ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 46(1): Ho. 113-122, (2008).

NEMATODES POPULATION RESPONSE TO REGULATED DEFICIT IRRIGATION AND SOIL MANAGEMENT PRACTICES IN 'PICUAL' OLIVE TREES

BY

El-Deeb, M. D.*; El-Sebsy, A.A.; Ahmed, S. A. *** and El-Alakmy, H.A.***

* Plant Production Dept. (Fruit Science), Fac. Environ. Agric. Sci., Suez Canal Univ.
** Soil and Water Dept., Fac. Environ. Agric. Sci., Suez Canal Univ.
*** Plant Production Dept. (plant protection), Fac. Environ. Agric. Sci., Suez Canal Univ.

ABSTRACT

The experiment was conducted in 2005 and 2006 seasons at the Olive Research Farm, Faculty of Environmental Agricultural Sciences, El-Arish, Suez Canal University, Egypt to study the effect of regulated deficit irrigation and soil management practices in 'Picual' olive trees on nematode population. Three irrigation treatments were applied (100%, RDI-70% and RDI-35% of ETo) from March to November. In addition, four soil management practices hand hoeing and three mulching treatments (black plastic mulch, olive pomace mulch and rice straw mulch). Hand hoeing was applied to the depth of about 15 cm in mid April, mid June and mid August, while black plastic, olive pomace and rice straw mulches were spread on ground around trees in mid February. The RDI-35% of ETc with olive pomace mulched trees succeeded in decreasing the population density and total number of nematodes genera.

INTRODUCTION

In arid and semi-arid zones the majority of rain or irrigation water is often lost due to the high evaporation demands. Numerous techniques are still conceived or adapted in order to reduce water losses in such severe conditions. The reduction of these losses may improve water management and hence contribute in realizing a sustainable agriculture. The most commonly used techniques are covering the soil surface by crop residues, straw, plastic sheets or gravel and the establishment of mulch using different surface mulching practices. (Mellouli *et al.*, 1998).

Many Countries have devised development plans on the basis of water mobilezation. Important investments have been made for the construction of hydraulic infrastructure during the second half of the last century. Consequently, there has been an impressive expansion of the irrigated lands. But, because of the limitation in water supply, the need for management practices to save water became rapidly vital in many areas.

Recently, large areas in Egypt are planted with olive trees, resulting in the production of large amounts of olive pomace and annually imposing a disposal and pollution burden.

Nematode and weeds are major problems in olive orchards which require special attention. Some problems have resulted in almost complete economic loss and in other cases these problems have required major alterations in the industry. The main losses in yield or oil production are mainly caused by competition between olive trees and weeds or nematode for moisture and nutrients. Managing these problems requires accurate information, proper strategies and production practice inputs in order to maintain economic yields. (El-Shamma and Hassan 2001). Therefore, the main objectives of this study was to investigate the effect of regulated deficit irrigation (RDI) and soil management (SM) practices on nematode population in Picual olive trees.

MATERIALS AND METHODS

Seventy two Picual olive trees (*Olea europea* L.) about 16 -year- old nearly moderate in vigor and productivity planted on loamy sand soil were used at the Olive Research Farm, Faculty of Environmental Agricultural Sciences, El-Arish, Suez Canal University, North Sinai Governorate, Egypt. Trees were spaced at 6 x 7 m and received nearly the same cultural care under drip irrigation system. Soil samples were taken in late October 2004 at three depths (0-30), (30-60) and (60-90cm) from the soil surface for mechanical and chemical analyses, (Table, 1) according to Piper (1947), while initial soil moisture constant were determined, (Table, 1) according to Richard's (1954). Irrigation water was pumped from a depth of 70 m in El-Arish area were subjected for chemical analysis (Table, 2) according to Agriculture Hand Book (1954).

Three irrigation treatments were applied: a control were considered fully irrigated treatment during whole seasons (100 % of crop evapotranspiration "ET_c"). Additionally to control treatment, two regulated deficit irrigation (RDI) treatments RDI-70% and RDI-35% of ET_c were imposed which were irrigated like the control treatment for the whole seasons, but applying only 70 % and 35 % of crop evapotranspiration of the dose applied to the control (Table 3).

Irrigation treatments were applied from March 20th and continued until November 15th of both seasons and were programmmed weekly during the afternoon based on calculated crop evapotranspiration (ET_c) using pan evaporation and modified blaney- criddle methods according to Doorenbos and Pruitt, (1977).

Table (1): Mechanical, chemical analyses and soil moisture constants of the tested olive orchard soil.

Parameter		Soil depth (cm)		
		(0 – 30)	(30 – 60)	(60 – 90)
Mechanical analysis				
Sand (%)		88.39	81.73	74.65
Silt (%)		4.51	8.93	12.70
Clay (%)		7.10	9.34	12.65
Soil texture		Loamy sand	Loamy sand	Sandy Loam
Bulk density ($g.cm^{-3}$)		1.55	1.51	1.42
Chemical analysis				
Cations (meq.l-1)	Ca++	6.72	7.95	12.37
	Mg++	5.10	5.87	8.03
	Na+	8.67	11.28	13.37
	K+	0.40	0.36	0.35
Anions (meq.l-1)	CO3–	-	-	-
	HCO3-	2.45	2.36	2.69
	Cl-	10.41	12.63	13.22
	SO4–	8.03	10.47	18.21
E.C ($dS.m^{-1}$)		2.09	2.55	3.43
pH		7.9	8.3	8.7
Organic matter (%)		0.18	0.13	0.09
Water holding capacity				
Saturation Percent (S.P)		24	25	44
Field Capacity (F.C)		5.92	6.22	15.81
Wilting Point (W.P)		2.51	2.93	7.02
Available Water (A.W)		3.41	3.29	8.79

According to Piper, (1947) and Richard's (1954).

Table (2): Chemical analysis of artesian well water used for irrigation.

Parameters		Value
E.C	(dS.m^{-1})	7.03
Conc.	(ppm)	4499
pH		7.3
Soluble cations (meq.l^{-1})		
	Ca^{++}	16.56
	Mg^{++}	17.60
	Na^{+}	35.87
	K^{+}	0.27
Soluble anions (meq.l^{-1})		
	$CO3^{--}$	-
	$HCO3^{-}$	6.13
	Cl^{-}	42.26
	$SO4^{--}$	21.91
Water quality(1)		
	Total salinity	C4
	Sodicity	S1

(1) water quality was according to **Agriculture Hand Book (1954).**

Table (3): Irrigation scheduling program for Picual olive trees grown at El-Arish, North Sinai Governorate in 2005 and 2006 seasons.

Month	Amount of irrigation water[1] (m^3.fed^{-1})					
	100% of ETc (Control)		RDI-70%of ETc		RDI-35%of ETc	
	2005	2006	2005	2006	2005	2006
March[2]	140	99.97	98	69.98	49	34.99
April	429	427.15	300.3	299	150.15	149.5
May	465	465	325.5	325.5	162.75	162.75
June	500	510	350	357	175	178.5
July	527	527	368.9	368.9	184.45	184.45
August	520	527	364	368.9	182	184.45
September	420	420	294	294	147	147
October	341	322.73	238.7	225.91	119.35	112.96
November[2]	153	144.76	107.1	101.33	53.55	50.67
Total amount of irrigation (m^3.fed^{-1}. year^{-1})	3495.00	3443.61	2446.50	2410.52	1223.25	1205.27

Where:

(1) Scheduling amount of irrigation water was according to Doorenbos and Pruitt, (1977).

(2) 11 days during March and 10 days during November.

Four soil management practices were applied hand hoeing and three mulching treatments. Weeds were removed from ground around olive trees by hand hoeing to the depth of about 15 cm in mid April, mid June and mid August in both seasons respectively. In mid February 2005, black polyethylene plastic sheets (50 μ thick × 120 cm wide), olive pomace (about 15 cm thick layer) and rice straw (about 15 cm thick layer) were spread on the ground around trees as a mulch.

The effect of different regulated deficit irrigation (RDI) and soil management (SM) practices on Picual olive trees were evaluated through the following measurements:

a) Identification of nematode genera

Soil samples were taken from ground around olive trees by digging the soil to a depth 15-30 cm. Three soil samples from each treatment were mixed together to form composite sample of about 1 kg. Samples were kept in polyethylene bags, labeled and sent directly to the laboratory of nematode extraction in Directorate of Agriculture, North Sinai Governorate. Family, Scientific name, Common name and Arabic name of different genera of *Meloidogyne* sp. were recorded monthly from mid March to mid November through both seasons according to Brown and Kerry (1987).

b) Population density and total count of nematode genera

The population density of each genus and total count of *Meloidogyne* sp. in Picual olive orchard were calculated according to Norton (1978) as follows:

$$P.D = \frac{\text{Total number of individuals of a genus}}{\text{Total number of samples containing this genus}} X100$$

Where:

P.D = Population density (%)

RESULTS AND DISCUSSION

1. Identification of nematodes genera

Data in Table (4) reveal that seven genera belong to seven families, to which ring nematodes (*Criconemoides informes*), free nematodes (*Dorylaimus* spp.), root knot nematodes (*Meloidogyne* spp.), spiral nematodes (*Helicotylenchus* spp.), needle nematodes (*Longidorus africanus*), lesion nematodes (*Partylenchus* spp.) and citrus nematodes (*Tylenchulus semipenetrans*) were investigated in the rhizosphere of olive trees.

The most effective nematode genera were distributed and tended to be highest of density from March to November. The ring nematodes (*Criconemoides informes*) and free nematodes (*Dorylaimus* spp.) were observed in March, April, May and June. While, spiral nematodes (*Helicotylenchus* spp.) were detected in March, May, July and August. On the other hand, other genera: root knot nematodes (*Meloidogyne* spp.), needle nematodes (*Longidorus africanus*), lesion nematodes (*Partylenchus* spp.) and citrus nema-odes (*Tylenchulus semipenetrans*) were stressed during all experimental seasons (March to November).

2. Population density of identified nematode genera

a) Before carrying out treatments.

Data in figure (1) illustrate that the root knot nematodes *Meloidogyne* spp. had the highest value of population density (31.14 %), followed by spiral nematodes *Helicotylenchus* spp. (22.05%), citrus nematodes *Tylenchulus semipenetrans* (18.64 %), lesion nematodes *Partylenchus* spp. (17.23 %) and needle nematodes *Longidorus africanus* (6.21 %). On the other hand, the free nematodes *Dorylaimus* spp. and the ring nematodes *Criconemoides informes* recorded the least values of population density (2.67 and 2.06 %), respectively in this respect.

b) After carrying out treatments.

Data presented in table (5-a) indicate that population density of nematode genera were decreased by deficit the amount of water applied. The irrigated trees at RDI-35% of ETc succeeded in decreasing population density of different nematodes genera. While, the irrigated trees at 100% of ETc caused the highest significant increase in this respect. However, the RDI-70% of ETc treatment came in between effects.

Concerning the population density of nematodes genera were subjected to soil management (SM) practices. Data in table (5-a) indicate that black polyethylene plastic and olive pomace mulches had caused a significant reduction in population density of nematode genera, followed by rice straw mulch in both seasons. On the other hand, the highest values of population density of nematodes genera were observed with the hand hoeing treatment in both seasons. A result that agrees

with earlier reports Duncan *et al.* (1992) and Ismail *et al.* (1997). In other words, the mulching significantly decreased population density of nematode genera than non-mulched trees (hand hoeing-control).

Regarding, the interaction effect between regulated deficit irrigation (RDI) and soil management (SM) treatments. Data in table (5-b) show that the RDI-35% of ETc with olive pomace mulch had the least population density. While, the highest population density of nematodes genera was given by irrigated trees at 100% of ETc with hand hoeing treatment. On the other hand, the other interactions came in between. In short, the interaction between water treatment x mulching caused a significant reduction in population density of nematode genera.

3. Total number of nematodes

With respect to the specific effect of regulated deficit irrigation treatments (RDI) on total number of nematodes in ground around olive trees, data in table (6-a) indicate that the maximum values of the total number nematodes was observed in March the gradually decrease till November. The total number of nematodes was generally decreased by decreasing irrigation water. The least values of total number of nematodes were recorded by RDI-35% of ETc treatment in both seasons. While, the irrigated trees at 100% of ETc had the highest values in this respect, followed by RDI-70% of ETc treatment in both seasons .

Concerning, the effect of soil management (SM) practices, data in table (16-a) reveal that mulching induced more simulative effect in total number of nematodes. The olive pomace mulch and black polyethylene plastic mulch treatments resulted in the least number of nematodes, followed by rice straw mulch. On the other hand, hand hoeing (control) induced the highest number of nematodes. However, the maximum values of total number of nematodes were recorded in March, while the minimum values were stressed in November. Similar results agree with Nico *et al.* (2003)

Regarding, the interaction effect between regulated deficit irrigation (RDI) and soil management (SM) treatments on total number of nematodes during 2005 and 2006 seasons. Data disclosed in table (6-b) show that the interaction between the RDI-35% of ETc and olive pomace mulch recorded a significant decrease in number of nematodes. Meanwhile, the highest ones in the two seasons came from the combination of 100% of ETc and hand hoeing treatment in this concern. The other tested interactions came in between with significant differences among them.

Table (4): Identified nematode genera recorded in Olive Research Farm at El-Arish, North Sinai Governorate during 2005 and 2006 seasons.

Identification of nematodes genera				Period of occurrence
Family	Scientific Name	Common Name		
		English	Arabic	
Criconematidae	Criconemoides informes	Ring nematodes	النيماتودا الحلقية	March, April, May and June
Dorylaimidae	*Dorylaimus* spp.	Free nematodes	النيماتودا الحرة	March, April, May and June
Heteroderidae	*Meloidogyne* spp.	Root knot nematodes	نيماتودا تعقد الجذور	March - November
Hoplolaimida	*Helicotylenchus* spp.	Spiral nematodes	النيماتودا الحلزونية	March, May, July and August
Longidoridae	Longidorus africanus	Needle nematodes	النيماتودا الإبرية	March - November
Partylenchidae	*Partylenchus* spp.	Lesion nematodes	نيماتودا تقرح الجذور	March - November
Tylenchulidae	Tylenchulus semipenetrans	Citrus nematodes	النيماتودا الطوالع	March - November

The identification of nematodes genera was according to Brown and Kerry (1987).

Table (5-a): Specific effect of regulated deficit irrigation and soil management treatments on population density of nematodes genera in ground around 'Picual' olive trees during two seasons.

Treatment	Population density of nematodes genera (%)													
	Criconemoides		*Dorylaimus*		*Meloidogyne*		*Helicotylenchus*		*Longidorus*		*Partylenchus*		Tylenchulus	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
1.Specific effect of regulated deficit irrigation (RDI) treatments														
100% ETc (Control)	10.81 a	11.54 a	12.65 a	15.14 a	10.48 a	10.51 a	10.25 a	9.53 a	11.45 a	9.91 a	10.29 a	10.02 a	12.15 a	11.36a
RDI-70% ETc	8.33 b	8.59 b	7.31 b	5.85b	8.73 b	8.50 b	8.30 b	8.25 ab	7.83 b	8.39 b	7.85 b	7.72 b	7.03 b	7.21 b
RDI-35% ETc	5.86 c	4.87 c	5.04 c	4.02 b	5.79 c	5.99 c	6.45 c	7.22 b	5.72 c	6.70 c	6.86 c	7.26 b	5.82 c	6.43 b
2.Specific effect of soil management (SM) practices														
Hand hoeing (Control)	12.67 a	12.92 a	15.31 a	12.92 a	11.08 a	10.18 a	10.30 a	9.12 a	12.01 a	13.78a	10.41 a	9.43 a	13.30 a	11.85 a
Black plastic mulch	6.90 c	6.70 c	5.62 c	6.34 c	6.87 c	7.39 c	7.59 c	8.22 ab	6.25 c	5.47 d	7.53 c	8.28 b	6.39 c	6.20 c
Olive pomace mulch	5.71 d	5.40 d	5.73 c	6.33 c	6.56 c	7.46 c	7.09 c	7.81 b	6.94 c	6.48 c	7.18 c	7.09 c	6.01 c	7.49 b
Rice straw mulch	8.05 b	8.31 b	6.67 bc	7.74 b	8.84 b	8.30 b	8.35 b	8.18 ab	8.13 b	7.61 b	8.21 b	8.54 b	7.63 b	7.79 b

Table (5-b): The interaction effect between regulated deficit irrigation and soil management treatments on population density of nematodes genera in ground around 'Picual' olive trees during 2005 and 2006 seasons.

Treatment		Population density of nematodes genera (%)													
		Criconemoides		*Dorylaimus*		*Meloidogyne*		*Helicotylenchus*		*Longidorus*		*Partylenchus*		*Tylenchulus*	
		2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
100% ETc	Hand hoeing	16.22 a	18.12 a	22.65 a	20.29 a	15.59 a	13.94 a	13.70 a	10.74 a	16.10 a	15.40 a	14.18 a	11.80 a	22.26 a	19.25 a
	Black plastic mulch	8.88 cde	8.91 d	9.05 d	11.94 c	8.11 bcd	9.40 b	9.04 b	8.80 bc	7.97 d	6.56 cd	8.69 bcd	9.72 b	7.97 d	7.01 c
	Olive pomace mulch	8.04 de	7.78 e	7.66 f	12.92 bc	7.68 cd	9.15 bc	8.69 bc	9.58 ab	9.21 c	7.41 c	8.06 bcde	7.89 cde	7.59 de	9.47 b
	Rice straw mulch	10.10 c	11.35 c	11.23 c	15.39 b	10.56 b	9.54 b	9.57 b	9.00 abc	12.52 b	10.29 b	10.23 b	10.65 ab	10.79 b	9.71 b
RDI- 70% ETc	Hand hoeing	12.58 b	14.27 b	15.08 b	11.17 c	10.06 b	9.04 bc	9.58 b	8.84 bc	12.15 b	15.18 a	9.29 bc	8.48 c	9.70 c	9.21 b
	Black plastic mulch	6.25 ef	6.08 f	5.00 g	4.40 e	8.75 bc	8.35 cd	7.81 cd	8.03 cd	5.91 ef	5.28 e	7.46 de	7.86 cde	6.29 e	6.14 d
	Olive pomace mulch	6.07 ef	6.49 ef	5.10 g	3.25 f	7.11 cde	7.77 cde	7.52 cde	7.52 de	6.78 de	6.34 cde	6.90 e	6.48 f	5.85 f	6.46 d
	Rice straw mulch	8.41 cde	7.53 e	4.07 h	4.58 e	8.98 bc	8.84 bcd	8.28 bcd	8.60 bcd	6.50 def	6.76 cd	7.76 cde	8.06 cd	6.27 e	7.05 c
RDI-35% ETc	Hand hoeing	9.20 cd	6.36 ef	8.22 e	7.30 d	7.57 cd	7.57 de	7.62 cd	7.79 d	7.78 d	10.74 b	7.77 cde	8.00 cd	7.94 d	7.10 c
	Black plastic mulch	5.57 f	5.13 g	2.82 i	2.67 g	3.75 f	4.42 g	5.91 ef	7.81 d	4.88 g	4.57 f	6.46 f	7.26 de	4.92 g	5.44 e
	Olive pomace mulch	3.04 g	1.93 h	4.42 gh	2.84 g	4.88 ef	5.47 f	5.07 f	6.34 e	4.82 g	5.71 de	6.56 f	6.88 ef	4.58 g	6.54 d
	Rice straw mulch	5.65 f	6.06 f	4.71 gh	3.25 f	6.96 de	6.51 ef	7.20 de	6.94 de	5.39 f	5.76 de	6.65 f	6.91 def	5.84 f	6.62 d

Means followed by the same letter(s) within each column are not significantly different at the 0.05 level, according to Duncan's multiple range test

Table (6-a): Specific effect of regulated deficit irrigation and soil management treatments on total number of nematodes in ground around 'Picual' olive trees during 2005 and 2006 seasons.

Treatment	Total number of nematodes. Kg^{-1} soil																	
	March		April		May		June		July		August		September		October		November	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
	1.Specific effect of regulated deficit irrigation (RDI) treatments																	
100% ETc (Control)	1825 a	2132 a	1661 a	2045 a	977 a	1034 a	718 a	554 a	486 a	401 a	344 a	316 a	263 a	242 a	191 a	256 a	143 a	117 a
RDI-70% ETc	1594b	1579 b	796 b	1096b	495 b	548 b	488 b	325 b	403 ab	315 b	295 ab	249 b	184 b	204 ab	161 b	154 b	62 b	57b
RDI-35% ETc	1252 c	1048 c	755 b	730 c	434 b	488 b	451 b	261 c	347 b	240 c	256 b	184 c	197 b	151 b	168 b	116 b	29 b	52 b
	2.Specific effect of soil management (SM) practices																	
Hand hoeing (Control)	1877 a	1999 a	1317 a	2285 a	923 a	907 a	1293 a	627 a	1059 a	572 a	729 a	463 a	446 a	448 a	426 a	449 a	277 a	261 a
Black plastic mulch	1503 b	1472 c	948 b	1008 b	486 c	604 c	286 c	209 c	196 bc	199 c	143 c	182 bc	125 c	160 b	71 c	85 b	20 b	12 b
Olive pomace mulch	1302 c	1343 d	879 c	804 c	411 c	476 d	262 c	235 c	122 c	153 c	68 d	128 c	44 d	26 c	0 d	0 c	0 c	0 c
Rice straw mulch	1547 b	1531 b	1138 ab	1064 b	720 b	772 b	369 b	448 b	272 b	349 b	253 b	226 b	243 b	161 b	196 b	167 b	15 b	27 b

Means followed by the same letter(s) within each column are not significantly different at the 0.05 level, according to Duncan's multiple range test.

Table (6-b): The interaction effect between regulated deficit irrigation and soil management treatments on total number of nematodes in ground around Picual olive trees during 2005 and 2006 seasons.

Treatment		Total number of nematodes . Kg^{-1} soil																	
		March		April		May		June		July		August		September		October		November	
		2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
100% ETc	Hand hoeing	2210 a	2417 a	1788 a	3700 a	1497 a	1274 a	1598 a	736 a	1206 a	583 a	900 a	525 a	505 a	504 a	485 a	540 a	467 a	351 a
	Black plastic mulch	1699 b	2020 bc	1684 ab	1528cd	709 c	965 abc	420 c	444 bc	329 d	370 bcd	207 cd	304 cde	132 e	234 c	88 e	118 c	61 d	37 d
	Olive pomace mulch	1431 c	1842bcd	1478 b	1323 d	516 d	823 bc	398 cd	406 bcd	142 f	245 cde	64 g	102 g	84 f	67 ef	0 g	0 e	0 e	0 e
	Rice straw mulch	1961 ab	2248 abc	1694 ab	1630 c	1184 b	1075 ab	457 c	630 ab	267 def	406 bc	204 cd	332 bcde	330 bc	163 cdef	189 d	366 b	44 d	81 c
RDI-70% ETc	Hand hoeing	1944 ab	2297 ab	1173 c	1933 b	642 cd	734 cd	1110 b	576 b	1037 b	598 a	652 b	401 abc	407 abc	440 ab	397 b	460 a	249 b	227 b
	Black plastic mulch	1467 c	1367 de	614 e	987 def	473 def	432 f	293 def	100 f	170 f	145 de	152 e	168 efg	62 f	179 cde	45 f	81 c	0 e	0 e
	Olive pomace mulch	1394 cd	1235 def	602 e	632 fg	370 ef	393 fg	205 ef	155 e	114 g	111 f	89 f	205 defg	36 g	11 g	0 g	0 e	0 e	0 e
	Rice straw mulch	1572 bc	1418 cde	793 de	831 ef	496 de	631 de	343 cde	468 bc	292 de	404 bc	288 c	222 def	229 cd	184 cd	202 c	74 cd	0 e	0 e
RDI-35% ETc	Hand hoeing	1478 c	1283 def	991 cd	1221 de	630 cd	713 cd	1170 b	570 b	934 c	534 ab	635 b	462 ab	426 ab	399 b	395 b	347 b	116 c	206 b
	Black plastic mulch	1342 cde	1030 ef	546 f	510 g	277 f	416 f	144 g	83 f	89 g	83 f	70 fg	73 h	180 cde	68 ef	81 e	57 d	0 e	0 e
	Olive pomace mulch	1080 e	952 f	558 f	457 g	348 ef	211 g	184 g	143 e	109 g	103 f	51 g	76 h	12 g	0 h	0 g	0 e	0 e	0 e
	Rice straw mulch	1109 de	928 f	926 cde	730 efg	480 de	610 de	307 de	246 de	257 def	238 cde	268 c	123 fg	169 de	136 def	196 cd	61 cd	0 e	0 e

Means followed by the same letter(s) within each column are not significantly different at the 0.05 level, according to Duncan's multiple range test.

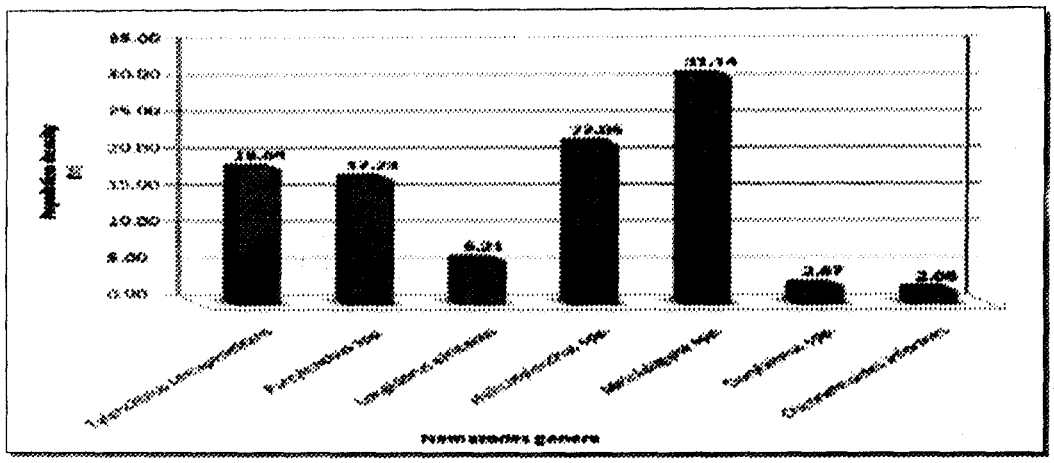

Fig. (1): Population density of nematode genera identified in the soil around 'Picual' olive trees before carrying out the treatments.

Thus, the total number of nematodes was gradually decreased in 2005 and 2006 seasons from March (maximum) till November (minimum) as affected by RDI and soil management treatments. In short, mulching x regulated deficit irrigation proved to be the superior interaction in reducing the total number of nematodes.

Generally, the results indicate that subjecting 'Picual' olive trees to soil water deficit and soil management practices (mulching) caused a decline in total number of nematode genera. The decrease in total number of nematodes due black polyethylene plastic and olive pomace mulches may be attributed to increase soil temperature at 20 cm depth in (between 47·4°C and 48·2°C) compared with unmulched (between 31·7°C trees and 32·9°C). The high temperature with low soil moisture content reduced egg hatch by > 95%. (Nico *et al.*, 2003)

REFERENCES

Agriculture Hand Book (1954): Diagnosis and improvement of saline and alkali soils. United States Department of Agriculture. Washington, D.C. 20402.

Brown, R.H. and Kerry (eds). B. R. (1987): Principles and practice of nematode control in crops. Academic Press. Sydney. 323 – 445.

Doorenbos, J. and Pruitt, W.O. (1977): Crop water requirements. FAO, Irrigation and drainage, paper No.24. Rome.

El-Shamma, M.S. and Hassan, A.A. (2001): A comparative study of some weed control methods on Thompson seedless vines. Assiut Journal of Agricultural Science, 32 (1): 145-155.

Ismail A.E; Ghali, M.H.; Nakhlla, F.G. and Aboul-Eid, H.Z. (1997): Effect of soil solarization by polyethylene sheets on growth of navel orange and control of citrus nematode *Tylenchulus semipenetrans*. Pakistan Journal of Nematology. 1997, 15: 1-2, 71-87; 34 ref.

Mellouli H.J; Hartmann, R.; Gabriels, D. and Cornelis, W.M. (1998): The use of olive mill effluents "margines" as soil conditioner mulch to reduce evaporation losses. Soil and Tillage Research., 49 (1998): 85-91.

Nico, A.I; Jiménez-Díaz, R.M. and Castillo, P. (2003): Solarization of soil in piles for the control of Meloidogyne incognita in olive nurseries in southern Spain. Plant Pathology December 2003, 52 (6), 770–778.

Norton D.C. (1978): Ecology of plant parasitic nematodes. Wiley, New York, 268 pp.

Piper, C. S. (1947): Soil and plant analysis. The University of Adelaide (Australia) pp: 59-74.

Richard's, L.A. (1954): Diagnosis and improvement of saline and alkaline soils. U.S.D.A. Handbook No. 60.

إستجابة تجمعات النيماتودا لتنظيم خفض مياه الري وخدمة التربة في أشجار الزيتون البيكوال

محمد دياب الديب*، عطية عبد الوهاب السبسي**، سيد على أحمد***، هاني عبد الله العلاقمي*

* قسم الإنتاج النباتي (فاكهة)- كلية العلوم الزراعية البيئية بالعريش- جامعة قناة السويس
** قسم الأراضي والمياه- كلية العلوم الزراعية البيئية بالعريش- جامعة قناة السويس
*** قسم الإنتاج النباتي (وقاية نبات)- كلية العلوم الزراعية البيئية بالعريش- جامعة قناة السويس.

أجريت التجربة بمزرعة الزيتون البحثية بكلية العلوم الزراعية البيئية بالعريش، جامعة قناة السويس، وذلك خلال عامي ٢٠٠٥، ٢٠٠٦ على أشجار الزيتون البيكوال عمر ١٦سنة والمنزرعة في تربة رملية طميية على أبعاد ٦ × ٧ م، وقد رويت الأشجار بمياه بئر ملوحته ٤٥٠٠ جزء في المليون. وتم دراسة تأثير خفض مياه الري وخدمة التربة (التغطية) على كل من أجناس النيماتودا المختلفة المنتشرة بأرض المزرعة وكثافة كل جنس من هذه الأجناس والعدد الكلي لها. وتم معاملة أشجار الزيتون بثلاث مستويات من الري ١٠٠%، و٧٠%، و٣٥% من البخر- نتح المحصولي . وتم إجراء معاملات الري إبتداءاً من شهر مارس وحتى شهر نوفمبر طبقاً للحسابات الشهرية للبخر – نتح المحصولي. كما تم معاملة أشجار الزيتون بأربعة معاملات من خدمة التربة بدون تغطية للتربة (العزيق اليدوي)، التغطية بالبلاستيك الأسود، والتغطية بتفل الزيتون، والتغطية بقش الأرز. وتم تغطية الأشجار في منطقة محيط حجر الشجرة إبتداءاً من شهر فبراير ٢٠٠٥ وحتي شهر نوفمبر ٢٠٠٦. وتم تمييز وتعريف سبعة أجناس من النيماتودا مندرجة من سبع عائلات وهم: النيماتودا الحلقية (*Criconemoides informes*)، والنيماتودا الحرة (*Dorylaimus* spp.)، ونيماتودا تعقد الجذور (*Meloidogyne* spp.)، والنيماتودا الحلزونية (Helicotylenchus spp.)، والنيماتودا الإبرية (*Longidorus africanus*)، ونيماتودا تقرح الجذور (*Partylenchus* spp.)، ونيماتودا الموالح (*Tylenchulus semipenetrans*). قد تبين أن جنس نيماتودا تعقد الجذور "أعطى أعلى كثافة إنتشار. بينما سجلت النيماتودا الحلقية أقل قيم للكثافة . أوضحت النتائج أن الأشجار المروية عند مستوى خفض -٣٥ % من البخر -نتح المحصولي نجحت في خفض كثافة أجناس النيماتودا المختلفة وكذلك أعدادها الكلية، تليها معاملة الري عند ٧٠% من البخر – نتح المحصولي. ونجح التغطية بالبلاستيك الأسود أوتفل الزيتون في إنخفاض كثافة أجناس النيماتودا المختلفة، تليها التغطية بقش الأرز. أشارت النتائج أن خفض الماء عند مستوى ٣٥ % من البخر -نتح المحصولي مع التغطية بتفل الزيتون أعطت أقل كثافة وعدد كلي. وقد لوحظ أن العدد الكلي للنيماتودا تناقص في بداية شهر مارس ثم أزداد بعد ذلك حتى شهر سبتمبر ثم تناقص مرة أخرى في شهر نوفمبر.