pomegranate; *Typhlodromus (Anthoseius) intercalaris (Livshitz and Kuznetzov*) on fig. *Typhlodromus* (A.) *bagdasarjani* and *E. finlandicus* were also found on the ornamental plant *Ipomoea indica* (Burman) Merrill (Convolvulaceae). *Tydeus californicus* (Banks) (Tydeidae) was reported from an unknown host. The predatory mite, *E. finlandicus* was the most common phytoseiid species in orchard trees.

Key words: Predatory mites, pest mites, vegetables, orchards, Kahramanmaraş, Turkey.

INTRODUCTION

Kahramanmaraş's climate favours the cultivation of vegetables and fruit, in particular, red pepper, *Capsicum annuum* L., an important crop for local consumption and export (Paksoy, 2003). Vegetables and orchards host many harmful and beneficial organisms. Although there are many reports on the insects and mites associated with cultivated and ornamental plants throughout the world (Ripka et al., 1997; Ripka, 1998; Uysal et al., 2001) and Turkey, (Yiğit and Uygun, 1982; Yıldız, 1998; Kasap and Çobanoğlu, 2007), there were no data available for Kahramanmaraş. Therefore, the aim of this study is to provide information on the mites associated with crops in this region of Turkey.

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MATERIALS AND METHODS

Survey was conducted on vegetable growing areas and some mixed orchards of Kahramanmaraş during 1997–2000. The vegetable samples were collected from Kahramanmaraş, Pazarcık, and Türkoğlu counties. The orchard samples were collected from Kahramanmaraş and Pazarcık (Figure 1). Vegetable samples were taken from eggplant (*Solanum melongena* L.), melon (*Cucumis melo* L.), watermelon (*Citrullus lanatus* (Thunb.)), tomato (*Lycopersicon esculentum* L.), cucumber (*Cucumis sativus* L.; *Cucumis melo* var. *flexuosus*.), okra (*Hibiscus esculentus* L.), pepper (*C. annuum*), cowpea (*Vigna unguiculata* L.), zucchini (*Cucurbita pepo* L.), and legume (*Phaseolus vulgaris* L.) plants. The most samples were taken from *C. annuum*, *C. sativus*, and *S. melongena* fields.

Orchard samples were taken from grape (*Vitis vinifera* L.), walnut (*Juglans regia* L.), mulberry (*Morus* sp.), quince (*Cydonia oblonga* Mill.), persimmon (*Diospyros kaki* L.), figs (*Ficus carica* L.), pomegranate (*Punica granatum* L.), and peaches (*Prunus persica* L.). Most of the samples (repeated 10 times) were taken from grape and walnut. Number of mulberry - persimmon trees and the other

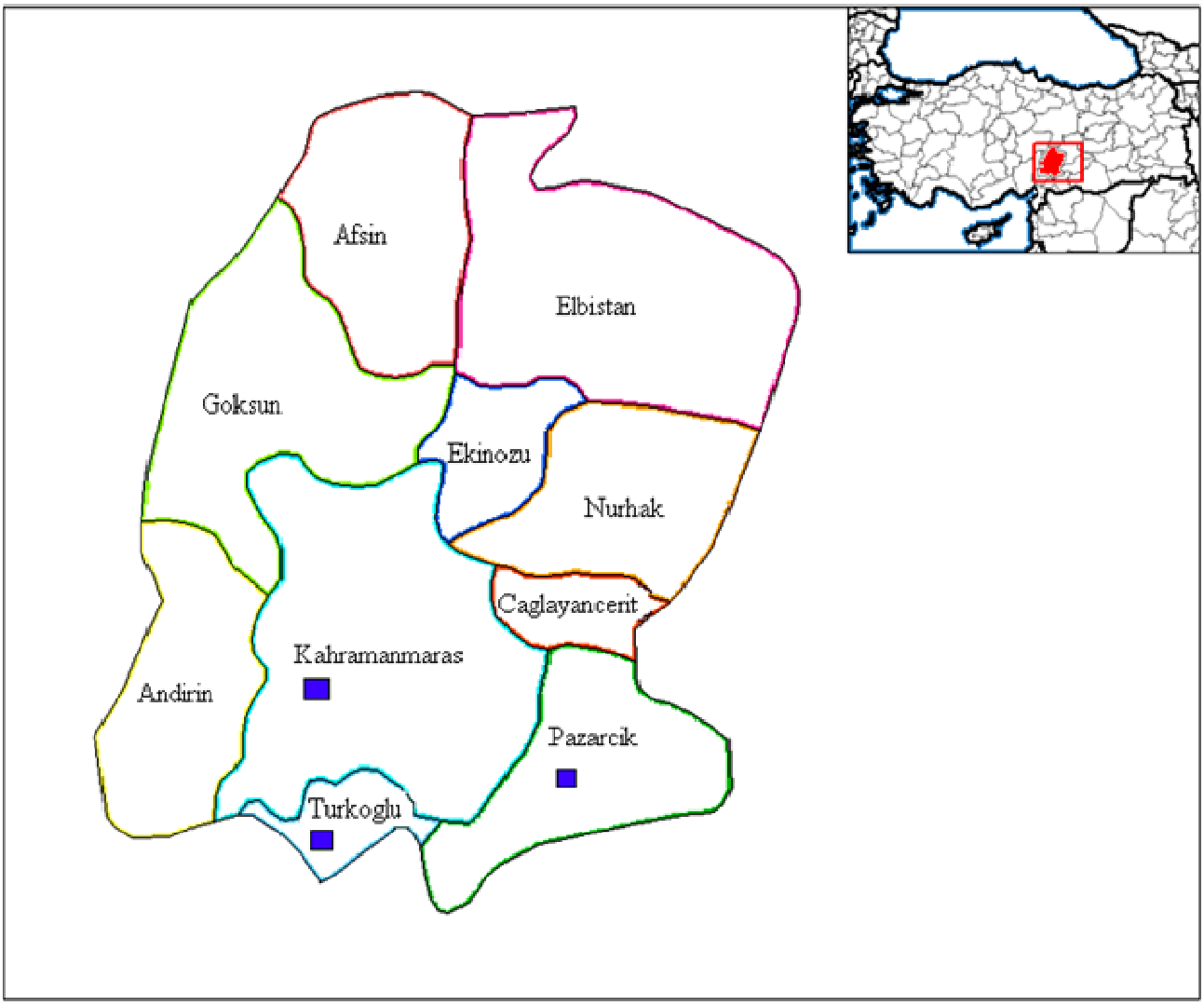

Figure 1. The counties of Kahramanmaraş province (Anonymous, 2009) and location of collecting sites of plant samples (marked with square).

trees sampled was 5 and 2, respectively. Besides the vegetables and fruit trees, the common weed ***Ipomoea indica*** (Burman) Merrill (Convolvulaceae) was also sampled.

The surveys were made at random from vegetables and orchards grown in cultivated and uncultivated areas during the growing seasons of 1997–2000. Twenty-five leaf samples were collected from the vegetables and orchard plants. In total, 26 and 110 mite specimens were identified from vegetable areas and eight types of fruit trees, respectively in Kahramanmaraş. Mites were removed from the obtained leaf samples under a stereomicroscope and were preserved in 70% ethyl alcohol. The mites were cleared in lactophenol solution and mounted in Hoyer's fluid. The slides were dried for 3-4 weeks at 35°C. The mite specimens were deposited at the Mite Collection of the second author at the University of Ankara, Agricultural Faculty, Plant Protection Department, Ankara, Turkey.

The keys used for identification where those of Pritchard and Baker (1955), Chant (1959), Baker (1965), Summers and Price (1970), Jeppson et al. (1975), Arutunjan (1977), Begljarov (1981), Chant and Yoshida-Shaul (1982), Karg (1971, 1994), and Chant and McMurtry (2007). A list of the vegetable sampled areas in Kahramanmaraş is presented in Table 1.

RESULTS AND DISCUSSION

Mite species obtained from vegetables in Kahramanmaraş

Although a large number of samples were taken from vegetables, tetranychid mites were obtained only from *C. annuum*, *P. vulgaris*, and *S. melongena* (Table 2). The phytoseiid mites were obtained from *C. sativus* and *S. melongena*. Phytoseiid mites were absent from *C. annuum*, which is a common cultivar in Kahramanmaraş

Table 1. The total number of vegetable species and areas sampeled in Kahramanmaraş (Turkey).

Vegetables	Kahramanmaraş	Pazarcık	Türkoğlu	Total
Citrullus lanatus	3	1	–	4
Cucurbita pepo	3	–	–	3
Capsicum annuum	7	12	8	27
Cucumis melo	2	2	–	4
Cucumis melo var. *flexuosus*	–	2	1	3
Cucumis sativus	2	6	8	16
Hibiscus esculentus	1	–	2	3
Lycopersicon esculentum	5	2	2	9
Phaseolus vulgaris	4	–	–	4
Solanum melongena	6	5	3	14
Vigna unguiculata	–	–	1	1

Table 2. The total number of mite speices collected from some of the vegetable species in Kahramanmaraş (Turkey).

Family	*Cucumis sativus*	*Capsicum annuum*	*Phaseolus vulgaris*	*Solanum melongena*	County
Tetranychidae					
Tetranychus turkestani		3	5	1	Pazarcık
Tetranychus cinnabarinus		2		2	Pazarcık
Phytoseiidae					
Amblyseius andersoni	8				Pazarcık
Phytoseius finitimus				5	Kahramanmaraş

(Table 2).

Family Tetranychidae

Tetranychus turkestani (Ugarov and Nikolski, 1937)

Material examined: Pazarcık (850m): Karaçay, 8.VIII.1997, 1 ♂, *Solanum melongena*; Pazarcık (850m): Narlı, 8.VIII.1997, 5 ♂♂, *Phaseolus vulgaris*; Pazarcık (850m): Karaçay, 8.VIII.1997, 3 ♂♂, *Capsicum annuum*. *Tetranychus turkestani* has been reported from Çukurova, Aegean and Central Anatolia Region of Turkey and is a common species in Turkey (Düzgüneş, 1954; İyriboz, 1971; Elma and Alaoğlu, 2008) and worldwide (Pritchard and Baker, 1955; Jeppson et al., 1975).

Tetranychus cinnabarinus Boisduval, 1867

Material examined: Pazarcık (850m): Narlı, 8.VIII.1997, 2 ♂♂, *Solanum melongena* (leaves); Pazarcık (850m): Karaçay, 8.VIII.1997, 2 ♂♂, *Capsicum annuum*. *Tetranychus cinnabarinus* is very well known in Turkey and worldwide (Pritchard and Baker, 1955; Jeppson et al., 1975; Ripka et al., 1997).

Family Phytoseiidae

Amblyseius andersoni (Chant, 1957)

Material examined: Pazarcık (850m): Karaçay, 8.VIII.1997, 5 ♀♀, *Cucumis sativus*; Narlı (Pazarcık), 15.VIII.1997, 3 ♀♀, *Cucumis sativus*. *Amblyseius andersoni* was previously recorded from the Black Sea, the Marmara, and the Mediterranean regions of Turkey (Şekeroğlu, 1984; Çobanoğlu 1991). In Thrace, it was obtained from Edirne and Kırklareli samples (Çobanoğlu, 2004). This species was also recorded from the bark of *Pinus nigra* Arn. from Bartın (Amasra) (Bayram and Çobanoğlu, 2007).

Phytoseius finitimus Ribaga, 1904

Material examined: Kahramanmaraş (568m):

Table 3. The total number of phytoseiid species collected in orchards in Kahramanmaraş (Turkey).

Phytoseiidae Species	Host plants								Country
	Vv	Co	Jr	M	Dk	Fc	Pg	Pb	
Typhlodromus (A.) *bagdasarjani*	11				2		1		Kahramanmaraş
			3						Pazarcık
Typhlodromus (A.) *intercalaris*						2			Kahramanmaraş
Euseius finlandicus	13	5	22	16	1			3	Kahramanmaraş
	5		4						Pazarcık
Kampimodromus aberrans		5	2		2				Kahramanmaraş
			5						Pazarcık
Paraseiulus soleiger			3						Kahramanmaraş
Paraseiulus subsoleiger	1	2							Kahramanmaraş
Paraseiulus triporus	1								Kahramanmaraş
Phytoseius finitimus				1					Kahramanmaraş

Vv, *Vitis vinifera;* Co, *Cydonia oblonga*; Jr, *Juglans regia*; M, *Morus* sp.; Dk, *Diospyrus kaki*; Fc, *Ficus carica*; Pg, *Punica granatum*; Pp, *Prunus persica*.

Hacımustafa, 7.VII.1997, 2 ♀♀, *Solanum melongena*; Kahramanmaraş (568m): Hacımustafa, 29.VIII.1997, 3 ♀♀, *Solanum melongena*. *Phytoseius finitimus* was found on eggplant in Antalya (Çobanoğlu, 1989a). It was also obtained from vegetable plants, *P. vulgaris*, *C. annuum* and *S. melongena* in the East Mediterranean region of Turkey (Yıldız, 1998). We accepted the name provided by Duso and Fontana (2001) on the species concept of *Phytoseius plumifer* (Canestrini and Fanzago, 1876) and the validity of *P. finitimus*.

MIte species obtained from orchards in Kahramanmaraş

The predatory species collected from orchards are shown in Table 3. The predatory mite *Euseius finlandicus* was identified as the most common species followed by *Typhlodromus* (*Anthoseius*) *bagdasarjani* and *Kampimodromus aberrans*. The numbers of the other phytoseiid species were quite low and the most preferred host plants were *J. regia* and *V. vinifera* (Table 3).

Family Phytoseiidae

Euseius finlandicus (Oudemans, 1915)

Material examined: Kahramanmaraş (568m): Sarıkaya, 18.V.1998, 9 ♀♀, *Juglans regia*, Kahramanmaraş (568m): Gafarlı, 28.VII.1998, 2 ♀♀, *Vitis vinifera*; Kahramanmaraş (568m): Gafarlı, 28.VII.1998, 7 ♀♀, *Morus* sp; Pazarcık (850m): Ulubahçe, 22.VII.1999, ♀, *Juglans regia*; Kahramanmaraş (568m): Gafarlı, 28.VII.1999, 7 ♀♀, *Vitis vinifera*; Gafarlı (Kahramanmaraş), 28.VII.1999, 2 ♀♀, ♂, *Juglans regia*; Kahramanmaraş (568m): Gafarlı, 28.VII.1999, ♀, *Diospyros kaki*; Kahramanmaraş (568m): Gafarlı , 28 July 1999, 5 ♀♀, *Juglans regia*; Pazarcık (850m): Narlı, 29 July 1999, 4 ♀♀, ♂, *Vitis vinifera*; Pazarcık (850m): Ulubahçe, 29.VII.1999, 3 ♀♀, *Juglans regia*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 4 ♀♀, *Vitis vinifera*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 5 ♀♀, *Cydonia oblonga*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 4 ♀♀, ♂), *Juglans regia*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 3 ♀♀, *Prunus persica*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 9 ♀♀, *Morus* sp. *Euseius finlandicus* is widespread in all regions of Turkey on various plants such as apple, hazel, pear, citrus species, grape, and legume (Swirski and Amitai, 1982; Düzgüneş and Kılıç, 1983; Şekeroğlu, 1984; Çobanoğlu, 1991-1992; Yıldız, 1998; Göven et al., 1999; İncekulak and Ecevit, 2002; Yanar and Ecevit 2005). This species was found in the Edirne, Kırklareli, and Tekirdağ provinces of Thrace (Çobanoğlu, 2004). It was reported as one of the most common predatory mite species in apple orchards of the Lake Van basin of Turkey (Kasap and Çobanoğlu, 2007). It was also obtained in apple orchards in Şemdinli county of Hakkâri (Kasap and Çobanoğlu, 2009).

Kampimodromus aberrans (Oudemans, 1930)

Material examined: Pazarcık (850m): Ulubahçe, 22.VII.1999, 5 ♀♀, *Juglans regia*, Sarıkaya (Kahramanmaraş), 22.VII.1999, ♀, *Diospyros kaki*; Gafarlı (Kahramanmaraş), 28.VII.1999, 2 ♀♀, *Juglans regia*; Gafarlı (Kahramanmaraş), 28.VII.1999, ♀, *Diospyros kaki*; Hacımustafa (Kahramanmaraş), 4.VII.1999, 5 ♀♀,

Cydonia oblonga. *Kampimodromus aberrans* is common on various plantssuch as apple, hazelnut, and pear in all regions of Turkey (Swirski and Amitai, 1982; Düzgüneş and Kılıç, 1983; Çobanoğlu 1991-1992; İncekulak and Ecevit, 2002; Çobanoğlu et al., 2003; Yanar and Ecevit, 2005). It was also found in association with colonies of Eriophyidae, Tarsonemidae and Tenuipalpidae (Çobanoğlu, 2004). This species was frequently reported that *K. aberrans* is associated with members of the families Tetranychidae and Tydeidae in every surveyed apple orchard (Kasap and Çobanoğlu, 2007). It was obtained in apple orchards in Esendere, Şemdinli Yüksekova provinces of Hakkâri (Kasap and Çobanoğlu, 2009).

***Paraseiulus soleiger* (Ribaga, 1902)**

Material examined: Kahramanmaraş (568m): Gafarlı, 28.VII.1999, ♀, 2 ♂♂), *Juglans regia*. *Paraseiulus soleiger* was obtained from grape Saruhanlı county of Manisa (Göven et al., 1999). It was recorded from *Ulmus* sp. from Bursa (Uludağ) (Çobanoğlu, 2004).

***Paraseiulus subsoleiger* Wainstein, 1962**

Material examined: Kahramanmaraş (568m): Gafarlı, 28.VII.1999, ♀, *Vitis vinifera*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 2 ♀♀, *C. oblonga*. *P. subsoleiger* was found in apple orchards from Bursa, Çankırı, Kayseri, Nevşehir, and Ankara (Düzgüneş and Kılıç, 1983) and in citrus orchards from Finike (Çobanoğlu, 1989b). It was found in apple orchards in Tokat province (Yanar and Ecevit, 2005).

***Paraseiulus triporus* (Chant and Yoshida-Shaul, 1982)**

Material examined: Kahramanmaraş (568m): Gafarlı, 1 .VIII.1999, 1 ♀, *Vitis vinifera*. *Paraseiulus triporus* was reported on *Cornus mas* L., *Cydonia vulgaris* Pers., and *Malus communis* L. from Edirne and Tekirdağ (Çobanoğlu, 2004). It was found in apple orchards in Erciş and Edremit (Kasap and Çobanoğlu (2007).

Phytoseius finitimus

Material examined: Kahramanmaraş (568m): Gafarlı, 28.VII.1998, ♀, *Morus* sp. *Phytoseius finitimus* is a very common species in all parts of Turkey (Düzgüneş and Kılıç (1983), Şekeroğlu, 1984; Çobanoğlu, 1989a and b, 1991, 1991-1992, 2004). This species was recorded on grape, *Rubus* spp., and *Rosa canina* L. plants in vineyards production areas and hedge plants around these areas in Çanakkale and İzmir provinces of Aegean Region (Göven et al., 1999). It was obtain from *C. mas*, *Corylus avellana* L., *C. vulgaris*, *Ficus carica* L., *M. communis*, *Morus nigra* L., *Prunus communis* L., *Prunus domestica* L., *Prunus spinosa* L., *Rubus fruticosus* L., *Ulmus campestris* L., *Ulmus* sp., *V. vinifera* in Edirne and Tekirdağ provinces (Çobanoğlu, 2004)

***Typhlodromus* (*Anthoseius*) *bagdasarjani* (Wainstein and Arutunjan, 1967)**

Material examined: Kahramanmaraş (568m): Sarıkaya, 22.VII.1999, 7 ♀♀, 2 ♂♂, *Vitis vinifera*; Kahramanmaraş (568m): Sarıkaya, 22.VII.1999, 2 ♀♀, *Diospyros kaki*; Pazarcık (850m): Ulubahçe, 29.VII.1999, 3 ♀♀, *J. regia*; Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 2 ♀♀,*Vitis vinifera*. Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, (♀), *Punica granatum*. *Typhlodromus* (*Anthoseius*) *bagdasarjani* was obtained from woody ornamental plants in Ankara (Çobanoğlu et al., 2003). It was reported as the common predatory species on coniferous plants, *Pinus brutia* Ten. in Muğla and *P. nigra* (Bayram and Çobanoğlu, 2007). It was found on *Urtica urens* L. in Hakkâri (Kasap and Çobanoğlu 2009).

***Typhlodromus (Anthoseius) intercalaris* (Livshitz and Kuznetzov, 1972)**

Material examined: Kahramanmaraş (568m): Hacımustafa, 4.VIII.1999, 2 ♀♀. *Ficus carica*, *Typhlodromus (A.) intercalaris* was collected previously from the Mediterranean region (Düzgüneş and Kılıç, 1983; Şekeroğlu, 1984) and was found in association with mites of the families Eriophyidae and Tydeidae. It was also reported on *Fagus orientalis* Lipsky. and *U. campestris* at Istranca Mountains-Kırklareli and Lalapaşa-Edirne, respectively (Çobanoğlu, 2004).

Family Tydeidae

***Tydeus californicus* (Banks, 1904)**

Material examined: Kahramanmaraş (568m): 2 ♀♀, 1999, unknown host. *Tydeus californicus* was reported in Ankara (Çobanoğlu, 1991-1992). It was recorded in grape areas in İzmir and Manisa provinces in Aegean Region (Göven et al., 1999). This predatory mite species was found in apple orchards in Amasya and Tokat province of Turkey (İncekulak and Ecevit, 2002; Yanar and Ecevit, 2005).

Mite species obtained from the ornamental plant *Ipomoea indica* (Convolvulaceae)

Euseius finlandicus and *T.* (*A.*) *bagdasarjani* were found

on I. indica.

Euseius finlandicus

Material examined: Kahramanmaraş (568m): 20.VII.2000, ♀, *I. indica. Euseius finlandicus* was recorded from ornamental plants *Sambucus ebulus* L. Rosa sp. and *Viburnum opulus* L. in Trace (Çobanoğlu, 2004).

Typhlodromus (*Anthoseius*) *bagdasarjani*

Material examined

Kahramanmaraş (568m): 20.VII.2000, 4 ♀♀, ***Ipomoea indica.*** *Typhlodromus* (*A.*) *bagdasarjani* was recorded from woody ornamental plants in Ankara (Çobanoğlu et al., 2003). It was obtained from *Thuja orientalis* L. (Cupressaceae) in Ankara (Çankaya) (Sağlam and Çobanoğlu, 2010).

Conclusion

Tetranychus cinnabarinus and *T. turkestani* were dominant pests on vegetables at Kahramanmaraş while *A. andersoni* and *P. finitimus* were the dominant predators. Phytoseiid mites were not found on *C. annuum*, which a common crop of Kahramanmaraş. Phytoseiid species from orchards were *E. finlandicus*, *K. aberrans*, *P. soleiger*, *P. subsoleiger*, *P. triporus*, *P. finitimus*, *T.* (*A.*) *bagdasarjani*, and *T.* (*A.*) *intercalaris*. In addition, *E. finlandicus* and *T.* (*A.*) *bagdasarjani* were collected from ***I. indica.*** The tydeid mite, *T. californicus* was identified from an unknown host. The phytoseiid mite fauna of Kahramanmaraş can be considered for implementation in future integrated pest management.

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