RESULTS & DISCUSSION

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1. ACAROLOGICAL RESULTS

1.1. Population density of soil mites associated with some field crops

Generally, soil mites which were collected in association with onion Giza 6 and Giza 20, fodder beet and broad bean belong to the five major groups: Astigmata, Cryptostigmata, Heterostigmata, Prostigmata and Mesostigmata (**Krczal,** 1959; **Abd-El-Shaheed** *et al.*, 1972 and **Gilyarov,** 1975).

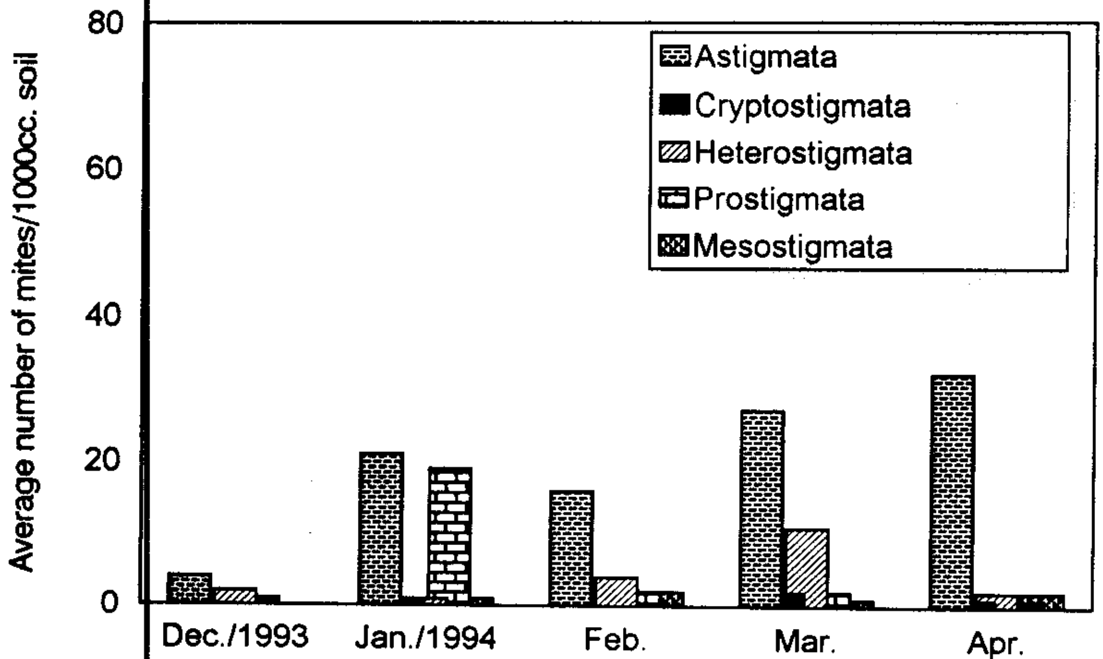
1.1.1 In onion

Monthly population dynamics, that were recorded for soil Acari groups in onion fields at two dates of transplanting are shown in Tables (1&2) and depicted in Figs. (1&2). The first date of transplanting (December 1) of onion Giza 6 and Giza 20 had a significant increase in mite population density than the second date (January 1) (155 and 367 ind./1000 cc soil, respectively). The late transplanting date resulted in less mite population averaging, respectively 116 and 269 individuals/1000 cc soil. This might be due to the sensitivity of different Acari groups for temperature and humidity changes. **Loots & Ryke** (1967) mentioned that, many factors such as temperature, humidity and organic matter ....etc. determine, to a large degree, the composition, nature, distribution and abundance of soil animals. In Giza 6 field at the 1st and 2nd dates of transplanting, Astigmata as a group not only occurred in high number but also dominated other Acari groups, since they

Table (1) **Effect of transplanting date of onion (*Allium cepa* L. Giza 6) on population density of soil mites during season 1993/1994**

Date	December 1								January 1							
	Average number of Acari groups/1000cc soil															
Acari groups	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**Total**	**Mean**	**%**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Total**	**Mean**	**%**
Astigmata	4	21	16	27	32	100	20.0	64.5	13	7	42	9	2	73	14.6	62.9
Cryptostigmata	0	1	0	2	1	4	0.8	2.6	3	2	3	1	4	13	2.6	11.2
Heterostigmata	2	1	4	11	2	20	4.0	12.9	6	2	3	2	1	14	2.8	12.1
Prostigmata	1	19	2	2	1	25	5.0	16.1	6	2	0	1	0	9	1.8	7.8
Mesostigmata	0	1	2	1	2	6	1.2	3.9	2	1	1	2	1	7	1.4	6.0
Total	7	43	24	43	38	155			30	14	49	15	8	116		
Mean	1.4	8.6	4.8	8.6	7.6				6.0	2.8	9.8	3.0	1.6			

L.S.D between Acari groups at 5% = 7.74
L.S.D between Acari groups at 1% = 10.36
L.S.D between months at 5% = 7.74



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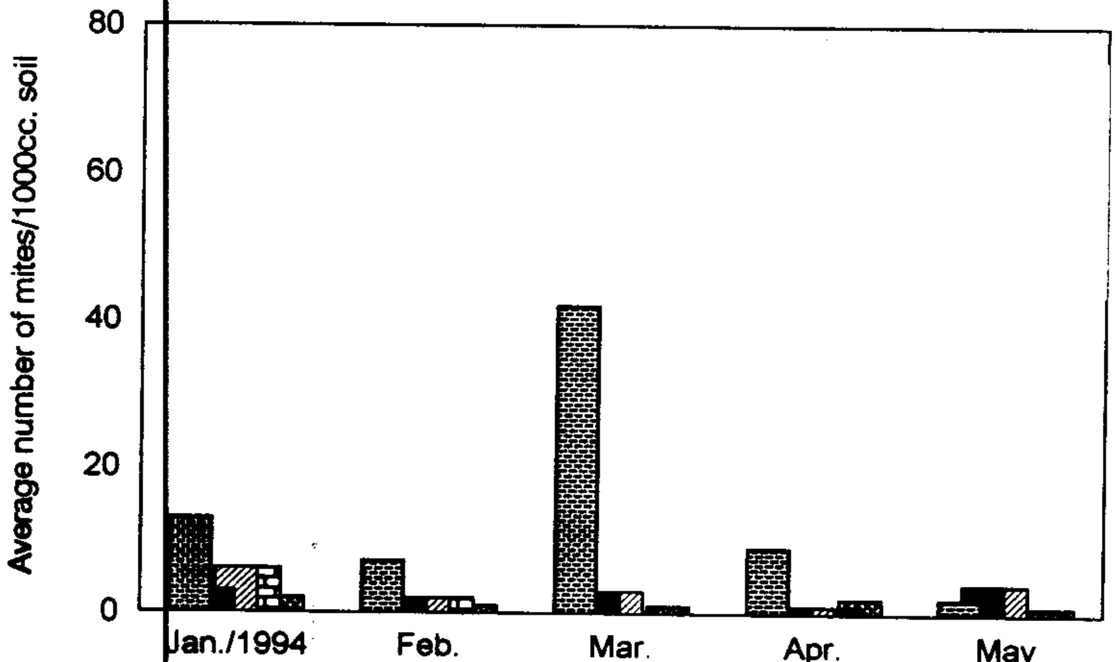


B

Fig. (1) Effect of transplating date of onion (***Allium cepae*** L. Giza 6) on population density of soil Acari during season 1993/1994
A) first date (1st December 1993)
B) second date (1st January 1994)

contributed 64.5, 62.9% respectively of all mites collected, followed by Heterostigmata (12.9, 12.1%), Prostigmata (16.1, 7.8%), Cryptostigmata (2.6, 11.2%) and Mesostigmata (3.9, 6.0%), while in Giza 20 field, Astigmata seems to be numerically important, compared with other Acari groups. It constituted 26.4, 61.7%, while Heterostigmata constituted 19.6, 16.4%, Prostigmata 12.0, 3.7%, Mesostigmata 4.1, 7.8% and Cryptostigmata 1.9, 10.4%. These results are in agreements with those of **Saadoon** (1984) and **Rady** *et al.* (1993a). Density of soil Acari reached the maxima in January and March in Giza 6 field with the average of 43 and 43 individuals/1000 cc soil, respectively, while in the second date of transplanting the maximum population density occurred in March (49 ind./1000 cc soil).

In Giza 20 field the maximum population desity occurred in February in both early and late transplanting date with the average of 93 and 80 individuals/1000 cc soil, respectively. **Abo-Korah** and **Osman** (1979), found that two peaks were occurred in December and March under wheat, while **Rady** *et al.* (1993b) mentioned that the density of soil Acari reached the maxima in March and May under wheat. The population density of Astigmata reached its maximum in April with the average of 32 ind./1000 cc soil, under Giza 6 at the 1st date of transplanting, while at the second date of transplanting , the density of mites reached the maximum in March with the average of 42 ind./1000 cc soil. In Giza 20 field Astigmata showed two peaks in January and April with average of 60 and 48 ind./1000 cc soil, respectively, while in the second date of transplanting showed one peak, distenclly in February was

Table (2) **Effect of transplanting date of onion (*Allium cepa* L. Giza 20) on population density of soil mites during season 1993/1994**

Date	December 1								January 1							
	Average number of Acari groups/1000cc soil															
Acari groups	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Mean	%	Jan.	Feb.	Mar.	Apr.	May	Total	Mean	%
Astigmata	53	60	50	18	48	229	45.8	62.4	6	61	42	34	23	166	33.2	61.7
Cryptostigmata	0	2	1	2	2	7	1.4	1.9	2	1	3	14	8	28	5.6	10.4
Heterostigmata	6	11	38	5	12	72	14.4	19.6	2	12	24	4	2	44	8.8	16.4
Prostigmata	31	9	2	2	0	44	8.8	12.0	2	4	2	2	0	10	2.0	3.7
Mesostigmata	2	5	2	3	3	15	3.0	4.1	2	2	3	9	5	21	4.2	7.8
Total	92	87	93	30	65	367			14	80	74	63	38	269		
Mean	18.4	17.4	18.6	6.0	13.0				2.8	16.0	14.8	12.6	7.6			

L.S.D between Acari groups at 5% = 12.35
L.S.D between Acari groups at 1% = 16.53
L.S.D between months at 5% = 12.35

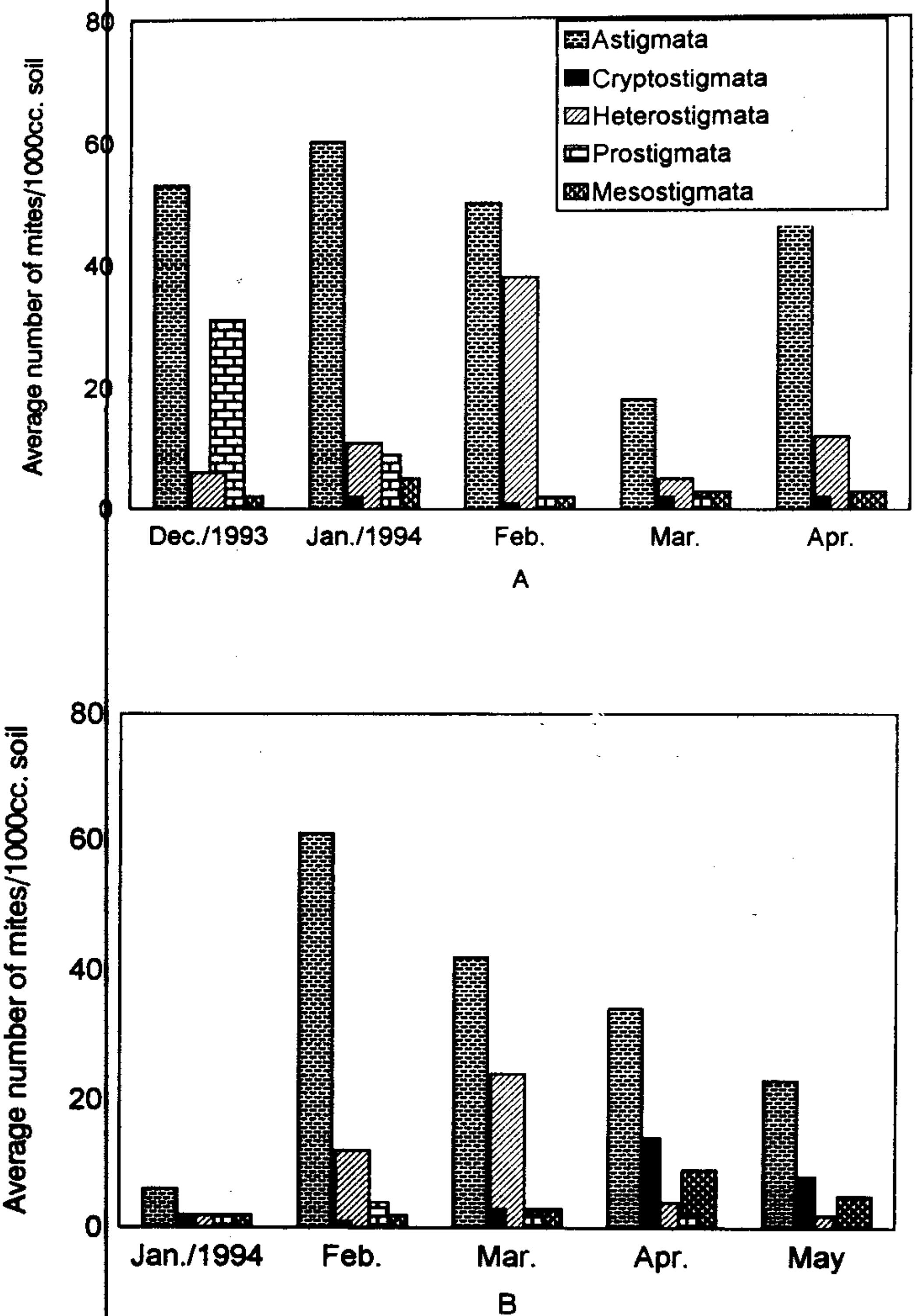


Fig. (2) Effect of transplanting date of onion (***Allium cepae*** L. Giza 20) on population density of soilAcari during season 19993/1994.

A) first date (1st December 1993)

B) second date (1st January 1994)

shown to have average of 61 ind./1000 cc soil, respectively. The prostigmatid population showed one peak in January (19 and 6 ind./1000 cc soil for the first and second dates of transplanting Giza 6 respectively), while in field of Giza 20, a peak was recorded in January 31 ind./1000 cc soil for the first date and in February 4 ind./1000 cc soil for the second date of transplanting. The highest peak of heterostigmatid mite was recorded in March at the first date of transplanting 11 ind./1000 cc soil and in January at the second date of transplanting 6 ind./1000 cc soil under Giza 6, but under Giza 20 peak occurred in February 38 ind./1000 cc soil at the first date of transplanting and in March 24 ind./1000 cc soil at the second date of transplanting. This agrees with findings of **Radwan and Abo-Korah** (1979), **Abo-Korah** *et al.* (1980) and **Abo-Korah** and **Salem** (1982) however, the drop of population in late May and June can be attributed to thereat, very high temperature accompanied with low relative humidity. Mesostigmatid mites reached its maximum under Giza 6 in February and April with average of 2 and 2 ind./1000 cc soil, respectively at the first date of transplanting, while at the second date the population reached its maxima in January and April (2 and 2 ind./1000 cc soil, respectively), under Giza 20 the highest peak of Mesostigmata was recorded in January at the first date of transplanting (5 ind./1000 cc soil) and in April (9 ind./1000 cc) at the second date of transplanting.

Cryptostigmata seems to be numerically insignificant compared with the other Acari groups, since they appeared in Giza 6 at the first date of transplanting with average of 2 ind./1000 cc soil in March, while at the second date of transplanting the highest population density was recorded in May (4 ind./1000 cc soil). In Giza 20 field, the population density of Oribatei reached the maxima in April (14 ind./1000 cc soil) at the second date of transplanting, but at the first date of transplanting it was observed in small numbers (2, 2 and 2 ind./1000 cc soil respectively) in January, March and April respectively.Statistical analysis showed highly significant differences between soil Acari groups in the two cultivars of onion at the two dates of transplanting butonly significant differences were detected between months. However, significant differences existed between the two dates of transplanting in the two cultivars of onion.

1.1.2 In fodder beet

Results presented in Table (3) and graphically illustrated in Fig.(3) show that the population dynamics of soil Acari associated with fodder beet reached the maxima in January and February 1994 with the average of 47 and 56 ind./1000 cc soil, respectively.

Generally such pattern of results seemed about similar to those were recorded in England by **Evans** *et al.* (1961) and **Davis** (1963) in New Zealand by **McMillan** (1969) and in Egypt by **Abo-Korah** (1979b), where high population densities occurred in Autumn and Winter seasons, and low populations existed in summer. Statistical analysis shows significant differences existing between Acari groups under study but no significant differences existed between months.

Table (3) **Population density of soil mites associated with fodder beet (*Beta vulgaris* L.) in Qualubia Governorate.**

Months	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Total**	**Mean**	**%**
Acari groups	**Average number of mites/1000cc. soil**							
Astigmata	26	32	8	30	17	113	22.6	59.8
Cryptostigmata	0	2	1	2	3	8	1.6	4.2
Heterostigmata	9	12	2	4	3	30	6.0	15.9
Prostigmata	4	3	1	0	1	9	1.8	4.8
Mesostigmata	8	7	4	2	8	29	5.8	15.3
Total	47	56	16	38	32	189		
Mean	9.4	11.2	3.2	7.6	6.4	3.7		

L.S.D. between Acari groups at 5% = 6.12
at 1% = 8.42

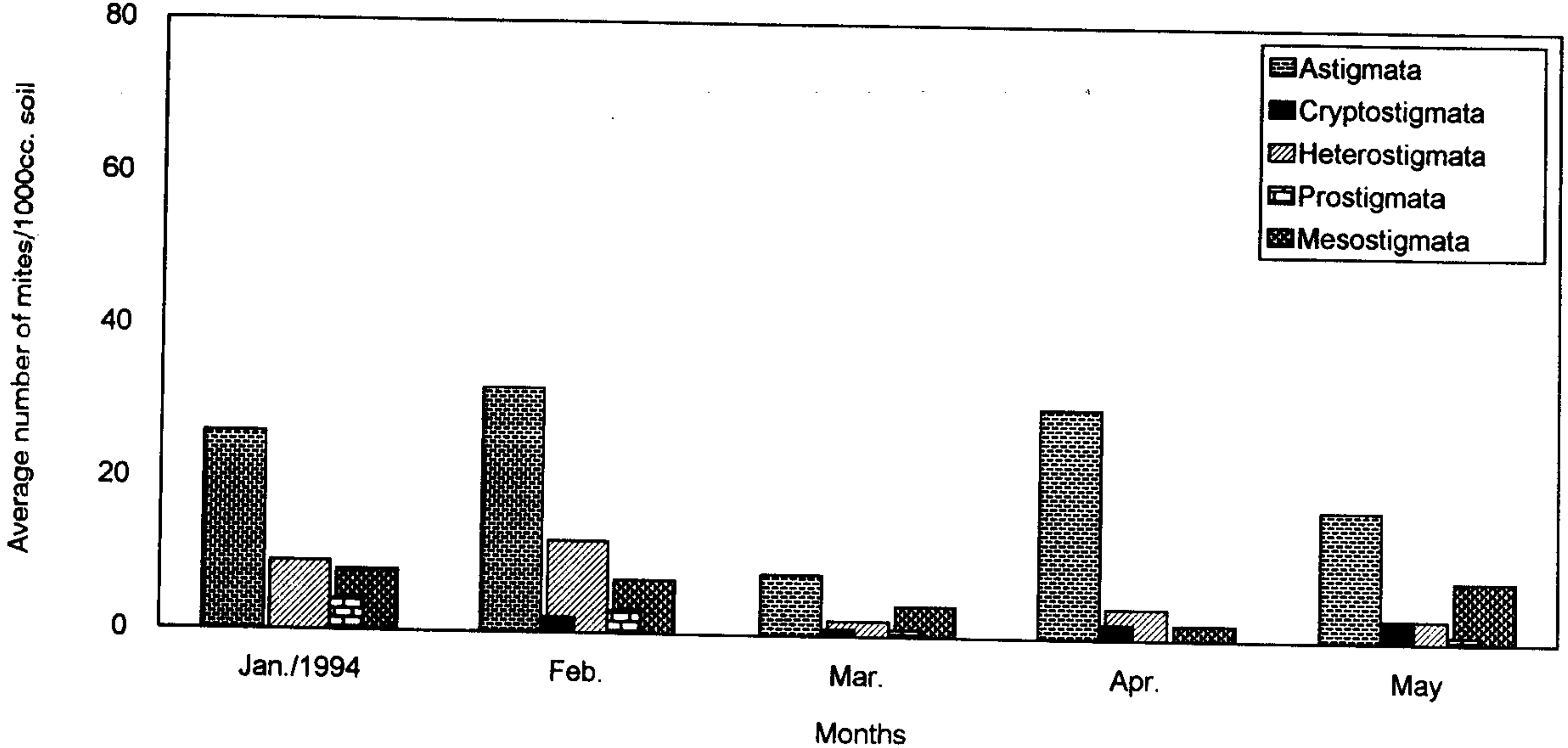


Fig. (3) Population density of soil mites assocated with fodder beet (***Beta vulgaris*** **L.**) in Qualubia Governorate.

Astigmata seemed to be, numerically important, compared with the other Acari groups, as constituted 59.8% in numbers of the whole Acari collected from fodder beet field, followed by Heterostigmata (15.3%), Prostigmata (4.8%) and Cryptostigmata (4.2%). These results agree with **El-Kifl** (1968) who noticed in Giza region that Astigmata were greater in number in light clay soils than in clay-loams. **Abd-Allah** (1974) indicated also that light clay soil was the most favourable one as it contained the highest number of arthropods.

Astigmata occurred in great abundance that, dominated other Acari groups and showed two peaks in Febuary and April with average of 32 and 30 ind./1000 cc soil, respectively, but **Abo-Korah** and **Osman** (1979) found that the population density of Astigmata reached its maximum in clover field in March (54 ind./1000 cc soil), while in wheat field in May. **Rady** *et al.* (1993b) recorded one peak in March in wheat field. **Van Den Berg** and **Ryke** (1967), found that Astigmata constituted a very small group in Magoebasklof forest soils and **Abo-Korah** (1979b) under citrus trees have attaimed similar findings these results assured that of **Holler** (1962), who mentioned that changes in densities of soil mites depended on soil, climatic conditions, vegetation, cultivation practices and biological properities of the species. The heterostigmatid population showed in January and February with average of 9 and 12 ind./1000 cc soil, respectively. **Loots** & **Ryke** (1967) found that in soil with low organic content the Trombidiformes appeared to be the dominant group while Sarcoptiformes appeared few in numbers.

Population of Mesostigmata reached its maximum during January, February and May with the average of 8, 7 and 8 ind./1000 cc soil respectively, while Prostigmata have only one peak in January (4 ind./1000 cc soil), since the majority of mesostigmatids are predatory on other soil mites and collembola (**Wallwork**, 1970 and **Acki**, 1973).

Cryptostigmata seemed to be numerically insignificant compared with other Acari groups, since they appeared in of soil fodder beet to have few numbers. **Wafa** *et al.* (1965) reported that oribatid species varied greatly in their magnitude not only from field to field but also from one district to another. **Abo-Korah** *et al.* (1984) found that population density of Cryptostigmata tended to increase with the increase of depth.

1.1.3. In broad bean

Data presented in Table (4) and depicted in Fig. (4) show that the population density of five systematic soil Acari groups, inhabiting broad bean field, reached the maximum number in February, with the average of 101 ind./1000 cc soil, while **Abo-Korah** and **Osman** (1979) found that population of soil Acari under broad bean reached the maxima in January. Statistical analysis showed that there was a significant differences between soil Acari groups but no significant differences were detected between months.

Astigmata contributed (63.1%) in numbers of all Acari collected from broad bean field, followed by Heterostigmata (18.4%), Mesostigmata (9.4%), Cryptostigmata (5.8%) and Prostigmata (3.2%).

Table (4) Population density of soil mites inhabiting broad bean fields.

Months	Jan.	Feb.	Mar.	Apr.	May	Total	Mean	%
Acari groups	Average number of mites/1000cc. soil							
Astigmata	49	71	58	10	7	195	39.0	63.1
Cryptostigmata	3	0	2	5	8	18	3.6	5.8
Heterostigmata	5	27	22	2	1	57	11.4	18.5
Prostigmata	7	1	1	0	1	10	2.0	3.2
Mesostigmata	17	2	4	3	3	29	5.8	9.4
Total	81	101	87	20	20	309		
Mean	16.2	20.2	17.4	4.0	4.0			

L.S.D. between Acari groups at 5% = 18.25

at 1% = 25.14

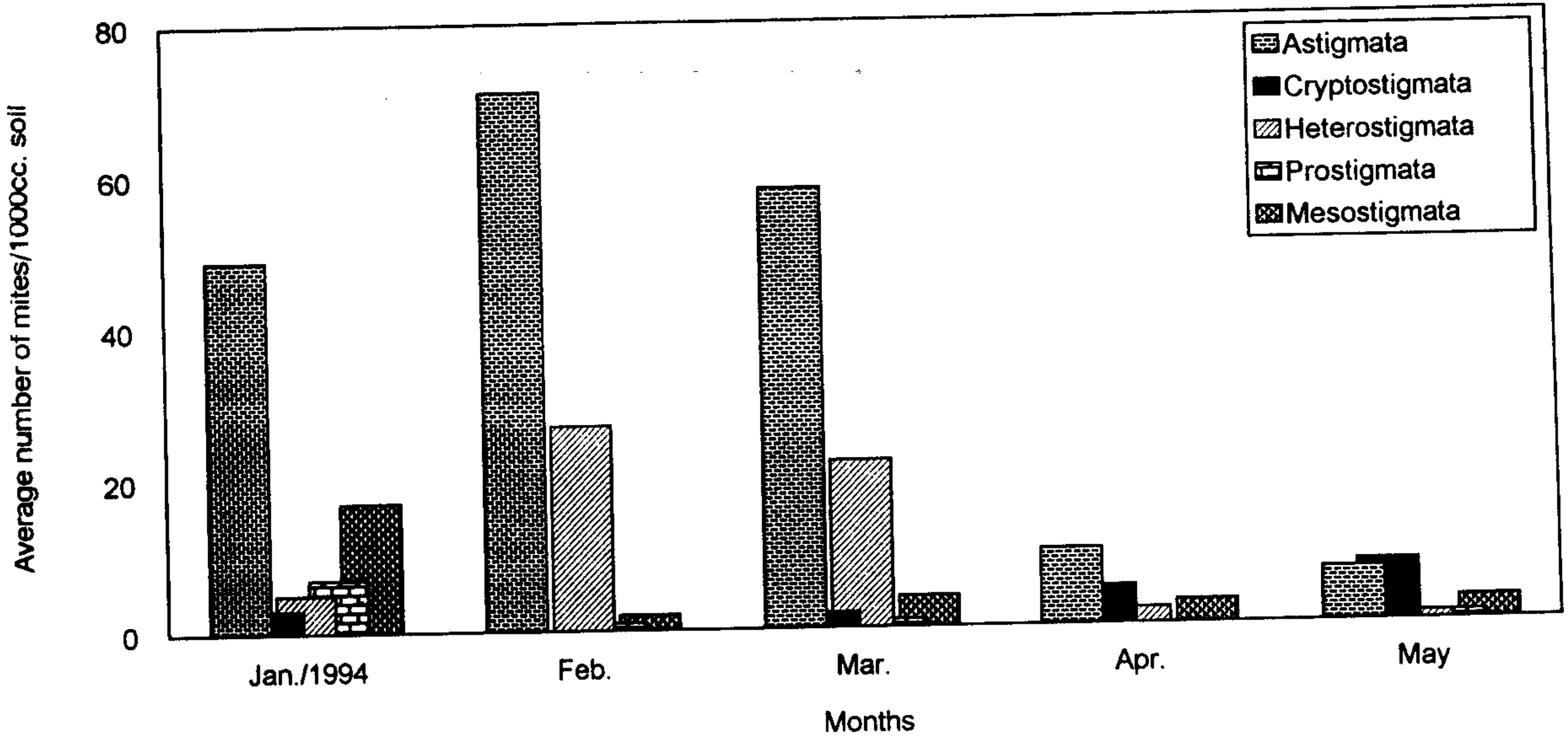


Fig. (4) Population density of soil mites inhabiting Broad bean fields (*Vicia fabae* L.)

The changes in population densites of soil Acari in cotton fields borne strong relationships to the fluctuation of soil temperature and moisture (**Abo-Korah** and **Salem**, 1982). The Astigmata not only occurred in great abundance but also their numbers dominated those of other Acari groups (Fig. 4) and showed three peaks in January, February and March with average of 49, 71 and 58 ind./1000 cc soil, respectively. These results are in agreements with those of **Abo-Korah** (1982) and **Rady** *et al.* (1993a).

The heterostigmatid population showed two peaks in February and March with averages of 27 and 22 ind./1000 cc soil, respectively (**Abo-Korah** and **Salem**, 1982). The maximum number of Mesostigmata was observed in January (17 ind./1000 cc soil) and the prostigmatid mites reached their maximum number in January with average of 7 ind./1000 cc soil. It has been generally assumed that, mesostigmatids and some prostigmatids are predacious, while cryptostigmatids and astigmatids are fungivorous and saprophagous (**Wallwork,** 1967 and **Luxton**, 1972).

Cryptostigmata showed two peaks in April and May with the averages of 5 and 8 ind./1000 cc soil, respectively.

1.1.4. Flactuation of soil mites under certain field crops

Fig. (5) showed that all mites in onion Giza 20 and Giza 6 fields reached their maxima in February and March with averages of 80 and 49 ind./1000 cc soil, respectively, while under fodder beet and broad bean occurred in February with averages of 56 and 101 ind./1000 cc soil,

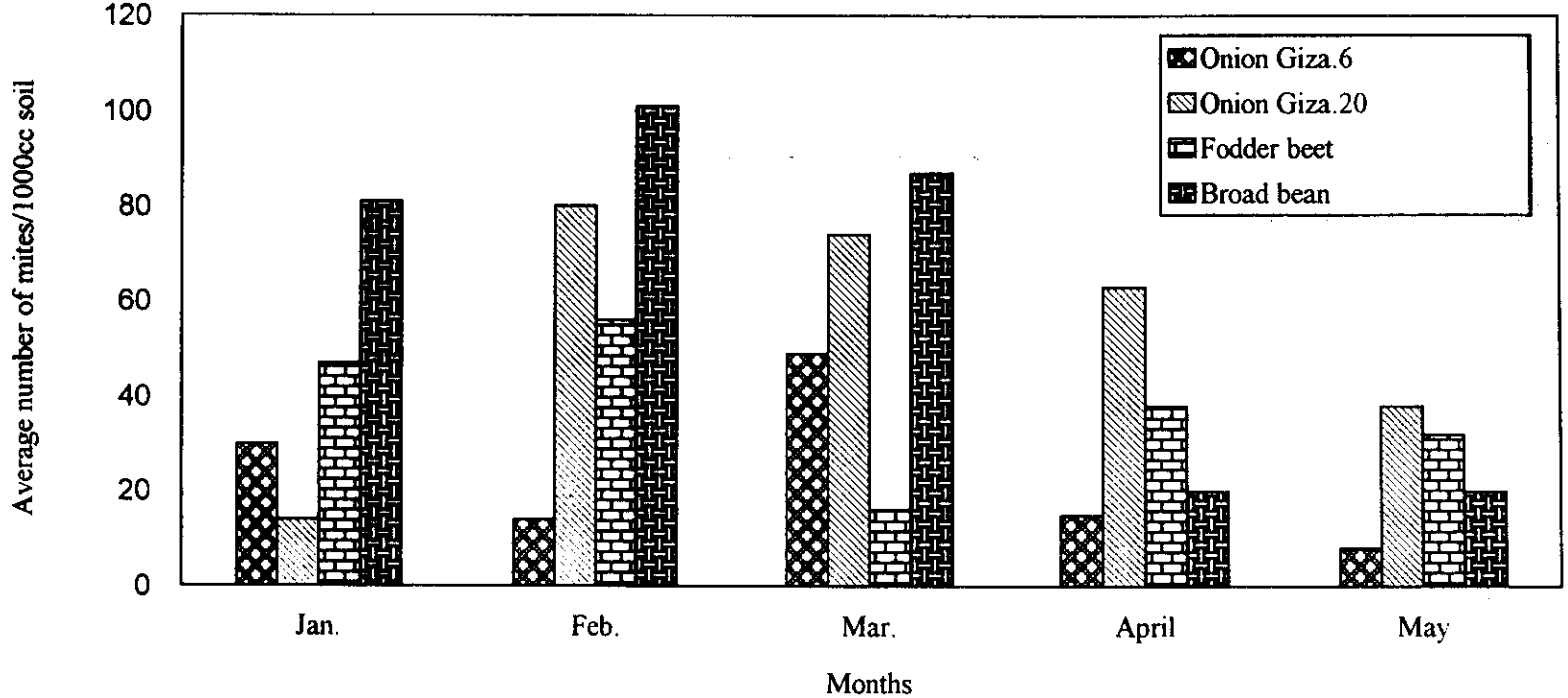


Fig. (5) Flactuation of soil mites under certain field crops respectively. The highest population density of Acari was recorded in broad bean (309 individuals), while the lowest population density was found under onion Giza 6 (116 individuals). Similar findings were recorded by **Abo-Korah** and **Osman** (1979). Also, similar variations in population densities, were observed by **Holler** (1962).

From the previous results, it could be concluded that, certain mite groups prefer one host plant than the other under which they live and carrying out their activities, and this agree with **Wasylik**, 1975, **Abo-Korah** and **Osman** (1979 & 1980) and **Rady** *et al.* (1993b).

1.2. Effect of soil fertilizers on population density of soil Acari concomitanted with some field crops:

1.2.1. Effect of nitrogenous fertilizers on soil Acari inhabiting two cultivars of onion fields:

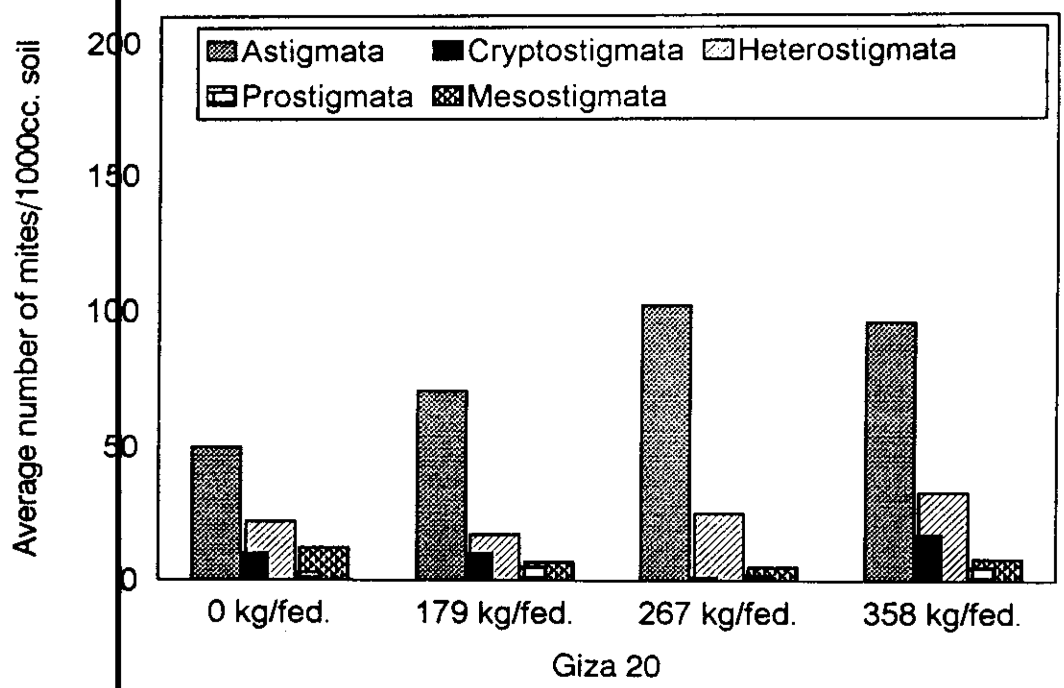
Table (5) and Fig. (6) shows that ammonium nitrate (NH_4NO_3 - 33.5%) in onion Giza 6 and Giza 20 had significant effect in increasing the population density of soil Acari (769 and 501 ind./1000 cc, respectively) in comparison with the check (131 and 97 ind./1000 cc, respectively). According to the response of soil Acari groups to different nitrogen levels adopted in onion field Giza 6 and Giza 20, mite groups could be arranged in a descending order: Astigmata contributed 65 and 63.7%, respectively in numbers of all Acari collected, followed by Heterostigmata (19.6 and 19.4%), Mesostigmata (6.6 and 5.4%),

Table (5) **Effect of ammonium nitrate (NH_4NO_3 33.5% N) on population density of soil Acari associated with two cultivars of onion**

Varieties	Giza 20							Giza 6						
NH_4NO_3 (33.5% N)	Average number ofAcari groups/1000cc soil													
Acari groups	0 kg/fed	179 kg/fed	267 kg/fed	358 kg/fed	Total	Mean	%	0 kg/fed	179 kg/fed	267 kg/fed	358 kg/fed	Total	Mean	%
Astigmata	50	71	102	96	319	79.7	63.7	82	128	166	124	500	125.0	65.0
Cryptostigmata	10	10	1	17	38	9.5	7.6	10	10	19	11	50	12.5	6.5
Heterostigmata	22	17	25	33	97	24.3	19.4	20	33	52	46	151	37.8	19.7
Prostigmata	3	5	2	5	15	3.8	2.9	8	1	4	4	17	4.3	2.2
Mesostigmata	12	7	5	8	32	8.0	6.4	11	10	16	14	51	12.8	6.6
Total	97	110	135	159	501			131	182	257	199	769		
Mean	19.4	22.0	27.0	31.8				26.2	36.4	51.4	39.8			

L.S.D between Acari groups at 5% = 22.26

L.S.D between Acari groups at 1% = 29.97



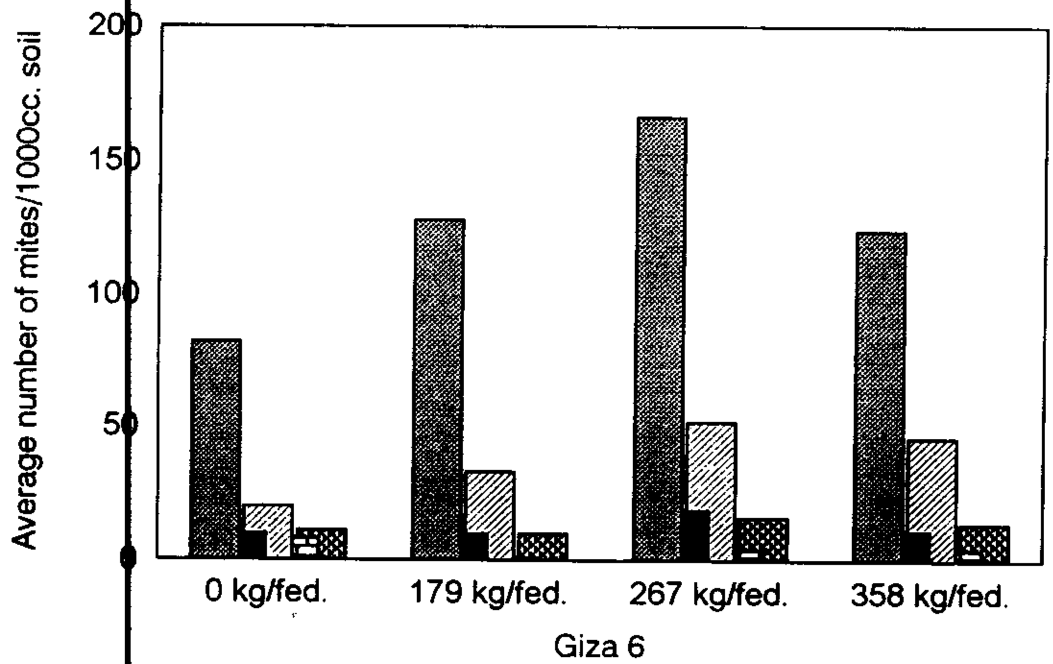


Fig. (6) Effect of ammonium nitrate (NH4 NO3 33.5% N) on population density of soil Acari assciated with two cultivars of onion

Cryptostigmata (6.5 and 6.4%) and Prostigmata (2.2 and 2.5%), respectively. These results agree with **Abo-Korah** *et al.* (1985a).

It was evident that the recommended rate of 267 kg/fed., highly increased the mite population density, especially in Giza 6.

Generally, the average number of mites obtained from fertilized treatment (267 kg/fed.) in Giza 6 was 257 ind., exhibiting, nearly twice the average number of the check (131 ind.) in Giza 20 it was 135 ind./1000 cc soil, while the ckeck was 97 ind.. These results are in agreement with **Muller** (1957), **Behan** (1972), **Abd-Allah** (1974), **Abo-Korah** *et al.* (1985b) and **Rady** *et al.* (1993b), who found that nitrogenous fertilizers increase mite population in agricultural soil.

At the higher nitrogen level of 358 kg/fed., Acari groups tended to decrease in number in Giza 6, and this may be due to the toxic effect of ammonia on these creatures. These results agree with **Franz** (1953), **Moursi** (1962 & 1970), **Abo-Korah** *et al.* (1985b) and **Rady** *et al.* (1993b).

It was obvious that the population density of Astigmata in Giza 6 and Giza 20 highly increased (102 and 166 ind./1000 cc, respectively) with the rate of ammonium nitrate 267 kg/fed., the same rate as recommended in field application. The higher rate of nitrogen 358 kg/fed. adopted in onion field Giza 20 flourished the population density of Cryptostigmata, Heterostigmata and Prostigmata, while in Giza 6 the

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Statistical analysis showed highly significant differences between soil Acari groups (F value = 44.75) i.e. there was a highly significant differences between Astigmata and each of Heterostigmata Cryptostigmata, Mesostigmata and Prostigmata, descendingly.

1.2.2. Effect of urea plus potassium sulphate on population density of soil Acari in fodder beet field:

Data presented in Table (6) and Fig. (7), generally show that urea plus potassium sulphate adopted in fodder beet field flourished soil Acari groups compartively with those treated only with urea. **Ronde** (1960) found that, urea increased most soil animal groups, and stimulate total population in short term, but individual species behaved differently. **Hausser** *et al.* (1969), reported that, phosphorus alone or combined with other elements stimulated Acarine population in forest soils. However, treatments with urea plus potassium sulphate increased abundance of Astigmata (67.3%), while, the least one occurred with Prostigmata (1.6%). Intermediate status between the abovementioned two levels of the Acari was observed with Heterostigmata (16.5%), Mesostigmata (9.3%) and Crytostigmata (5.3%) in descending order. These results are in agreement with **Ronde** (1960).

It was obvious that the population density of soil Acari, highly increased (153 ind./1000 cc soil) with the rate of 100 kg/fed. urea, the

Table (6) **Effect of urea plus potassium sulphate on population density of soil Acari in fodder beet field during season 1994**

Co $(NH_2)_2$ (46%N)	50 kg/fed.				100 kg/fed.				120 kg/fed.						
K_2SO_4 (48% K_2O)	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed	Total	Mean	%
Acari groups	Average number of Acari groups/1000cc soil														
Astigmata	40	76	88	75	47	107	39	57	47	46	69	45	736	61.3	67.3
Cryptostigmata	3	2	1	2	5	9	9	5	5	10	6	1	58	4.8	5.3
Heterostigmata	14	9	37	26	7	23	11	11	7	7	15	14	181	15.1	16.5
Prostigmata	4	6	0	1	1	2	0	1	1	0	0	1	17	1.4	1.6
Mesostigmata	11	8	4	2	11	12	16	6	11	7	9	5	102	8.5	9.3
Total	72	101	130	106	71	153	75	80	71	70	99	66	1094		
Mean	14.4	20.2	26.0	21.2	14.2	30.6	15.0	16.0	14.2	14.0	19.8	13.2			

L.S.D between Acari groups at 5% = 23.36

L.S.D between Acari groups at 1% = 31.66

same recommended rate as in field application plus 40 kg/fed. potassium sulphate (the lower rate of potassium). At the lower and higher rate of urea (50 kg/fed. and 120 kg/fed.) plus the recommended rate of potassium (70 kg/fed.) the population density of soil Acari was 130 and 90 ind./1000 cc, respectively.

The population density of Astigmata reached its maximum at the recommended rate of nitrogen (100 kg/fed.), plus the lower rate of potassium (40 kg/fed) with an average of 107 ind./1000 cc, while at the recommended rate of potassium (70 kg/fed.) plus the lower rate of nitrogen (50 kg/fed.) the population density of Heterostigmata reached its maximum with an average of 37 ind./1000 cc. The maximum population density of Mesostigmata (16 ind./1000 cc soil) occurred at the recommended rate of ammonium nitrate and potassium (100 kg/fed. and 70 kg/fed., respectively). At the higher rate of nitrogen (120 kg/fed.) plus the lower rate of potassium (40 kg/fed.) the population density of Cryptostigmata reached its maximum with an average of 10 ind./1000 cc, while the population density of Prostigmata reached its maximum (6 ind./1000 cc soil) at the lower rate of nitrogen (50 kg/fed.) plus the lower rate of potassium (40 kg/fed.).

These results are in agreements with those of **Behan** (1972), **Weetman** *et al.* (1972) and **Abo-Korah** *et al.* (1982), who found that nitrogenous fertilizer flourished certain soil Acari groups in number. **Hill** *et al.* (1975) found that the moderate levels of nitrogenous fertilizer increase of mite population in agricultural soils.

Table (7) **Effect of transplanting date of onion Giza 6 on population density and species composition of astigmatid mites during the season 1993-1994.**

Date	December 1							January 1						
	Average number of mites/ 1000cc soil													
Species	Dec.	Jan.	Feb.	Mar.	Apr.	Total	%	Jan.	Feb.	Mar.	Apr.	May	Total	%
Fam. : Acaridae														
Tyrophagous putrescentiae (Schr.)	0	2	14	20	20	56	56	6	3	36	6	1	52	71.2
Rhizoglyphus echinopus F.R.	3	15	0	3	7	28	28	4	0	2	1	0	7	9.6
Aleuroglyphus ovatus (Troua)	1	4	1	2	3	11	11	3	3	4	2	1	13	17.8
Acarus siro Linne	0	0	1	0	1	2	2	0	0	0	0	0	0	0
Acotyledon sp.	0	0	0	2	0	2	2	0	0	0	0	0	0	0
Fam. : Glycyphagidae														
Gobieria fusca (Oudms.)	0	0	0	0	0	0	0	0	0	1	0	0	1	1.4
Fam. : Anoetidae														
Anoetus sp.H.	0	0	0	0	1	1	1	0	0	0	0	0	0	0
Total	4	21	16	27	32	100		13	6	43	9	2	73	
Number of species	2	3	3	4	5			3	2	4	3	2		

Table (8) **Effect of transplanting date on population density and species composition of the astigmatid mites in onion Giza 20 during season 1993-1994.**

Date	**December 1**							**January 1**						
	Average number of mites/ 1000cc soil													
Species	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**Total**	**%**	**Jan**	**Feb**	**Mar**	**Apr**	**May.**	**Total**	**%**
Fam. : Acaridae														
Tyrophagous putrescentiae (Schr.)	10	5	50	17	48	130	56.8	1	59	42	29	0	131	79
Rhizoglyphus echinopus F.R.	21	10	0	0	0	31	13.5	2	1	0	0	5	8	4.8
Aleuroglyphus ovatus (Troup)	22	44	0	0	0	66	28.8	3	1	0	4	18	26	15.7
Acotyledon sp.	0	1	0	1	0	2	0.9	0	0	0	0	0	0	0
Fam. : Pyroglyphidae														
Dermatophagoides farinae H.	0	0	0	0	0	0	0	0	0	0	1	0	1	0.6
Total	53	60	50	18	48	229		6	61	42	34	23	166	
Number of species	3	4	1	2	1			3	3	1	3	2		

field four species were obsereved to exist at both first and second transplanting dates, with population dynamices of 111 ind./1000 cc and 77 ind./1000 cc soil for the first and second dates, respectively, such results coincide with those of **Abo-Korah** and **Kandil** (1982), who found that the different date of transplanting of cabbage had highly significant effect on population density of soil Acari.

The maximum population density of astigmatids occurred in January under Giza 20 at the first transplanting (60 ind./1000 cc soil), with predominant ***Aleuroglyphus ovatus*** (44 ind./1000 cc soil), while at the second transplanting the maximum population density was observed in February (61 ind./1000 cc soil), with predominant ***Tyrophagous putrescentiae*** (59 ind./1000 cc soil) (Table, 7). These results agree with those **Kavan** and **Sharma** (1963) and **Rady** (1993).

Under Giza 6, however, the maximum population dynamics of astigmatids was found in April (32 ind./1000 cc soil) at the first transplanting date and in March (42 ind./1000 cc soil) at the second transplanting date, seeming to have predominant ***Tyrophagous putrescentiae*** (20 and 36 ind./1000 cc, respectively) (Table, 7) **Rady** (1988), recorded the same species under first trees.

There is no relationship between number of species and their population density, was detected, as in Giza 20 field, four species with density of 60 ind./1000 cc soil were recorded, while one species was found with density of 50 ind./1000 cc soil (Table, 8).

Tyrophagous putrescentiae had two peaks in Giza 6 field during April and March at the two dates of transplanting with a density of 20 and 36 ind./1000 cc soil, respectively, while in Giza 20 field ***T. putrescentiae*** had one peak during February and another one in April with a population density of 50 and 48 ind./1000 cc soil, respectively at the first transplanting. At the second one, it had only one peak during February with a density of 59 ind./1000 cc soil. ***Rhizoglyphus echinopus*** in Giza 6 field had two peaks at the first date of transplanting during January and April with a population density of 15 and 7 ind./1000 cc soil, respectively, while in Giza 20 field only one peak was observed in December, with a density of 21 ind./1000 cc soil and another peak at the second transplanting during May with a density of 5 ind./1000 cc soil **Andison** (1951) and **Bald & Jefferson** (1952), reported that ***R. echinopus*** causing economic damage to the bulb crops.

In Giza 20 field the species ***Aleuroglyphus ovatus*** had two peaks during January and May at the first and second transplanting with a population density of 44 and 18 ind./1000 cc soil, respectively. In Giza 6 field, the same species had two peaks during Januray and March at the two dates of transplanting, with a density of 4 ind./1000 cc soil for each.

Acarus siro, ***Acotyledon*** *sp.*, ***Gohieria fusca, Anoetus*** *sp.* in Giza 6 field and ***Acotyledon*** *sp.*, ***Dermatophagoides farinae*** in Giza 20 field seemed numerically to be insignificant, compared with other species.

1.3.2. Population dynamics of astigmatid mite species associated with fodder beet and broad bean fields:

Under fodder beet field (***Beta vulgaris*** L.), six astigmated mite species were observed with population density of 39 ind./1000 cc soil, but in broad bean (***Vicia faba*** L.) field six species were recorded with abundance of 47 ind./1000 cc soil (Table, 9).

The maximum population density of astigmatids occurred in February under fodder beet and broad bean with the averages of 32 and 71 ind./1000 cc soil, respectively.

Generally, these findings indicates that qualitative and quantitative composition of astigmatid mites were dissimilar under two hosts **Wood, (1960)**, found that the plant roots might influence their surroundings, both phisically and chemically and also by providing organic matter from their dead tissues.

There is no relationship between the number of species and their population density. In fodder beet field, 6 species with density of 32 ind./1000 cc soil were recorded, while under broad bean plantation four species with density of 71 ind./1000 cc soil were obtained.

Tyrophagous putrescentiae (Schr.) occurred in great numbers, dominanted other species under two hosts, and showed two peaks in February and April with averages (20 and 27 ind./1000 cc soil, respectively) under fodder beet, while under broad bean it had two peaks

Table (9) **Population dynamics of astigmatid mites associated with fodder beet and broad bean fields.**

Months	Average numbers of mites/1000cc													
	Jan		Feb		Mar		Apr		May.		Total		%	
Species	F	B	F	B	F	B	F	B	F	B	F	B	F	B
Fam. : Acaridae														
Tyrophagous putrescentiae (Schr.)	8	6	20	56	8	55	27	6	12	5	75	128	66.4	65.6
Rhizoglyphus echinopus F.R.	6	0	3	0	0	0	3	3	5	2	17	5	15	2.6
Aleuroglyphus ovatus (Troup)	6	34	5	9	0	1	0	0	0	0	11	44	9.7	22.6
Acarus siro Linne	3	7	1	5	0	0	0	0	0	0	4	12	3.5	6.2
Acotyledon sp.	3	2	2	1	0	1	0	0	0	0	5	4	4.4	2.1
Fam. : Anoetidae														
Anoetus sp.	0	0	1	0	0	1	0	1	0	0	1	2	0.9	1.02
Total	26	49	32	71	8	58	30	10	17	7	113	195		
Number of species	5	4	6	4	1	4	2	3	2	2				

F= Fodder beet
B= Broad bean

in February and March with abundace of 56 and 55 ind./1000 cc soil, respectively.

Rhizoglyphus echinpous F.R. had two peaks during January and May with a population density of 6 and 5 ind./1000 cc, respectively in fodder beet field, while in broad bean field ***R. echinopus*** appeared less density.

In broad bean field the species ***Aleuroglyphus ovatus*** (Troup) had only one peak in January with a density of 34 ind./1000 cc, while in fodder beet field the species appeared only in Januray and Febrauary with a population density of 6 and 5 ind./1000 cc, respectively.

Acarus siro, Acotyledon sp. and ***Anoetus*** sp. seemed numerically to be insignificant compared with the other species. **Sevastianov & Rady** (1987), studied the ways and dispersion synanthropicus Acari found in soil.

1.4. Effect of soil fertilizers on population dynamics of Astigmata in onion and fodder beet fields:

1.4.1. Influence of onion nitrogenous fertilizer (ammonium nitrate) on the population density of soil astigmatid mite species:

In general, nitrogenous fertilizer (ammonium nitrate NH_4NO_3 33.5%) caused a positive effect on population growth of Astigmata in onion Giza 6 and Giza 20 fields (Table, 10). These results are in agreement with those of **Behan** (1972), **Weetman** *et al.* (1972), **Abd-Allah** (1974), **Abo-Korah** *et al.* (1982b and 1985) and **Rady** *et al.* (1993c), who found that nitrogen fertilization flourished certain soil Acari groups.

At the recommended rate of 267 kg/fed., ammonium nitrate adopted in Giza 6 and Giza 20 fields had significant effect in increasing population density of astigmatid species in comparison with the cheek. Similar findings were recorded by **Hill** *et al.* (1975), **Abo Korah** *et al.* (1985b) and **Rady** *et al.* (1993c), who found that moderate levels of nitrogenous fertilizer increase mite population in agricultural soils.

At a high nitrogen level of 358 kg/fed., the astigmatid mite species tended to decrease in density under Giza 6 and Giza 20 in comparison with the recommended rate. **Kuhnelt**, 1961 suggested that species composition and density decrease with increase of salt content, which indicates a possible adverse effect from high rates of inorganic fertilizers.

The species ***Tyrophagous putrescentiae***; ***Aleuroglyphus ovatus*** and ***Rhizoglyphus echinopus*** were predominant, since they constituted 8?.4; 5.2 and 3.4% of all astigmatid mites collected from Giza 6 soil, respectively. However, In Giza 20 field ***Tyrophagous putrescentiae*** occurred in great abundace (95.9%), followed by ***Rhizoglyphus echinopus*** (1.6%) and ***Aleuroglyphus ovatus*** (1.3%). Percentage of the rest species under two hostes ranged between 0.2-1.4%. **Hill** *et al.* (1975), found that fertilizers, such as ammonium sulphate and ammonium

Table (10) Effect of ammonium nitrate (NH_4NO_3 33.5%N) adopted in onion field on soil Astigmata (1993-1994)

Varieties	Giza 20						Giza 6					
NH_4NO_3 (33.5%N)	0 kg./f.	179 kg./f.	267 kg./f.	358 kg./f.	Total	%	0 kg./f.	179 kg./f.	267 kg./f.	358 kg./f.	Total	%
Species	Average number of mites/1000cc											
Fam. : Acaridae												
Tyrophagous putrescentiae (Schr.)	47	65	102	92	306	95.9	64	119	148	117	448	89.4
Rhizoglyphus echinopus F.R.	0	2	0	3	5	1.6	10	2	3	2	17	3.4
Aleuroglyphus ovatus (Troua)	0	4	0	0	4	1.3	4	7	10	5	26	5.2
Acarus siro Linne	0	0	0	0	0	0	1	0	0	0	1	0.2
Acotyledon sp.	3	0	0	0	3	0.9	2	0	0	0	2	0.4
Fam. : Anoetidae												
Anoetus sp.	0	0	0	0	0	0	1	0	5	1	7	1.4
Fam. Pyroglyphidae												
Dermatophagoides farinae H.	0	0	0	1	1	0.3	0	0	0	0	0	0
Total	50	71	102	96	319		82	128	166	125	501	
Number of species	2	3	1	3			6	3	4	4		

nitrate, which raise make the soil more acidity, tend to increase fungal growth.

1.4.2. Effect of urea plus potassium sulphate on population density of Astigmata inhabiting fodder beet field.

Data in Table (11) clearly demonstrate the effect of urea plus potassium sulphate on soil acarid mites associated with fodder beet. It is evident that there is no significant effect of urea alone on population density of astigmatid mite species. In general, nitrogenous fertilizer (urea) plus potassium sulphate flourished soil acarid mites in number in comparing with those treated with urea only. **Ronde** (1960), found that urea increased most soil animal groups and stimulates population in the short term.

At the recommended rate of nitrogenous fertilizer (100 kg/fed.) plus the lower rate of potassium (40 kg/fed.) the population density of acarid mites highly increased (107 ind./1000 cc soil), while at the lower and the higher rate of urea (50 and 120 kg/fed.) plus the recommended rate of potassium (70 kg/fed.), the population density of Astigmata was 88 and 69 ind./1000 cc, respectively. **Abo-Korah** *et al.* (1985c), found that nitrogenous fertilizer affect qualitiative and quantitative of tarsonemina.

At a high and low nitrogen levels of 120 and 50 kg/fed. plus the higher rate of potassium (100 kg/fed.) the population density of Acarid mites tended to decraese, while at the recommended rate of nitrogen (100

Table (11) Effect of certain fertilizers adopted in fodder beet on population dynamics of astigmatid mites during season (1994)

$Co(NH_2)_2$ (46%N)	50 kg./f.						100 kg./f.						120 kg./f.					
K_2SO_4 (48%K_2O)	0 kg./f.	40 kg./f.	70 kg./f.	100 kg./f.	Total	%	0 kg./f.	40 kg./f.	70 kg./f.	100 kg./f.	Total	%	0 kg./f.	40 kg./f.	70 kg./f.	100 kg./f.	Total	%
Species	Average number of mites/1000cc																	
Fam. : Acaridae																		
Tyrophagous putrescentiae (Schr.)	17	61	81	65	224	80.3	40	97	35	47	219	87.6	39	28	65	37	169	81.6
Rhizoglyphus echinopus F.R.	8	4	2	5	19	6.8	7	10	4	9	30	12	8	18	4	3	33	15.9
Aleuroglyphus ovatus (Troua)	6	3	3	3	15	5.4	0	0	0	0	0	0	0	0	0	3	3	1.5
Acarus siro Linne	4	2	0	0	6	2.2	0	0	0	0	0	0	0	0	0	0	0	0
Acotyledon sp.	4	6	2	2	14	5.01	0	0	0	1	1	0.4	0	0	0	2	2	1
Fam. : Anoetidae																		
Anoetus sp.	1	0	0	0	1	0.4	0	0	0	0	0	0	0	0	0	0	0	0
Total	40	76	88	75	279		47	107	39	57	250		47	46	69	45	207	
Number of species	6	5	4	4			2	2	2	3			2	2	2	4		

kg/fed.) plus the higher rate of potassium (100 kg/fed.) the astigmatid mite species increased.

In treatments of urea plus potassium sulphate ***Tyrophagous putrescentiae*** not only occurred in great abundance, but rather predominated those of other Acarid species, of all Astigmata collected from fodder beet field, which contributed 82.2% followed by ***Rhizoglyphus echinopus***, ***Aleuroglyphus ovatus***, ***Acotyledon*** *sp.*, ***Acarus siro*** and ***Anoetus*** *sp.* with percentages of 11.1%, 2.5%, 2.3%, 0.8% and 0.1% in descending order.

2. NEMATOLOGICAL RESULTS:

2.1. Survey:

A limited survey was carried out for detecting nematode infestation in some commercial crop plants.

2.1.1. Frequency, occurrence and population density of plant parasitic nematodes associated with three crops plants:

Soil samples from broad bean, fodder beet, onion (two cultivars), were processed for nematode extraction, identification and numeration.

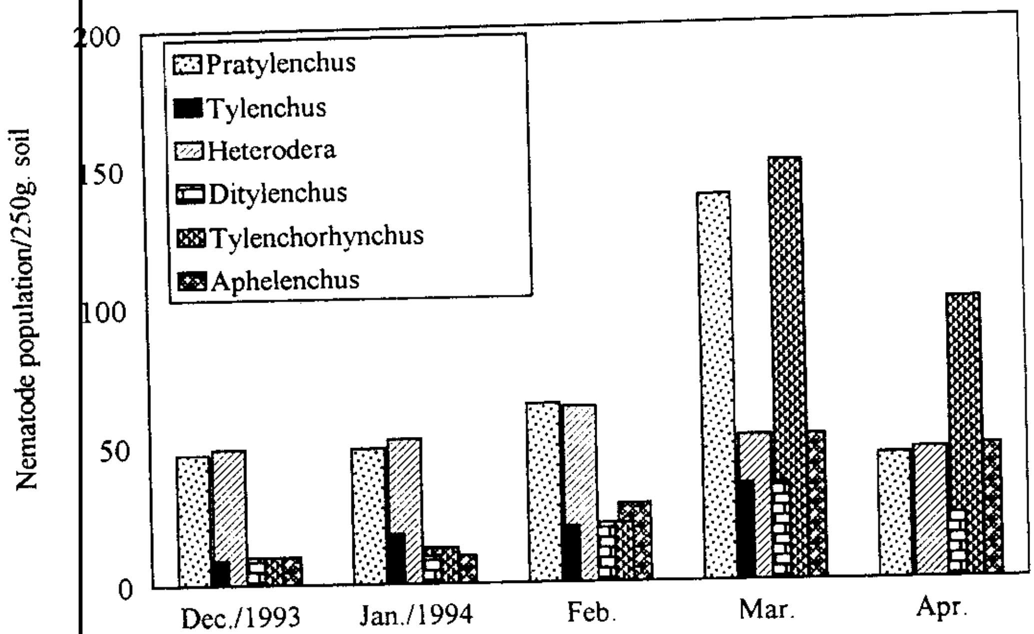
The occurrence and population densities of the recovered nematode genera, which are shown in Table (12), clearly indicate that 6 nematode genera were associated with the above mentioned crops, namely ***Pratylenchus, Tylenchus, Heterodera, Ditylenchus, Tylenchorhynchus*** and ***Aphelenchus***. The plant nematode genera ***Pratylenchus, Aphelenchus*** and ***Tylenchorhynchus*** followed by ***Heterodera,*** were recoreded in high population densities and in relatively higher percentages occurence from most of the investigated plants.

2.1.2. Effect of transplanting date of two onion cultivars on nematode population in soil:

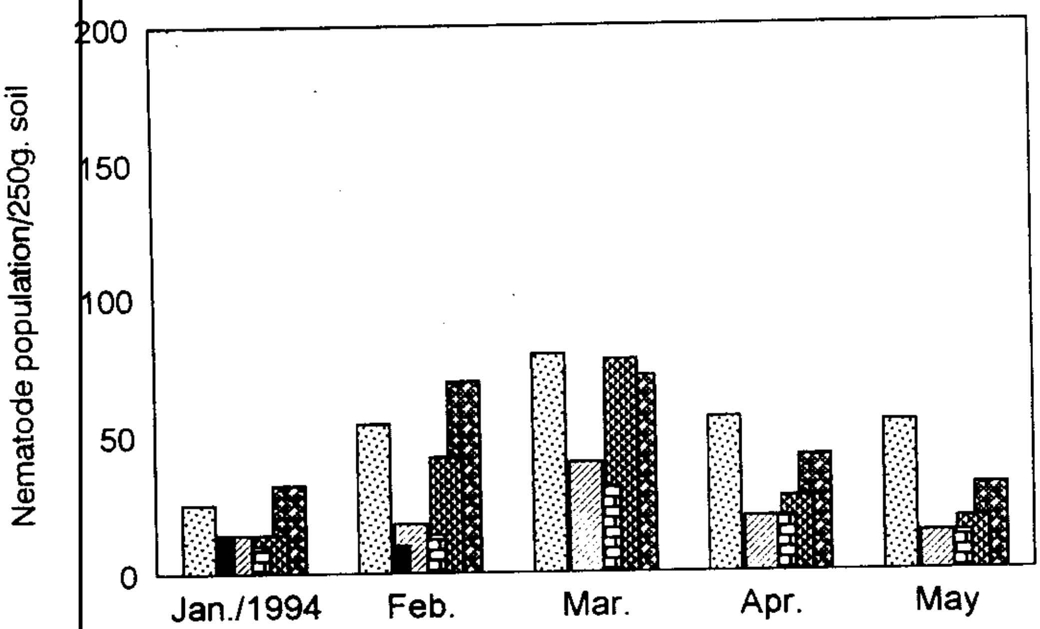
Data from Table (13) and Fig. (8) revealed that onion cv. Giza 6 was mainly contaminated with ***Pratylenchus, Heterodera, Tylenchrorhynchus*** and ***Aphelenchus***. These plant nematode genera were recorded in a high population densities, while genera, ***Tylenchus*** and ***Ditylenchus*** were represented in low frequent occurrence. The total

Table (12) Total number of nematode genera which were associated with the three investigated plants during the whole period of the study

Nematode genera	Population density of nematode associated with						
	Broad bean	Fodder beet	Onion Giza (6)		Onion Giza (20)		Total
			1st date	*2nd* date	*1st* date	*2nd* date	
Pratylenchus	279	202	343	268	423	259	1774
Tylenchus	61	92	82	24	123	10	392
Heterodera	145	216	263	106	191	106	1027
Ditylenchus	62	29	99	89	124	161	564
Tylenchorhynchus	299	138	294	179	306	191	1407
Aphelenchus	273	441	148	245	255	188	1550
Total	1119	1118	1229	911	1422	915	6714



A



B

Fig. (8) Effect of transplanting date of onion (***Allium cepae*** L. Giza 6) on nematode population in soil during season 19993/1994.

A) early date (1st December 1993)

B) late date (1st January 1994)

population denisties of the genera ***Pratylenchus*, *Tylenchus*, *Heterodera*, *Ditylenchus*** and ***Tylenchorhynchus***, were high in the early date of transplanting (1st December) 343, 82, 263, 99 and 294 individuals/250 g soil, respectively, as comparing with the late date (1st January) (268, 24, 106, 89 and 179 ind./250 g soil, respectively). The high number of genus ***Heterodera*** due to the presences of many weeds such as (***Beta vulgaris***, L.) wildbeet, which belong to family chenopodiaceae.

Generally, at the early date, the high population density occurred in March (462 ind./250 g soil) while, the lowest density achieved in December (135 ind./250 g soil). On the other hand, the high population density at the late date was obtained in March for all the genera while the lowest one in January. Also, data from Table (14) and Fig. (9) showed that the cultivar Giza 20 gave the same trend, where the genera ***Pratylenchus*, *Heterodera*, *Tylenchorhynchus*** and ***Aphelenchus*** were the most abundant genera followed by the genera ***Tylenchus*** and ***Ditylenchus***.

At the early date, the maximum population was found in March (611 ind./250 g soil) while the lowest one in December (99 ind./250 g soil). Also, at the late date, most of genera reached its peak in March.

There is a, highly significant difference in populations of nematode in March in the early date of transplanting and the other months either in the early or late date of transplanting.

Table (14) Effect of transplanting date of onion (*Allium cepa* L. Giza 20) on nematode population in soil during season 1993/1994

Date	1 December						1 January					
Months	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**Total**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Total**
Nematode genera	**Nematode population/250g. soil**											
Pratylenchus	49	63	67	163	81	423	38	32	110	44	35	259
Tylenchus	6	14	17	48	38	123	10	0	0	0	0	10
Heterodera	10	17	25	83	56	191	0	10	56	25	15	106
Ditylenchus	6	10	18	67	23	124	42	35	56	21	7	161
Tylenchorhynchus	18	30	56	125	77	306	10	35	40	81	25	191
Aphelenchus	10	14	35	125	71	255	63	56	21	27	21	188
Total	99	148	218	611	346	1422	163	168	283	198	103	915

L.S.D between genera at 5% = 17.4 at 1% = 23.2
L.S.D between months at 5% = 19.06 at 1% = 25.5
L.S.D between dates at 5% = 30.13 at 1% = 40.19

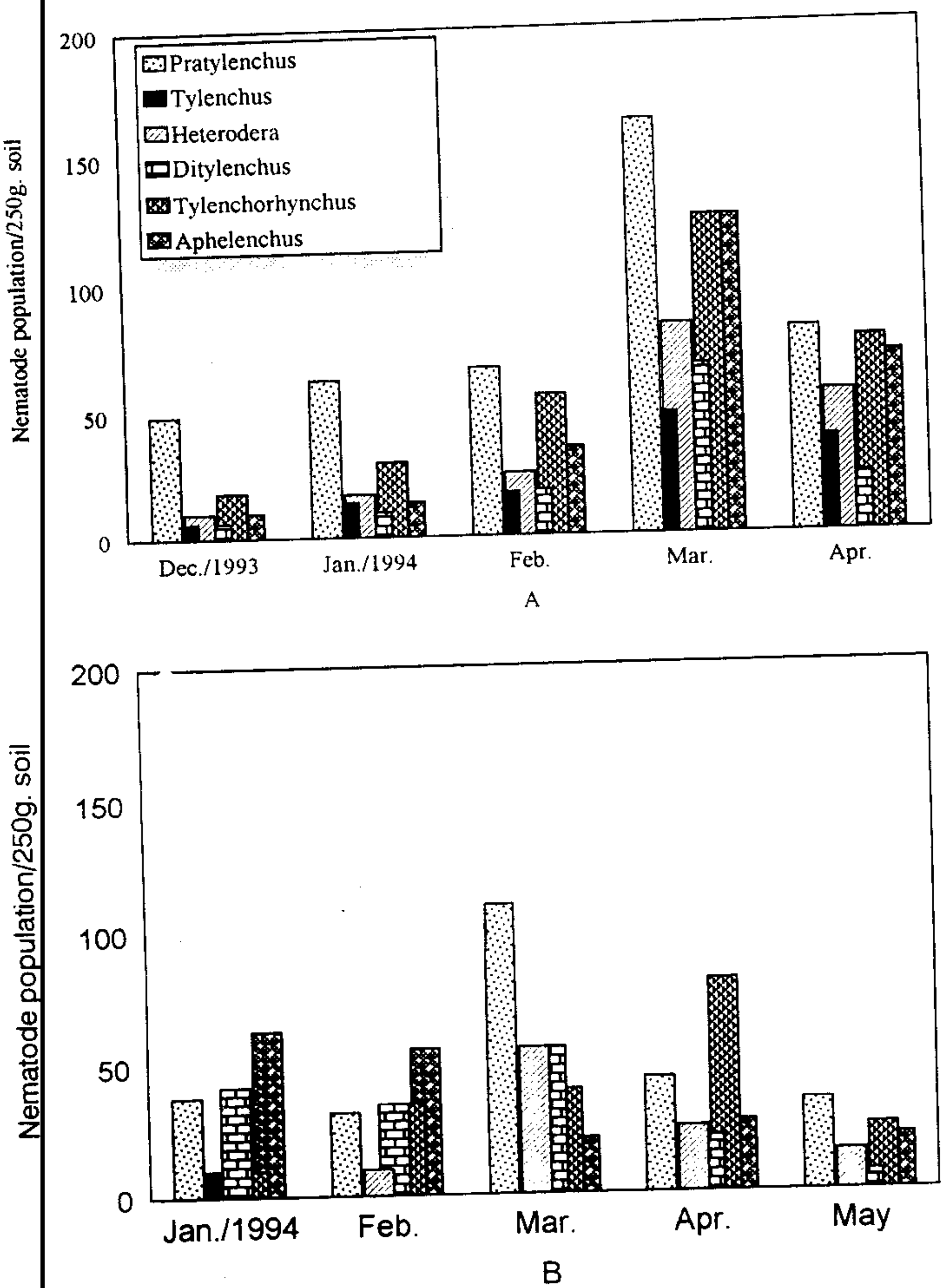


Fig.. (9) Effect of transplanting date of onion (***Allium cepae*** L. Giza 20) on nematode population in soil during season 19993/1994.

A) early date (1st December 1993)

B) late date (1st January 1994)

From these results, it is clear to notice that, in the early date of transplanting the population of nematode was high as comparing with the late date, this may be attributed to the difference in environmental condition variability i.e. soil temperature and soil moisture contents. This findings are in agreement with those of **Sterezygiel** (1966 and 1972), **Wasilewaska** (1967), **Boag** (1977), **Cuadra** (1986) and **Abd-Alla** (1992).

2.1.3. Population density of soil nematodes associated with fodder beet:

Data in Table (15) and Fig. (10) revealed that genera ***Pratylenchus, Heterodera, Tylenchus, Ditylenchus, Tylenchorhynchus*** and ***Aphelenchus,*** were found associated with fodder beet. Genera ***Aphelenchus, Heterofera, Pratylenchus*** and ***Tylenchorhynchus*** appeared to be of high population (441, 210, 202 and 138 ind./250 g soil, respectively), while the other two geneera ***Tylenchus***, and ***Ditylenchus***, were found in low population density (92 and 29 ind./250 g soil, respectively).

Data also showed that, the population densities of genera ***Pratylenchus, Tylenchus***, and ***Heterodera***, increased gradually to reach their high population in March (73, 38 and 98 ind./250 g soil, respectively), while the nematode population decreased at the end of the growing seasons to reach the lowest population density in May (15, 0 and 19 ind./250 g soil, respectively). Genus ***Tylenchorhynchus*** recorded its

Table (15) **Population density of soil nematodes associated with fodder beet (*Beta vulgaris* L.).**

Months	Jan.	Feb.	Mar.	Apr.	May	Total
Nematode genera	**Nematode population/250g. soil**					
Pratylenchus	21	54	73	39	15	202
Tylenchus	18	21	38	15	0	92
Heterodera	15	42	98	42	19	216
Ditylenchus	18	11	0	0	0	29
Tylenchorhynchus	0	11	48	52	27	138
Aphelenchus	63	57	127	52	142	441
Total	135	196	384	200	203	1118

L.S.D between genera at 5% = 28.44 at 1% = 38.79
L.S.D between months at 5% = 31.15

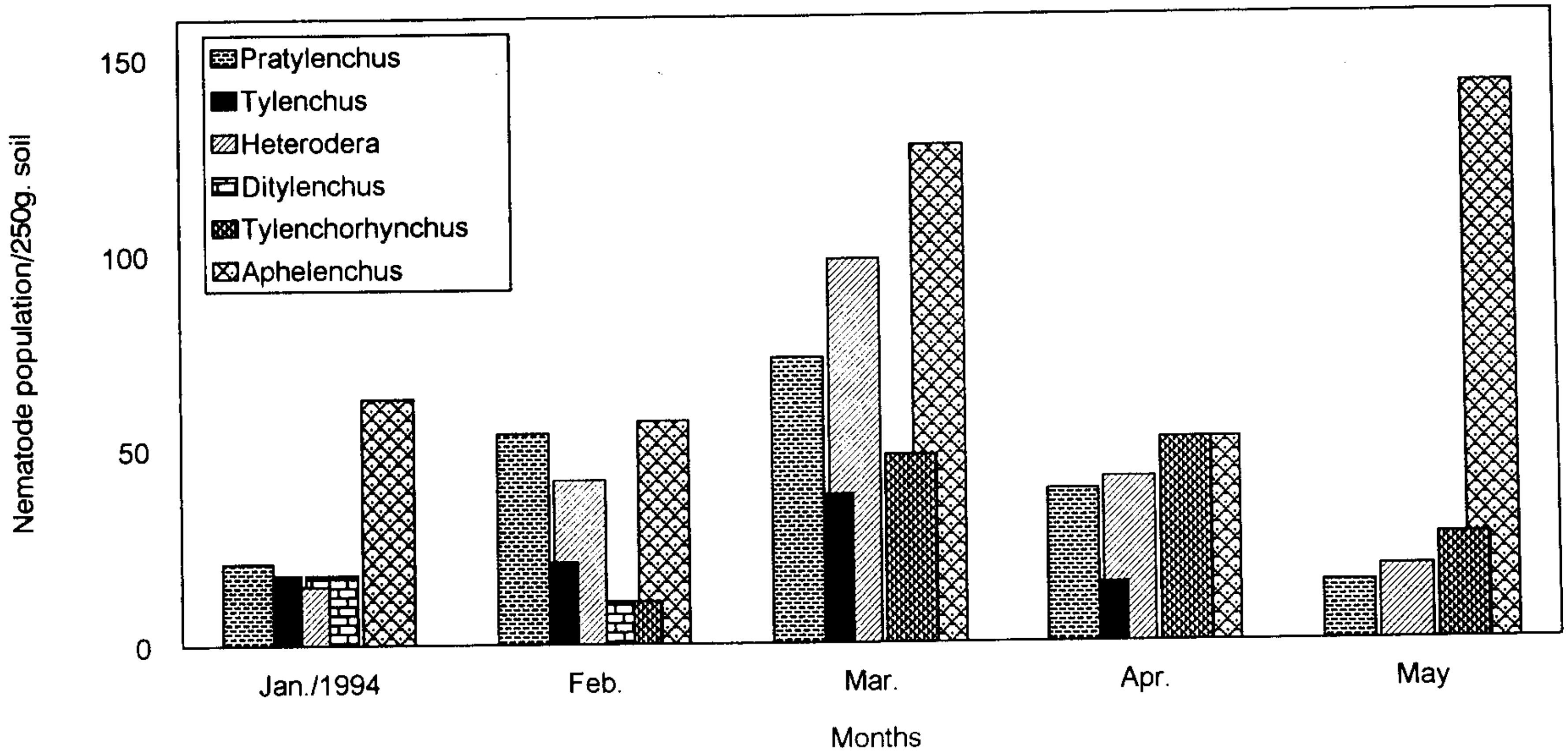


Fig. (10) Population density of soil nematode associated with fodder beet (***Beta vulgaris*** L.)

high population density in April, followed by March (52 and 48 ind./250 g soil, respectively).

Genus ***Aphelenchus*** reached its highest population density in May, followed by March (142 and 127 ind./250 g soil, respectively).

2.1.4. Population density of soil nematodes inhabiting broad bean field:

Data in Table (16) and Fig. (11) indicated that, the four nematode genera ***Pratylenchus, Heterodera, Tylenchorhynchus*** and ***Aphelenchus*** appeared to be of common association with broad bean, where the population density of genera, were 279, 145, 299 and 273 ind./250 g soil, respectively, while the other two genera ***Tylenchus*** and ***Ditylenchus,*** were found in lesser numbers of population (61 and 62 ind./250 g soil).

Genus ***Pratylenchus*** reached their high population density in January, however, at the end of the growing season (April and May) the population of nematode rapidaly decreased (18 and 13 ind./250 g soil, respectively).

Heterodera showed its maximum population in February (71 ind./250 g soil), while the lowest population occurred in April. The population density of genera ***Ditylenchus*** and ***Tylenchus*** were, relatively low as comparing with the other four genera during the period of study. The population density of genus ***Tylenchus*** gradually decreased, while numbers of genus ***Ditylenchus,*** obviously flactuated in

Table (16) **Population density of soil nematodes associated with broad bean (*Vicia faba* L.) .**

Months	Jan.	Feb.	Mar.	Apr.	May	Total
Nematode genera	**Nematode population/250g. soil**					
Pratylenchus	106	53	89	18	13	279
Tylenchus	28	19	14	0	0	61
Heterodera	32	71	28	14	0	145
Ditylenchus	10	10	14	13	15	62
Tylenchorhynchus	18	130	89	15	47	299
Aphelenchus	58	74	44	29	68	273
Total	252	357	278	89	143	1119

L.S.D between genera at 5% = 31.50
L.S.D between months at 5% = 34.51

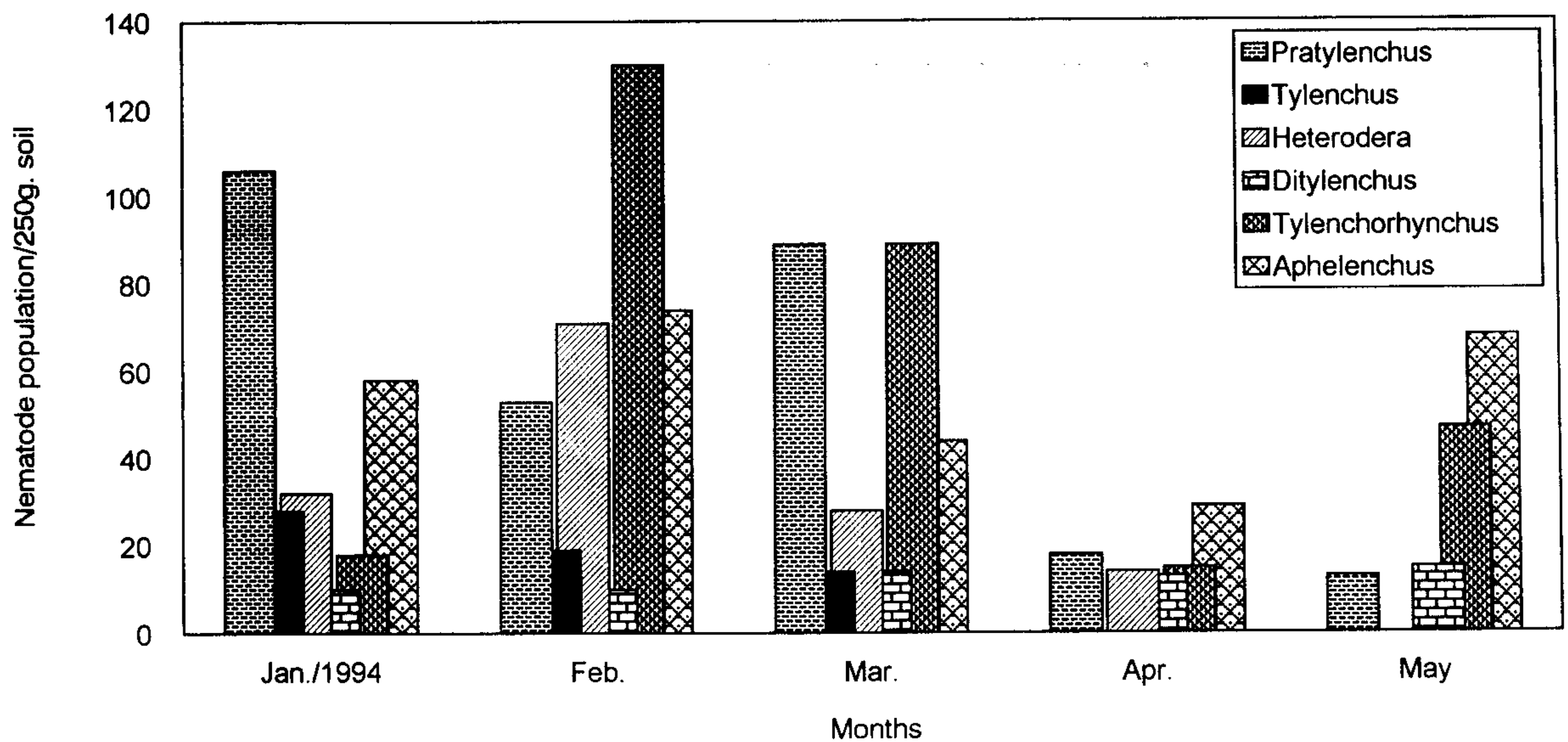


Fig. (11): Population density of soil nematode inhabting broad bean (***Vicia faba*** L.).

this period. On the other hand, genus ***Tylenchorhynchus*** showed its highest population density in February (130 ind./250 g soil), while the lowest population was observed in April (15 ind./250 g soil). Genus ***Aphelenchus*** recorded its highest population density in February (74 ind./250 g soil), while the lowest population was recorded in April (29 ind./250 g soil).

2.2. Influence of fertilizer on nematodes:

2.2.1. Effect of Ammonium nitrate on nematode population density cultivated with two onion cultivars:

Data presented in Table (17) and Fig. (12) showed the efficacy of the application of three different rates of ammonium nitrate on the number of nematodes infecting two cultivars of onion. Data clearly indicated that the low rate of ammonium nitrate (179 kg/fed.), significantly increased the population density of genus ***Pratylenchus*** in soil (130 ind./250 g soil) as comparing with the other treatment including the untreated plots (106 ind./250 g soil) in cultivar Giza 20.

A slight reduction in nematode numbers were found in plots treated with high doses of ammonium nitrate (267 and 358 kg/fed.). On other hand, the three rates of ammonium nitrate suppressed the population of ***Pratylenchus*** in onion cultivar Giza 6, as comparing with untreated plots (93 ind./250 g soil) the same trend was observed in the population of genus ***Tylenchus*** in the two onion cultivars.

Table (17) Effect of ammonium nitrate (NH_4NO_3 33.5% N) on nematode population with two cultivars of onion

Varieties	Giza 20				Giza 6			
NH_4NO_3 (33.5% N)	0 kg/fed	179 kg/fed	267 kg/fed	358 kg/fed	0 kg/fed	179 kg/fed	267 kg/fed	358 kg/fed
Nematode genera	**Nematode population/250g. soil**							
Pratylenchus	106	130	102	99	93	43	55	58
Tylenchus	34	15	10	10	14	8	10	11
Heterodera	63	63	75	81	40	47	61	57
Ditylenchus	47	21	35	24	23	35	18	13
Tylenchorhynchus	101	71	68	64	100	53	44	37
Aphelenchus	93	134	108	103	40	71	55	53

L.S.D between genera at 5% = 19.98 at 1% = 26.74
L.S.D between varieties at 5% = 22.05 at 1% = 46.31

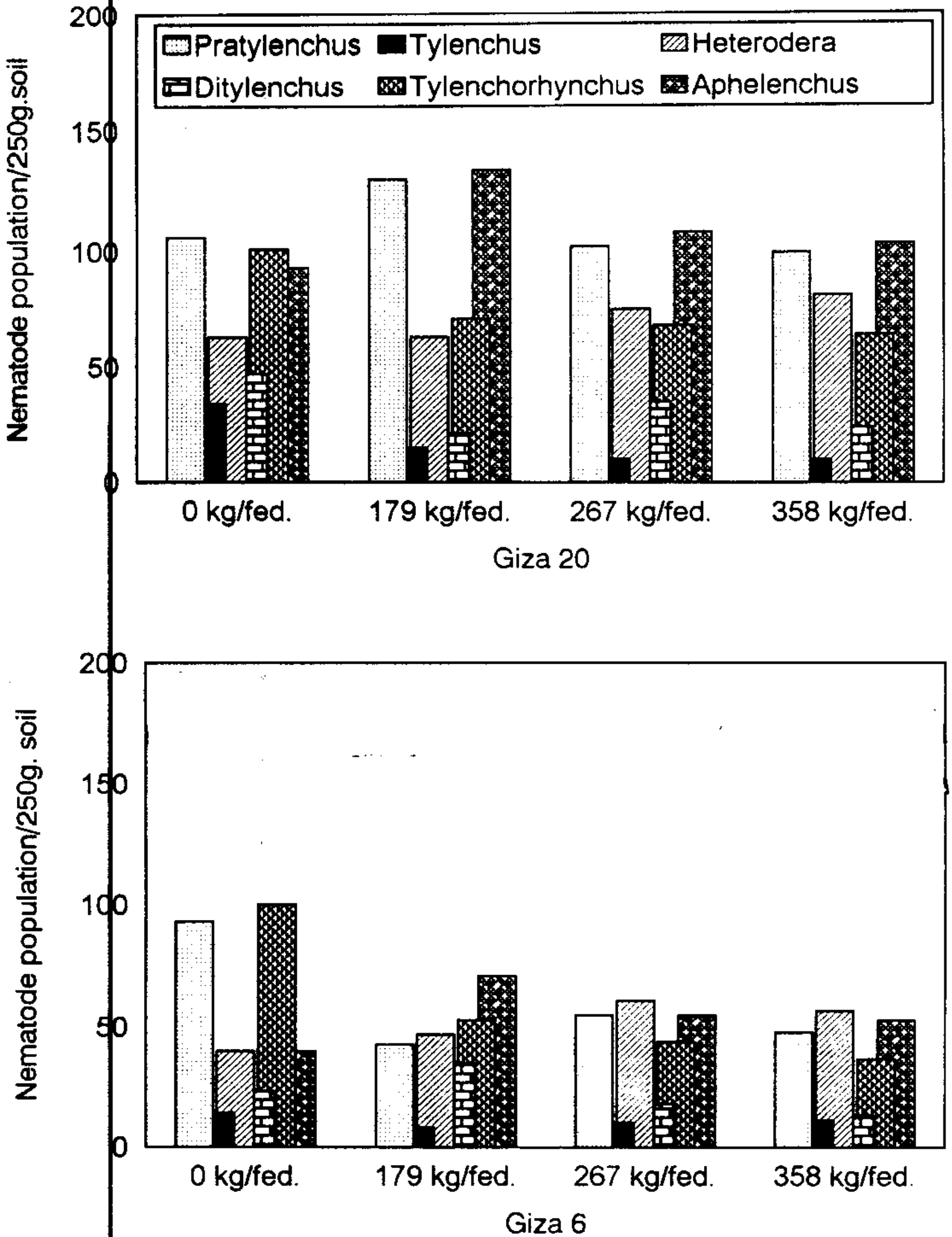


Fig. (12) Effect of ammonium nitrate (NH4 NO3 33.5% N) on nematode population in soil associated with two cultivars of onion

Increasing the rate of ammonium nitrate, population of *Tylenchorhynchus* gradually decreased, as comparing with untreated plots in the two onion cultivars. The application of the three different rates of ammonium nitrate reduced population of ***Ditylenchus*** found in onion cv. Giza 20 (21, 35 and 24 ind./250 g soil, respectively) as comparing with untreated plots (47 ind./250 g soil). On the other hand, the application of low rate increased the population of ***Ditylenchus*** infected onion cv. Giza 6 (35 ind./250 g soil), and by increasing the rate of application the nematode numbers decreased.

Application of ammonium nitrate increased the population of ***Heterodera*** and ***Aphelenchus*** in different levels in the two onion cultivars, as comparing with untreated plots. By increasing the rate of the fertilizer the population of ***Aphelenchus*** decreased.

Generally, in this experiment, the nematode population in cultivar Giza 20 was, remarkedly higher than that in cultivar Giza 6.

These results may be attributed to the toxicity of ammonium ions released during ammonium nitrate degradation. These results agree with those of **Ross** (1959), **Safyanov** (1966), **Walker** (1971), **Yassin** (1980), **Al-Sayed** and **Ahmed** (1987) and **Ahmed** *et al.* (1991), suggested that the application of ammonium nitrate at the rate of 0.875 and 1.750 g/pot reduced the population of *Meloidgyne incognita* in both soil and roots of cowpea.

.2.2. Effect of application of urea and potassium sulphate combination on nematode population density in fodder beet:

Data on Table (18) and Fig. (13) illustrate the influence of the combination of three rates of urea and three rates of potassium sulphate, where it was noticed that, the combination of both fertilizers increased significantly the population of ***Pratylenchus,*** while increasing rate of potassium sulphate, the population gradually decreased. Combination of recommended and high rates of both fertilizers decreased nematode numbers as comparing with those treated with urea only.

The low rate of urea in combination with the low rate of potassium sulphate, significantly reduced population density of ***Tylenchus*** (11 ind./250 g soil) as comparing with those treated with urea only (34 ind./250 g soil).

The application of the three rates of urea increased the population of ***Heterodera***, while the combination of urea and the different rates of potassium sulphate decreased individuals such of genera.

Genera ***Ditylenchus*** increased by the addition of potassium sulphate plus the low rate of urea (11, 44 and 46 ind./250 g soil, respectively) as comparing with the plots treated with urea only (8 ind./250 g soil), while the population of ***Ditylenchus*** decreased by the addition of both recommended and high rates of urea with any of the three rates of potassium sulphate. The same trend was achieved by the genera ***Tylenchorhynchus*** and ***Aphelenchus***. On the other hand, the

Table (18) Effect of some fertilizers application in fodder beet on population dynamics of nematode during season 1994

$Co(NH_2)_2$ (46%N)	50 kg/fed.				100 kg/fed.				120 kg/fed.			
K_2SO_4 (48% K_2O)	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed	0 kg/fed	40 kg/fed	70 kg/fed	100 kg/fed
Nematode genera	Nematode population /250 gm. soil											
Pratylenchus	77	100	78	51	27	11	0	0	27	26	18	10
Tylenchus	34	11	14	14	7	12	11	0	7	7	0	0
Heterodera	80	43	66	68	30	0	0	11	30	11	0	0
Ditylenchus	8	11	44	46	0	12	11	10	0	11	0	0
Tylenchorhynchus	32	42	61	73	40	77	53	40	40	142	98	24
Aphelenchus	106	146	201	250	97	126	105	37	97	118	77	68

L.S.D between	at 5%	at 1%
*genera	28.09	37.84
*genera x $Co(NH_2)_2$	16.22	21.85
* $Co(NH_2)_2$	39.75	53.53

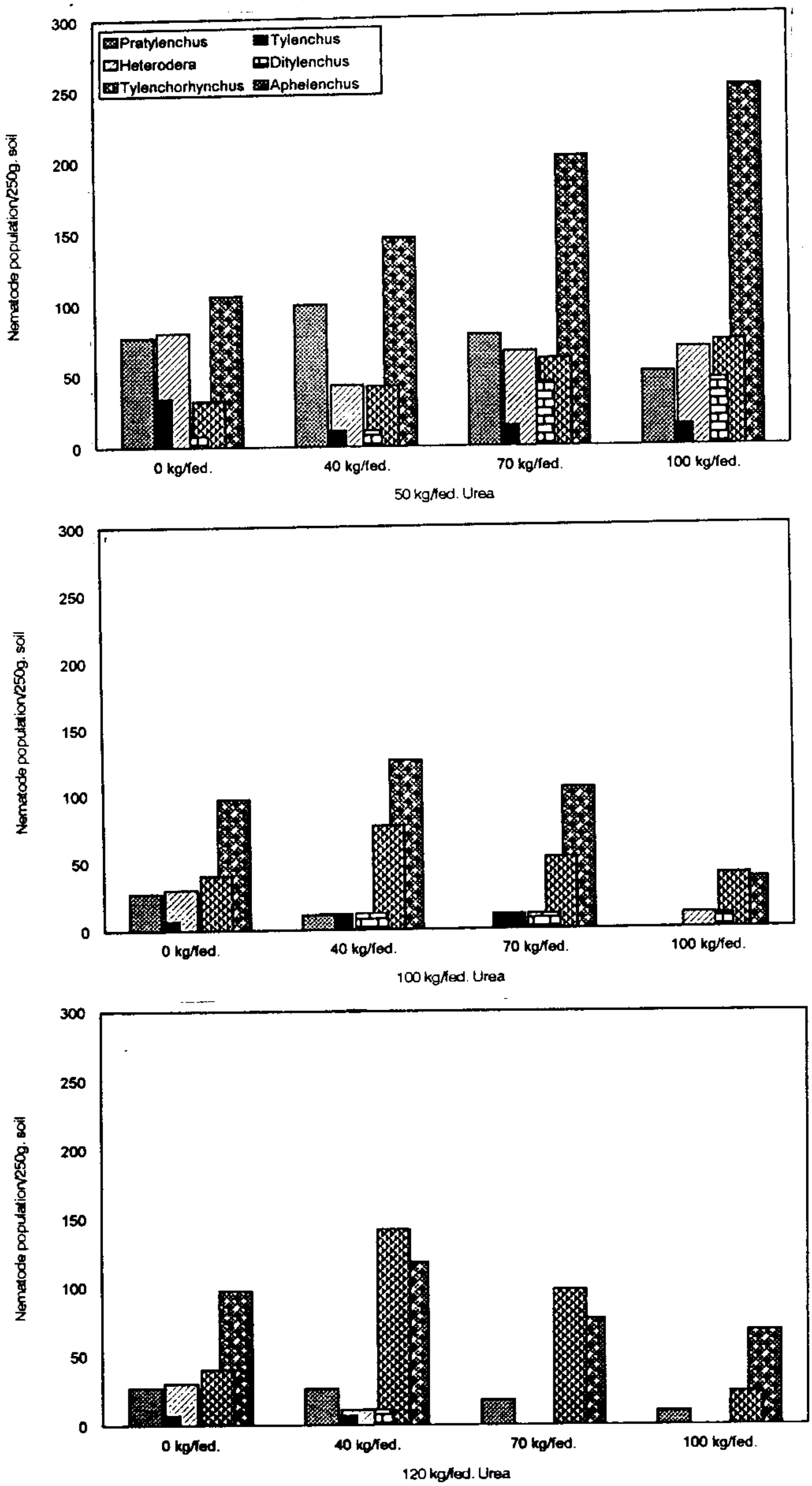


Fig. (13) Effect of some fertilizers application in fodder beet on population dynamics of nematode during the season 1994 population of these genera, were relatively different by using the recommended and high rates of urea. The highest population densities of the genera ***Ditylenchus*** and ***Aphelenchus*** were obtained by the application of the combination of the low rate of urea plus the high rate of potassium sulphate, where the nematode numbers were 46 and 250 ind./250 g soil, respectively.

It is clear that the application of the low rate of urea plus the three rates of potassium sulphate gave the highest population number of ganera ***Ditylenchus***, ***Heterodera*** and ***Aphelenchus***, as comparing with all the other treatments.

These results agree with those of **Oteifa** 1951 & 1955; **Mukhopadhyaya** and **Prased** (1968), **Miller** *et al.* (1968) **Brichfield** *et al.* (1969), **Endo** (1971), **Gupta** and **Mukhxpubhyaya** (1971), **Singh** and **Sitaramalah** (1971), **Sinclair** (1975), **Kali** and **Gupta** (1982), **Ahmed** *et al.* (1991) and **Abd-Alla** (1992). They found that potassium and urea have inhibitory effect to the nematodes development.

2.3. Effect of plant extracts on egg hatchability, juveniles mortality and juveniles emergence of *Meloidogyne incognita*:

Results shown in Table (19) and Fig. (14) revealed that, both extracts of acetone and petroleum ether of american coneflower, stimulated the egg hatching of ***M. incognita*** at the two used concentrations (200 and 400 p.p.m.), where the juveniles recovered in 15 days were 484.8 and 459.5 respectively for aceton extract, and 502.3 and

Table (19) Accumulated hatch, percentage of inhibition and mortality of *Meloidogyne incognita* as influenced by some plants extracts.

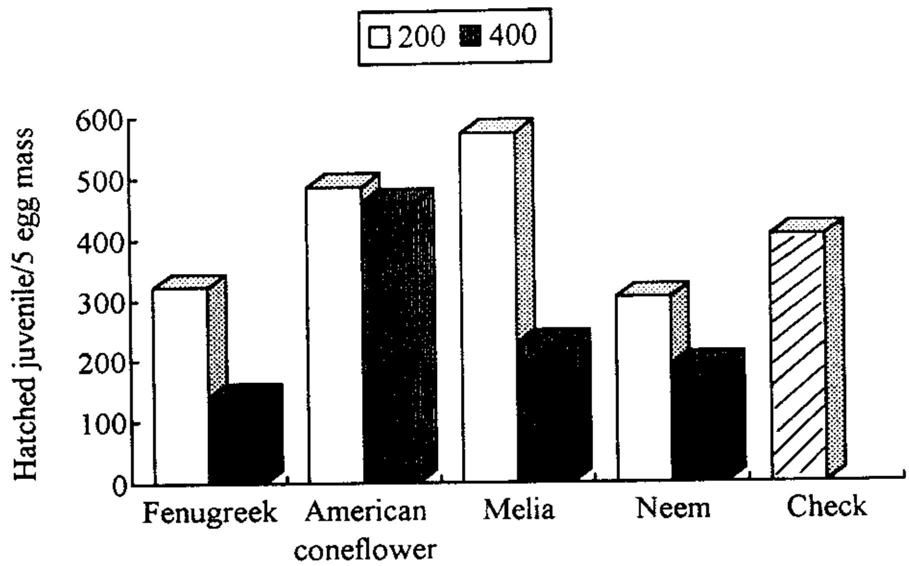
Treatments	Commen Name	Dose (g)	Solvent					
			Aceton			Petroleum ether		
			H	I	M	H	I	M
Tigonella fenumgraceum	Fenugreek	200	322.1	19.9	18.2	460.0	-	22.5
		400	139.5	65.3	19.1	207.0	48.5	37.5
Echinacea angustifolia	American	200	484.8	-	19.2	502.3	-	15.3
	coneflower	400	459.5	-	11.9	438.1	-	13.5
Melia azdarach	Melia	200	571.3	-	14.1	384.3	4.4	11.7
		400	226.1	43.8	12.6	331.6	17.5	10.6
Aizadriachata indica	Neem	200	301.6	25.1	13.3	336.5	16.3	13.5
		400	190.2	52.7	9.6	313.1	22.1	38.3
Check			402.1	-	4.4	402.1	-	4.4

H = Total juveniles recoverd in 15 days from one eggmass average of 5 eggmass

I = $\frac{\text{No. of juveniles from eggs in check - juveniles from eggs in treatment}}{\text{No. of juveniles from eggs in check}}$

M= $\frac{\text{No. of juveniles dead}}{\text{No. of total hatched juveniles}}$ x 100

A



B

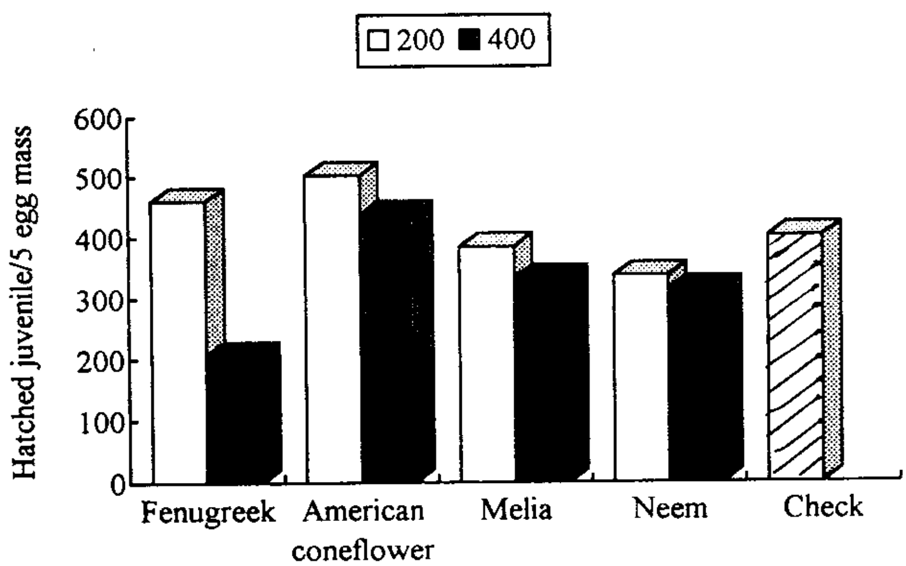


Fig. (14): Hatched of ***Meloidogyne incognita*** as influenced by some plants extracts.

(A) Aceton extract **(B) Petroleum ether extract.**

438.1 for petroleum ether. Also, egg hatching was slightly stimulated in the low concentration of fenugreek (petroleum ether extract) where the number of hatched juveniles was 480, while egg hatching was strongly stimulated (541.3 juveniles) in melia (aceton extract) at the low concentration.

Data in Table (19) and Fig. (14) indicated that the mortality of emerged juveniles, significantly increased as the concentration of plant extracts of all tested plants increased. It is clear to notice that the highest rate of nematode mortality occurred by the high concentration of neem and fenugreek (petroleum ether solvent extract) where the mortality percent were 38.3% and 37%, respectively. On the other hand, the lowest percent (9.6%) were obtained from high concentration of neem (aceton solvent extract). In general, the mortality rate of the plants extracted by the petroleum ether, were more than those extracted by aceton except the two extracts of melia, where the mortality rate were 14.1 and 12.6%, respectively. Petroleum ether extracts gave only 11.7 and 10.6% respectively.

Generally, it is clear to say that the percentage of inhibition of juveniles emergence increased by increasing concentration of extract as well as high mortility rate of nematode juveniles and also inhibition in egg hatching of ***M. incognita*** may be due to the percentage of some toxic substance in the plant extract. These results agree with those of **Dropkin** *et al.* (1958), **Loewenberg** *et al.* (1960), **Stephenson** (1962) **Ahmad** and **Khan** (1964) **Wallace** (1966 & 1968) and **Mostafa** (1992), where they found that increasing of the potential of the water or atmosphere around the egg, would remove body water from the larvae, and increase osmotic pressure of the body contents. This may inhibits metabolism, and prevents movements style thrusting and finally juvenile hatching. Also, the nematicidal activity of solvent extract varied from solvent to solvent for the same plant extract. These variation may be attributed to the diffrences in the chemical nature, composition and concentration of toxic compound, which was separated from each plant by both solvent (aceton and petroleum ether) and presented in water extracts (**Miller** *et al.*, 1973; **Egunjobi & Stephenola**, 1976, **Vijayalakshmi** *et al.*, 1979; **Hasseb** *et al.*, 1982; **Prot & Kornprobst**, 1983 and **Mostafa**, 1992).

2.4. Effect of dried powder of some plants part on the development of the root-knot nematode infected sunflower:

The effect of application of dried powder of some plants species at three different rates (10, 20 and 40 g/pot) in controlling the root-knot nematode ***Meloidogyne incognita*** infected sunflower cv. **Miak**, and its effect on plant growth was studied under greenhouse conditions.

2.4.1. Effect on development of *M. incognita*:

Obtained results indicated that all tested plants parts were toxic to root-knot nematode to varying extents (Table, 20). The nematode development decreased as the rate of dry powder increased.

The highest reduction in nematode final population on roots was achieved by the application of the different rates (10, 20 and 40 g/pots) of

Table (20) Effect of dried powder of some plant parts on the population of *Meloidogyne incognita*.

Treatments	Commen Name	Dose (g)	Nematode Population						
			No. of Eggmass	Reduction %	Nematodes final population/R	Reduction %	No. of gall/Root	Reduction %	Root gall index
Tigonella fenumgraceum	Fenugreek	10	15	90.5	42	94.1	36	88.0	4
		20	13	91.8	37	94.8	35	88.4	4
		40	7	95.6	27	96.2	26	91.4	3
Echinacea angustifolia	American coneflower	10	23	85.5	45	93.7	31	89.7	4
		20	20	87.4	49	93.1	29	90.4	3
		40	15	90.6	24	96.6	21	93.0	3
Melia azdarach	Melia	10	13	91.8	25	96.5	20	93.4	3
		20	9	94.3	19	97.3	15	95.0	3
		40	5	96.9	12	98.3	12	96.0	3
Aizadriachata indica	Neem	10	8	95.0	20	97.2	17	94.4	3
		20	7	95.6	14	98.0	14	95.3	3
		40	5	96.9	6	99.2	6	98.0	2
Check		--	159	--	709	--	301	--	5
L.S.D		5%	22.79		64.56		29.23		
		1%	30.44		86.25		39.05		

neem powder where the percentage of nematode reduction were 97.2, 98.0 and 99.2, respectively, as comparing with the check followed by melia where reduction percent were 96.5, 97.3 98.3, respectively.

Gall formation was highly significantly reduced in all plants treated with the plants dried powder of neem and melia at the three rates of application had lower galls with respect to other treatments. Also the reduction percent of gall formation increased as the dry plant powder rate increased. Also results revealed that the number of egg masses influenced by the type of dry powder as well as their rates (Table, 20). It is worthy to notice that the percentage of reduction was increased according to the increase in the rate of all the tested plants dry powder. The highest reduction in number of eggmasses was obtained also at the high rates (40 g/pot) of melia (5 eggmasses) and neem (5 eggmasses), followed by fenugreek (7 eggmasses). The reduction percent were 96.9, 96.9 and 95.6, respectively as comparing with the check.

In general, the highest reduction of eggmasses, nematode final population and galls formation occurred by plant dry powder of neem followed by those of melia, american caneflower and fenugreek in dascending order.

The antagonistic action of the abovementioned plants dried powder against ***M. incognita*** caused reduction in eggmasses, nematode final population and galls formation. This may be attributed to the accumulated toxicity of the decomposing materials, these results agree with those of

Miller *et al.* (1973), **Alam** *et al.* (1978 & 1979), **Vijayalakshmi** *et al.* (1979) and **Siddiqui & Alam** (1988a) or due to the increased of host resistance **Alam** *et al.* (1977 & 1980). The action of this dried powder of tested plants may also be attributed to the release of some compounds having nematicidal potential againts the nematode **Al-Sayed** *et al.* (1992) **Mostafa** (1992) and **Abadir** *et al.* (1994).

.4.2. Effect on plant growth:

With concern to plant growth, response judged by plant shoot and root lengths, shoot fresh weight and shoot & root dry weights, results illustrated in table (21) Figs. (15 & 16) show that all dry powder materials improved the abovementioned plant creiteria as comparing with untreated plants. The increement of plant growth was positively correlated with the increase in the rate of added plant powder of all tested plants.

The improvement of plant growth was more detectable in the application of the moderate and high rates of fenugreek.

The improvement of plant growth may be attributed to the reduction in nematode populations in the roots and to the fact that these soil organic amendments, also served as fertilizers. Similar results were reported by several investigators working on different crops. **Siddiqui & Alam** (1988b), **Abid and Maqbool** (1990), **Mostafa** (1992) and **Abadir** *et al.* (1994).

Table (21) Effect of some plant dry powder on the growth of sunflower plants infected with *Meloidogyne incognita*.

Treatments	Commen Name	Dose (g)	Plant growth				
			Shoot			Root	
			Fr. weight (g)	Dry weight (g)	Length (cm)	Fr. weight (g)	Length (cm)
Tigonella fenumgraceum	Fenugreek	10	19.8	6.3	58.9	13.9	23.3
		20	48.8	14.5	80.8	30.3	27.5
		40	82.3	21.8	95.1	44.3	33.6
Echinacea angustifolia	American coneflower	10	23.5	6.8	65.8	13.2	24.8
		20	29.8	8.8	73.8	15.3	26.1
		40	32.3	11.5	75.6	16.6	28.5
Melia azdarach	Melia	10	25.5	8.0	76.3	7.3	22.9
		20	31.0	10.3	77.8	14.7	31.1
		40	39.5	12.0	85.5	16.7	33.5
Aizadriachata indica	Neem	10	31.5	9.3	64.6	19.6	22.3
		20	34.3	12.5	75.4	19.8	23.5
		40	36.5	13.0	77.3	21.7	25.6
Check			20.0	7.2	53.0	13.2	22.4
L.S.D		5%	10.61	3.62	16.31	9.54	4.81
		1%	14.14	4.83	13.74	12.72	6.41

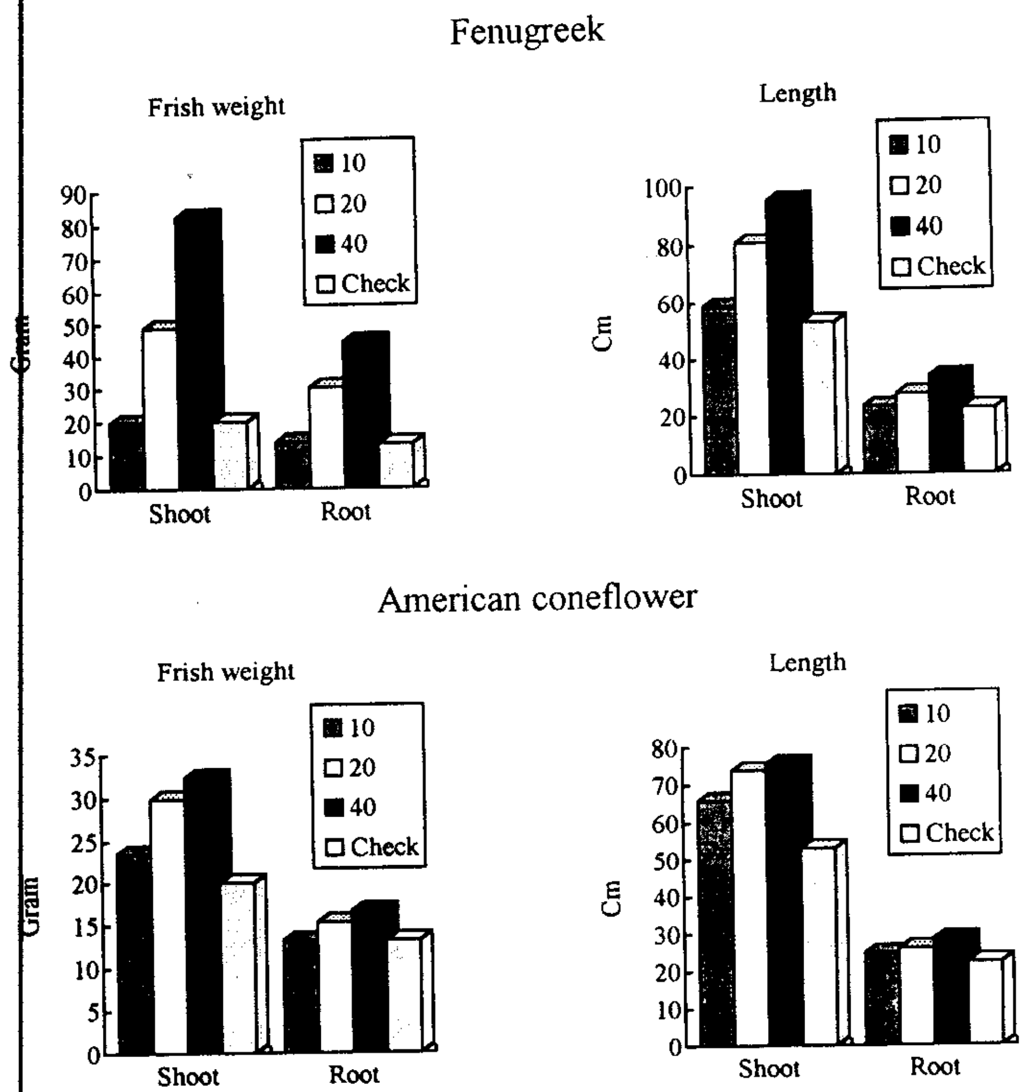


Fig. (15): Effect of some dry powder on the growth of sunflower plants infested with ***Meloidogyne incognita***

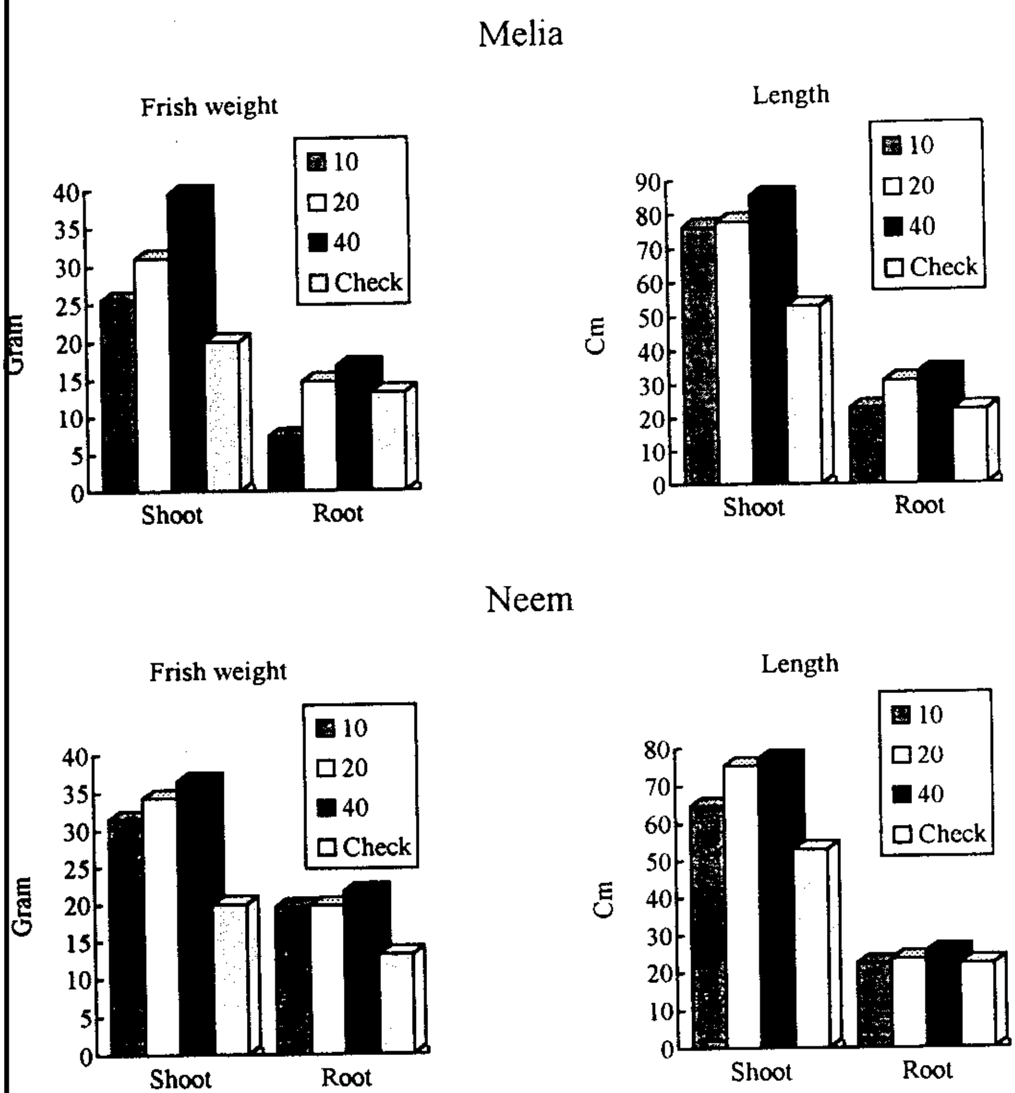


Fig. (16): Effect of some dry powder on the growth of sunflower plants infested with ***Meloidogyne incognita***