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Occurrence and Seasonal Fluctuations of Common Phytonematodes Infesting Field and Vegetable Crops and Associated Weeds in the Newly Reclaimed Soil of El Sadat City, El Menoufia Governorate, Egypt

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ABSTRACT

Worldwide, plant nematodes have a direct effects on crops production, as well as recorded a very harmful plant pathogen. In this study, nematode species were collected and identified from soil samples of several field crops such as clover, *Trifolium alexandrinum*, potato, *Solanum tuberosum*, wheat, *Triticum aestivum*, broad bean, *Vicia faba* and cabbage, *Brassica oleracea* and their associated weeds and grasses (Bermuda grass, *Cynodon dactylon*, nut grass, *Cyperus rotundus*, jungle rice, *Echinochloa colonum weed*, common sowthistle, *Sonchus maritima* weed, and goosefoot, *Chenopodium album*) weed in El Sadat City, El Menoufia Governorate, Egypt from the period of October 2022 to March 2023. The obtained results showed that, the highest occurrence genus was root-knot nematode, *Meloidogyne* with percentages of 64.6%, 52.6%, 51.0% and 50.1% in broad bean, sowthistle, nut grass and potato, respectively. The lowest occurrence genus was *Xiphinema* with percentages of 1.0%, 1.1%, 1.3% and 1.4% in clover, nutgrass, potato and broad bean, respectively. Other nematode genera, *Pratylenchus*, *Helicotylenchus*, *Hoplolaimus* and *Criconemoides* were plenty different in the other tested crops.

Keywords*:* El-Sadat city, phytonematodes, field crops, vegetable crops, weeds, population density

INTRODUCTION

The total loss in field and vegetable crops were estimated by 36.5%, where 14.2% was caused by pathogenic micro-organisms, economic insects 10.2% and 12.2% by weeds. Casanueva et al. (2016) found that phytonematodes cause yield loss up to 20% in field and vegetable crops. Ibrahim and Handoo (2016) collected 240 samples in northern Egypt from the soil of surveyed plants, where 23 genera of phytonematodes have been detected. *Meloidogyne incognita* and *M. javanica* were very common on surveyed vegetables and weeds. Eisvand et al. (2019) identified phytonematodes infesting citrus orchards in Khuzestan province. Bakr et al. (2020) indicated that *Meloidogyne* species infected different weeds such as Common lambsquarters (*Chenopodium murale* L.), Small bindweed (*Convolvulus arvensis*), Common purslane (*Portulaca oleracea* L.) and Solanum (*Solanum nigrum*). Feyisa (2021) determined the type; frequency and population of plant-parasitic nematode genera associated with the rhizosphere of faba bean roots, and revealed the presence of six nematode genera i.e., *Pratylenchus*, *Rotylenchulus*, *Tylenchorhynchus*, *Xiphinema*, *Ditylenchus* and *Tylenchus*. The most dominant nematode genera were *Xiphinema* followed by *Ditylenchus* with 12% and 7% of occurrence, respectively. Gad et al. (2018) determined the type, frequency and population of

phytonematodes associated with the rhizospheres of potato cultivars i.e. Spunta, Cilany, Cara and Shamcya, during the growing season of 2016, and identified ten nematode genera i.e. *Criconemoides*, *Helicotylenchus*, *Heterodera*, *Longidorus*, *Meloidogyne*, *Pratylenchus*, *Rotylenchulus*, *Tylenchorhynchus*, *Xiphinema* and *Tylenchus* that were found to be the most prevalent nematode genera in the surveyed counties. Sweelam et al. (2022) studied the diversity of nematode genera in the soil of some fruit trees, where monthly composite soil samples from each fruit trees were collected for a year from April 2017 to March 2018 and nematode genera were identified and counted along the year months. Abdel Razek and Balah (2023) conducted surveys to spot light on the impact of weed species on the communities and composition of nematodes in barley, wheat, quinoa, eggplant, and tomato crops in Alexandria and Ismailia regions of Egypt. Eight occurring genera of nematodes were found viz., *Meloidogyne*, *Pratylenchus*, *Helicotylenchus*, *Rotylenchulus*, *Xiphinema*, *Criconemoides*, *Ditylenchus* and *Longidorus* associated with the rhizospheres of 28 weed species belonging to 12 families. Among these weeds, *Hordeum marinum* and *Sonchus oleraceus* were good hosts to all nematode species. Both wheat and barley had higher nematode diversity than quinoa in the winter season. *Pratylenchus* spp.., *Meloidogyne* spp. and *Rotylenchulus* spp. can be considered a vital potential plant parasitic nematodes (PPNs) with economic importance. A positive correlation was monitored among weeds, nematode frequencies and relative abundances as well as their crops. Finally, weed species are critical components in nematode communities that may increase the incidence and severity of nematode risks based on crop type and soil characteristics. Therefore, weeds must be managed properly to diminish reservoir sites when applying developing nematode management options.

This work aimed to recognize the common species of plant parasitic nematodes that infest field and vegetables crops causing great losses in the newly reclaimed soil of El-Sadat city, El Menoufia as well as focused on their associated weeds.

MATERIALS AND METHODS

The present research was conducted to study the status of phytonematodes in the rhizospheres of the field crops viz. clover, *Trifolium alexandrinum*, potato, *Solanum tuberosum*, wheat, *Triticum aestivum*, broad bean, *Vicia faba* and cabbage, *Brassica oleracea* and their associated weeds (Bermuda grass, *Cynodon dactylon*, nut grass, *Cyperus rotundus*, jungle rice, *Echinochloa colonum* weed, common sowthistle, *Sonchus maritima* weed and goosefoot, *Chenopodium album* weed). This study was run on private farms in newly cultivated soil of El Sadat City, El Menoufia Governorate, Egypt in the period from October 2022 to March 2023.

1-Sampling Procedures

Rhizosphere soil samples were taken by trowel, from the wetted regions, then dried soil was removed and transferred to the laboratory to determine and identify the population of each genus of phytonematodes. Samples were collected monthly from October 2022 to March 2023 with three replicates for examining field and vegetable crops as well as associated weeds with them. Samples were kept in polyethylene bags and prepared in the laboratory for nematode extraction.

2- Extraction, Counting and Identification of Phytonematodes

From each sample, totally 250 cm^3 was prepared for nematode extraction according to Southey (1970). Totally 500 ml of water was added to the soil in a glass beaker and mixed by fingers, after that the suspension was poured in 100 mesh-sieves and suspension was then passed into 240 mesh-sieves. The final suspension was transferred to a Modified Baermann pan fitted with soft tissue paper for nematode extraction. The last suspension was collected and nematode

counts and identification to the generic level were done by stereomicroscope according to the description of Mai and Lyon (1975).

3- Statistical analysis:

The obtained results were statistically analyzed by subjecting to the analysis of variance test as randomized complete blocks design. The least significant differences (LSD) at the 5% level were determined using a computer program (Costat, 6400, 2008).

RESULTS

1- Occurrence and dynamics of phytonematodes in the rhizosphere of clover, *Trifolium alexandrinum* cv. Gemiza 1 and Bermuda grass, *Cynodon dactylon*.

Occurrence and dynamics of phytonematodes in the rhizosphere of clover soil cv. Gemiza 1 along six months were recorded in Table (1). Statistical analysis of the data revealed significant differences in phytonematode numbers between January, February, March months and October, November, December months, while there were no significant differences in the numbers of phytonematodes among October, November and December. Moreover, no significant differences were detected in the numbers of phytonematodes among January, February and March.

Table 1: Average numbers and occurrence % of phytonematode genera in soil samples of clover plants cv. Gemiza 1.

Date of samples	Average numbers of phytonematodes / 250 cm^3 soil and (occurrence %)				
	Meloidogyne	*Pratylenchus*	*Helicotylenchus*	*Xiphinema*	Total
October 2022	490 (24.4)	1093 (54.4)	411 (20.4)	17 (0.8)	2011b
November 2022	529 (28.9)	945 (51.6)	336 (18.4)	20 (1.1)	1830 b
December 2022	587 (29.2)	1120 (55.7)	281 (13.97)	24 (1.2)	2012 b
January 2023	851 (35.7)	1202 (50.4)	308 (12.9)	25 (1.1)	2386 a
February 2023	929 (38)	1284 (52.5)	211 (8.6)	23 (0.94)	2447 a
March 2023	958 (36.6)	1315 (50.2)	322 (12.3)	26 (1.0)	2621a
Total	4344 B (32.6)	6959 A (52.2)	1869 C (14.01)	135 D (1.0)	13307
LSD 5%		412.7			332.8

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

Regarding to nematode genera numbers, the obtained data revealed the presence of four phytonematodes genera viz., *Meloidogyne* (root-knot nematode), *Pratylenchus* (lesion nematode), spiral nematode, *Helicotylenchus* (spiral nematode), and *Xiphinema* (dagger nematode) with total occurrence of 32.6 %, 52.2 %, 14.01 %, and 1.0 %, respectively (Table 1) and there were significant differences among the numbers of four registered nematode genera.

Moreover, data in Table (2) showed phytonematodes in the soil of Bermuda grass**,** *Cynodon dactylon* along six months. Results indicated significant differences in the phytonematodes numbers between March and other months, while no differences in phytonematode numbers among October, November, and December. Moreover, there were no significant differences in the numbers of phytonematode genera between January and February. Regarding the numbers of nematode genera, the differences were significant among the classified genera (Table 2). The obtained data revealed the occurrence of four genera viz, *Meloidogyne, Pratylenchus, Helicotylenchus,* and *Xiphinema* with total occurrence of 28.9%, 50.2%, 19.0%, and 1.8%, respectively.

Table 2: Average numbers and occurrence % of phytonematode genera in the samples of *Cynodon dactylon* grass soil associated with clover plants

Date of samples	Average number of phytonematodes / 250 cm^3 soil and occurrence%				
	Meloidogyne	*Pratylenchus*	*Helicotylenchus*	*Xiphinema*	Total
October 2022	382 (26.8)	707 (49.7)	310 (21.8)	24 (1.7)	1423 d
November2022	325.0 (26.4)	622.0 (50.6)	256.0 (20.8)	26.0 (2.1)	1229 d
December 2022	417.0 (29.4)	726.0 (51.1)	246.0 (17.3)	31.0 (2.2)	1420 d
January 2023	488.0 (27.5)	920.0 (51.9)	325.0 (18.3)	41.0 (2.3)	1774 c
February 2023	608.0 (29.7)	1013.0 (49.6)	387.0 (18.9)	36.0 (1.8)	2044 b
March 2023	771.0 (31.2)	1221.0 (49.4)	446.0 (18.0)	33.0 (1.3)	2471 a
Total	2991 B (28.9)	5209 A (50.2)	1970 C (19.0)	191 D (1.8)	10361
LSD 5%		386.5			299.5

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

2-Occurrence and dynamics of phytonematodes in the rhizosphere of potato, *Solanum tuberosum*, cv. Spunta and nut grass, *Cyperus rotundus*.

The presence and dynamics of phytonematodes in potato samples cv**.** Spunta along six months are in Table (3). Analysis of results indicated significant differences in phytonematode numbers between January, December months and October, November, March months, while there were no significant differences in phytonematode numbers among October, November and March, Moreover, there were no significant differences in phytonematode numbers among January, February and December. Statistical analysis of data (Table 3) indicated significant differences in phytonematode numbers among the five genera. The obtained data (Table 3) revealed the occurrence of five phytonematode genera: *Meloidogyne* (root- knot nematode), *Pratylenchus* (lesion nematode), spiral nematode, *Helicotylenchus* (spiral nematode), *Hoplolaimus* (lance

Table 3: Average numbers and occurrence % of phytonematode genera in the samples of potato plants cv.Spunta.

Date of samples	Average no. of phytonematodes / 250 cm^3 soil and occurrence%					
	Meloidogyne	*Pratylenchus*	*Helicotylenchus*	*Hoplolaimus*	*Xiphinema*	Total
October 2022	1119 (40.9)	1056 (38.6)	431 (15.8)	105 (3.8)	25 (0.9)	2736 a
November 2022	1187 (48)	887 (35.8)	298 (12.04)	82 (3.3)	21 (0.9)	2475 a
December 2022	953 (54.2)	460 (26.2)	254 (14.4)	64 (3.6)	28 (1.6)	1759 b
January 2023	895 (46)	314 (16.1)	204 (10.5)	71 (3.7)	19 (1.0)	1946 b
February 2023	1136 (58.4)	532 (27.3)	155 (8.0)	91 (4.7)	32 (1.6)	1946 b
March 2023	1298 (52.1)	862 (34.6)	187 (7.5)	106 (4.3)	40 (1.6)	2493 a
Total	6588 A (51.0)	4111B (31.8)	1529 C (11.8)	519 D (4.0)	165 E (1.3)	12912
LSD 5%			320.3			435.8

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

Table 4: Average numbers and occurrence % of phytonematode genera in the samples of *Cyperus rotundus* grass associated with potato plants.

Date of samples	Average number of phytonematodes / 250 cm^3 soil and occurrence%					
	Meloidogyne	*Pratylenchus*	*Helicoty-lenchus*	*Hoplolaimus*	*Xiphinema*	Total
October2022	884 (48.23)	716 (39.06)	183 (9.98)	36 (1.96)	14 (0.76)	1833 a
November2022	822 (48.70)	668 (39.57)	152 (9.00)	27 (1.60)	19 (1.13)	1688ab
December2022	524 (47.77)	428 (39.02)	105 (9.57)	24 (2.19)	16 (1.46)	1097 d
January2023	518 (50.39)	386 (37.55)	79 (7.68)	32 (3.11)	13 (1.26)	1028 d
February2023	605 (55.00)	363 (33.00)	89 (8.09)	30 (2.73)	13 (1.18)	1100cd
March2023	754 (52.07)	524 (36.19)	113 (7.80)	40 (2.76)	17 (1.17)	1448bc
Total	4107 A (50.1)	3085 B (37.6)	721 C (8.8)	189 D (2.3)	92 D (1.1)	8194
LSD 5%			424.2			370.3

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

nematode) and *Xiphinema* (dagger nematode) with total occurrence of 51.0 %, 31.8 %, 11.8 %, 4.0 %, and 1.3 %, respectively.

Results in Table (4) showed the occurrence and dynamics of phytonematode genera in the rhizosphere of *Cyperus rotundus* grass soil along six months. Data indicated significant differences in phytonematode numbers between October, November months and December, January, February months, while there were no significant differences in numbers between October and November. Moreover, there were no significant differences in phytonematode numbers among December, January and February. Regarding to nematode numbers, differences were significant among the five registered genera, while no difference was noticed between *Hoplolaimus* and *Xiphinema* (Table 4). The obtained data revealed the occurrence of phytonematode genera viz., *Meloidogyne, Pratylenchus, Helicotylenchus, Hoplolaimus* and *Xiphinema* with total occurrence of 50.1%, 37.26%, 8.8%, 2.3%, and 1.1%, respectively.

3- Phytonematode occurrence and numbers in wheat, *Triticum aestivum* cv. Giza 24 and jungle rice, *Echinochloa colonum* weed rhizospheres.

Statistical analysis of data in Table (5) revealed that there were significant differences in phytonematode numbers between January, February, March and October, November, December, while there were no significant differences in phytonematode genera among January, February and March. Moreover, no significant differences were recorded in phytonematode genera among January, February and December. Moreover, there were significant differences in *Pratylenchus* numbers and both of *Meloidogyne* and *Xiphinema* nematodes.

Table 5: Average numbers & occurrence % of phytonematode genera in soil samples of wheat cv. Giza 24.

Date of samples	Average number of phytonematodes / 250 cm3 soil and occurrence%			
	Meloidogyne	*Pratylenchus*	*Xiphinema*	Total
October 2022	902 (28.4)	1352 (42.5)	927 (29.1)	3181 d
November 2022	968 (27.6)	1575 (44.9)	966 (27.5)	3509 c
December 2022	1063 (29.4)	1558 (43.1)	994 (27.5)	3615 bc
January 2023	1086 (28.9)	1626 (43.2)	1051 (27.9)	3763 abc
February 2023	1082 (28.2)	1681 (43.8)	1076 (28.0)	3839 ab
March 2023	1130 (28.2)	1725 (43.1)	1148 (28.7)	4003 a
Total	6327 B (28.5)	9613 A (43.3)	6258 B (28.2)	22198
LSD 5%		562.4		324.8

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

The obtained data revealed the total occurrence of three phytonematode genera viz., *Meloidogyne*., *Pratylenchus* and *Xiphinema* with total occurrence of 28.5%, 43.3%, and 28.2%, respectively.

Data in Table (6) showed phytonematode genera in wheat soil plants cv. Giza 24 along six months. Statistical analysis of the data recorded significant differences in phytonematode numbers between March and all other months, while no significant differences between October and November. As for numbers of nematode genera, statistical analysis indicated significant differences among *Pratylenchus, Meloidogyne* and *Xiphinema* (Table 6). The obtained data revealed the presence of three phytonematode genera viz., *Meloidogyne, Pratylenchus* , and *Xiphinema* with total occurrence of 30.2%, 46.3%, and 23.5%, respectively.

Table 6: Average numbers and occurrence % of phytonematode genera in soil samples of *Echinochloa colonum* weed associated with wheat plants.

Date of samples	Average number of phytonematodes / 250 cm^3 soil and occurrence%			
	Meloidogyne	*Pratylenchus*	*Xiphinema*	Total
October 2022	643 (29.77)	969 (44.86)	548 (25.37)	2160 f
November2022	703 (30.09)	1051 (44.99)	582 (24.91)	2336 e
December 2022	822 (30.58)	1246 (46.35)	620 (23.07)	2688 d
January2023	895 (30.92)	1415 (48.88)	585 (20.21)	2895 c
February 2023	948 (30.17)	1502 (47.80)	692 (22.02)	3142 b
March2023	1017 (29.68)	1524 (44.47)	886 (25.85)	3427 a
Total	5028 B (30.2)	7707 A (46.3)	3913 C (23.5)	16648
LSD 5%		602.2		177.9

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

4- Occurrence and numbers of phytonematodes associated with the rhizosphere of broad bean, *Vicia faba* cv. Sakha 1 and common sowthistle, *Sonchus maritima* weed.

Data in Table (7) showed the status of phytonematode population genera in broad bean soil plants cv. Sakha 1 along six months. Analysis of the data revealed significant differences in phytonematode numbers between February, March and November, December, while no significant differences in the phytonematode numbers between February to March. Moreover, no significant differences in phytonematodes individuals between October and November. Statistical analysis of phytonematode numbers indicated significant differences among *Pratylenchus*, *Meloidogyne* and *Xiphinema* nematodes (Table 7). The obtained data revealed the total occurrence of three phytonematode genera viz., *Meloidogyne*, *Pratylenchus*, and *Xiphinema* with 64.6%, 34.0%, and 1.4%, respectively.

Table 7: Average numbers & occurrence % of phytonematode genera in the samples of broad bean soil plants cv. Sakha 1.

Date of samples	Average numbers of phytonematodes / 250 cm^3 soil and occurrence%			
	Meloidogyne	*Pratylenchus*	*Xiphinema*	Total
October 2022	845 (73.41)	278 (24.15)	28 (2.43)	1151d
November2022	951 (68.47)	414 (29.81)	24 (1.73)	1389 d
December 2022	1083 (67.27)	493 (30.62)	34 (2.11)	1610 c
January 2023	1153 (60.46)	716 (37.55)	38 (1.99)	1907 b
February 2023	1663 (61.71)	982 (36.44)	50 (1.86)	2695 a
March 2023	1704 (61.45)	1015 (36.60)	54 (1.95)	2773 a
Total	7399 A (64.6)	3898 B (34.0)	162 C (1.4)	11459
LSD 5%		395.4		251.6

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

Table 8: Average numbers and occurrence % of phytonematode genera in soil samples of *Sonchus maritima* weed associated with broad bean plants.

Date of samples	Average number of phytonematodes / 250 cm^3 soil and occurrence%			
	Meloidogyne	*Pratylenchus*	*Xiphinema*	Total
October 2022	1045 (52.75)	908 (45.84)	28 (1.41)	1981c
November 2022	1134 (56.42)	836 (41.59)	40 (1.99)	2010c
December 2022	969 (50.92)	890 (46.77)	44 (2.31)	1903 c
January 2023	993 (50.72)	932 (47.6)	33 (1.69)	1958c
February 2023	1192 (51.65)	1068 (46.27)	48 (2.08)	2308 b
March 2023	1398 (52.87)	1190 (45.01)	56 (2.12)	2644 a
Total	6731 A (52.6)	5824 B (45.5)	249 C (1.9)	12804
LSD 5%		310.2		162.4

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

Data in Table (8) contain the occurrence and dynamics of phytonematode genera in the rhizosphere of common sowthistle, *Sonchus maritima* soil weed along six months. Analysis of the data indicated significant differences in the phytonematode numbers between March month and October, November, December, January months, while no significant differences in the phytonematode numbers among October, November, December and January months. As for the numbers of each nematode genus, statistical analysis indicated significant differences in nematode numbers among *Pratylenchus* (lesion nematode), *Meloidogyne* (root-knot nematode). and *Xiphinema* (dagger nematode) (Table 8). The obtained data revealed the presence of three phytonematode genera viz., *Meloidogyne*, *Pratylenchus*, and *Xiphinema*. with total occurrence of 52.6%, 45.5%, and 1.9%, respectively.

5- Population of phytonematodes the samples of cabbage, *Brassica oleracea* cv. Balady and goosefoot, *Chenopodium album* weed.

Data in Table (9) contain the occurrence and dynamics of phytonematode genera of cabbage soil plants cv. Balady along six months. Analysis of the data indicated significant differences in the phytonematode numbers between November, December & March and other three months, while no significant differences in phytonematode numbers among November, December and March. Moreover, no significant differences in the phytonematode numbers between January and February. As for numbers of phytonematode genera, there were significant differences in the numbers among *Meloidogyne* (root-knot nematode), *Pratylenchus* (lesion nematode), *Criconemoides* (ring nematode) and *Hoplolaimus* (lance nematode) (Table 9). The obtained data revealed the presence of four phytonematode genera viz., *Meloidogyne*, *Pratylenchus*, *Criconemoides*, and *Hoplolaimus* with total occurrence of 17.7%, 8.9 %, 22.6%, and 50.8%, respectively.

Table 9: Average numbers and occurrence % of phytonematode genera in the samples of cabbage plants cv. Balady.

Date of samples	Average no. of phytonematodes / 250 cm^3 soil occurrence%				
	Meloidogyne	*Pratylenchus*	*Criconemoides*	*Hoplolaimus*	Total
October 2022	461 (25.18)	236 (12.84)	413 (22.47)	728 (39.61)	1838 a
November 2022	416 (19.99)	187 (8.99)	514 (24.70)	964 (46.32)	2081 a
December 2022	288 (14.73)	195 (9.97)	448 (22.92)	1024 (52.38)	1955 a
January 2023	242 (15.48)	125 (8.00)	368 (23.54)	828 (52.98)	1563 b
February 2023	230 (14.13)	102 (6.27)	331 (20.33)	965 (59.28)	1628 b
March2023	324 (16.45)	138 (7.01)	416 (21.12)	1092 (55.43)	1970 a
Total	1961 C (17.7)	983 D (8.9)	2490 B (22.6)	5601 A (50.8)	11035
LSD 5%	456.2				217.9

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

Data in Table (10) depicted population components of phytonematode genera of goosefoot, *Chenopodium album* weed soil along six months. Analysis of the data indicated significant differences in phytonematode numbers between October, November, December, March and both of January and February, while no significant differences in phytonematode numbers among October, November, December and March. Moreover, no differences were recorded in phytonematode numbers between both of January and February. Regarding to the differences in the numbers of each nematode genus, they were significant among *Meloidogyne, Pratylenchus. Criconemoides,* and *Hoplolaimus* (Table 10). The obtained data revealed the presence of four phytonematode genera viz., *Meloidogyne, Pratylenchus., Criconemoides*, and *Hoplolaimus* with total occurrence of 18.2%, 8.8%, 14.1% and 58.9% respectively.

Table 10: Average numbers and occurrence % of phytonematode genera in the soil of *Chenopodium album* weed associated with cabbage plants.

Date of samples	Average numbers of phytonematodes / 250cm^3 soil occurrence%				
	Meloidogyne	*Pratylenchus*	*Criconemoides*	*Hoplolaimus*	Total
October 2022	266 (16.18)	210 (12.77)	320 (19.46)	848 (51.58)	1644 a
November 2022	298 (17.88)	160 (9.60)	284 (17.04)	925 (55.49)	1667 a
December 2022	343 (20.49)	111 (6.63)	232 (13.86)	988 (59.02)	1674 a
January 2023	291 (20.28)	79 (5.51)	186 (12.96)	879 (61.25)	1435 b
February 2023	251 (17.71)	119 (8.40)	125 (8.82)	922 (65.07)	1417 b
March 2023	285 (16.73)	163 (9.57)	191 (11.21)	1065 (62.5)	1704 a
Total	1734 B (18.2)	842 D (8.8)	1338 C (14.1)	5627 A (58.9)	9541
LSD 5%		350.2			177.9

The different letters for each column or row mean significant differences at 5% level.
Values between parenthesis represent occurrence % of each nematode genera.

DISCUSSION

The obtained results are in harmony with those obtained by Ibrahim and Handoo (2016) who found twenty-three genera of phytoparasitic nematodes in soil samples of different crops from Alexandria governorate, where sugar beet cyst nematode, *Heterodera schachtii* was very common on sugar beet while the root-knot nematodes *Meloidogyne incognita* and *M. javanica* were very common on guava, olive trees and sugar beet, while *Helicotylenchus* sp, *M. incognita*, *Pratylenchus* sp., *Rotylenchulus reniformis* and *Xiphinema* sp. were observed in spearmint, *Xiphinema rivesi* was found in orange soil samples. Moreover, Gad et al. (2018) who surveyed the population of plant parasitic nematode genera associated with potato cultivars rhizosphere during the growing season of 2016and registered ten nematode genera i.e. *Criconemoides, Helicotylenchus, Heterodera, Longidours, Meloidogyne, Pratylenchus, Rotylenchulus, Tylenchorhynchus, Xiphinema* and *Tylenchus*. Basyony et al. (2020) conducted

a survey in Alexandria, El-Behera, El-Gharbia, El-Monufia and Kafr El-Sheikh governorates in northern Egypt during the 2017 – 2019 cropping seasons to study occurrence, population density and host association of phytonematodes associated with spinach, Swiss chard and table beet where they registered 15 genera and 18 species of nematodes that are reported for the first time on spinach, Swiss chard and table beet in Egypt , and root-knot nematode, *Meloidogyne* spp.) with 37 – 67 (FO) were the most frequently encountered group of nematodes (37 – 67 %), followed by spiral , *Helicotylenchus* sp., cyst , *Heterodera* sp., lesion , *Pratylenchus* sp. and stunt, *Tylenchorhynchus* sp. nematodes with 15 – 61 % frequency of occurrence, while the other genera (*Ditylenchus, Hoplolaimus, Psilenchus, Rotylenchulus, Rotylenchus, Trichodorus,* and *Xiphinema*) were less common. Feyisa (2021) conducted a survey to determine the types, frequency and population of plant parasitic nematode genera associated with the rhizosphere of faba bean, during the growing season of 2018-2019, and revealed the presence of six nematode genera i.e., *Pratylenchus, Rotylenchulus, Tylenchorhynchus, Xiphinema, Ditylenchus* where *Xiphinema* was the most dominant genera followed by *Ditylenchus* with 12% and 7% of occurrence respectively. Lopez et al. (2021) studied the interaction of PPNs with the major weeds in the semi-arid region of south Texas, where five organically managed farms were surveyed for four weeds of regional agronomic importance including silverleaf nightshade (*Solanum elaeagnifolium*), common sunflower (*Helianthus annuus*), false ragweed (*Parthenium hysterophorus*), and London rocket (*Sisymbrium irio*), and registered *Pratylenchus* spp., *Trichodorus* spp., *Criconemella* spp., *Helicotylenchus* spp., *Xiphinema* spp., *Dorylaimus* spp., *Aphelencoides* spp., and *Tylenchus* spp.

Recently, Abdel Razek and Balah (2023) determined the impact of 28 weed species on the communities and composition of nematodes in barley, wheat, quinoa, eggplant, and tomato crops in Alexandria and Ismailia of Egypt, and recorded eight genera: *Meloidogyne* spp, *Pratylenchus* spp, *Helicotylenchus* spp, *Rotylenchulus* spp, *Xiphinema* spp., *Criconemoides* spp, *Ditylenchus* spp, and *Longidorus* spp. where, *Hordeum marinum* and *Sonchus oleraceus* weeds were good hosts to nematode species, as well as the structural indices greatly varied based on the host weed species, crop types.

The study encourages more research work to establish the economic importance and the management of the reported nematode pests where weeds should be managed properly to diminish reservoir sites when developing nematode management options. This article indicate that these weed species can pre-sent additional challenges in agriculture, not only as direct competitors for resources to agronomic crops, but also as potential hosts for PPNs.

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الملخص العربي

التواجد والتذبذب الموسمي لأجناس النيماتودا النباتية الشائعة والتى تصيب بعض محاصيل الحقل والخضر والحشائش فى الاراضى الجديدة المستصلحة فى مدينة السادات بمحافظة المنوفية

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تؤثر النيماتودا المتطفلة على النبات تأثيرا مباشرا على إنتاج المحاصيل الزراعية في جميع انحاء العالم، حيث تم تسجيلها في العديد من الأبحاث كممرض نباتي ضار جداً، في هذه الدراسة تم رصد تعداد وتواجد العديد من أجناس النيماتودا المتطفلة على النبات وتعريفها من عينات التربة للعديد من المحاصيل الحقلية والخضر مثل البرسيم، البطاطس، القمح، الفول والكرنب والحشائش المصاحبة لها (النجيل ، السعد، أبو ركبة ، الجعضيض والزربيح). والتي أجريت في مدينة السادات بمحافظة المنوفية بمصر في الفترة من أكتوبر ٢٠٢٢ إلى مارس ٢٠٢٣. وأظهرت النتائج التي تم الحصول عليها أن أكثر الاجناس تواجداً هي نيماتودا تعقد الجذور (*Meloidogyne*) بنسبة ٦٤,٦٪، ٥٢,٦٪، ٥١٪ و ٥٠,١٪ في الفول البلدي، الجعضيض، البطاطس، وحشيشة السعد على التوالي. كما أظهرت هذه الدراسة أن أقل االاجناس حدوثاً هو *Xiphinema* وبنسبة ١,٠٪، ١,١٪، ١,٣٪، ١,٤٪ في البرسيم، حشيشة السعد، البطاطس، والفول البلدي على التوالي. واختلفت الأجناس الأخرى *Pratylenchus, Helicotylenchus, Hoplolaimus* and *Criconemoides* فى تعدادها كثيرًا باختلاف المحاصيل والحشائش.