J. Agric. Sci. Mansoura Univ., 32 (10): 8695 - 8704, 2007

STATUS OF PLANT PARASITIC NEMATODES ASSOCIATED WITH COTTON FIELDS IN NORTH EASTERN NILE DELTA REGION, EGYPT WITH SPECIAL REFERENCE TO HOST SUITABILITY TO *Meloidogyne incognita* INFECTION.

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ABSTRACT

A survey of plant parasitic nematodes associated with the rhizosphere of cotton cvs. Giza 86 and 45 grown in fourteen locations of Dakahlia and Damaita governorates was carriedout during the cotton growing seasons of 2005 and 2006, , in addition, a pot experiment was conducted to determine host suitability of three cotton cultivars i.e. Giza 86, 89 and Giza 45 to *Meloidogyne incognita* infection under greenhouse condition at 30±5ºC . Twelve nematode genera were recorded in cotton fields surveyed in Dakahlia governorate, whereas nine nematode genera only for those of Damaita governorate. Based on their frequency of occurrence these genera can be arranged in descending order as follows: *Tylenchus* (46.3%), *Tylenchorhynchus* (39.7%), *Xiphinema(*23.9%), *Meloidogyne* (19.0%), *Rotylenchus* (10.7), *Hirschmanniella* (9.1%), *Trichodorus* (8.25%) ,*Hoplolaimus(*7.49%), *Rotylenchulus* (7.4%), *Helicotylenchu*s (4.9%) *, Psilenchus* (1.6%) and *Pratylenchus* (0.82%),for Dakahlia , whereas *Meloidogyne* (68.0%) , *Tylenchus* (64.0%), *Tylenchorhynchus* (60.0%), *Heterodera* (38.0%), *Dorylaimus* (14.0%), *Hirschmanniella* (10.0%), *Helicotylenchu*s (8.0%) ,*Aphelenchus* (8.0%0) and *Psilenchus* (2.0%) for Damiata. cotton cv. Giza 86 appeared to encounter the highest number of nematode genera (10) while Giza 45 gained (5) only. Screening of the selected cotton cultivars against *M. incognita* infection revealed that plant growth parameters tested were obviously affected to a certain extent, where cotton cv. Giza 89 showed the least percentage reduction for shoot and root lengths, and total plant fresh and shoot dry weights with values of 4.9, 7.5, 2.5 and 0.44%, respectively, On the other hand, cotton cv. Giza 86 and 45 recorded the highest percentage reduction values for the same growth parameters. Based on root-gall index and R factor of *M. incognita* infecting cotton cultivars tested, Giza 89 was scored as resistant while Giza 45 as well as Giza 86 were scored as susceptible hosts since their root gall indices were 2, 5 and 4 with R factor values of 0.4, 2.31 and1.11, respectively.

Keywords: Survey, Nematode genera, Cotton cultivars, Host suitability, *Meloidogyne incognita*

INTRODUCTION

Cotton plant, *Gossybium barbadense* L . constitutes the major agricultural national income of the Arab Republic of Egypt. Its total cultivated area in Dakahlia and Damiata governorates reached to 79,400 and 3,000 feddans*, respectively with an average of 8.6 kentar** /feddan for the season of 2006.

*** Feddan =4200m^2 or 1.08 acre**

****Kentar=150Kg**

Several plant parasitic nematodes i.e. the reniform nematode, *Rotylenchulus reniformis* (Salem,1970) the root lesion nematode, *Pratylenchus brachyurus* (El-Sherif,1976), the root –knot nematode, *Meloidogyne incognita* and *R. reniformis*,(Starr and Page,1990), and the sting nematode *Belonolaimus longicaudatus* (Crow *et al* ., 1997) were recorded as pathogens of cotton plant in many soil types all over the world. The first four nematode species are widely distributed in the cultivated cotton areas of Egypt, causing remarkable crop losses. Nematological survey is necessary in providing information on the probability and magnitude of crop losses due to nematode infection , especially with *Meloidogyne* spp. Their wide host range and favorable environmental condition provoked suitable control measure to achieve reasonable result .Therefore the aim of the present investigation deals with 1) the survey of nematode genera associated with cotton fields cultivated in Dakahlia and Damiata governorates during the two successive growing seasons of 2005 and 2006, , and 2) screening certain cotton cultivars i.e. Giza 89, 86 and Giza 45 against the root –knot nematode ,*Meloidogyne incognita* infection under greenhouse conditions. .

MATERIALS AND METHODS

A. Nematode Assay:

One hundred and seventy one composite soil samples were collected from the rhizosphere of cotton plants, during the growing season of 2005 and 2006. These samples represented two Egyptian cotton cultivars i.e. Giza 86 and Giza 45 , where the first cultivar was grown in eleven localities of four counties of Dakahlia governorate (Temi El-Amded , El-Sinbellawan , Talkha and Mansoura)where the second cultivar Giza 45 was grown in three counties (Kafer-Sad , El–Zarka and Faraskor) with three localities of Damiata governorate . Each soil sample was separately kept in a plastic bag, refrigerated at 4ºC and then proceeds for nematode recovery. Separation of nematodes from soil was accomplished by sieving and modified Baermann–pan technique (Goodey1957). Identification of nematode genera in repeated aliquots (1m/each) in each soil sample was based on the morphological characters of the adult and larval forms according to Mai and Lyon (1975). The Hawksely counting slide was used for determining the number of each genus and recorded.

B. Host Suitability of Cotton Cultivars to the Root-knot Nematode, *Meloidogyne incognita* Infection under Greenhouse Condition

1**- Nematode inoculum preparation**:

Meloidogyne incognita (J2) were extracted from infected coleus plants (*Coleus blumei*) roots by incubating egg-masses in distilled water. Second stage juveniles (J2), were obtained from a pure culture established from a single egg-mass of *M. incognita* that previously identified according to the characteristics of perineal pattern (Taylor and Sasser, 1978) and reared on coleus plants in the greenhouse of Nematodology Research Unit, Faculty of Agriculture, Mansoura University, where this experiment was conducted.

2- Screening three cotton cultivars against *Meloidogyne incognita* infection:

Thre cotton cultivars used in this experiment i.e. Giza 89 , Giza 86 and Giza 45 were obtained from Cotton Research Institute, Agric. Res. Center, Giza, where the former two cultivars were cultivated in Dakahlia governorate and the latter cultivar was cultivated in Damiata governorate. Plastic pots of 10-cm-diam.were partially filled with steam–sterilized sandy loam soil (850 g soil /pot). Five seeds of each cotton cultivar were planted per pot watered as needed and left on a bench in the greenhouse at 30±5ºC until germination. Ten days after seed germination, one healthy cotton seedling left per pot while the rest seedlings removed, then each seedling was inoculated with 1000 second stage juveniles of *M. incognita* with a total of five seedlings per cotton cultivar, while another five seedlings / cultivar were left free of nematode inoculum and served as control treatment. All pots were arranged in block design system and agronomically treated the same during the course of experiment. Forty five days after inoculation, plants were uprooted and root system was washed from adhering soil. Length and fresh weight of shoots and roots as well as shoot dry weight were measured and percent reduction in such growth parameters were calculated in relation to health plants. Infected cotton roots were stained in 0.01 hot lactic acid fuchsin (Byrd *et al.,* 1983) and examined for the numbers of developmental stages , females, galls and egg-masses, *M. incognita* (J_2s) were then extracted from soil by sieving and modified Baermann-pan technique (Goodey, 1957) counted and recorded. The reproduction factor (R) on each cultivar was calculated and recorded. Root gall index (RGI) and egg-mass index (EI) were determined according to the scale given by Taylor and Sasser (1978) as follows: 0=0 galls or egg-masses, 1=1-2 galls or egg-masses, 2=3-10 galls or egg-masses, 3=11-30 galls or egg-masses and 4=31-100 galls or egg-masses, 5=more than 100 galls or egg-masses. Host suitability was measured according to the scale of Canto-Saenz (1983) on the basis of root gall index and nematode reproduction (R factor) as follows: (RGI≤2&R≤1) = Resistant (R) , (RGI≤2&R>1) = Tolerant (T) and (RGI>2&R>1)= Susceptible (S).Statistically the obtained data were subjected to analysis of variance (ANOVA)(Gomez and Gomez 1984), followed by Duncan's multiple range test to compare means (Duncan, 1955)

RESULTS AND DISCUSSION

Data in table (1) recorded the presence of ten and two genera of true and suspected plant parasitic nematodes in one hundred and twenty one soil samples collected from the rhizosphere of cotton plant cv. Giza 86 grown in eleven localities of four counties of Dakahlia governorate during the growing season of 2005. These nematode genera were *Helicotylenchu*s, *Hirschmanniella, Hoplolaimus*, *Meloidogyne*, *Pratylenchus, Rotylenchulus*, *Rotylenchus, Trichodorus*, *Tylenchorhynchus*, and *Xiphinema* as true plant parasitic nematodes, as well as *Psilenchus* and *Tylenchus* as suspected parasitic nematode genera . *Tylenchus*, *Tylenchorynchus, Xiphinema* and *Meloidogyne* ,genera seemed to be the most prevailing cotton nematodes as

they occurred at rates of 56,48,29 and 23 times with percentages occurrence of 46.3,39.7,23.9 and 19.0%, respectively. The nematode genera *Rotylenchus, Hirschmanniella, Trichodorus, Hoplolaimus, Rotylenchulus, and Helicotylenchus,* showed moderate distribution as they occurred at rates of 13,11,10,9,9, and 6 times with percentage occurrence of 10.7,9.1, 8.25,7.4,7.4, ,and 4.9% ,respectively, Whereas , the genera *Pratytenchus* and *Psilenchus* were less common as they occurred at the rate of one and two times each with percentage occurrence of 0.82% and 1.6 , respectively. It was also evident (Table1) that Temi-El Amded county encountered the largest number of nematode genera (11) followed by El-Sinbellawan (9). Talkha and Mansoura (2 each). Moreover ,Kafersngab locality (Temi-El-Amded) encountered the highest number of nematode genera (10) i.e. *Helicotylenchus*, *Hoplolaimus*, *Meloidogyne, Rotylenchulus*, *Rotylenchus*, *Tylenchorynchus*, *Xiphinema,Trichdorus,Tylenchus* and *Psilenchus* followed by Shobra-hoor locality (EL-Sinbellawan) (6) i.e. *Meloidogyne*, *Rotylenchulus*, *Rotylenchus, Tylenchorynchus, Xiphinema* and *Tylenchus.*The dagger nematode , *Xiphinema* sp.. and the root-knot nematodes, *Meloidogyne* spp. (j_2) were recorded from 29 and 23 out of 121 soil samples examined and ranked first in Shobrahoor locality (El-Sinbellawian) of 10 and 8 times with an average of 187 and 70 individuals per 100 g soil , followed by Kafersngab (Temi El-Amded) locality at the rate of 4 and 6 times with an average of 132 and 171 individuals /100g. soil while their population density per 100 g .soil reached the moderate number in Kafrghanam (El-Sinbellawian) locality which were amounted to 108 and 67 at the rate of 8 and 3 times , respectively.
It was worthy to note that the reniform nematode *Rotylenchulus* spp... was common in Kafersngab locality (Temi-El-Amded),Kafer-ghanam and Shobrahoor (EL-Sinbllawian) localities at that rate of 1,3 and 5 times with an average of 68,87, and 158 individuals per 100 g. soil ,respectively . *Helicotylenchus*, *Hirschmanniella*, *Hoplolaimus* and *Rotylenchulus* were detected from the soil of three localities, while, were present in the soil of two localities, On the other hand, *Pratytenchus* was detected from the soil of one locality.(Table 1).

Concerning Damiata governorate, five as well as four true and suspected parasitic nematode genera were observed in the collected soil samples (50) (Table 2). With respected to the true parasitic ones the root –knot nematode, *Meloidogyne* spp.. (J_2) and the stunt –nematode, *Tylenchorhynchus* spp.. seemed to be the most prevailing pestes as they occurred at the rate of 34 and 30% times with percentage of 68.0 and 60% , respectively . The cyst nematode *Heterodera* spp.. (J_2) showed a moderate distribution as it occurred for the first time at the rate of 19 times with percentage of 38.0%. The nematodes, *Tylenchus, Meloidogyne*, *Tylenchorhynchus*, *Heterodera* and *Dorylaimus* seemed to be the prevailing nematodes in Kafer-Elatrash locality of Kafer- Sad county and occurred at the rate of 16,15,15,8 and 7 times with an average of 25,40,20,23, and 27 individuals per 100 g.soil , respectively. Whereas , in EL-Zarka and Faraskor counties, the genera *Meloidogyne* (J_2), *Tylenchorhynchus* and *Tylenchus* were the most prevalent at the rate of 10,8and 7, and 9,7 and 9 times with an average of 30,20 and 20; and30,20 and18 individuals per 100 g.soil , respectively.

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In Damiata governorate , the true parasitic genera ,i.e. *Hoplolaimus, Pratytenchus*, *Rotylenchulus, Rotylenchus, Trichodorus and Xiphinema* were not found in the soil of the surveyed cotton field ,Giza cv.45 , while the infective juveniles of the cyst nematode *Heterodera* spp... were recorded and absent in soil of cotton field Giza 86 cultivated in Dakahlia governorate. Among the surveyed cotton cultivares, Giza 86 encountered the largest number of true parasitic nematode genera (10) (Table 1) that grown in Dakahlia governorate, whereas, Giza 45 cultivated in Damiata governorate, ranked the second in the number of nematode genera (5) (Table 2) . Data also revealed that the highest densities of nematode individuals per 100 g. soil averaged 206, and 187 and 171 in the rhizosphere of Giza 86 for *Trichodorus*, and *Xiphinema* as vector of plant viruses and *Meloidogyne* (j_2) as serious plant pathogen. *Tylenchus*, *Psilenchus*, *Dorylaimus* and *Aphelenchus* which are considered to be suspected plant parasitic nematode genera were recorded from the rhizosphere of cotton fields of Giza 45 ,whereas, the first two genera were only detected from soil of Giza 86 (Tables 1&2) in Dakahlia fields.

Data in Table (3) represent the growth response of three cotton cultivars i.e. Giza 45, Giza 86 and Giza 89 to *M. incognita* infection under greenhouse conditions at 30± 5ºC. It was evident that plant growth parameters tested were obviously affected by nematode infection to certain extent. Treatment with 1000 J_2 of *M. incognita* per pot greatly reduced the shoot and the root lengths , and fresh and dry weights of shoot with values of 10.6 ,30.7,17.6 and 13.1%for Giza 45, followed by Giza 86 with values of 28.5, 8.3,6.4and 8.0% ,respectively, whereas Giza 89 showed the least percentage reduction which amounted to 4.9 ,7.5 ,2.5 and 0.44% for shoot and root length, and total plant fresh and shoot dry weights ,respectively.

Data in Table (4) on host suitability of the tested cotton cultivars i.e. Giza 45, Giza 86 and Giza 89 revealed that none of these cultivars was immune or resistant to *M. incognita* infection, since galls and egg-masses were found on all varieties and various number of nematode developmental stages were observed infecting their root systems depending on their degree of resistance. Host suitability of the tested cotton cultivars was determined by the designation given by Canto-Saenz (1983) based on root gall index and R factor. It was found that Giza 89 was rated as resistant since root gall index equal 2.0 with R factor value of 0.4. On the other hand Giza 45 as well as Giza 86 were rated as susceptible hosts. Their root gall indices were 5 and 4, respectively, while their R factor was also 2.31 and 1.11, respectively.

Apparently the present work on nematological survey is in accordance with the findings of Bird *et al*., (1971) who recorded the frequency occurrence of *Criconemooides* ,(83%) , *Trichodorus* (70%) , *Pratytenchus* (32%) , *Helicotylenchu*s (30%), *Meloidogyne* (24%) , *Hoplolaimus* (9%), *Rotylenchulus reniformis* (9%) , *Tylenchorhynchus* (7%) , *Xiphinema* (7%) and *Hemicyclophora* (4%) , respectively, during a survey of approximately 100% of stunted cotton fields in south Georgia state of U.S.A , except for the first and last nematode genera that were not recorded in the surveyed fields tested .

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Egyptian cotton cultivars, *G. barbadense* showed deference in their suitability to *M. incognita* infection with the exception of Giza 89 cultivar which was ranked as resistant, while the other two commercial cultivars i.e. Giza 86 and Giza 45 were susceptible cultivars according to their root gall index and R factor.

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وضع النيماتودا المتطفلة نباتيا المصاحبة لحقول القطن في شمال شرق منطقة دلتا مصر بالاشارة الي قابلية العائل للاصابة بنيماتودا تعقد الجذور "ميليدوجين انكوجنيتا"

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تشمل الدراسة علي حصر لاجناس النيماتودا المصاحبة لنباتات القطن صنف جيزة ٨٦ وجيزة ٤٥ المنزرعة في اربعة مراكز (تمي الاميد –السنبلاوين –طلخا –المنصورة) شاملة احدي عشر موقع في محافظة الدقهلية خلال موسم ٢٠٠٥ بالنسبة للصنف الاول وثلاثة مراكز (كفر سعد والزرقا وفارسكور) شامله ثلاثه مواقع في محافظة دمياط خلال موسم ٢٠٠٦.

كما تضمنت الدراسة ايضا تجربة لبيان مدي اصابة ثلاثه اصناف قطن هي جيزة ٨٦,٨٩,٤٥ للاصابة بنيماتودا تعقد الجذور"ميليدوجين انكوجنيتا" تحت ظروف الصوبة السلكية عند درجة حرارة ٣٠±٥ درجة مئوية .

اسفرت الدراسة عن وجود 12 جنس من اجناس النيماتودا في ترب حقول نباتات القطن صنف جيزة ٨٦ المزرعة في محافظة الدقهلية وهي حسب اهميتها بالنسبة لمعدل تواجدها *Tylenchus* و *Tylenchorhynchus*و *Xiphinema* و *Meloidogyne*و *Rotylenchus*و *Hirschmanniella* و*Hoplolaimus* و*Rotylenchulus* و *Trichodorus*و*Helicotylenchus* و*Pratylenchus* و*Psilenchus* بينما في محافظة دمياط تم تسجيل تسعة اجناس فقط وهي *Meloidogyne*و *Tylenchus* و*Tylenchorynchus*و*Heterodera* و*Dorylaimus* و*Hirschmanniella* و *Helicotylenchus* و*Aphelenchoides* و*Psilenchus* واتضح ان صنف جيزة ٨٦ احتوي علي اعلي عدد لاجناس النيماتودا (١٠) بينما احتوي الصنف جيزة ٤٥ علي (٥) اجناس فقط .

كما اظهرت النتائج ايضا ان قياسات النمو المختبرة لصنف جيزه ٨٩ اعطت اقل النسب نقصا عند الاصابة بنيماتودا تعقد الجذور بمعدلات ٤,٩ % و٧,٥% و٢,5% و0.44% لاطوال الساق والجذر والوزن الرطب الكلي للنبات والجاف للمجموع الخضري علي التوالي .بينما اعطت نفس القياسات النباتيه المختبرة اعلي معدلات نقص لصنفي القطن جيزة ٨٦,٤٥ كما ادت النتائج بناء علي معدل العقد النيماتودية مع معدل تكاثر النيماتودا علي جذور نباتات القطن المختبرة ان الصنف جيزة ٨٩ مقاوم للاصابه بينما صنفي القطن جيزة ٨٦و٤٥قابلين للاصابة بنيماتودا تعقد الجذور حيث ان معدلات العقد الجذرية ٥,٤,٢ ومعدل التكاثر ٠,٤, ١,١١و٢,٣١ علي التوالي .

ملحوظة هامة : هذا البحث ممول من وحدة حساب البحوث جامعة المنصورة.

Table(1):Frequency occurrence and population density of nematode genera associated with cotton cv. Giza 86 in eleven localities at four counties of Dakahlia governorate during the cotton growing season of 2005

Nematode Genera	Occurrence of nematode genera per 100 g . soil within each locality of cotton fields													
True plant parasitic nematodes	Temi El-Amded n=40					El Senbillawan n=42				Talkha n=30	Mansuora n=9	occurrence n=121	No. of infested localities	Frequency occurrence%
	Abo ser n=5	Abo Dawod n=5	Kafer Sngab n=20	El- Safa n=5	Zafer n=5	Ghazala n=5	Shobra-Keballa n=9	Kafr-Ghnam n=10	Shobra-hoor n=18	Meat-anter n=30	El-baklia n=9			
Helicotylenchus	-	-	(1)83	-	(2)56	-	-	-	-	(3)60	-	6	3	4.9
Hirschmanniella	5)222(	(2)79	-	-	-	-	(4)146	-	-	-	-	11	3	9.1
Hoplolaimus	2)104(	(4)149	(3)65	-	-	-	-	-	-	-	-	9	3	7.4
*Meloidogyne**	-	-	(6)171	-	-	-	(1)30	(3)67	(8)70	(5)80	-	23	5	19.0
Pratylenchus	-	-	-	-	-	-	(1)65	-	-	-	-	1	1	0.82
*Rotylenchulus**	-	-	(1)68	-	-	-	-	(3)87	(5)158	-	-	9	3	7.4
Rotylenchus	-	-	(2)102	-	-	-	-	-	(11)189	-	-	13	2	10.7
Trichodorus	-	(1)160	(3)206	-	-	-	(2)90	-	-	-	(4)70	10	4	8.25
Tylenchorhynchus	(1)70	-	(5)122	(4)98	(2)158	(4)154	(5)105	(6)126	(12)152	-	(9)50	48	9	39.7
Xiphinema	-		(4)132	(2)81	(3)82	(2)150	-	(8)108	(10)187	-	-	29	6	23.9
Suspected plant parasitic nematodes														
Psilenchus	-	-	(2)123	-	-	-	-	-	-	-	-	2	1	1.6
Tylenchus	(5)155	(5)257	(11)152	(3)120	(4)108	(5)120	-	(8)92	(15)99	-	-	56	8	46.3
Nematode genera/locality	4	4	10	3	4	3	5	5	6	2	2			

n= number of soil sample

Number between parentheses represented the frequency occurrence of each genus.

*** Juvenile formes**

Table(2): Frequency occurrence and population density of nematode genera associated with cotton plant cv. Giza 45 at three counties and localities of Damiata governorate during the cotton growing season of 2006

Nematode Genera	Occurrence of nematode genera per 100 g . soil within each locality of cotton fields					
True plant parasitic nematodes	Kafer -sad n=25	El-Zarka n=10	Faraskor N=15	Occurrence n=50	No. of infested localities	Frequency occurrence %
	Kafer- Elatrash n=25	El-Serw n=10	Abo-Grada n=15			
Helicotylenchus	(2)24	(1)15	(1)16	4	3	8.0
*Heterodera**	(8)23	(5)10	(6)8	19	3	38.0
Hirschmanniella	(3)17	(1)12	(1)14	5	3	10.0
*Meloidogyne**	(15)40	(10)30	(9)30	34	3	68.0
Tylenchorhynchus	(15)20	(8)20	(7)20	30	3	60.0
Suspected plant parasitic nematodes						
Tylenchus	(16)25	(7)20	(9)18	32	3	64.0
Psilenchus	(1)24	-	-	1	1	2.0
Dorylaimus	(7)27	-	-	7	1	14.0
Aphelenchus	(4)15	-	-	4	1	8.0
Nematode genera/ locality	9	6	6			

n= **number of soil sample**
Number between parenthesis represented the frequency occurrence of each genus.
*** Juveniles forms**

Table (3): Plant growth response of three cotton cultivars as influenced by *Meloidogyne incognita* infection under green house conditions at 30±5ºC.

Cotton cultivars	Treatment	Plant growth parameters*											
		Shoot length (cm)	% Reduction	Root length (cm)	% Reduction	Shoot fresh weight (gm)	% Reduction	Root fresh weight (gm)	% Reduction	Total fresh weight (gm)	% Reduction	Shoot dry weight (gm)	% Reduction
Giza45	uninfected	30.9b	-	28.6a	-	5.6a	-	2.4b	-	8.0b	-	1.99b	-
	Infected(N)	27.62b	10.6	19.82b	30.7	4.16b	17.6	1.28b	46.6	5.66c	29.25	1.73b	13.1
Giza86	uninfected	29.6b	-	33.0a	-	6.3a	-	2.6b	-	8.8b	-	2.03b	-
	Infected(N)	21.16c	-28.5	30.26a	8.3	5.85b	6.4	2.30a	10.5	7.84b	11.20	1.87b	8.0
Giza89	uninfected	44.6a	-	28.6a	-	6.4a	-	4.4a	-	10.7a	-	2.27a	-
	Infected(N)	42.4a	-4.9	26.45a	7.5	5.49b	14.08	2.68a	36.0	10.50a	2.5	2.26a	0.44

Each value is the mean of five replicates.*
N=1000 *M incognita* J_2s.
Means in each column followed by the same letter (s) did not differ at P<0.05 according to Duncan multiple –range test.

Table (4): Host suitability of three cotton cultivars to *Meloidogyne incognita* infection under greenhouse condition at 30±5ºC.

Cotton cultivars	Nematode population in			Total	No. of egg-masses	EI	No. of galls Per root system	Root gall index (RGI)*	(RF) Pf/Pi**	Host category
	root		soil							
	Females	Develop. stages								
Giza45+N	137a	810a	1360a	2307	102a	5	139a	5	2.31	Susceptible(S)
Giza86+N	35b	152b	918b	1105	25b	3	32b	4	1.11	Susceptible(S)
Giza89+N	5c	50c	335c	390	5c	2	5c	2	0.4	Resistant(R)

***Each value is the mean of five replicates.**
N=1000 *M incognita* J_2s.
****RF=reproductive factor.**
Means in each column followed by the same letter (s) did not differ at P<0.05 according to Duncan multiple –range test