

Original article (Orijinal araştırma)

Occurrence of plant parasitic nematode species in important crops in the Southeast Anatolia Region of Turkey¹

Güneydoğu Anadolu Bölgesindeki önemli kültür bitkilerinde bitki paraziti nematodların belirlenmesi

Ece Börteçine KASAPOĞLU ULUDAMAR^{2*}

Şenol YILDIZ³

Mustafa İMREN⁴

Atilla ÖCAL⁵

İbrahim Halil ELEKCİOĞLU²

Abstract

The Southeast Anatolia Region is one of the major agricultural production areas of Turkey where durum wheat, barley, vegetables and some fruit crops are grown. This study aimed to determine the important plant parasitic nematode species affecting the most commonly cultivated plants in this region. Soil samples were collected in the wheat growing areas of Şanlıurfa, Mardin, Şırnak, Kilis Provinces between May and June in 2011-2012, and pistachio, barley, grapevine, wheat, tomato, watermelon, melon, cotton and tobacco fields of Adıyaman in May, July, October in 2010-2011. The study also reviewed the list of nematode species previously identified in the region. *Aphelenchus avenae* Bastian 1965, *Anguina tritici* (Steinbuch) Filipjev, *Merlinius brevidens* (Allen, 1955) Siddiği, 1970, *Pratylenchus neglectus* (Rensch, 1924) Filipjev & Schururmans Stekhoven 1941, *P. thornei* Sher & Allen, 1953, *Paratrophurus acristylus* Siddiği et Siddiği, 1983 and *Pratylenchoides alkani* Yüksel, 1977 were the most common species found. This study reports *Ditylenchus longicauda* Geraert & Chi, 1988, *Rotylenchus echelimae* Scotto La Massese & Germani, 2000, *Filenchus hamatus* (Thorne & Malek, 1968) Raski & Geraert, 1987, *Helicotylenchus crassatus* Anderson, 1973, *Helicotylenchus goodi* Tikyani et al., 1969, and *Helicotylenchus oleae* Inserra, Vovlas & Golden, 1979 for the first time in Turkey.

Keywords: Plant parasitic nematodes, Southeast Anatolia Region, vegetables, wheat

Öz

Güneydoğu Anadolu Bölgesi Türkiye'nin önemli tarımsal üretim alanlarından birisi olup, makarnalık buğday, arpa, sebze ve bazı meyve üretimleri yapılmaktadır. Çalışmada yoğun tarımsal üretim yapılan bölgelerdeki, önemli bitki paraziti nematod faunasının belirlenmesi amaçlanmıştır. Toprak örnekleri, Şanlıurfa, Mardin, Şırnak, Kilis illeri buğday alanlarından 2011-2012 yılları Mayıs-Haziran aylarında; Adıyaman ili fıstık, arpa, bağ, buğday, domates, karpuz, kavun, pamuk ve tütün alanlarından da 2010-2011 yılları Mayıs-Temmuz-Ekim aylarında toplanmıştır. Çalışmada ayrıca bölgede günümüze kadar saptanmış nematod türlerinin listesi verilmiştir. *Aphelenchus avenae* Bastian 1965, *Anguina tritici* (Steinbuch) Filipjev, *Merlinius brevidens* (Allen, 1955) Siddiği, 1970, *Pratylenchus neglectus* (Rensch, 1924), *P. thornei* (Sher and Allen 1953), (Sher, 1948), *Paratrophurus acristylus* Siddiği et Siddiği, 1983 ve *Pratylenchoides alkani* Yüksel, 1977 en yaygın bulunan türlerdir. Bu çalışmada *Ditylenchus longicauda* Geraert & Chi, 1988, *Rotylenchus echelimae* Scotto La Massese & Germani, 2000, *Filenchus hamatus* (Thorne & Malek, 1968) Raski & Geraert, 1987, *Helicotylenchus crassatus* Anderson, 1973, *Helicotylenchus goodi* Tikyani et al., 1969 ve *Helicotylenchus oleae* Inserra, Vovlas & Golden, 1979 Türkiye'de ilk kez tespit edilmiştir.

Anahtar sözcükler: Bitki paraziti nematodlar, Güneydoğu Anadolu Bölgesi, sebze, buğday

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² Çukurova University, Faculty of Agriculture, Department of Plant Protection, 01330, Sarıçam, Adana, Turkey

³ Abant İzzet Baysal University, Faculty of Agricultural and Natural Sciences, Department of Wildlife Ecology and Management, Gölköy, 14030, Bolu, Turkey

⁴ Abant İzzet Baysal University, Faculty of Agricultural and Natural Sciences, Department of Plant Protection, Gölköy, 14030, Bolu, Turkey

⁵ Atatürk Horticultural Central Research Institute, 77102 Yalova, Turkey

* Corresponding author (Sorumlu yazar) e-mail: ecekasapoglu@gmail.com

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Introduction

Plant parasitic nematodes are multicellular microorganisms that behave as obligate parasites of plants. Plant parasitic nematodes living outside their host are called ectoparasites and some of them are known as vectors of important plant viruses. Nematodes living inside roots, as migratory or sedentary, are called endoparasites. All plant parasitic nematodes use their stylet to puncture plant cells and to remove the contents. The major symptoms exhibited by plants affected by nematodes include retarded growth, wilting and predisposition to infection by other pathogens (Williamson & Hussey, 1996). Each nematode causes different damage due to secretions of the pharynx. They cause significant yield losses worldwide. The damage caused by plant parasitic nematodes has been estimated at up to \$80 billion per year due to the 10-20% production loss of agricultural yield (Sasser & Freckman, 1987; Bongers & Ferris, 1999; Gaugler & Bilgrami, 2004; Nicol et al., 2011).

There are many diseases and pests known as limiting factors in wheat, vegetables, grapevine, barley, melon and other crops, depending on the region. Among these biotic factors, the most common and important are plant parasitic nematodes of which the most damaging to the world agricultural crops are root-knot (*Meloidogyne* spp.) and cyst (*Heterodera* spp. and *Globodera* spp.) nematodes. Root-knot nematodes have wide host range and infect a number of plant species, both wild and cultivated. It has been found that some nematode species of different cultivated plants are new records for the Turkish fauna. The occurrence in Turkey of *Meloidogyne artiella* Franklin, 1961, emphasize the need to take precautions against plant parasitic nematodes (İmren et al., 2014). *Meloidogyne luci* Carneiro et al., 2014, very similar to *Meloidogyne ethiopica* Whitehead, 1968, was detected in Turkey (Geriç Stare et al., 2017). *Meloidogyne chitwoodi* Golden et al., 1980, is known to be quite common in Central Anatolian, East Anatolia, and Aegean regions (Devran et al., 2009; Özarslandan et al., 2009; Yıldız et al., 2009; Ulutaş et al., 2011; Evlice & Bayram, 2012; Özarslandan et al., 2013). Cyst nematodes can cause up to 50% yield losses in wheat plants. Of this group of nematodes determination of pathotype, species, screening for genetic resistance and phylogenetic analyses were made in Turkey (İmren et al., 2012, 2013; Cui et al., 2017). *Helicotylenchus multincinctus* (Cobb, 1893) Golden, 1956 was found in chickpea, whereas *Pratylenchus thornei* Sher & Allen, 1953 and *Heterodera avenae* Wollenweber, 1924 were reported in wheat in the Southeastern Anatolia Region (Kepenekçi, 2014).

A list of the plant parasitic nematodes with their hosts association and distribution in the Southeast Anatolia Region of Turkey is presented. It includes 240 different Tylenchid species collected from different sites of Turkey. Since 2000, agricultural areas in the Southeast Anatolia Region are irrigated with water derived from different dams, and have become more productive. Despite the importance of agriculture in this region, only a few studies had been undertaken to ascertain the occurrence of plant parasitic nematodes (Öztüzün, 1970; Di Vito et al., 1994; İmren, 2007, 2013; Yıldız, 2007; Kılıç, 2011; Öcal, 2012). Therefore, this study was aimed to determine the important plant parasitic nematode fauna associated to wheat, barley, vegetables, grapevine, pistachio, melon, tobacco, cotton, and watermelon in the area.

Material and Methods

Survey

Surveys were conducted in Mardin, Kilis, Şanlıurfa, Adıyaman, Şırnak Provinces between May and October (Figure 1). Soil samples were taken from 275 wheat, 29 pistachio, 69 barley, 16 tomato, 21 watermelon, 23 melon, 23 cotton and 32 tobacco fields, and 45 grapevines in spring, summer and autumn seasons in 2010-2012. Each soil samples were taken from at least 50-60 different points according to a zigzag pattern in each field with a soil corer to 30 cm deep (Southey, 1986).



Figure 1. Map showing the provinces survey in the Southeast Anatolia Region of Turkey.

Laboratory studies

Each sample was thoroughly mixed and a 100-g subsample processed. To extract vermiform nematodes from the soil, a Petri sieving method, a modification of the enhanced Baermann funnel method, was used (Barker, 1985; Southey, 1986).

In order to identify nematodes at species level, permanent slides of them were prepared. Therefore, nematodes extracted from soil were killed at 65°C and fixed in TAF solution [7 ml formalin (40% formaldehyd), 2 ml triethanolamin and 91 ml pure water] (Hooper, 1986). After the fixation process, nematodes were transferred to solution I (1 part glycerol and 79 parts pure water) at 35-40°C for 12 h and then in solution II (5 parts glycerin and 95 parts 96% ethanol) at 40°C for 3 h. Individuals nematode were put in a desiccator for the period of time required for all remaining water to evaporate (Seinhorst, 1959). The nematodes were kept in pure glycerin and were separated according to their genus then permanently mounted on glass slides using the wax-ring method (Hooper, 1986). The method of Hartman and Sasser (1985) developed for root-knot nematodes identification was used. The vulval sections of root-knot nematode females were cut in 45% lactic acid, and processed into glycerin and used for species-level identification. For *Heterodera* spp., the vulval cone were dissected, bleached in H₂O₂ and prepared in glycerin for identification.

Identification of nematodes

Nematodes were identified by morphological and morphometric characters. Ten nematodes per sample were identified. If ten nematodes were not available, all specimens in the sample were identified. Synonyms, systematic position and phylogenetic classification of Tylenchid nematodes are according to Siddiqi (2000). Taxonomic position and synonyms of *Aphelenchoides* and nematode species belonging to Dorylaimida are according to Hunt (1993).

Results and Discussions

Plant parasitic nematode species identified in this study belong to the genera, *Amplimerlinius* (Siddiqi, 1976) (Tylenchida: Telotylenchidae), *Aphelenchoides* Fischer, 1894 (Aphelenchida: Aphelenchoididae), *Aphelenchus* Bastian, 1965 (Aphelenchida: Aphelenchidae), *Bitylenchus* Filipjev, 1934 (Tylenchida: Belonolaimidae), *Ditylenchus* Filipjev, 1936 (Tylenchida: Anguinidae), *Filenchus* Andrassy, 1954 (Tylenchida: Tylenchidae), *Helicotylenchus* Steiner, 1945 (Tylenchida: Hoplolaimidae), *Heterodera* Schmidt, 1871 (Tylenchida: Heteroderidae), *Meloidogyne* Goeldi, 1892 (Tylenchida: Meloidogynidae), *Merlinius* Siddiqi, 1970 (Tylenchida: Telotylenchidae), *Paratrophurus* Arias, 1970 (Tylenchida: Belonolaimidae), *Pratylenchus* Filipjev, 1936 (Tylenchida: Pratylenchidae), *Pratylenchoides*

Winslow, 1958 (Tylenchida: Pratylenchidae), *Quinisulcius* Siddiqi, 1971 (Tylenchida: Belonolaimidae), *Rotylenchus* Filipjev, 1936 (Tylenchida: Hoplolaimidae), *Rotylenchulus* Linford and Oliveira, 1940 (Tylenchida: Rotylenchulidae), *Scutylenchus* Jairajpuri, 1971 (Tylenchida: Telotylenchidae), *Trophurus* Loof, 1956 (Tylenchida: Belonolaimidae), and *Xiphinema* Cobb, 1913 (Dorylaimida: Longidoridae). The nematode species identified in the survey are presented in Table 1.

Among the 39 species found, six species, *Ditylenchus longicauda*, *Filenchus hamatus*, *Helicotylenchus crassatus*, *H. goodi*, *H. oleae*, and *Rotylenchus echelimaie* are new records for the Turkish nematode fauna. A list of plant parasitic nematode fauna in important cultivated plants in the Southeast Anatolia Region was compiled. Also, additional information is given only for the nematodes species that are new records for Turkey.

Table 1. Plant parasitic nematode species found in the soil during this study in the Southeast Anatolia Region of Turkey

Family*	Species**	Host	Locality
Anguinidae	<i>Ditylenchus longicauda</i> ***	barley	Adiyaman
	<i>Ditylenchus myceliophagus</i>	barley, tobacco, wheat	Adiyaman
	<i>Ditylenchus dipsaci</i>	wheat	Mardin
Aphelenchidae	<i>Aphelenchus avenae</i>	barley, grapevine, melon, pistachio, wheat	Adiyaman
		wheat	Mardin
	<i>Amplimerlinius vicia</i>	watermelon, wheat	Adiyaman
	<i>Bitylenchus goffarti</i>	tomato	Adiyaman
		wheat	Kilis
	<i>Paratrophurus acristylus</i>	barley, cotton, grapevine, watermelon, wheat	Adiyaman
		wheat	Kilis
	<i>Paratrophurus loofi</i>	wheat	Adiyaman
	<i>Paratrophurus striatus</i>	barley, cotton, watermelon, wheat	Adiyaman
	Belonolaimidae	<i>Quinisulcius capitatus</i>	tobacco, tomato
<i>Scutylenchus cylindricaudatus</i>		wheat	Şanlıurfa
		wheat	Şırnak
<i>Scutylenchus quadrifer</i>		wheat	Mardin
		wheat	Mardin
<i>Scutylenchus quadrifer</i>		barley, melon, watermelon, wheat	Adiyaman
<i>Scutylenchus stegus</i>		tobacco	Adiyaman
<i>Trophurus imperialis</i>		grapevine, melon	Adiyaman
Heteroderidae	<i>Heterodera latipons</i>	wheat	Adiyaman
	<i>Helicotylenchus crassatus</i> ***	barley, wheat	Adiyaman
Hoplolaimidae	<i>Helicotylenchus digonicus</i>	grapevine, pistachio	Adiyaman
	<i>Helicotylenchus exallus</i>	grapevine	Adiyaman
	<i>Helicotylenchus goodi</i> ***	grapevine	Adiyaman
	<i>Helicotylenchus oleae</i> ***	melon	Adiyaman
	<i>Rotylenchus cypriensis</i>	grapevine	Adiyaman
	<i>Rotylenchus echelimaie</i> ***	wheat	Mardin

Table 1. (Continued)

Family*	Species**	Host	Locality
Longidoridae	<i>Xiphinema index</i>	pistachio	Adiyaman
	<i>Xiphinema pachtaicum</i>	grapevine, pistachio	Adiyaman
Meloidogynidae	<i>Meloidogyne arenaria</i>	tobacco, tomato	Adiyaman
	<i>Meloidogyne incognita</i>	tobacco, tomato	Adiyaman
	<i>Meloidogyne javanica</i>	tomato	Adiyaman
Pratylenchidae	<i>Pratylenchoides alkani</i>	barley, melon, watermelon, wheat, tobacco	Adiyaman
	<i>Pratylenchus crenatus</i>	melon	Adiyaman
	<i>Pratylenchus neglectus</i>	barley, tobacco	Adiyaman
	<i>Pratylenchus thornei</i>	cotton, grapevine, melon, tobacco, watermelon, wheat	Adiyaman
Rotylenchulidae	<i>Rotylenchulus macrosoma</i>	wheat, cotton	Adiyaman
Telotylenchidae	<i>Merlinius brevidens</i>	cotton, barley, melon, tobacco, watermelon, wheat,	Adiyaman,
		wheat	Mardin, Kilis
	<i>Merlinius microdorus</i>	barley, grapevine, pistachio, wheat	Adiyaman
Tylenchidae		wheat	Mardin, Kilis
	<i>Filenchus cylindricauda</i>	wheat	Adiyaman
	<i>Filenchus cylindricus</i>	wheat	Adiyaman
	<i>Filenchus hamatus</i> ***	tomato	Adiyaman
	<i>Filenchus thornei</i>	wheat	Adiyaman

*: Families are listed alphabetically;

** : species are listed alphabetically;

***: the new species for Turkish nematode fauna.

Additional information on the new species records for Turkey

Filenchus hamatus (Thorne & Malek, 1965)

Synonym: *Tylenchus hamatus* (Thorne and Malek, 1968)

Hosts and distribution: Previously reported by Duan et al. (1995) in soybean in South China; Walters et al. (2008) in peach nurseries in Illinois, USA; Baird & Bernard (1984) in wheat and soybean. There is no previous record for Turkey Therefore this is a new record of the species for Turkish nematode fauna and in particular of tomato in Adiyaman Province.

Ditylenchus longicauda Geraert & Choi, 1988

Hosts and distribution: This species was first described by Geraert & Choi (1988) in rice area in Korea. Later it was recorded in Romania and in association with rice in Korea (Choi et al., 1989; Dobrin & Geraert, 1994). During this study, *D. longicauda* was recorded in barley in the Adiyaman Province. This is a new record of the species for the Turkish nematode fauna.

Helicotylenchus crassatus Anderson, 1973

Hosts and distribution: Anderson (1973) found this species in white clover (*Trifolium repens* L.) and red clover (*Trifolium pratense* L.), clover (*Trifolium* sp.), tobacco (*Nicotiana tabacum* L.), apple (*Malus x domestica* Borkh) trees, grass and in the bird's-foot trefoil (*Lotus corniculatus* L.) plant in Canada, Quebec and Ontario. It was also reported in carnation and walnut in Iran (Deimi et al., 2008; Bahmani et al., 2013). In Turkey, *H. crassatus* was found in wheat and barley in the Adiyaman Province. This is new record of the species for the Turkish nematode fauna.

Helicotylenchus goodi Tikyani et al., 1969

Synonym: *Helicotylenchus gratus* Patil and Khan, 1983 (syn. by Lal and Khan, 1977)

Hosts and distribution: This species was detected in guava (*Psidium guajava* L.) in India by Tikyani et al. (1969) and Khan et al. (2007). *Helicotylenchus goodi* was recorded in grapevine in Adiyaman Province and is a new record for the Turkish nematode fauna.

Helicotylenchus oleae (Inserra, Vovlas & Golden, 1979)

Hosts and distribution: This species was first recorded by Inserra et al. (1979) in olive in Italy. Additionally, it was found in olive and grapevine in Spain and Greece (Palomares-Rius et al., 2015; 2018). This species was identified in association with melon in Adiyaman Province. This is the first record of *H. oleae* for the Turkish nematode fauna.

Rotylenchus echelimae Scotto La Massese & Germani, 2000

Hosts and distribution: Previously, it has only detected in Menton, France (Scotto La Massese & Germani, 2000). In this study, *R. echelimae* was found in association with wheat in Mardin Province and is the first record for the Turkish nematode fauna.

Discussion

In this study a total of 39 plant parasitic nematode species were found in the Southeast Anatolia Region of Turkey. Among them, 6 species were found for the first time in Turkey and considered as new records for the Turkish nematode fauna.

In previous studies, 37 plant parasitic nematode species were detected in this region (Table 2), totaling 76 the nematode species in the Southeast Anatolia Region. Among these species 16 species have economic importance in other regions of Turkey.

The genus *Ditylenchus* Filipjev, 1936 has more than 80 valid species (Brzeski, 1991), grouped as mycophagous and phytophagous species (Qiao et al., 2016). In this study, three species were identified with *Ditylenchus dipsaci* (Kühn, 1857) Filipjev, 1936, being more important than *Ditylenchus myceliophagus* and *D. longicauda*. *Ditylenchus dipsaci* is one of the most economically important plant parasitic nematodes; mostly it infests onion and garlic, as well as many other crop plants and weeds worldwide. Population densities of *D. dipsaci* of 10 individuals/500 g of soil may lead to significant crop losses (Palo, 1962). *Ditylenchus dipsaci* has been recorded in onion fields in Turkey (Mennan & Ecevit, 2002; Yavuzaslanoğlu et al., 2015). Investigation on races of *D. dipsaci* and host status in Turkey should be undertaken.

Spiral nematodes, *Helicotylenchus dihystera* and *H. multicinctus* are observed most frequently in banana plantations in the Mediterranean Region of Turkey (Elekcioğlu, 1992; Özarslandan & Dinçer, 2015; Kasapoğlu et al., 2015). However, *H. dihystera* can also be found in vegetables. The economic importance of the *Helicotylenchus* spp., *H. crassatus*, *H. digonicus*, *H. exallus*, *H. goodi*, *H. oleae*, found in the Southeast Anatolia Region, is not known. Therefore, more research on occurrence, biology, distributions and economic importance of these and other plant parasitic nematodes is needed to understand the role that these nematodes have in the Southeast Anatolia Region.

Pratylenchus thornei, *Heterodera avenae*, *H. filipjevi* and *H. latipons* are widespread and cause severe yield losses in wheat in Turkey (Gözel, 2001) and other countries (Lasserre et al., 1994; Taheri et al., 1994; Smiley et al., 2004). İmren (2013) and Gözel (2001) detected these species in the Southeast Anatolia and Mediterranean Regions, respectively. Yield losses caused by *H. avenae* were estimated to be up to 26% in the Southeast Anatolia Region of Turkey and up to 57% by *H. avenae*, 40% by *P. thornei* in East Mediterranean Region of Turkey, and 52% by *H. latipons* in İnan (Gözel, 2001; Hajjhasani et al., 2010; İmren, 2013). It should be taken into consideration that *Heterodera* species may cause economic yield losses in wheat growing areas. Also, it is not feasible to use nematicide for control root lesion and cyst nematodes in wheat. So, studies on screening of resistant wheat genotypes and management strategy have been carried out in Turkey in recent years (Dababat et al., 2015; İmren et al., 2015; Toktay et al., 2015).

Table 2. Plant parasitic species identified previously in the Southeast Anatolia Region of Turkey

Family*	Species**	Host	Locality	Reference
Belonolaimidae	<i>Amplimerlinius vicia</i>	wheat	Diyarbakır	İmren, 2008
	<i>Amplimerlinius vicia</i>	lentil, unidentified grass	Şanlıurfa	Yıldız, 2007
Anguinidae	<i>Anguina tritici</i>	wheat	Diyarbakır	İmren, 2008
		wheat	Şanlıurfa	Öztüzün, 1970
Aphelenchidae	<i>Aphelenchus avenae</i>	eggplant, grapevine, pepper, tobacco, tomato, wheat	Diyarbakır	İmren, 2008
		wheat	Mardin	Kılıç, 2011
Aphelenchoididae	<i>Aphelenchoides bicaudatus</i>	wheat	Mardin	Kılıç, 2011
Belonolaimidae	<i>Paratrophurus acristylus</i>	wheat	Diyarbakır	İmren, 2008
		lentil	Şanlıurfa	Yıldız, 2007
	<i>Paratrophurus striatus</i>	wheat	Mardin	Kılıç, 2011
	<i>Paratrophurus striatus</i>	wheat	Diyarbakır	İmren, 2008
Heteroderidae	<i>Heterodera avenae</i>	barley, lentil, wheat,	Şanlıurfa	Yıldız, 2007
		wheat	Diyarbakır	İmren, 2013
	<i>Heterodera avenae</i>	wheat	Gaziantep, Kilis, Şanlıurfa, Mardin, Şırnak, Kahramanmaraş	İmren et al., 2011
	<i>Heterodera filipjevi</i>	wheat	Şanlıurfa	Yıldız, 2007
<i>Heterodera latipons</i>	wheat	Şanlıurfa	Yıldız, 2007	
Hoplolaimidae	<i>Helicotylenchus ciceri</i>	lentil	Diyarbakır	Di vito et al., 1994
		chickpea	Mardin, Şanlıurfa	Di vito et al., 1994
	<i>Helicotylenchus dihystra</i>	grapevine, tomato, pepper, eggplant, tobacco	Diyarbakır	İmren, 2008
		barley, grapevine, lentil, pistachio, unidentified grass	Şanlıurfa	Yıldız, 2007
<i>Helicotylenchus tunisiensis</i>	eggplant, grapevine, pepper, tomato	Diyarbakır	İmren, 2008	
Longidoridae	<i>Xiphinema diversicaudatum</i>	grapevine	Diyarbakır	İmren, 2008
	<i>Xiphinema index</i>	grapevine, pistachio, wheat	Şanlıurfa	Yıldız, 2007
	<i>Xiphinema pachtaicum</i>	grapevine	Diyarbakır	İmren, 2008
		barley, lentil, wheat	Şanlıurfa	Yıldız, 2007
Meloidogynidae	<i>Meloidogyne arenaria</i>	eggplant, pepper, tobacco, tomato	Diyarbakır	İmren, 2008
	<i>Meloidogyne incognita</i>	cucumber, eggplant, grapevine, pepper, tobacco, tomato	Diyarbakır	İmren, 2008
		eggplant, parsley, pepper, tomato	Şanlıurfa	Yıldız, 2007
Paratylenchidae	<i>Paratylenchus israelensis</i>	barley, grapevine, lentil, pistachio, wheat	Şanlıurfa	Yıldız, 2007

Table 2. (Continued)

Family*	Species**	Host	Locality	Reference
Pratylenchidae	<i>Pratylenchoides alkani</i>	eggplant, grapevine, pepper, tomato	Diyarbakır	İmren, 2008
		cotton, unidentified grass, wheat	Şanlıurfa	Yıldız, 2007
		wheat	Mardin	Kılıç, 2011
	<i>Pratylenchoides erzurumensis</i>	grapevine	Diyarbakır	İmren, 2008
		unidentified grass, wheat	Şanlıurfa	Yıldız, 2007
		chickpea	Mardin	Di vito et al., 1994
	<i>Pratylenchoides leiocauda</i>	chickpea, lentil	Diyarbakır	Di vito et al., 1994
		chickpea	Mardin, Şanlıurfa	Di vito et al., 1994
	<i>Pratylenchoides sheri</i>	wheat	Diyarbakır	İmren, 2008
	<i>Pratylenchus crenatus</i>	wheat	Diyarbakır	İmren, 2008
		cotton	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus fallax</i>	eggplant, grapevine, pepper, tomato, wheat	Diyarbakır	İmren, 2008
	<i>Pratylenchus flakkensis</i>	cotton	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus loosi</i>	lentil	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus mediterraneus</i>	chickpea	Diyarbakır, Gaziantep	Di vito et al., 1994
	<i>Pratylenchus neglectus</i>	wheat	Diyarbakır	İmren, 2008
		unidentified grass, wheat	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus penetrans</i>	eggplant, grapevine, pepper, tomato, wheat	Diyarbakır	İmren, 2008
		chickpea, lentil	Diyarbakır	Di vito et al., 1994
		chickpea	Gaziantep	Di vito et al., 1994
		chickpea	Şanlıurfa	Di vito et al., 1994
		corn, lentil, unidentified grass	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus pratensis</i>	wheat	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus scribneri</i>	unidentified grass	Şanlıurfa	Yıldız, 2007
	<i>Pratylenchus thornei</i>	wheat	Diyarbakır	İmren, 2008
		chickpea, lentil	Diyarbakır, Mardin	Di vito et al., 1994
barley, cotton, unidentified grass, wheat		Şanlıurfa	Yıldız, 2007	
wheat		Mardin	Kılıç, 2011	
Rotylenchulidae	<i>Rotylenchulus macrosoma</i>	cotton	Şanlıurfa	Yıldız, 2007
		wheat	Mardin	Kılıç, 2011
Telotylenchidae	<i>Merlinius brevidens</i>	grapevine, wheat	Diyarbakır	İmren, 2008
		cotton, lentil, unidentified grass	Şanlıurfa	Yıldız, 2007
		wheat	Mardin	Kılıç, 2011
	<i>Merlinius microdorus</i>	unidentified grass	Şanlıurfa	Yıldız, 2007
		wheat	Mardin	Kılıç, 2011
	<i>Scutylenechus rugosus</i>	grapevine, wheat	Diyarbakır	İmren, 2008
<i>Tylenchorhynchus usmanensis</i>	cotton	Şanlıurfa	Yıldız, 2007	

*: Families are listed alphabetically;

** : species are listed alphabetically.

Meloidogyne arenaria (Neal, 1889) Chitwood, 1949, *M. incognita* (Kofoid & White, 1919) Chitwood 1949, and *M. javanica* (Treub, 1885) Chitwood, 1949 have been detected in vegetables and known to infest many crops in Turkey. While *Meloidogyne incognita*, *M. javanica*, *M. arenaria* have been found in warm areas, *Meloidogyne hapla* Chitwood, 1949 and *M. chitwoodi* occur in cool areas (Kaşkavalcı & Öncüer, 1999). Depending on population density, *Meloidogyne* spp. can cause yield losses of 22% in okra, 15% in peppers, 29% in tomato and 23% in eggplant (Sasser, 1979). Therefore, study on the impact of these nematode on different crop plants in Turkey is suggested.

Xiphinema causes root tip galling and damage a broad range of crop plants by their direct feeding on root tips. They are migratory ectoparasite and polyphagous nematodes. *Xiphinema* includes important species that transmit plant viruses, such as *Xiphinema index* Thorne & Allen, 1950 which is well known as the natural vector of *Grapevine Fanleaf Virüs* to grapevine. *Xiphinema index* and *X. pachtaicum* (Tulaganov 1938) Kirjanova, 1951 have been identified in Mediterranean, Marmara, and Aegean Regions (Elekcioğlu, 1992; Nogay et al., 1995; Mıstanoğlu et al., 2015). As a result of this study, additional harmful plant parasitic nematode fauna was revealed in the Southeast Anatolia Region. Determination of new species from soil samples taken at different times and in different regions is also necessary to ensure early detection of new pests. Given the difficulties of nematode surveys and extraction methods, population densities of existing species and new species need to be determined by systematically sampling from different regions at defined intervals.

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