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## IDENTIFICATION AND DISTRIBUTION OF SOME PLANT-PARASITIC NEMATODES IN VINEYARDS OF SOUTH – WESTERN OF IRAN

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### ABSTRACT

Grape (*Vitis* spp) belonging to family Vitaceae is a commercially important fruit crop. The most grape producing countries have one or more soil problems such as, salinity, drought and harmful biotic agents such phylloxera, nematodes and fungal pathogens. Nematodes are one of the most important soil pathogenic agents and can cause considerable damage to grapes in high populations. There are no studies on biodiversity of plant parasite nematodes in Vineyards of Chaharmahal and Bakhtiyari province of Iran. So, in order to identify the plant parasitic nematodes in Vineyards of Chaharmahal and Bakhtiyari province, south-western of Iran, 350 soil samples were collected from different regions during years 2019-2020. The nematodes were extracted by centrifugal flotation technique and tray methods. Then, they were fixed and transferred to glycerin. The permanent slides were prepared and the nematodes were studied by light microscopy and valid keys. In this study, 30 Species belonging to 21 genera were identified: *Amplimerlinius globigerus*, *Aphelenchus avenae*, *Aphelenchoides limberi*, *Basiria graminophila*, *Boleodorus thylactus*, *Coslenchus polygyrus*, *Ditylenchus dipsaci*, *D. parvus*, *D. tenuidens*, *Filenchus vulgaris*, *Helicotylenchus vulgaris*, *H. digonicus*, *H. minzi*, *H. pseudorobustus*, *Irantylenchus vicinus*, *Merlinius brevidens*, *M. microdorus*, *Mesocriconema xenoplax*, *Neopsilenchus magnidens*, *Nothotylenchus hexaglyphus*, *Pratylenchoides ritteri*, *P. erzumensis*, *Pratylenchus neglectus*, *P. thornei*, *Psilenchus iranicus*, *P. aestuarius*, *Scutylenchus rugosus*, *Tylenchus arcuatus*, *Zygotylenchus guevaria*, *Xiphinema index*. Among them, the highest percentage of abundance, were *Helicotylenchus vulgaris*, *Filenchus vulgaris*, *Xiphinema index*, *Pratylenchus neglectus* by 50%, 42%, 38% and 31%, respectively.

**Keywords:** Chaharmahal and Bakhtiyari, province, Grapes, Iran, Plant parasitic nematode.

### INTRODUCTION

Grape (*Vitis vinifera*) is a dicotyledonous plant belonging to family Vitaceae. This plant is one of the most important commercial plants in Iran (Rossetto, 2002). It is native to Asia Minor and the Caucasus region, was distributed throughout Europe, and is now extensively grown in the Mediterranean Basin, the subtropical regions of Australia, Southern Africa, and North and South America (Brown, 1993). Today, grapes are grown in more than 40 countries around the world. Over the last three decades, the area under cultivation of this crop

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has been steadily increasing (Porica, et al, 2015). The major grape producing countries are China, Italy, USA, France, Spain and Turkey. According to FAO statistics in 2017, Iran is one of the most important grape producing countries in the world and is ranked eighth in terms of area under grape cultivation (FAO, 2017). Chaharmahal and Bakhtiyari province is one of the producers of grapes in Iran. In general, grape cultivars cultivated in Iran are: Maleki, Sahebi, Asgari, Razeghi, Hosseini, Rish Baba, Sabz bi daneh, Yaghoti, Siah Sardasht, Fakhri, Keshmeshi and Shirazi (SPCRI, 2020). Global data show that income from grape exports in Iran is over \$ 150 millions for one year and, Iran was also the third largest exporter of raisins in the world in 2019 with exports worth \$ 166.8 millions (FAO, 2019). Annually, pests, diseases and weeds spread in the vineyards and cause a lot of damage to the producers of this valuable product

(Carisse *et al.*, 2006). Therefore, identification and management of these harmful factors, including nematodes, can increase performance and thus economic profitability play a big role (Quist *et al.*, 2015). Considering, that plant parasitic nematodes are serious challenge to productivity of many fruits and horticultural trees including grapes (Askary and Haidar 2010). It is important to know the nematode species present and to estimate their approximate population. Due to the role, economic importance and global position of grape production, extensive studies have been conducted to identify plant parasitic nematodes worldwide and in Iran. Nearly, 2500 species of plant parasitic nematodes have been reported in the world, of which around 1600 are associated with grapevines

(Askary *et al.*, 2018). Plant parasitic nematodes have often been found in soils where grapevines showed reduced vigor (Brown *et al.*, 1993). However, not all of these species have been recognized as causing economically significant damage (Nicol *et al.*, 1999). According to previous reports of the existence these nematodes in Iran, this article discusses the distribution and frequency of identified nematodes from vineyards of Chaharmahal and Bakhtiyari province. The distribution of any nematode was determined by considering the region and location of sampling. The frequency of identified species in terms of percentage was calculated based on the number of samples with the desired species in relation to the total samples.

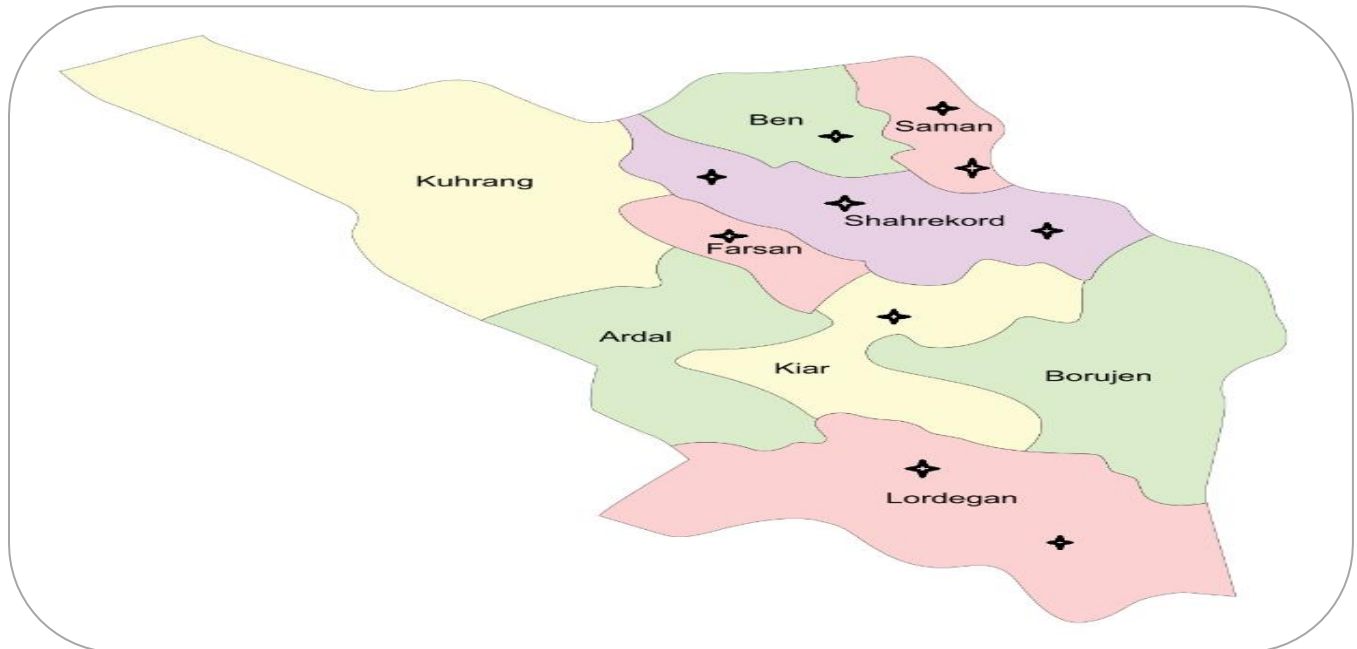



Figure 1. Map of Chaharmahal and Bakhtiyari province, south-western of Iran. - The symbol  indicates the sampling locations.

#### MATERIALS AND METHODS

**Soil sampling:** Soil and root samples were randomly collected from the rhizosphere of Vineyards in Chaharmahal and Bakhtiyari province, South-Western of Iran. A total of 350 samples were collected with a shovel from the depth of 10-40 cm, placed in polyethylene bags, with necessary labeled and brought to the laboratory and processed.

**Processing of samples:** Nematodes were extracted from soil samples by using the rapid centrifugal-flotation method (Jenkins, 1964) and tray method (Whitehead and Hemming, 1965), killed and fixed according to (De Grisse, 1969). Genera and species were identified based on morphological and morphometric characters (Siddiqi, 2000 ; Geraert, 2008). Specimens were heat-killed by adding boiling 4% formalin solution, and were then transferred to anhydrous glycerin according to De Grisse, 1969. Permanent slides were prepared and studied using a light Olympus CX31 microscope. Measurements and drawings were performed using a drawing tube attached to an Olympus CX31 light microscope (LM). Morphometric abbreviations and ratios were used in the present study (Siddiqi, 2000). Nematodes were identified based on morphological and morphometric characteristics, using available identification keys and original descriptions (Raski, 1975; Brzeski, 1991 and Geraert, 2008).

**Measurement and drawings:** Measurements were taken with an ocular micrometer of "Olympus CX31" model microscope. Drawings were made with drawing tube attached to the compound microscope.

**RESULTS AND DISCUSSION**

Nematological survey of vineyardes in Chaharmahal and Bakhtiyari Province revealed the presence of many plant-parasitic nematode genera and species. In total, 30 Species belonging to 21 genera were identified in present study. Survey results are summarized in (Table1, Figure2).29 species belong to the Infra order Tylenchomorpha and one species (*Xiphinema index*) belongs to the order Dorylaimida. Most of the identified species belonged to the genera *Helicotylenchus*, *Pratylenchus* and *Ditylenchus*.

Among them, the highest percentage of abundance, were *Helicotylenchus vulgaris*, *Filenchus vulgaris*, *Xiphinema index* and *Pratylenchus neglectus* by 50%,42%,38% and 31%respectively in surveyed areas (Table1). Next were other root-lesion nematodes (*Z. guevarai* and *P. thornei*) were detected in moderate (20 %) to low (7.1%) frequencies in soil and root samples. The lesion nematodes such as *P. neglectus*, *P. thornei*, and *Z. guevarai*, are common parasites of monocotyledonous and dicotyledonous weeds and are not expected to cause important economic damage to grapevines (Castillo, 2007).Also according to the data in Table 1, can be said, among the identified nematodes, *Scutylenechus rugosus* has a frequency of 23%. The abundance of *M. xenoplax* in the studied vineyards is 15%.Feeding of this

nematode on grapevine was reported to cause rapid darkening and destruction of root tissues, thus resulting in stunted root systems with a few feeder roots (Santo and Bolander, 1977). In addition, the frequency of other identified nematodes varies between 5 to 20%.Root knot nematodes (*Meloidogyne* spp) are the most important group of plant parasitic nematodes due to their have a broad host range wide, global distribution and interaction with some fungi and plant pathogenic bacteria (sassre,1979).Therefore, the presence of this genus of nematodes in the soil around the roots of grape trees is very likely.However, in this study, the root knot nematode was not found in soil and grape roots.

Table 1. List of identified nematodes from Grapes in this study, with morphometric characters and their abundance. All measurements are in µm.

No.	Nematode species	Abundnce(%)	Morphometric Characters
1	<i>Amplimerliniusglobigerus</i>	9.4	6♀:L=749.5(723.35-880.6);a=33.55 (29.5-35.4);b=4.9 (4.7-5.2);c=17.38(15.2-22.5); c`= 2.8(2.4-3.6);V=55.3 (53-60);stylet=21 (19.76-22.8);Tail =39.4(33.44-47.12); Tail annuli = 37-40.
2	<i>Aphelenchusavenaeae</i>	6	9♀:L=680(566.1-893.18);a=32 (29.5-37.5);b=5 (4.4-5.6);b`=4 (3-5);c=34.5 (27.5-38.1);c`=1.8(1.6-2.1);V=75 (67-80);stylet=17.8(15.2-21.28);Tail=20.1(18.24-22.8). 5♂:L=548.4(377.4-616.42);a=31.98(27.5-330.7);b=4.3(4.2-4.5);c=19.32(18.6 20) ; c`= 2.6(2.5-2.8); stylet=16.4(15.2-18.24);Tail=26.1(19.76 30.4); Gubernaculum = 15.2; Spicules=6.69(4.56-9.12).
3	<i>Aphelenchoideslimberi</i>	2.8	5♀:L=557.4(516.8-603.84);a=34.76(32-39);b=4.9(4.3-5.5);b`=5.3 (4.8-5.8);c=14.9(13.2-18); c`= 3.1(2.5-3.6);V=66.6(6270);stylet=11.8((10.6-13.68);Tail=43.7(33.44-53.2).
4	<i>Basiriagraminophila</i>	5.7	8♀:L=706.9(660.45-817.7);a=36.5(30.1-44.8);b=5.1(4.1-5.7);c=7.5(4.3-8.6);c`=9.92(6.9-12.5); V=65.8(61-80); V`=81.2(8083);stylet=9.96(9.3-10.64);Tail =127.7(94.84-148.8).
5	<i>Boleodorusthylactus</i>	2.8	4♀:L=688.7(641.58-723.35);a=38 (33.9-42.2);b=6.3(5.6-7.7);c=11.3(8.9-12.9);c`=5.35(4.7-6.2);V=77.5(73-81);stylet=8.06(7.44-8.68);Tail67.75(62-77.5).

6	<i>Coslenchuspolygyrus</i>	10.5	8♀:L=693.4(566.1-943.5);a=33.6(31-35);b=5.5(5-6.2);c=5(3.3-6.3);c`=11.8(9.1-15.7);V=66.7 (61-67);stylelet=11.9(10.54-15.2);Tail=128.6(96.1-144.4);Reos=57(56-58);Rex=41(40- 43); Rvu=151(145-155);Rvan=41(40-43).
7	<i>Ditylenchus dipcasi</i>	12	8♀:L=798.5(597.55-947.95);a=39.8(34.4-47.9);b=6.2(5.9-6.8);c=12.6(9.5 16.5 ); c`= 5.2 (4.1-6.2);V=80(78-82); stylelet=9.1(7.6-10.6); Tail length=79(76-91.2). 5♂: L=844.4(673.03-1132.2);a=38.83(36.8-41.3);b=5.07(4.6-5.6);c=14.6(12.4-17.7); c`=5.05 (4.5-6.1);stylelet=9.12 (7.6-12.6);Tail =7.18(48.64-63.84);Gubernaculum=8.36(7.6-12.16); Spicules=22.04(16.72-27.36).
8	<i>Ditylenchus parvus</i>	16.2	14♀:L=573.9(553.52-792.54);a=40.2(30.4-46.6);b=5.4(5.1-6.1);c=6.6(5.9-10.2);c`=8.06(5.9-9.2);V=76.5(68-85);stylelet=7.7(7.6-8.68);Tail=89.6(88.16-132.2).
9	<i>Ditylenchus tenuidens</i>	7.1	5♀:L=798.83(629-849.15);a=36.6(34.3-41.3);b=5.8(5-6.8);c=11.77(12.9-15.5);c`=6.05 3.8-4.4);V=78.5(64-85);stylelet=9.1(8.68-9.92);Tail =59.3(53.94-65.1). 4♂:L=635.29(597.55-673.03);a=39.75(39.3-40.2);b=4.8(4.8-4.9);c=4(3.1-5);c`=18.6(15.5-21.7);stylelet=7.75 (7.44-8.06);Tail=34.72(3138.44) Gubernaculum=8.3(7.6-9.12);Spicules= 17.05(15.5-18.6).
10	<i>Filenchus vulgaris</i>	42	15♀:L=704.48(578.68-773.67);a=34.1(26.1-42.4);b=6.4(5.2-7.8);c=7(5.9-7.8);c`=12.6 (9.1-17);V=60.7(53-65);stylelet=11.47(9.315.2);Tail=125.5 (96.1-167.2). 4♂:L=668.3(566.1-754.8);a=34.25(22.6-43.4);b=5.8(5.3-6.8);c=7(5.9-7.8);c`=14.75 (11.4-17.5);stylelet=10.37 (9.12-12.6);Tail length=131.8 ( 99.2-159.6);Gubernaculum=7.22(6.08-7.6);Spicules=18.62(15.2-22.8).
11	<i>Helicotylenchus vulgaris</i>	50	6♀:L=944 (723.35-1132);a=30.2 (23.7-36);b=8.3 (5.4-10.6);c=61.5 (47.5-82.7);c`=0.9(.69 -1.2);V=56.78 (50-62);stylelet=31.6 (30.434.96);Tail=15.5(13.68-18.6).
12	<i>Helicotylenchusdigonicus</i>	12	9♀:L=762(566.1-943.5);a=28.1(24.8-34.4);b=8.3 (5.4-10.6);b`=5.8(4.7-7.4);c=60.6 (56.3-71); c`=0.8 (0.6-1.5);V=57.5 (52-68);stylelet=27.9 (21.08-31.92);Tail=17.2(15.2-19.76).
13	<i>Helicotylenchusminzi</i>	8.5	5♀:L=857 (817.7-849.15);a=35.3(32.1-37.2);b=6.8(6.2-7.3);b`=6.25(5.7-6.5);c=43.9 (38.3-50.7);c`=1.17(1.04-1.3);V=61.25 (6062);stylelet=24.32;Tail=20(15.5-25.42).
14	<i>Helicotylenchuspseudorobustus</i>	8.5	6♀:L=702.3(691.9-754.8);a=25.9(22.7-27.5);b=4.9(4.5-5.5);b`=4.4(4.1-5);c=37.85(32.5-47) ; c`= 1.1(1.1-1.3);V=68;stylelet=25.84;Tail=19.2(16.72-21.28).
15	<i>Irantylenchusvicinus</i>	18.5	10♀:L=723.2 (660.45-880.06);a=41.5(32.3-48.2);b=7.1(6.1-8);c=6.4(4.3-8.5);c`=7.5(5.2-10);V=68.8 (57-81);stylelet=9.74(8.68-11.76);Tail =113.1(100-125.8).
16	<i>Merliniusbrevidens</i>	18	10♀:L=697(578.68-691.9);a=31.93(26.1-36.8);b=5.7(4.2-7.5);c=12.87(10.9 15.1); c`= 3.19(2.5-3.8);V=53.7(51-59);stylelet=16.14 (14.88-18.24);Tail=44.9(34.1- 49.6) ; Tail annuli=35-45.

17	<i>Merliniusmicrodorus</i>	20	9♀:L=566.1(534.65-629);a=30.22(26.6-33.8);b=5.6(4.1-7.6);c=13.32(11.1-14.5);c`=3.42(3-3.8);V=50.8(48-52);Stylet=14.7(13.68-15.5);Tail=41.3(41-56);Tail annuli=50-51.
18	<i>Mesocriconemaxenoplax</i>	15	7♀:L=567.89(534.65-603.84);a=9.41(8.4-9.8);b=3.4(3.1-4.1);c=13.8(10.6-16.3);V=92(88-96);Stylet=65.7(72.96-79.04);Tail=41.9(36.48-53.2);R=97(86-104);Rst=14.8(13-18);Rb=6.5(6.08-7.6);Roes=27.1(21-30);Rex=26.5(24-29);Rv=10.7(7-10);Ran=7(7-10);VL/VB=1(1-1.1).
19	<i>Neopsilenchusmagnidens</i>	10	7♀:L=780.7(566.1-943.5);a=38(21.9-47.3);b=6(4.7-5.6);c=6.6(5.2-8.1);c`=9.1(7.7-13.5);V=68.8(66-79);stylet=10.9(8.06-12.16);Tail=114.9(88.9-145.1).
20	<i>Nothotylenchushexaglyphus</i>	7.1	5♀:L=666.74(566.1-742.22);a=31.5(27.9-34.8);b=5.2(4.8-5.4);c=12.6(10.5-16.7);c`=4.7(4.1-5);V=76.25(77-80);stylet=7.2(6.08-7.6);Tail=65.36(50.16-79.04).
21	<i>Pratylenchoidesritteri</i>	8.2	6♀:L=692.9(660.45-817.7);a=31.5(28.4-33.6);b=5.7(5.1-7.1);b`=5.4(5.2-5.6);c=14.6(12.6-16.2);c`=3.1(3-3.3);V=57(48-59);stylet=16(18.24-21.28);Tail=47.5(42.56-51.46).
22	<i>Pratylenchoideserzumensis</i>	4	4♀:L=840(764.38-899.47);a=26.3(24.6-30.9);b=6.45(5.4-7.1);c=11.2(1.03-22.6);c`=2.3(2.2-2.5);V=59.2(56-61);stylet=23.4(22.8-24);Tail=64.3(48.64-86.64).
23	<i>Pratylenchus. thornei</i>	31	5♀:L=499.52(456-532);a=24.76(20.5-27.5);b=6.2(5-8.7);b`=4.7(4.4-5);c=21.78(19.4-24.5);c`=2.28(1.9-2.8);V=77.4(75-81);stylet=17.9(15.23-19.76);Tail=20.3(15.5-24.1).
24	<i>Pratylenchus neglectus</i>	7.1	6♀:L=532.5(478.04-629);a=28.1(24.8-34.4);b=5.2(4-5.3);b`=4.2(3.9-4.6);c=23.2(15.9-36.2);c`=2.15(1.6-2.5);V=73.1(64-79);stylet=17.21(15.2-18.24);Tail=27.72(17.3633.44).
25	<i>Psilenchusiranicus</i>	5.7	4♀:L=1391.6(1258-1572.5);a=35.3(32.6-38.3);b=6.4(6.1-7.6);c=7.9(6.5-9.3);c`=6.7(6.1-7.6);V=50.25(49-52);stylet=16.57(13.68-18.24);Tail=175.1(152-197.6).
26	<i>Psilenchusaestuarius</i>	5.7	6♀:L=873.05(830.28-943.5);a=38.7(32.6-42);b=5.7(5.2-6.2);c=6.14(5-6.9);c`=9.74(9.2-10.9);V=49.8(47-51);stylet=14.5(13.68-15.2);Tail=142.88(135.28-168.68).
27	<i>Scutylenchusrugosus</i>	23	15♀:L=814(805.12-943.5);a=33.5(29.4-38.7);b=5.8(4.9-6.8);c=14.3(12.2-16);c`=3.2(2.7-3.7);V=55.2(50-61);stylet=22.8;Tail=56.4(57.04-68.2);Tail annuli=22-28.
28	<i>Tylenchusarcuatus</i>	7.1	5♀:L=715.8(566.1-880.6);a=31.74(28.9-34);b=5.74(5-7.2);c=7.7(6.6-9.3);c`=7(6.6-7.7);V=69.4(66-76);stylet=15.8(12.4-15.2);Tail=92.4(74.48-110.96).
29	<i>Zygotylenchusguevariai</i>	20	9♀:L=570(471.2-660);a=28(20.6-32.2);b=7(6.6-7.6);b`=5.5(5-6.4);c=21.3(18.7-23.8);c`=2.1(1.95-2.6);V=62.8(62-78);stylet=16.3(15.218.24);Tail=20.5(24.8-32.24).
30	<i>Xiphinema index</i>	38	7♀:L=3572(3360-4480);a=52.7(46.2-59.3);b=7.5(7.1-7.9);c=76.3(68.4-82.6);c`=1(1-1.2);V=36.5(36-38);Stylet=207.8(182.4-220);Tail=43.8(41.04-45.6).

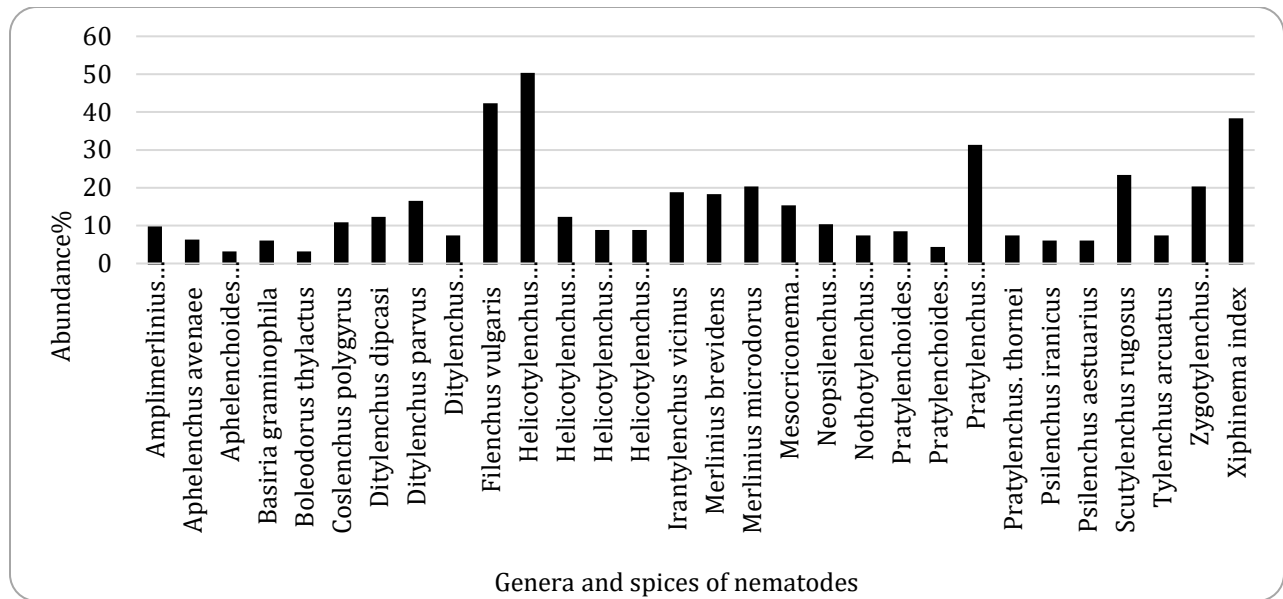


Figure 2. Histogram of Plant parasite nematodes associated with Grapes in Chaharmahal and Bakhtiyari province (South-Western of Iran) with their abundance.

Table 2. Distribution of Plant parasite nematodes in Grapes of various regions in Chaharmahal and Bakhtiyari province (South-Western of Iran)

No	Nematode species	Sampling location					
		Shahrekord	Saman	Eshkaftak	Farokh shahr	Naghan	Lordegan
1	<i>Amplimerlinius globigerus</i>	+	+	-	-	-	-
2	<i>Aphelenchus avenae</i>	+	+	-	-	-	-
3	<i>Aphelenchoides limberii</i>	-	-	-	-	-	+
4	<i>Basiriagraminophila</i>	+	-	-	-	-	-
5	<i>Boleodorusthylactus</i>	+	+	-	-	-	-
6	<i>Coslenchus polygyrus</i>	+	-	+	-	-	-
7	<i>Ditylenchus dipcasi</i>	+	+	-	-	-	-
8	<i>Ditylenchus parvus</i>	-	+	-	-	+	-
9	<i>Ditylenchus tenuidens</i>	+	-	-	-	-	-
10	<i>Filenchus vulgaris</i>	+	+	+	-	-	+
11	<i>Helicotylenchus vulgaris</i>	+	+	+	+	+	+
12	<i>Helicotylenchus digonicus</i>	-	+	-	-	-	-
13	<i>Helicotylenchus minzi</i>	+	-	-	-	-	-
14	<i>Helicotylenchus pseudorobustus</i>	-	-	+	-	-	-
15	<i>Irantylenchus vicinus</i>	+	+	-	-	-	+
16	<i>Merlinius brevidens</i>	+	-	-	-	+	-
17	<i>Merlinius microdorus</i>	+	+	+	-	-	-
18	<i>Mesocriconema maxenoplax</i>	-	+	-	-	+	-
19	<i>Neopsilenchus magnidens</i>	-	+	-	-	-	-
20	<i>Nothotylenchus hexaglyphus</i>	-	-	-	+	-	-
21	<i>Pratylenchoides ritteri</i>	+	-	-	-	-	-
22	<i>Pratylenchoides serzumensis</i>	-	-	-	-	+	-
23	<i>Pratylenchus neglectus</i>	+	+	-	+	-	-
24	<i>Pratylenchus thornei</i>	+	-	+	-	-	-
25	<i>Psilenchus iranicus</i>	-	-	-	-	-	+
26	<i>Psilenchus aestuarius</i>	-	-	-	-	-	+
27	<i>Scutylenechus rugosus</i>	+	+	-	-	-	-
28	<i>Tylenchus arcuatus</i>	-	+	-	-	-	-
29	<i>Zygotylenchus guevaria</i>	+	-	+	+	-	-
30	<i>Xiphinema index</i>	+	+	+	+	+	+

As mentioned in the table above, individual species distribution differed. The distribution of the obtained species were highest in Shahrekord and Saman regions and lowest in Lordegan and Naghan regions. According to the data obtained from Table 2, several cases are briefly mentioned: *Helicotylenchus vulgaris*, *Xiphinema index* were found in all of soil samples in the province and widely distributed. In other words, they were the most prevalent species identified. Conversely *Helicotylenchus pseudorobustus*, *Pratylenchoides ritteri*, *Psilenchus iranicus* and *Psilenchus aestuarius* were found only in the soil of the Eahkaftak, Shahrekord and Lordegan regions respectively. *Amplimerlinius globigerus*, *Aphelenchus avenae*, *Boleodorus thylactus*, *Ditylenchus dipsasi* and *Scutylenechus rugosus* were found in the soil of the Shahrekord and Saman regions. *Mesocriconema xenoplax* and *Ditylenchus parvus* were found in soil and root samples from Saman and Naghan areas. *Filenchus vulgaris* was found in almost all sampled areas except Farkashhar and Naghan regions. *Pratylenchoides erzumensis* was found only in a single vineyard located in Naghan and the last case, *Irantylenechus vicinus* was found in soil and root samples from Shahrekord, Saman and Naghan areas. *Tylenchus arcuatus*, *Neopsilenchus magnidens* and *Helicotylenchus digonicus* were found only in the soil of the Saman region. (Table 2). There was a noticeable difference observed between distribution of nematodes from these vineyards. We do not know the cause of the between state differences in the grape PPN communities. This dispersion can be caused by the diversity of soil texture, physical and chemical properties of soil, temperature, amount and distribution of water in the soil profile and the transfer of seedlings from other areas are connected to these vineyards. Obviously, insufficient attention to seedlings containing soil contaminated with nematodes during transmission and distribution, can lead to increased diversity of plant parasitic nematodes and their further distribution.

#### CONCLUSION

The main goal of this study was to determine the extent of soil infestation by plant-parasitic nematodes in vineyards of key grapevine-growing areas of Chaharmahal and Bakhtiyari province of Iran. The fauna of plant parasite nematodes in Vineyards, were investigated, and 30 species belonging to 21 genera were identified. As a result of nematode infection there is slight yellowing of the leaves and decline in the plant

health and vine vigour. Moreover, the injuries thus caused by nematodes on plant root tissues are predisposed for further infection by other pathogens present in the soil such as bacteria and fungi. Therefore, in order to improve the production and increase the yield of grapes, it is necessary to manage plant parasitic nematodes using methods that minimize economic, health and environmental risks. The results of this study will facilitate management decisions regarding plant parasitic nematodes for Chaharmahal and Bakhtiyari province, grape growers.

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**Contribution of Authors:**

Maryam Fayaz	:	Help in writing manuscript, data collection and analysis
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Ali A. F. Tehrani	:	Help in writing manuscript