RESULTS AND DISCUSSION

4- RESULTS AND DISCUSSION

4.1. Ecological studies on certain homopterous insects infesting some Cucurbitaceous, solanaceous and cruciferous vegetable crops (Squash, Pepper, Eggplant, Cabbage and Cauliflower).

4.1.1. Survey of certain homopterous insects infesting some cucurbitaceous, solanaceous and cruciferous vegetable crops.

4.1.1.1. Whitefly *Bemisia tabaci* (Genn.) (Aleyrodidae: Homoptera):

Data presented in **Table (3)** showed the total number of the whitefly *B. tabaci* collected by two different techniques,i.e. (plant sample and yellow sticky board traps) in the investigation areas. It is worth to mention that plant samples proved to be more efficient for surveying the whitefly. Data in **Table (3)** revealed that the plant sample were more convenient to whitefly than the other one during the two successive seasons of investigations. It was clear that the highest infestation by the whitefly *B. tabaci* (Genn.) was recorded on cabbage varieties (51935, 65473) individuals followed by cauliflower (35103, 60833), eggplant (18516, 14237), pepper (6323, 4900) and squash varieties with a total number of (5844, 5150) during the two successive seasons, respectively.

The present results agree with those obtained by **Soliman (1993), Hassanein *et al.* (1994), Carrizo (2000)** in Argentina.

Table (3): Total number of whitefly (*Bemisia tabaci*) infesting some Cucurbitaceous, Solanaceous and Cruciferous plants in Minia El- Kamh district, Sharkia Governorate collected by different techniques during 2002 / 2003 and 2003 / 2004 seasons.

Whitefly	Host plants	varieties	Total number of whitefly / sample			
			2002/2003		2003/2004	
			Plant s.	Y.S.B.T	Plant s.	Y.S.B.T
Bemisia tabaci	**Squash**	*Amco star*	1942	613	1811	523
		Escandarani	1774	541	1334	388
		Top kapi	2128	649	2005	582
		Total	**5844**	**1803**	**5150**	**1493**
	Pepper	**Anaheium**	1844	753	1502	473
		Marconi	2048	857	1617	503
		Yellow wander	2431	987	1781	549
		Total	**3623**	**2597**	**4900**	**1525**
	Eggplant	**Black beauty**	3993	2490	5406	2193
		White Baladi	6363	2171	4864	1919
		Longpurple	5160	1788	3967	1371
		Total	**18516**	**6449**	**14237**	**5483**
	Cabbage	**Baladi**	14915	1535	19580	1727
		Brunswick	17824	1864	21639	1900
		Copenhagen	19196	2084	24254	2130
		Total	**51935**	**5483**	**65473**	**5757**
	Cauliflower	**Sultani**	13942	1650	24310	2068
		Original	12101	1443	21913	1773
		Snowball	9060	1031	14610	1083
		Total	**35103**	**4124**	**60833**	**4924**

Plant s = plant samples

Y.S.B.T. = yellow sticky board traps.

4.1.1.2. Leafhoppers (Cicadellidae : Homoptera)

The data presented in **Table (4)** show the total number of the leafhopper species collected by the aforementioned different techniques, i.e. sweeping net and yellow sticky board traps in investigated areas. Concerning the efficiency of the two methods of surveying, it appears that the use of sweeping nets was the most efficient during the two successive seasons of investigation. Leafhopper species collected from each host were recorded as follows:

a) Squash plants

Three leafhopper species occurred on squash plants. Leafhopper species were collected and arranged descending according to their abundance: *Empoasca decipiens* (Paoli) (1454, 994), *Balclutha hortensis* (Lindb) (1274,1059) and *Empoasca decedens* (Paoli) (1101, 935) such species were collected by the two methods of collections. *Empoasca decipiens* (Paoli) was the most abundant species on squash plants during 2002 and 2003 seasons.

b) Pepper plants:

Four leafhopper species were collected and arranged descending according to their abundance: *Empoasca decipiens* (Paoli) (1864, 1541), *Empoasca decedens* (Paoli) (1226, 1051), *Cicadulina chinai* (Ghauri) (1044,976) and *Circulifer tenellus* (Baker) (983, 798). *Empoasca decipiens* (Paoli) was the most abundant leafhopper species on pepper plants during two seasons.

c) Eggplant plants:

Four leafhopper species were collected and arranged descending according to their abundance:

Empoasca lybica (de Berg) (5162,3892), *Empoasca decipiens* (Paoli) (2766,2451), *Empoasca decedens* (Paoli) 2310,2132) and *Cicadulina chinai* (Ghauri) (1893,1659).

Empoasca lybica (de Berg) was the most abundant leafhoppers species on Eggplant plant during 2002 and 2003 seasons. These results agree with the findings of **El-Block (1976), Hegab *et al.* (1989) and Hamdi and Emam (1994).**

d) Cabbage plants:

The data presented in **Table (4)** show the total number of the three leafhoppers species collected by the two different techniques. It is worth to mention that sweeping net proved to be more efficient for collection leafhoppers than yellow sticky board traps. Leafhopper species were collected and arranged descending according to their abundance: *Balclutha hortensis* (Lindb) (1135,1267), *Empoasca decipiens* (Paoli) (933,1126) and *Empoasca decedens* (Paoli) (588,594).

e) Cauliflower plants:

Data in **Table(4)** revealed that the sweeping net proved to be the efficient method for collecting leafhoppers species than the yellow sticky board traps from cauliflower plants during the two successive seasons of investigation.

Three leafhopper species were collected and arranged descending according to their abundance:

Table (4): Total number of leafhopper species collected from certain Cucurbitaceous, Solanaceous and Cruciferous plants in Minia El-Kamh district, Sharkia Governorate collected by different techniques during 2002/ 2003 and 2003 / 2004 seasons.

leafhoppers	Host plant	varieties	Total number of leafhoppers / sample			
			2002/2003		2003/2004	
			S.N.	Y.S.B.T.	S.N.	Y.S.B.T.
Empoasca decipiens (Paoli.)	Squash	***Amco star***	513	288	323	170
		Escandarani	404	214	229	127
		Top kapi	537	321	442	233
		Total	**1454**	**823**	**994**	**530**
	Pepper	***Anaheium***	454	261	452	267
		Marconi	666	392	514	294
		Yellow wander	744	436	575	329
		Total	**1864**	**1089**	**1541**	**890**
	Eggplant	*Black beauty*	1017	536	978	542
		White Baladi	905	478	857	487
		Longpurple	844	435	616	361
		Total	**2766**	**1449**	**2451**	**1390**
	Cabbage	Baladi	258	117	349	184
		Brunswick	305	175	366	196
		Copenhagen	370	194	411	214
		Total	**933**	**486**	**1126**	**594**
	Cauliflower	Sultani	334	217	416	246
		Original	277	180	386	215
		Snowball	236	133	272	153
		Total	**847**	**530**	**1074**	**614**
Empoasca decedens (Paoli.)	Squash	***Amco star***	363	127	363	110
		Escandarani	325	119	214	63
		Top kapi	413	151	358	100
		Total	**1101**	**397**	**935**	**273**
	Pepper	***Anaheium***	289	174	287	149
		Marconi	441	247	363	203
		Yellow wander	496	305	401	245
		Total	**1226**	**726**	**1051**	**597**
	Eggplant	*Black beauty*	878	564	781	466
		White Baladi	805	468	725	453
		Longpurple	627	344	626	376
		Total	**2310**	**1376**	**2132**	**1295**
	Cabbage	Baladi	166	71	170	84
		Brunswick	201	87	203	98
		Copenhagen	221	98	221	106
		Total	**588**	**256**	**594**	**288**
	Cauliflower	Sultani	195	57	211	64
		Original	162	49	187	56
		Snowball	122	39	133	41
		Total	**479**	**145**	**531**	**161**

Continue table (4) :

Leafhoppers	Host plant	Varieties	Total number of leafhoppers/ sample			
			2002/2003		2003/2004	
			S.N.	Y.S.B.T	S.N.	Y.S.B.T
Balclutha hortensis (Lindb.)	Squash	***Amco star***	429	194	354	134
		Escandarani	380	178	303	118
		Top kapi	465	200	402	154
		Total	**1274**	**572**	**1059**	**406**
	Cabbage	Baladi	279	152	382	170
		Brunswick	410	179	436	245
		Copenhagen	446	212	449	265
		Total	**1135**	**543**	**1267**	**680**
	Cauliflower	Sultani	390	233	593	270
		Original	348	208	543	255
		Snowball	321	190	377	204
		Total	**1059**	**631**	**1513**	**729**
Cicadulina chinai (Ghauri)	Pepper	***Anaheium***	260	158	289	113
		Marconi	378	180	327	133
		Yellow wander	406	207	360	156
		Total	**1044**	**545**	**976**	**402**
	Eggplant	*Black beauty*	710	340	649	272
		White Baladi	665	295	586	244
		Longpurple	518	260	424	181
		Total	**1893**	**895**	**1659**	**697**
Empoasca lybica (de Berg)	eggplant	*Black beauty*	2003	1367	1405	685
		White Baladi	1805	1226	1317	647
		Longpurple	1354	911	1170	572
		Total	**5162**	**3504**	**3892**	**1904**
Circulifer tenellus (Baker)	Pepper	***Anaheium***	265	124	219	114
		Marconi	344	178	274	126
		Yellow wander	374	193	305	141
		Total	**983**	**495**	**798**	**381**

S.N. = Sweeping net

Y.S.B.T. = yellow sticky board traps.

Balclutha hortensis (Lindb) (1059,513), *Empoasca decipiens* (Paoli) (847,1074) and *Empoasca decedens* (Paoli) (479,531).

Balclutha hortensis (Lindb) was the most abundant species on cabbage and cauliflower plants during 2002/2003 and 2003/2004 seasons. These finding agreed with those recorded by **Hegab *et al*. (1989), El-Gendy (2002) and Der *et al*. (2003).**

4.1.1.3. Aphids (Aphididae:Homoptera):

In the present work the next three aphid species were surveyed by two methods of collections. These three aphid species were harbourd by three experimented cucurbitaceaus and cruiferous vegetable crops on squash, cabbage and cauliflower **Table (5)**:

(1) *Aphis gossypii* (Glover)

(2) *Brevicoryne brassicae* (Linnaeus).

(3) *Myzus persicae* (Sulzer).

The results given in **Table (5)** reveal that plant sample proved to be efficient method for collection aphids than the other one. Yellow sticky board traps were attractive to aphid species during the two successive seasons of investigation 2002/2003 and 2003/2004. **El-Zohairy *et al.* (1989), Hegab et.al, (1987), Soliman (1993), Hashem (1997), Hegab ola (2000) and El-Gindy (2002)** mentioned that sticky trap method is one of the best sampling methods available for estimation winged aphids population. Therefore, sticky traps could be used to determine the relative winged aphid density. For the plant sample it was

Table (5): Total number of aphid species infesting some Cucurbitaceous, Solanaceous and Cruciferous plants in Minia El-Kamh district, Sharkia Governorate collected by different techniques during 2002 / 2003 and 2003 / 2004 seasons.

Aphid species	Host plants	varieties	Total number of aphid / sample			
			2002/2003		2003/2004	
			Plant s.	Y.S.B.T	Plant s.	Y.S.B.T
A.gossypii	**Squash**	*Amco star*	477	89	399	68
		Escandarani	418	66	300	54
		Top kapi	555	99	447	104
		Total	**1450**	**254**	**1146**	**226**
B.brassicae	**Cabbage**	**Baladi**	8425	95	8825	102
		Brunswick	10520	118	12324	116
		Copenhagen	11102	125	14175	144
		Total	**30047**	**338**	**35324**	**362**
	Cauliflower	**Sultani**	5586	92	8688	108
		Original	5132	80	7804	91
		Snowball	3976	57	5306	70
		Total	**14694**	**229**	**21798**	**269**
M.persicae	**Cabbage**	**Baladi**	331	27	378	28
		Brunswick	351	35	529	34
		Copenhagen	408	37	568	39
		Total	**1090**	**99**	**1475**	**101**
	Cauliflower	**Sultani**	722	45	999	64
		Original	668	40	905	59
		Snowball	590	28	598	37
		Total	**1980**	**113**	**2502**	**160**

Plant s = plant samples

Y.S.B.T. = yellow sticky board traps .

worth to mention that the most extensive infestations by *Aphis gossypii* (Glover) was recorded only on squash plants (1450,1146) aphids during the experimental seasons of 2002 and 2003 seasons. Concerning the total number of *Brevicoryne brassicae* (Linnaeus) it was recorded on cabbage varieties with a total number of (30047,35324) aphids followed by cauliflower (14694,21798) during the experimental season of 2002/2003 and 2003/2004 seasons, also it is clear that the total number of *Myzus persicae* (Sulzer) recorded on the varieties of cauliflower plants with a total number of (1980, 2502) aphids followed by cabbage varieties (1090,1475) during the experimental seasons. Similar results were obtained by **Hegab *et al* (1989), Soliman (1993), Hegab- Ola (2001) and El – Gendy (2002)** on cabbage and cauliflower crops.

4.2. Seasonal abundance of certain insects infesting some cucurbitaceous, solanaceous and cruciferous plants.

4.2.1. Summer plantation (cucurbitaceous and solanaceous plants).

4.2.1.1. Immature stages of whitefly *Bemisia tabaci* (Genn.).

On Squash plants (*Cucurbita pepo* var. *melopepo* L.)

Weekly number of *B. tabaci* immature stages collected from squash plants during 2002 and 2003 seasons are shown in **Table (6)** and illustrated graphically in **Fig. (1 & 2)**. Three peaks of *B. tabaci* immature stages during 2002 and 2003 seasons on squash plants were recorded.

The first peak occurred in third week of April with a total number of 104 eggs, 60 larvae and 22 pupae/sample and 77 eggs, 38 larvae and 17 pupae/sample at mean temperature of 25.59°C, 20.04°C with 53.00% and 20.04% R.H for both seasons, respectively. The second peak was recorded at the end of May with a total number of 55 eggs, 26 larvae and 9 pupae/sample and 35 eggs, 17 larvae and 8 pupae/sample at mean temperature of 26.77°C, 26.48°C with 54.50% and 52.71% R.H for the two season, respectively. The third peak occurred in third week of June with a total number 55 eggs, 28 larvae and 13 pupae/sample and 38 eggs, 18 larvae and 10 pupae/sample at mean temperature of 29.10°C, 28.47°C with 54.71% and 52.29% R.H for both seasons, respectively.

4.2.1.2. Adult stage of white fly *Bemisia tabaci* (Genn.).

On squash plants:

The weekly number of *B.tabaci* adult stage collected from squash plants during 2002 and 2003 seasons are shown in **Table (6)** and illustrated graphically in **Fig. (1 & 2)**. The abundance of adults population on squash plants indicated three peaks of adults population. The first one occurred at the first week of May with a total number of 93 and 102 adults/sample at mean temperature of 23.00°C, 23.97°C and 52.00% and 50.43% R.H for both seasons, respectively. The second peak was found at the first of June with a total number 63 and 75 adults/sample at mean temperature of 26.27°C, 26.54°C and 55.29% and 52.71% R.H for both seasons, respectively. The third peak occurred in first week of July with a total number 57 and 54 adults/sample at mean temperature of 29.60°C, 29.74°C and 58.14% and 58.57% R.H for both seasons, respectively.

The obtained results are in agreement with those obtained by **Hegab and Helaly (1989), Fouda and Mohammed (1994) and Abd El- Maksaud (1997).**

4.2.1.3. Leafhoppers (Cicadellidae:Homoptera)

The following discussion on the population density of the dominant leafhopper species are based on the records of the sweeping nets technique.

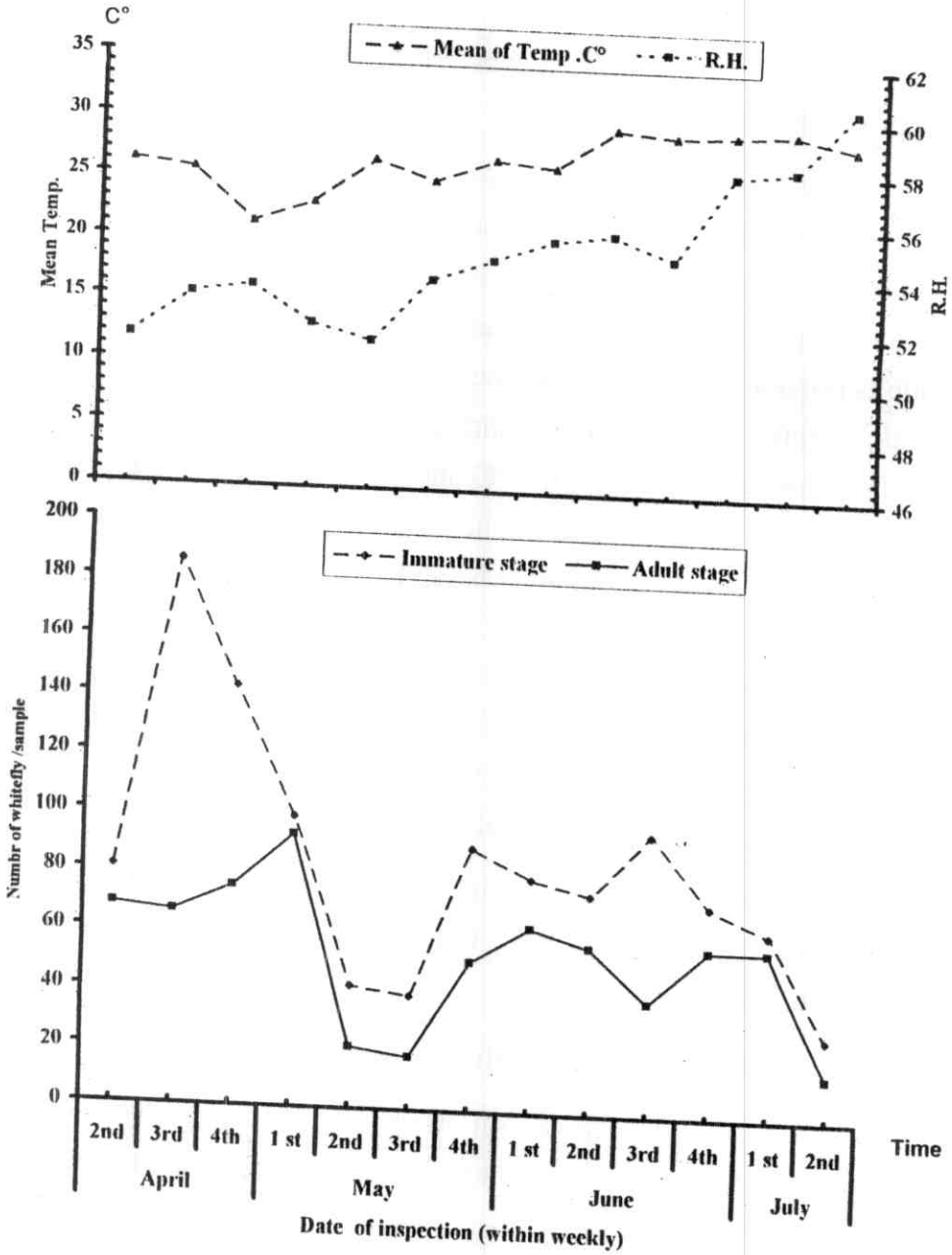

Fig. (1) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (immature stages and adult stage) infesting squash plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002 season.

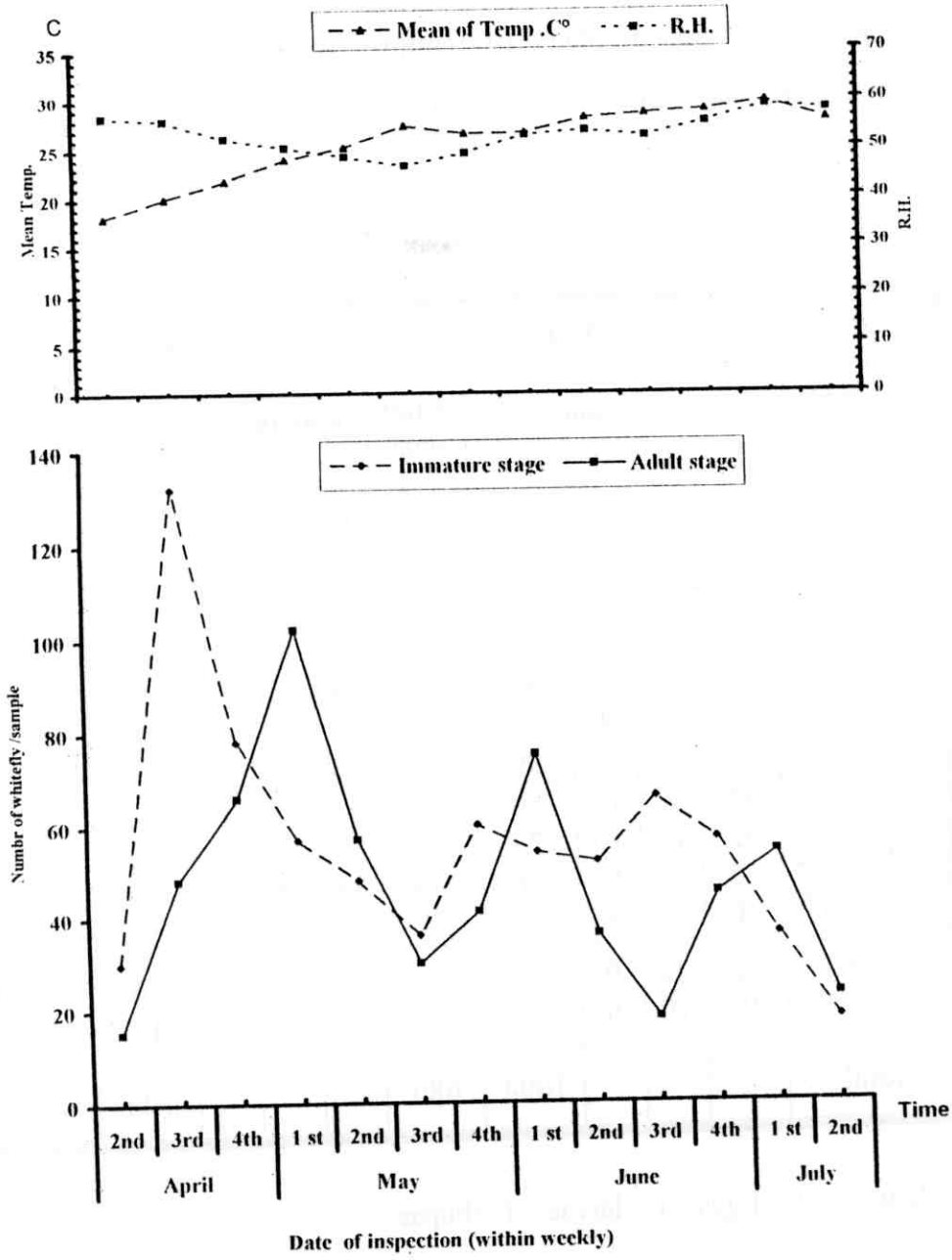

Fig. (2) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (immature stages and adult stage) infesting squash plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003 season.

Table(6): Total numbers of whitefly *Bemisia tabaci* (Genn.) immature stages and adult stage infesting squash plants colleted by plant samples at Minia El-Kamh district, Sharkia Governorate during summer plantation in 2002 and 2003 seasons.

Date of inspection (within weeks)		2002					2003				
		Immature stages				Adult stage	Immature stages				Adult stage
		E.	L.	P.	Total		E.	L.	P.	Total	
April	2nd	49	23	9	81	68	19	8	3	30	15
	3rd	104	60	22	186	66	77	38	17	132	48
	4th	87	36	20	143	75	49	20	9	78	66
May	1st	64	24	11	99	93	36	14	7	57	102
	2nd	26	11	5	42	21	28	13	7	48	57
	3rd	25	10	4	39	18	22	10	4	36	30
	4th	55	26	9	90	51	35	17	8	60	41
June	1st	48	22	10	80	63	31	15	8	54	75
	2nd	42	23	10	75	57	30	15	7	52	36
	3rd	55	28	13	96	39	38	18	10	66	18
	4th	40	23	9	72	57	31	17	9	57	45
July	1st	32	22	9	63	57	19	12	5	36	54
	2nd	12	10	6	28	15	9	6	3	18	23
total					1094	680				724	610

N.B. E.=Eggs L.=larvae P.=Pupae

On squash plants:

a) *Empoasca decipiens* (paoli):

Empoasca decipiens was the most abundant leafhopper species on some vegeTable plants during 2002 and 2003 seasons.

The total numbers of *E.decipiens* adults per a sample on squash plants during 2002 and 2003 seasons are tabulated **Table (7)** and illustrated graphically in **Fig. (3 & 4).** The first collection *E. decipiens* adult were noticed on the 2nd and 3rd week of April at 26.18°C, 20.04°C with a mean of 51.42% and 56.00% R.H. for both seasons respectively.

According to the abundance of *E. decipiens* adults on squash plants appeared one peak occurred in the third week of June with a total number of 60 and 42 individuals/200 strokes at a mean temperature of 29.10°C, 28.47°C and 54.71%, 52.29% R.H. for the two seasons respectively.

b)*Empoasca decedens* (Paoli):

The total number of *E. decedens* individuals collected from squash plants during 2002 and 2003 seasons are given in **Table (7)** and illustrated graphically in **Fig. (3 & 4).**The first collected of individuals were recorded in 3rd week of April. The total number of initial occurrence were 6 and 3 adults/200 strokes in 2002 and 2003 seasons respectively at mean temperature of 25.59°C, 20.04°C with a mean 53.00% and 56.00 R.H. for the two seasons respectively.

Data in **Fig. (3 & 4)** indicated that the numbers of leafhopper species had one peak on squash plants. The number

of insects increased gradually till reached to the top peak which occurred in the 3rd week of June with a mean number of 57 adult/200 strokes at mean temperature of 29.10°C, 28.47°C with 54.71 % and 52.29% R.H. for the tow experimental seasons. Then the numbers of leafhopper decreased until reached the minimal number at the 2nd week of July with a total numbers 9 and 12 leafhopper adults/200 strokes at mean temperature of 28.45°C, 27.84°C and 60.43%, 57.71% R.H. during the two successive seasons.

c) *Balclutha hortensis* (Lindb).

The total number of *B. hortensis* individuals per 200 strokes on squash plants during 2002 and 2003 seasons are shown in **Table (7)** and illustrated graphically in **Fig. (3 & 4)**. The first collection of *B. hortensis* individuals was counted at the 2nd and 3rd of April for 2002 and 2003 seasons, respectively.

The total initial number per a sample (200 strokes) were 6 and 15 individual in the two seasons respectively. According to the abundance of *B. hortensis* individuals on squash plants, there are two peak recorded at the end of April with a total number of 39 and 33 individuals/200 strokes 2002 and 2003 seasons, respectively at 21.27°C 21.69°C with 53.33%, 52.33% R.H. for the two seasons, respectively.

The second peak was obtained in the end week of June with mean number of 57 and 40 adults / 200 strokes at mean temperature of 29.33°C 28.88°C with 57.89%, 55.11% R.H. for the two seasons, respectively.

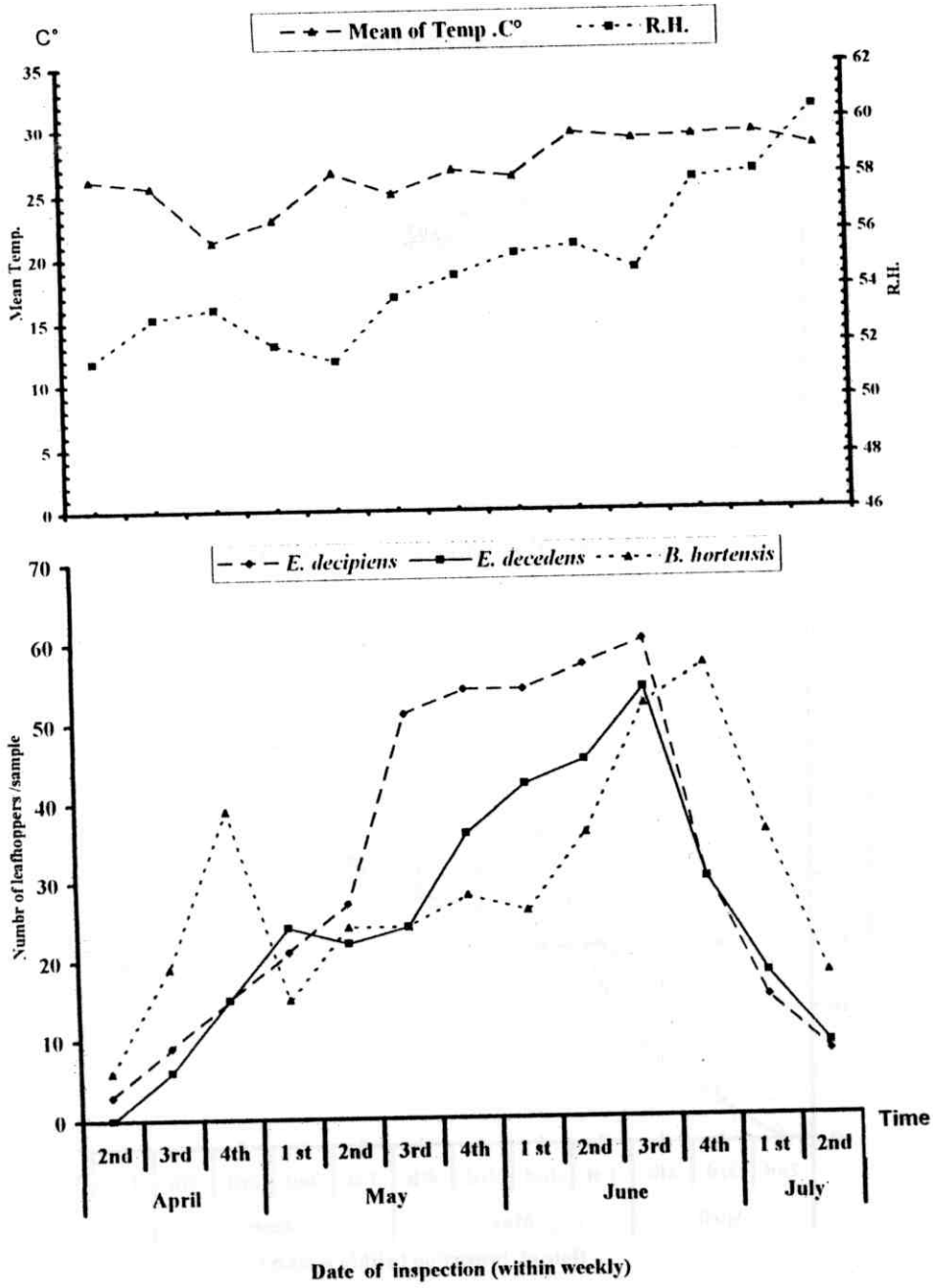

Fig. (3) : Seasonal abundance of leafhoppers *E. decipiens*, *E. decedens* and *B. hortensis* infesting Squash plants collected by sweeping net at Minia EL- kamh district, Sharkia Governorate during 2002 season.

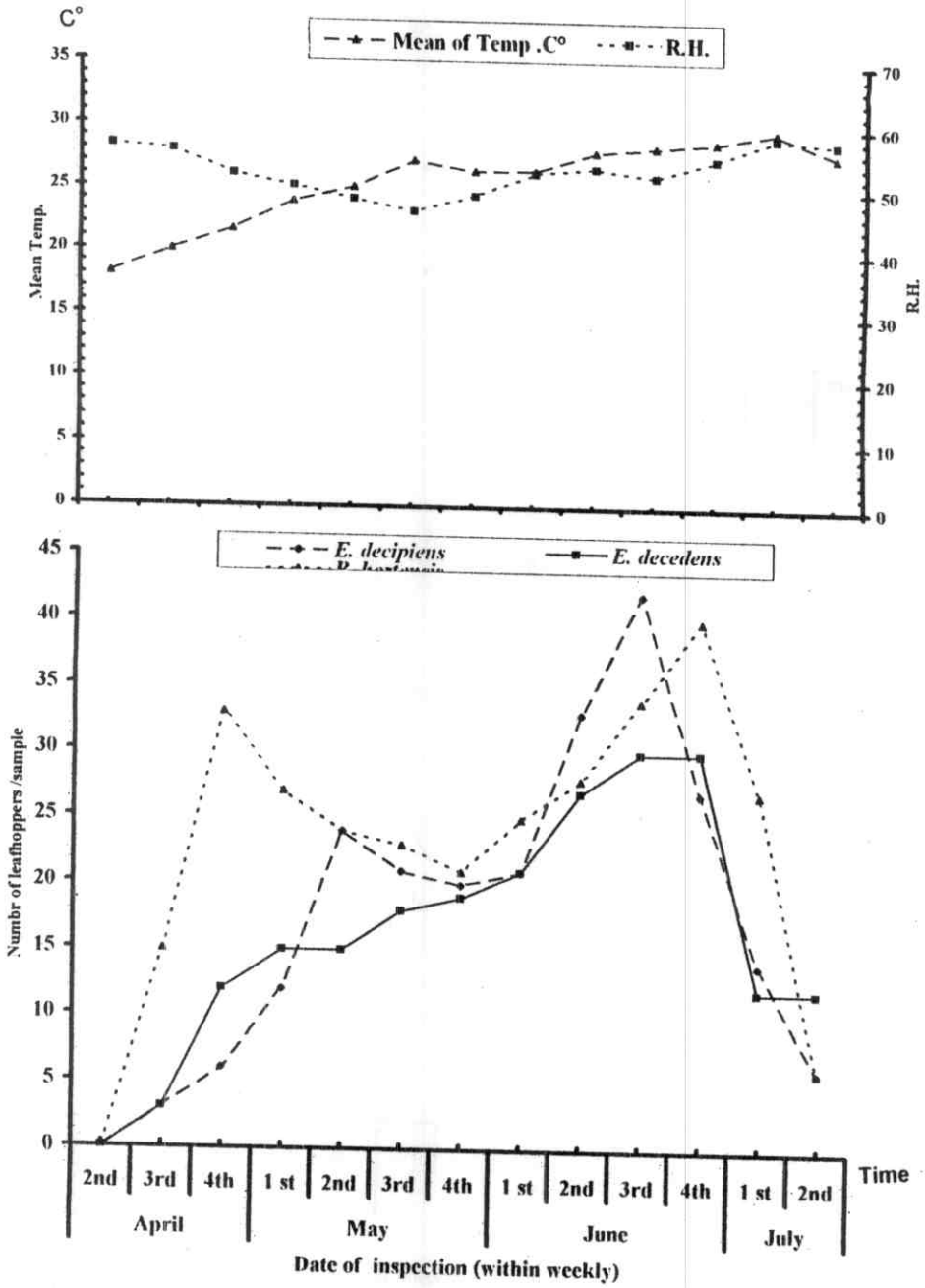

Fig. (4) : Seasonal abundance of leafhoppers *E. decipiens*, *E. decedens* and *B. hortensis* infesting Squash plants collected by sweeping net at Minia EL- kamh district, Sharkia Governorate during 2003 season.

Table(7): Total number of leafhoppers *Empoasca decipiens* (Paoli), *Empoasca decedens* (Paoli) and *Baclutha hortensis* (Lindb.) infesting squash plants colleted by sweeping net at Minia El-Kamh district, Sharkia Governorate during summer plantation in 2002 and 2003 seasons.

Date of inspection (within weeks)		2002			2003		
		E. decipiens	*E. decedens*	*B. hortensis*	*E .decipiens*	*E. decedens*	*B. hortensis*
April	2nd	3	0	6	0	0	0
	3rd	9	6	19	3	3	15
	4th	15	15	39	6	12	33
May	1st	21	24	15	12	15	27
	2nd	27	22	24	24	15	24
	3rd	51	24	24	21	18	23
	4th	54	36	28	20	19	21
June	1st	54	42	26	21	21	25
	2nd	57	45	36	33	27	28
	3rd	60	54	52	42	30	34
	4th	30	30	57	27	30	40
July	1st	15	18	36	14	12	27
	2nd	8	9	18	6	12	6
total		404	325	380	229	214	033

The number of *B. hortensis* tended to decline until reached its minimal at 2nd week of July with a total number of 18 and 6 in individuals/200 strokes at a mean temperature 27.84°C and 60.43%, 57.71% R.H. for two seasons respectively.

Similar results were found by **Hamdi (1992) and Hamdi and Emam (1994).**

4.2.1.4. Aphids (Aphididae:Homoptera)

On Squash plants

***Aphis gossypii* (Golver):**

The weekly number of aphids collected from squash plants during 2002 and 2003 seasons at minia El-kamh district, Sharkia Governorate are shown in **Table (8)** and illustrated graphically in **figure (5 & 6).** The individuals of *Aphis gossypii* were collected from samples taken from squash plants starting from 2nd week of April for both experimental years **Table (8)**.The total number of initial occurrence were 67 and 57 individuals/sample at a mean of 26.18°C, 18.13°C and 51.42%, 56.71% R.H. for the two seasons, respectively.

Then the number of individuals fluctuated, on squash plants with general tendency to increase gradually until reached its peak of population density **figure (5 & 6)** show one peak occurred at the end of April with total number of 117 and 93 individuals/sample at 21.27°C, 21.69°C and 53.33% and 52.33% R.H. for the two seasons respectively. After the top peak the *Aphis gossypii* (Glover) numbers tended to decline until showing 0 and 0 aphid / sample in 2nd and 1st June in 2002 and 2003 seasons, respectively.

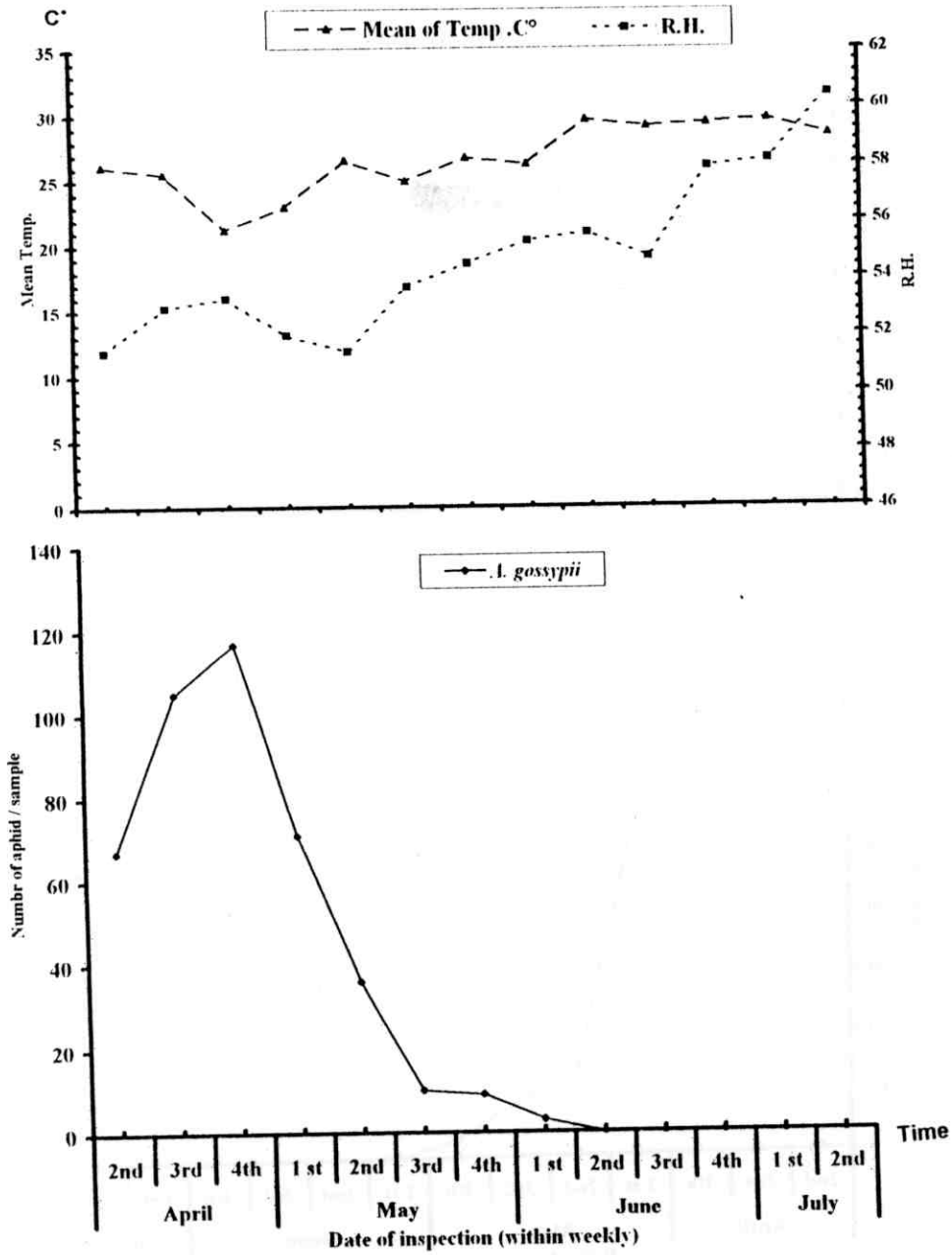

Fig. (5) :Seasonal abundance of aphid *A. gossypii* infesting squash plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002 season.

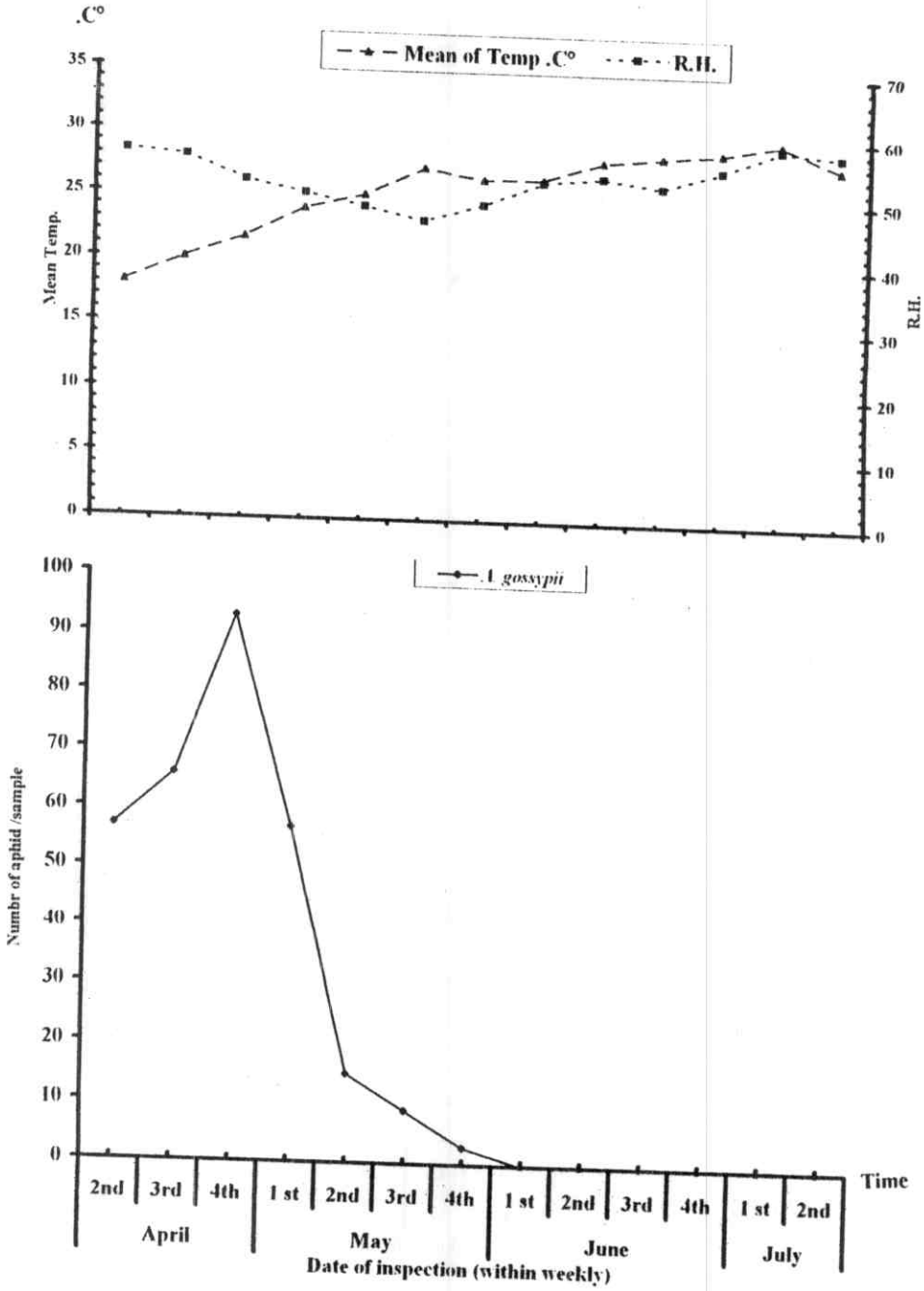

Fig. (6) : Seasonal abundance of aphid *A. gossypii* infesting squash plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003 season.

Table(8) : Total number of *Aphis gossypii* (Glover) infesting squash plants collected by plant samples at Minia El kamh district, Sharkia Governorate during summer plantation in 2002 and 2003 seasons.

Date of inspection (within weeks)		2002	2003
April	2nd	67	57
	3rd	105	66
	4th	117	93
May	1st	71	57
	2nd	36	15
	3rd	10	9
	4th	9	3
June	1st	3	0
	2nd	0	0
	3rd	0	0
	4th	0	0
July	1st	0	0
	2nd	0	0
total		418	300

Regarding the weekly counted of aphids on Squash plants, it is clear that this species was more abundant during 2002 than 2003.

These results are in harmony with those obtained by **El – Sisi and Mousa (2001) and Dukic *et al*. (2002)** in Yugoslavia.

4.2.1.5. Immature stages of whitefly *Bemisia tabaci* (Genn.).

4.2.1.5.1 On Pepper (*Capsicum anuum L.*)

The weekly number of *B. tabaci* immature stages collected from pepper plants during 2002 and 2003 seasons are shown in **Table (9&10)** and illustrated graphically in Fig. (7&8). Resulted obtained clearly indicated two peaks respectively high population density of *B. tabaci* immature stages. The first one occurred in the 2nd week of June with total numbers of 25 eggs,7larvae and 1 pupae/sample and 30 eggs, 8 larvae and 1pupae/sample for the two seasons respectively at mean temperature of 29.59°C, 28.05°C and 55.57%, 53.57% R.H. respectively.

The second peak occurred in 1st week of September with total number of 71eggs,55 larvae and 30 pupae/sample and 67 eggs, 38larvae and 30 pupae for the two seasons respectively at mean temperature of 27.45°C , 28.37°C and 59.57 % , 59.86 % R.H respectively.

4.2.1.5.2 On Eggplant (*Solanum melongena L.*)

The total number of whitefly immature stages collected from eggplant plants during summer 2002 and 2003 seasons are shown in **Table (9&10)** and represented in **Fig. (7&8).**

According to **Table (9&10)** and **Fig. (7&8)**, it can be stated that whitefly immature was present under the field conditions on the eggplant plants during the period from the 4th week of May to 2nd week of October. The mean number of initial occurrence were 117 and 39 insects/sample in 2002 and 2003 seasons , respectively at 26.77°C, 26.48°C and 54.50%, 49.00% R.H for two seasons, respectively.

Fig. (7&8) indicate that the mean number of immature stage of white fly on eggplant plants tended to increase until it reached the first peak in the 2nd week of June with total number of 318 (302 eggs, 14 larvae and 2 pupae)/sample and 207 (151 eggs, 56 larvae and 0 pupae)/sample in 2002 and 2003 seasons, respectively at 29.59°C, 28.05°C and 55.57%, 53.57% R.H for the two seasons, respectively. The second peak was recorded in the 4th week of July with total numbers 275 (165 eggs, 77 larvae and 33 pupae) and 202 (115 eggs, 69 larvae and 18 pupae)/sample in 2002 and 2003 seasons, respectively at 29.10°C, 29.01°C and 60.00%, 61.50% R.H for the two seasons, respectively. The third peak occurred in 4th week of August with total numbers of 378 (166 eggs, 125larvae 87 pupae) and 246 (79 eggs,108 larvae 59 pupae) / sample in 2002 and 2003 seasons, respectively at 27.37°C, 29.72°C with 59.60% and 58.50% R.H for the two seasons, respectively.

The date obtained show that the population density of immature stage of *Bemisia tabaci* has two peak on pepper plants, while it has three peaks on eggplant plants.

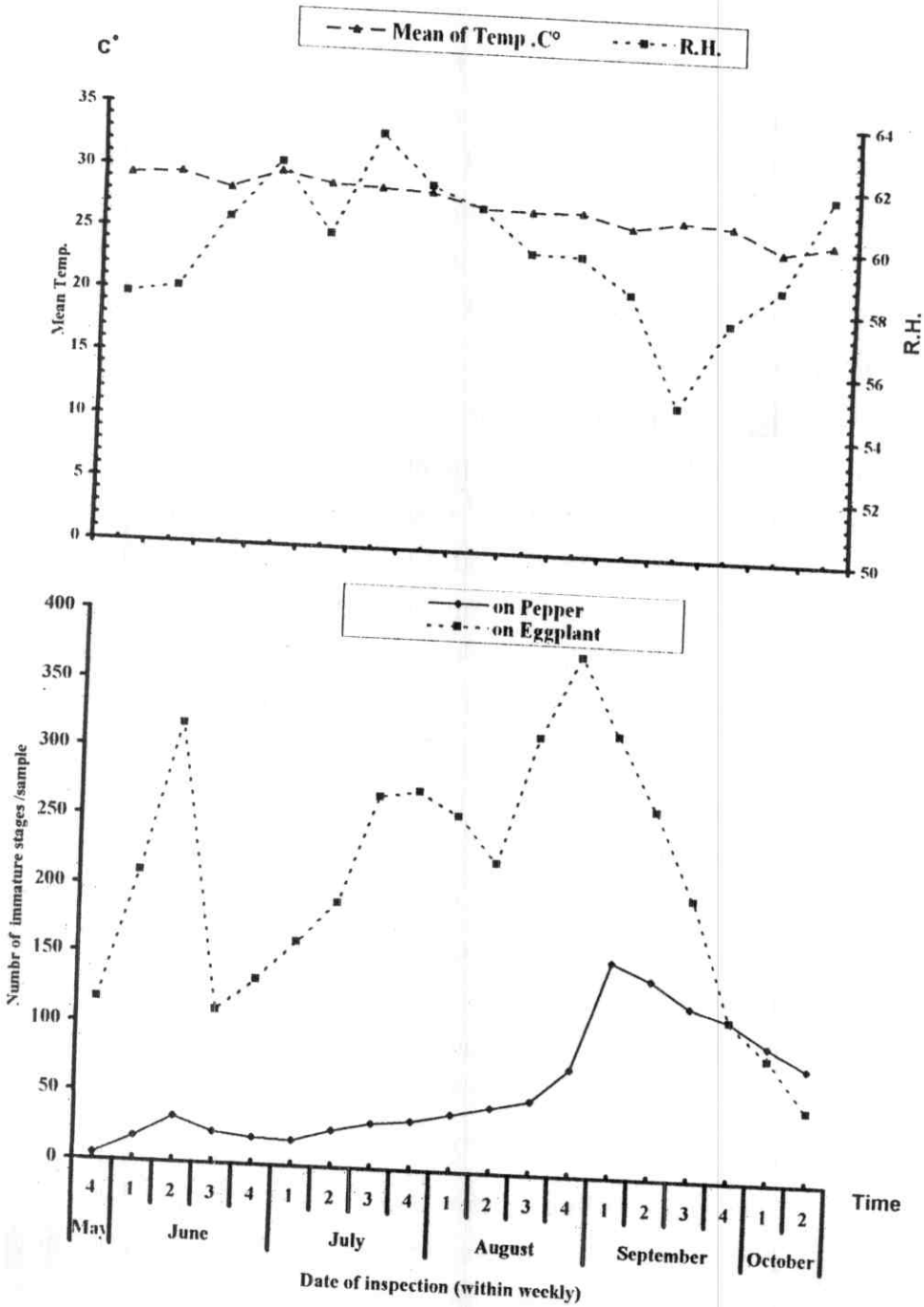

Fig. (7) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (immature stages) infesting pepper and eggplant plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002 season.

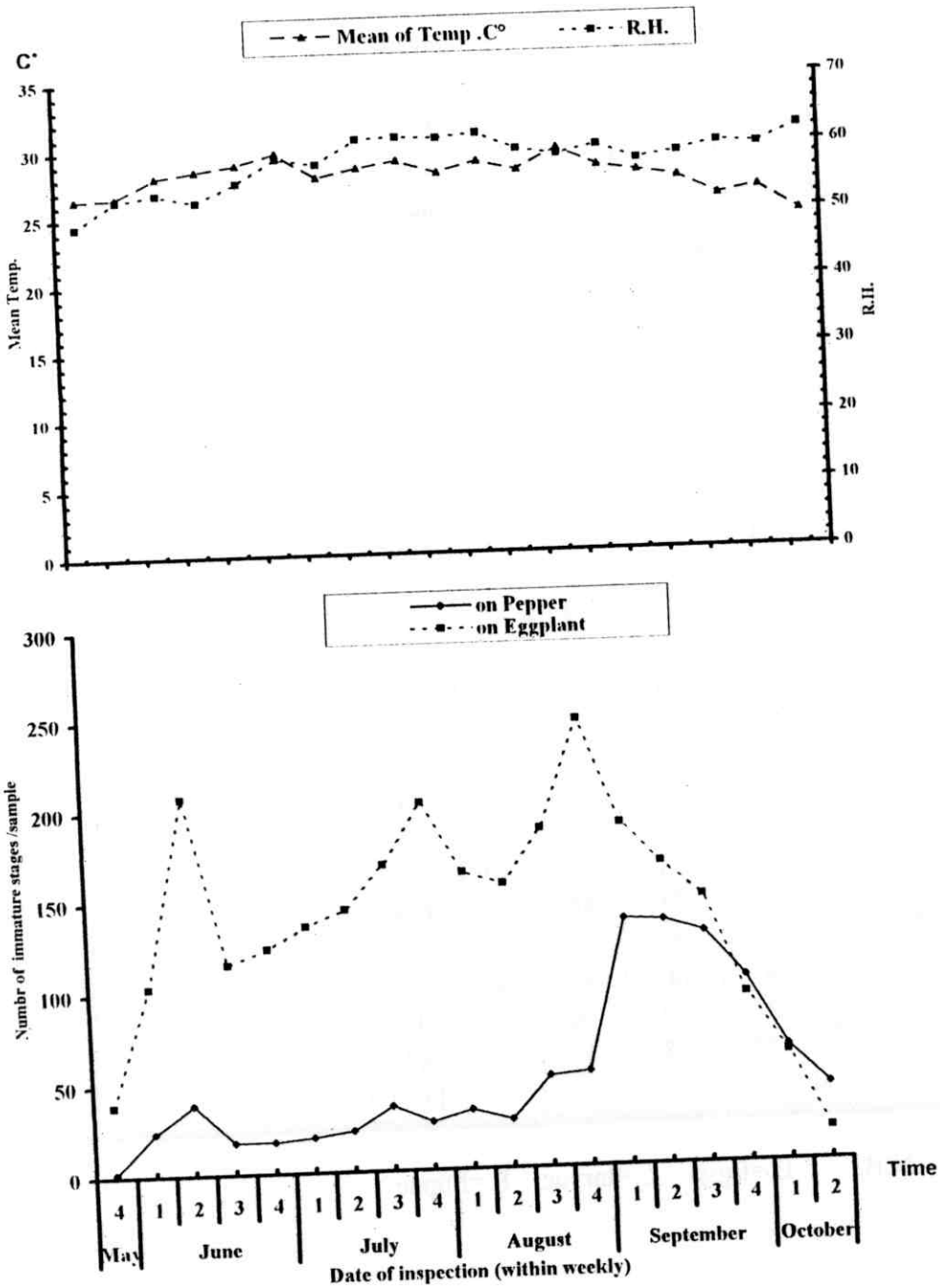

Fig. (8) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (immature stages) infesting pepper and eggplant plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003 season.

Table (9): Total number of whitefly *Bemisia tabaci* (Genn.) immature stages infesting certain solanaceous vegetable (Pepper and Eggplant) plants collected by plant samples at Minia El kamh district, Sharkia Governorate during summer plantation in 2002 seasons.

Date of inspection within weeks		Pepper plant				Eggplant plant			
		E.	L.	P.	Total	E.	L.	P.	Total
May	4th	5	0	0	5	111	6	0	117
June	1st	14	4	0	18	200	10	0	210
	2nd	25	7	1	33	302	14	2	318
	3rd	17	5	1	23	94	16	1	111
	4th	15	4	1	20	101	29	4	134
July	1st	11	6	2	19	92	57	13	162
	2nd	16	9	2	27	110	67	15	192
	3rd	20	10	3	33	167	76	27	270
	4th	21	11	4	36	165	77	33	275
August	1st	25	13	4	42	131	65	62	258
	2nd	29	15	4	48	94	52	79	225
	3rd	29	18	7	54	137	89	92	318
	4th	35	29	14	78	166	125	87	378
September	1st	71	55	30	156	144	90	87	321
	2nd	71	46	27	144	125	61	81	267
	3rd	65	43	18	126	94	63	47	204
	4th	66	42	9	117	53	46	18	117
October	1st	37	50	12	99	21	30	39	90
	2nd	28	42	14	84	12	24	18	54
Total					1162				4021

N.B. E.=Eggs L.=larvae P.=Pupae

Table(10): Total number of whitefly *Bemisia tabaci* (Genn.) immature stages infesting certain solanaceous vegetable (Pepper and Eggplant) plants collected by plant samples at Minia El kamh district, Sharkia Governorate during summer plantation in 2003 seasons.

Date of inspection within weeks		Pepper plant				Eggplant plant			
		E.	L.	P.	Total	E.	L.	P.	Total
May	4th	2	0	0	2	29	10	0	39
June	1st	18	5	1	24	72	31	0	103
	2nd	30	8	1	39	151	56	0	207
	3rd	13	4	1	18	67	32	7	115
	4th	14	4	0	18	82	34	7	123
July	1st	14	5	1	20	78	45	12	135
	2nd	15	6	2	23	72	55	17	144
	3rd	22	10	4	36	91	60	17	168
	4th	16	9	2	27	115	69	18	202
August	1st	19	11	3	33	88	55	20	163
	2nd	15	9	3	27	80	53	23	156
	3rd	25	17	8	50	76	73	37	186
	4th	22	18	12	52	79	108	59	246
September	1st	67	38	30	135	57	71	60	188
	2nd	68	34	32	134	46	54	66	166
	3rd	65	28	34	127	37	46	64	147
	4th	44	24	34	102	21	28	44	93
October	1st	22	32	9	63	11	17	32	60
	2nd	14	21	7	42	3	5	10	18
Total					972				2659

N.B. E.=Eggs L.=larvae P.=Pupae

4.2.1.6. Whitefly *Bemisia tabaci* (Genn.) (Aleyrodidae, Homoptera).

Adult stage of whitefly *B.tabaci*

4.2.1.6.1On Pepper plants .

The weekly number of *B. tabaci* adults collection from pepper plants during 2002 and 2003 seasons are shown in **Table (11)** and illustrated graphically in **Fig. (9 & 10)**. Two peaks of abundance was recorded during the two years of investigation. The first one occurred in the 4th week of June with total number of 31 and 33 adult/sample in 2002 and 2003 seasons respectively at mean temperature 29.33°C, 28.88°C with 57.89% and 55.11% R.H for the two seasons, respectively.

The second peak occurred in the 3rd week of September with total number of 81 and 60 adult/ sample in 2002 and 2003 seasons respectively with 27.03°C, 27.41°C and 54.86%, 58.57% R.H for the two seasons, respectively.

4.2.1.6.2 On Eggplant plants .

Table (11) and **Fig. (9&10)** showed the weekly number of whitefly *B. tabaci* adults collected from eggplant plants at Minia El-Kamh, Sharkia Governorate during 2002 and 2003 seasons.

The individuals of adult whitefly were first collected from Eggplant plants in the 4th week of May. The numbers appeared early was 9 and 12 white fly adults/sample (60 leaves) in 2002 and 2003 seasons, respectively.

Fig. (9 & 10) indicated that the whitefly had three peaks of population density the first one was recorded at the 4th week of June with total number of 159 and 105 whitefly/sample at mean temperature of 29.33°C, 28.88°C and 57.89%, 55.11% R.H for the two seasons, respectively. The second peak of occurrence recorded in the 2nd week of August with total number of 99 and 144 *B. tabaci* adult/sample in 2002 and 2003 seasons, respectively at mean temperature of 28.69°C with 61.71% and 28.84°C with 61.86 R.H. for the two seasons. The third peak of occurrence recorded in the 2nd week of September with total numbers of 87 and 123 *B. tabaci* adult/sample in 2002 and 2003 seasons respectively at mean temperature of 26.33°C, 27.93°C and 58.42% and 57.57% R.H for the two seasons. After the third peak, the numbers of adult whitefly on eggplant plant tended to decline until its minimal in 2nd week of October with a total number of 20 and 22 whitefly/sample in 2002 and 2003 seasons, respectively at mean temperature of 25.55°C and 24.74°C with a mean relative humidity of 61.71% and 62.14% for the two seasons, respectively.

Regarding the weekly counts of whitefly on eggplant plants, **Table (11)** it is clear that these species were clearly more abundant during 2003 than 2002 seasons.

These results were in agreement with finding of **El-Sayed (1986), Hegab *et al.* (1989) and Fouda and Mohammed (1994).**

This differences may be due to the variations of the experimental sites and environmental conditions prevailing during execution of these experiments.

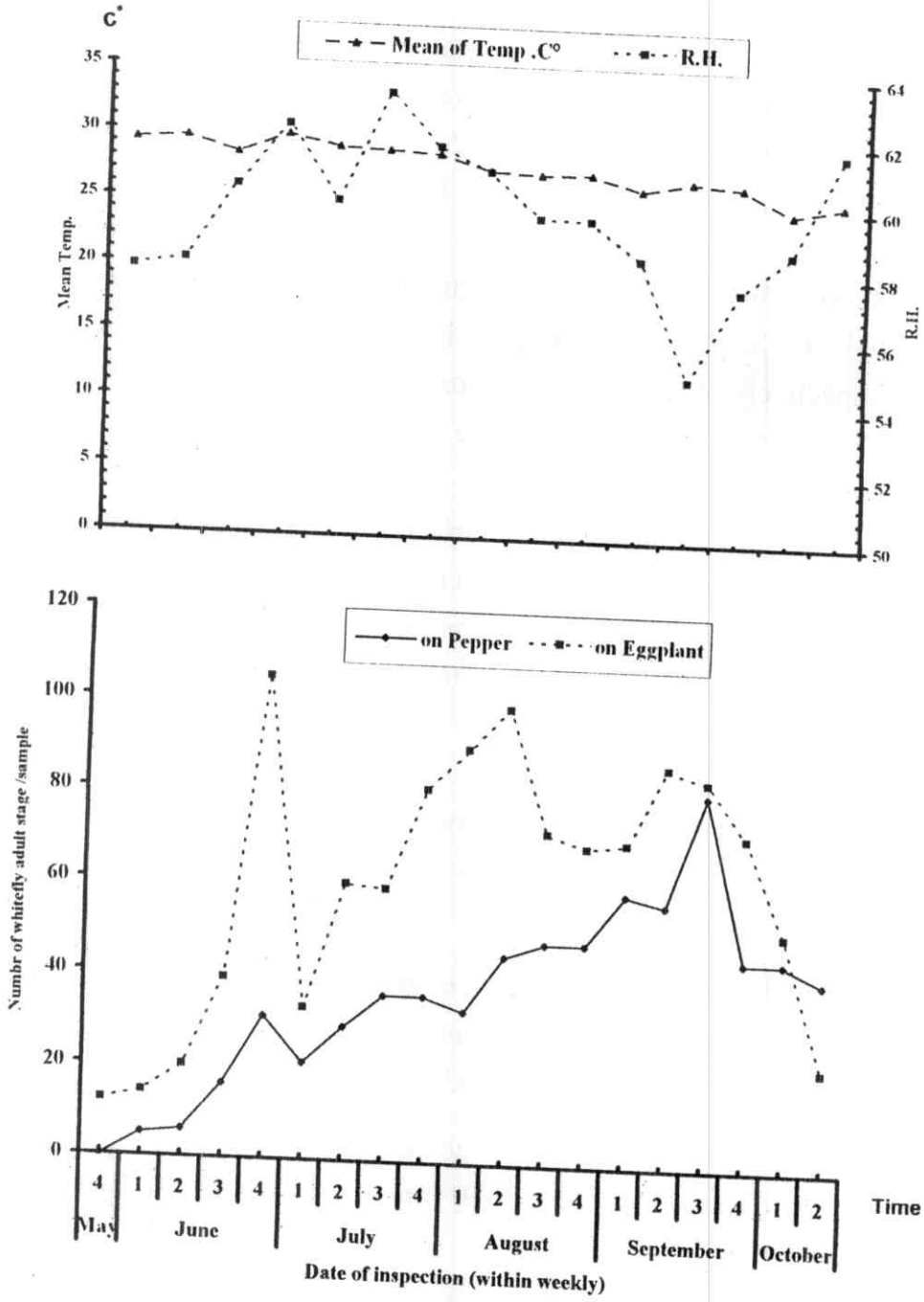

Fig. (9) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (adult stage) infesting pepper and eggplants plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002 season.

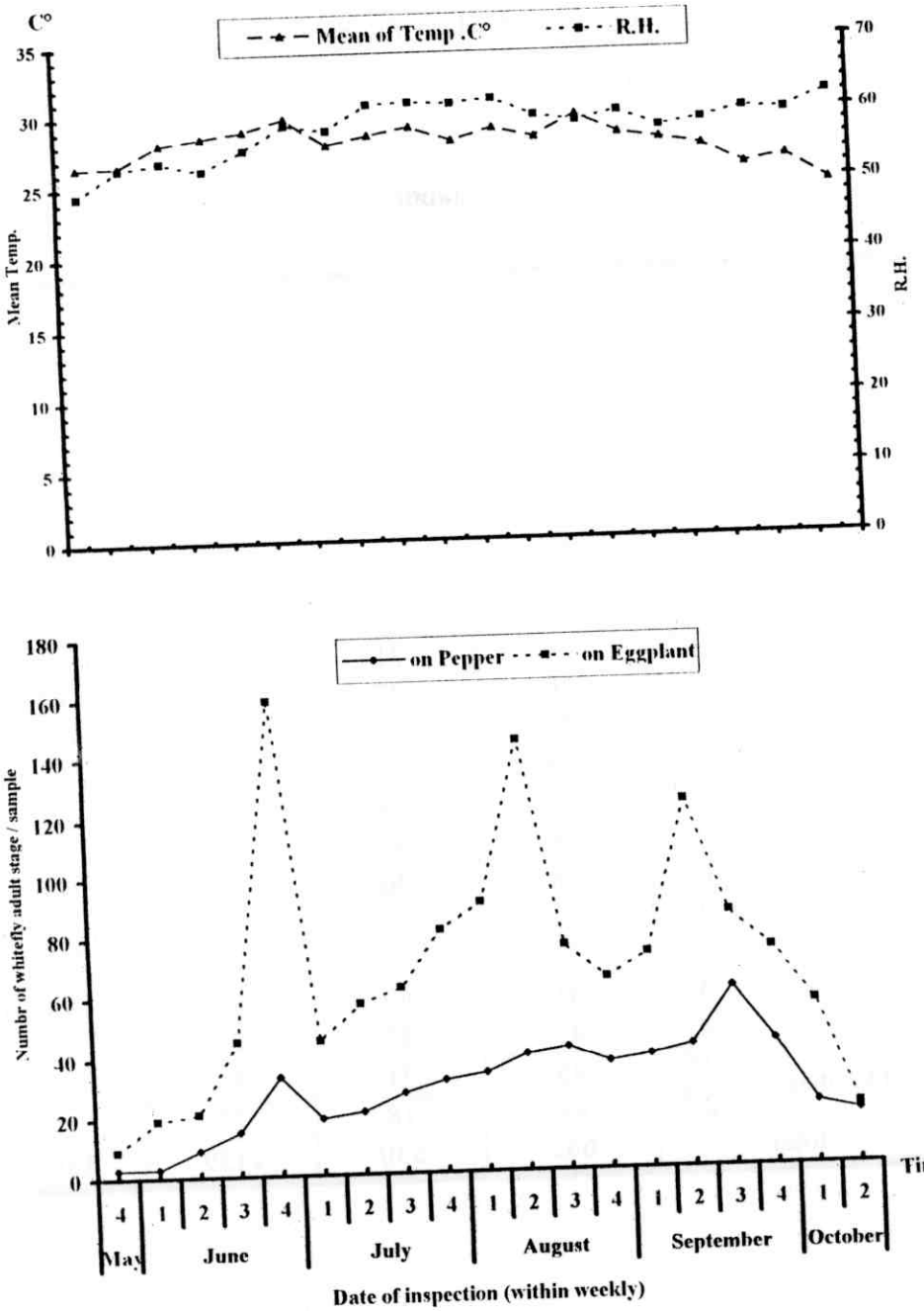

Fig. (10) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (adult stage) infesting pepper and eggplants plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003season.

Table(11) :Total number of white fly *Bemisia tabaci* (Genn.) adult infesting certain solanaceous vegetable (pepper and Eggplant) plants collecting by plant samples at Minia El Kamh district, sharkia Governorate during summer plantation in 2002 and 2003 seasons.

Date of inspection within weeks		Pepper		Eggplant	
		2002	2003	2002	2003
May	4th	0	3	12	9
June	1st	5	3	14	19
	2nd	6	9	20	21
	3rd	16	15	39	45
	4th	31	33	105	159
July	1st	21	19	33	45
	2nd	29	21	60	57
	3rd	36	27	59	62
	4th	36	31	81	81
August	1st	33	33	90	90
	2nd	45	39	99	144
	3rd	48	41	72	75
	4th	48	36	69	64
September	1st	59	38	70	72
	2nd	57	41	87	123
	3rd	81	60	84	85
	4th	45	42	72	73
October	1st	45	21	51	55
	2nd	41	18	22	20
total		682	530	1139	1308

4.2.1.7 Leafhoppers (Cicadellidae :Homoptera)

The following discussion on the population density of the dominant leafhopper species are based on the records of the sweeping nets technique.

4.2.1.7.1 On Pepper plants.

a) *Empoasca decipiens* (Paoli) :

Empoasca decipiens was the most abundant leafhopper species on some vegeTable plants during 2002 and 2003 seasons.

The total number of *E. decipiens* adult per a sample on peeper plants during 2002 and 2003 seasons are tabulated in **Table (12)** and illustrated graphically in **Fig. (11&12).** The first collection of *E. decipiens* adult were noticed on the 4th week of May at 26.77°C, 26.48°C with a mean 54.50% and 49.00% R.H for both seasons, respectively.

The total number of initial occurrence per 200 strokes were 5 and 3 adults in the two seasons, respectively. According to the abundance of *E. decipiens* adults on pepper plants appeared two peaks occurred during the two seasons of investigation. The first one was recorded 3rd week of July with a mean number of 82 and 54 adults/200 strokes in 2002 and 2003 seasons, respectively at 29.91°C, 28.48°C with 62.29% and 61.28% R.H for two successive seasons. While in the second peak was obtained in the 3rd week of September with mean numbers 33 and 30 adults/200 strokes at mean temperatures of 27.03°C, 27.41°C with 54.86% and 58.57% R.H for two seasons respectively.

b)*Empoasca decedens* **(Paoli):**

The total number of *E. decedens* individuals collected from pepper plant during 2002 and 2003 seasons are given in **Table(12)**and illustrated graphically in **Fig. (11&12).** The first collected of individuals were recorded in 4th week of May. The total numbers of initial occurrence were 3 and 1 adults/200 strokes in 2002 and 2003 seasons respectively at mean temperatures of 26.77°C, 26.48°C with a mean 54.50% and 49.00 % R.H for the two seasons respectively.

Data in **Fig. (11&12)** indicated that the numbers of leafhopper species had two peaks on pepper plants. The number of insects increased gradually till reached the first peak which occurred in the 3rd week of July with a mean numbers of 36 and 32 adult/200 strokes at mean temperature of 29.91°C, 28.48°C with 62.29% and 61.28% R.H for the two experimental seasons. The second peak was obtained in the 3rd week of September with a total numbers of 27 and 19 adults/200 strokes at mean temperature of 27.03°C, 27.41°C with 54.86% and 58.57% R.H for two seasons respectively. Then the numbers of leafhopper decreased until reached the minimal numbers at the 2nd week of October with a total numbers of 4 and 3 leafhopper adults / 200 strokes at mean temperature of 25.55°C and 24.74°C and 61.71% and 62.14% R.H during the two successive seasons.

C) *Cicaduline chinai* **(Ghauri):**

The total number of *C. chinai* individuals per 200 strokes on pepper plants during 2002 and 2003 seasons are shown in **Tables (12)** and illustrated graphically in **Fig. (11&12).** The first

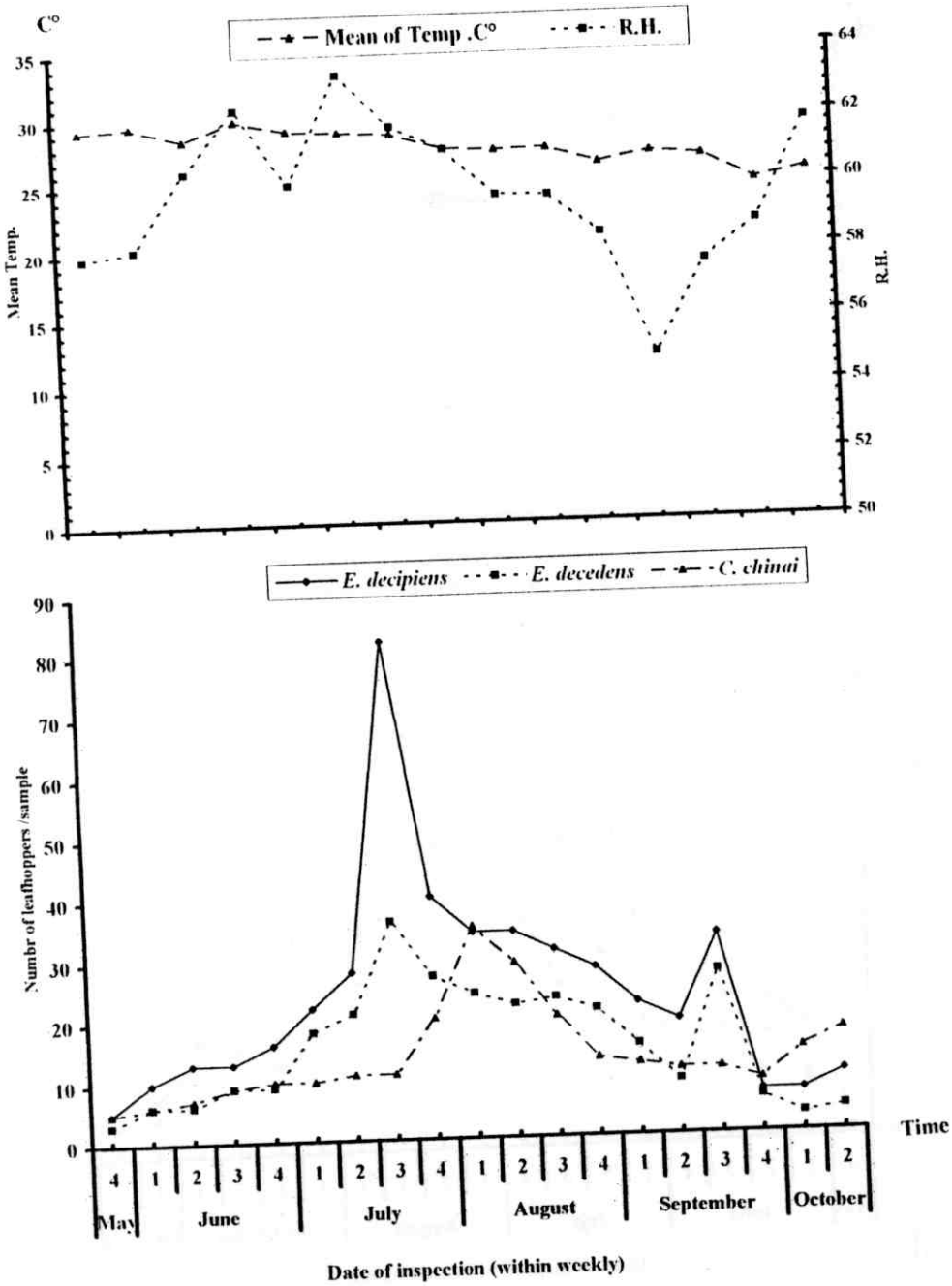

Fig. (11) : Seasonal abundance of leafhoppers *E. decipiens* ,*E. decedens* and *C. chinai* infesting pepper plants collected by sweeping net at Minia EL- kamh district , Sharkia Governorate during 2002 season.

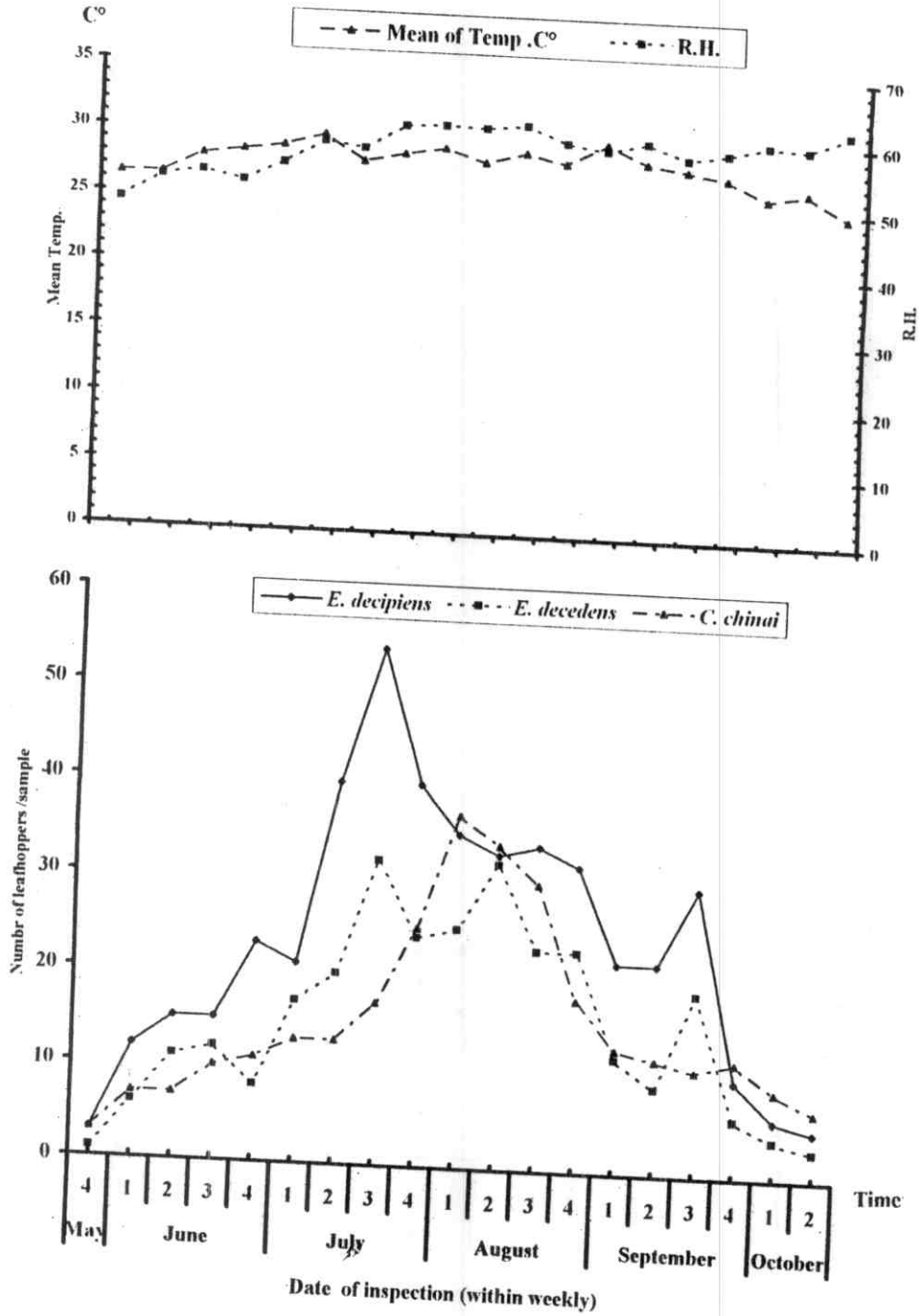

Fig. (12) : Seasonal abundance of leafhoppers *E. decipiens* ,*E. decedens* and *C. chinai* infesting pepper plants collected by sweeping net at Minia EL- kamh district , Sharkia Governorate during 2003 season.

Table (12): Total number of leafhoppers *Empoasca decipiens* (Paoli), *Empoasca decedens* (Paoli) and *Cicadulina chinai* (Ghauri) infesting pepper plants collected by sweeping net at Minia El kamh district, Sharkia Governorate during summer plantation in 2002 and 2003. seasons.

Date of inspection within weeks		*E. decipiens*		*E. decedens*		*C. chinai*	
		2002	2003	2002	2003	2002	2003
May	4th	5	3	3	1	5	3
June	1st	10	12	6	6	6	7
	2nd	13	15	6	11	7	7
	3rd	13	15	9	12	9	10
	4th	16	23	9	8	10	11
July	1st	22	21	18	17	10	13
	2nd	28	40	21	20	11	13
	3rd	82	54	36	32	11	17
	4th	40	40	27	24	20	25
August	1st	34	35	24	25	35	37
	2nd	34	33	22	32	29	34
	3rd	31	34	23	23	20	30
	4th	28	32	21	23	13	18
September	1st	22	22	15	12	12	13
	2nd	19	22	9	9	11	12
	3rd	33	30	27	19	11	11
	4th	7	10	6	6	9	12
October	1st	7	6	3	4	14	9
	2nd	10	5	4	3	17	7
Total		454	452	289	287	260	289

collected of *C. chinai* individuals was counted at the end of May for 2002 and 2003 seasons, respectively at 26.77°C 26.48°C with 54.50%, 49.00% R.H for the two seasons respectively.

The total initial numbers per a sample (200strokes) were 5 and 3 individuals in the two seasons, respectively. According to the abundance of *C. chinai* (Ghauri) individuals on pepper plants, there are one peak recorded at the 1st of August with a total number of 35 and 37 individuals / 200 strokes for 2002 and 2003 seasons, respectively at 28.90°C, 28.03°C with 63.29%, 61.29 % R.H for the two seasons, respectively.

4.2.1.7.2 On Eggplant plants .

a)*Empoasca decipiens* (Paoli)

The mean numbers of *E. decipiens* individuals collected from Eggplant plants by using sweeping net during the period from the 4th week of May to 2nd week of October at Minia El-Kamh district, Sharkia Governorate. The total number of leafhoppers infesting Eggplant plants are shown in **Table (13)** and illustrated graphically in **Fig. (13 &14).** The first sample were collected in 4th week of May and 1st week of June at a mean temperature of 26.77°C and 26.48°C with a mean relative humidity 54.50% and 49.00%.

The total number reached 2 and 8 leafhoppers/sample in 2002 and 2003 seasons, respectively. **Fig. (13&14)** indicated that the total number of leafhoppers Eggplant plants tended to increase until reached its first peak at the 3rd week of July with a total number of 69 and 45 leafhoppers/sample in 2002 and 2003

seasons, respectively at 29.91°C, 28.48°C and 62.29%, 61.28 % R.H for the two seasons , respectively.

The second peak was obtained in the 3rd week of September with mean numbers of 78 and 60 adults/ 200 strokes at mean temperatures of 27.03°C, 27.41°C with 54.86 % and 58.57 % R.H for the two seasons, respectively Regarding the weekly counts of leafhoppers on eggplant plants presented in **Table (13)**,it is clear that these species were also more abundant in 2002 than 2003 season.

b) *Empoasca decedens* (Paoli).

The total numbers of leafhopper collected from Eggplant plants during 2002 and 2003 seasons are shown in **Table (13)**and illustrated graphically in **Fig. (13 & 14).**

From **Fig. (13&14)**, the first samples were collected in the 4th week of May and the initial occurrence of *E. decedens* on Eggplant plants were 9 and 3 *E. decedens* /sample in 2002 and 2003 seasons, respectively with a mean temperature of 26.77°C, 26.48°C and 54.50%, 49.00% R.H for both seasons, respectively. **Fig. (13 & 14)** indicate that the mean number of *E. decedens*/sample on Eggplant.

Plants tended to increase until reached its first peak at the 2nd week of August with a total number of 57 and 69 *E.decedens*/sample in 2002 and 2003 seasons, respectively at 28.69°C, 28.84°C with 61.71%, 61.86% R.H for the two seasons, respectively. After this peak, the *E. decedens* numbers tended to decline until reached its minimal number in 2nd week of October with total numbers 20 and 7 *E. decedens*/sample in 2002 and

2003 seasons, respectively when the mean temperature were 25.55°C and 24.74°C and R.H were 61.71% and 62.14% for both seasons, respectively.

c) *Cicadulina chinai* (Ghauri).

The total number of *C.chinai* individuals per 200 strokes on Eggplant plants during 2002 and 2003 seasons are shown in **Table (13)** and illustrated graphically in **Fig. (13&14).** The first collection of *C. chinai* individuals was counted at the 3rd and 2nd of June for 2002 and 2003 seasons, respectively at 29.10°C, 28.05°C with 54.71%, 53.57% R.H for the two seasons respectively.

The total initial numbers/sample (200 strokes) were 15 and 6 individuals in the two seasons, respectively. Acoording to the abundance of *C. chinai* individuals on Eggplant plants, there are one peak recorded at the 3rd of September with a total number of 67 and 45 individuals/200 strokes 2002 and 2003 seasons, respectively at 27.03°C, 27.41°C with 54.86%, 58.57% R.H for the two seasons, respectively. The number of *C. chinai* tended to decline until reached its minimal at the 2nd week of October with a total number of 10 and 15 individuals/200 strokes at a mean temperature 25.55°C, 24.74°C with 61.71%, 62.14% R.H for two seasons respectively.

d) *Empoasca Lybica* (de Berg.).

The total numbers of *E. lybica* adults per a sample on Eggplant plants during 2002 and 2003 seasons are tabulated in **Table (13)** and illustrated graphically in **Fig. (13 & 14)**. The first collection of *E. lybica* adult were noticed on the 4th week of May

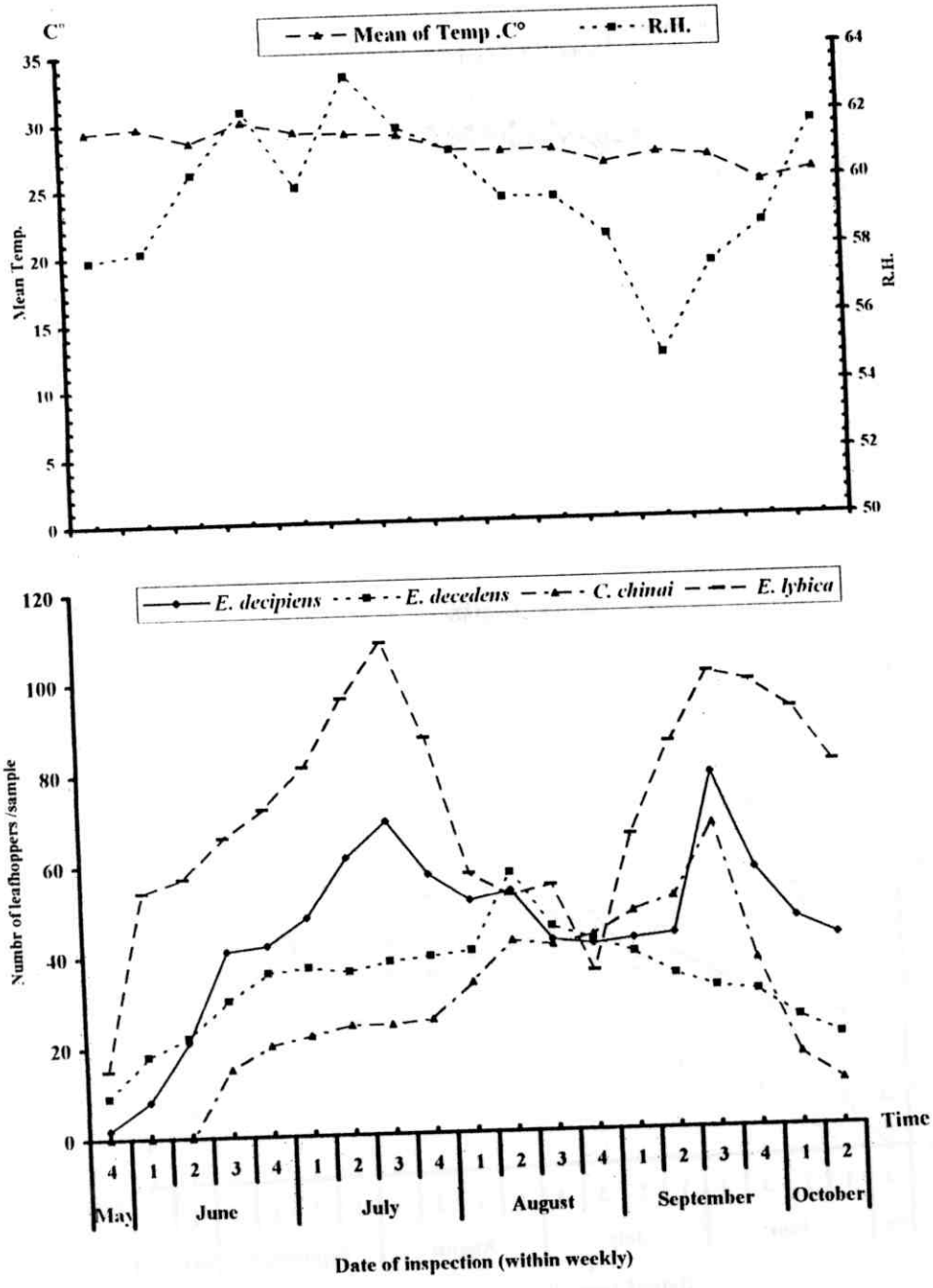

Fig. (13) : Seasonal abundance of leafhoppers *E. decipiens*, *E. decedens*, *C. chinai* and *E. lybica* infesting Eggplant plants collected by sweeping net at Minia EL- kamh district, Sharkia Governorate during 2002 season.

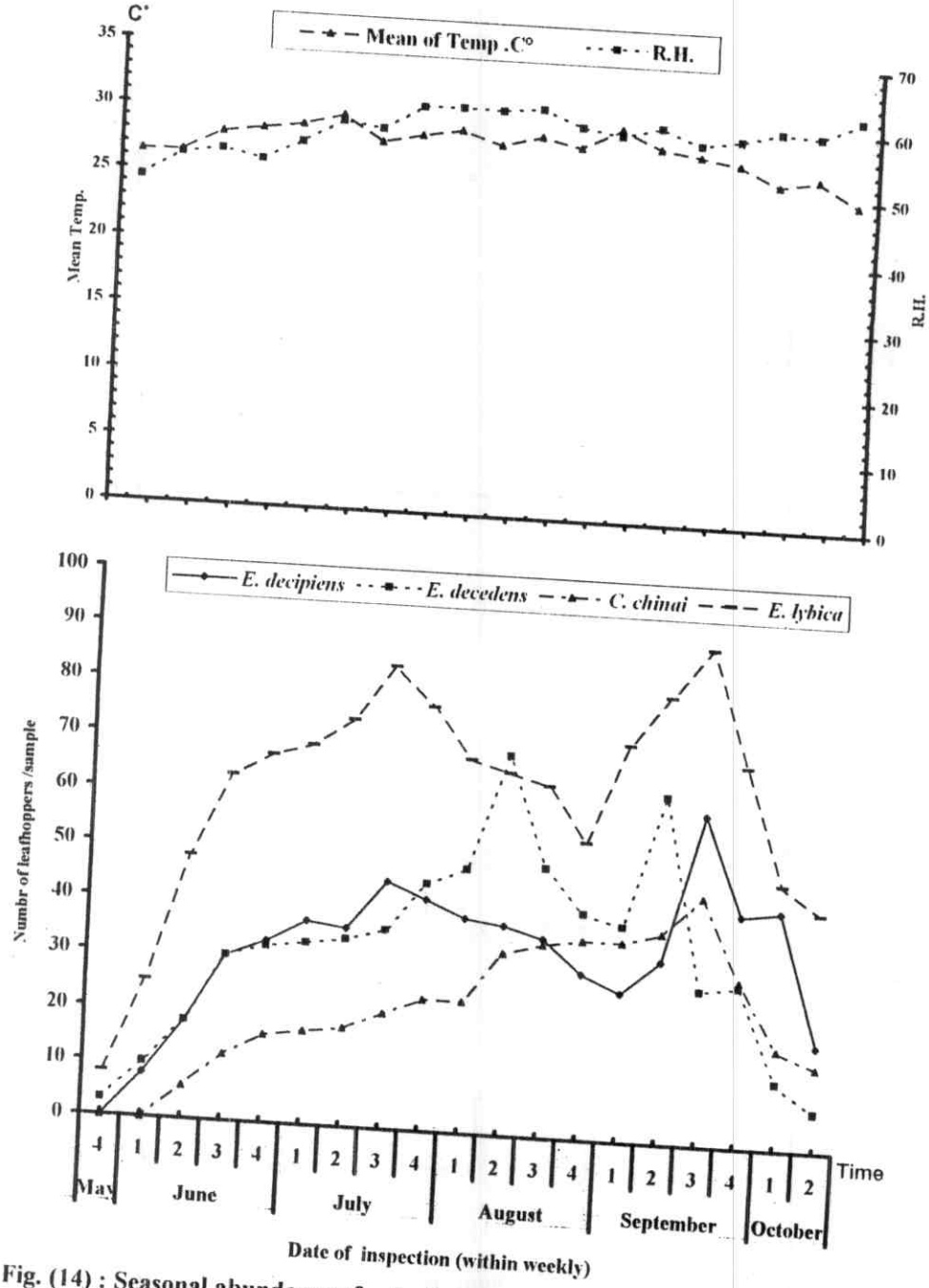

Fig. (14) : Seasonal abundance of leafhoppers *E. decipiens* ,*E. decedens* ,*C. chinai* and *E. lybica* infesting Eggplant plants collected by sweeping net at Minia EL- kamh district , Sharkia Governorate during 2003 season.

Table (13): Total number of leafhoppers, *Empoasca decipiens* (Paoli), *Empoasca decedens* (Paoli), *Cicadulina chinai* (Ghauri)and *Empoasca lybica* **(de Berg)** infesting Eggplant plants collected by sweeping net at minia El kamh district, Sharkia Governorate during summer plantation in 2002 and 2003 seasons.

Date of inspection within weeks		*E. decipiens*		*E. decedens*		*C. chinai*		*E. lybica*	
		2002	**2003**	**2002**	**2003**	**2002**	**2003**	**2002**	**2003**
May	4th	2	0	9	3	0	0	15	8
June	1st	8	8	18	10	0	0	54	25
	2nd	21	18	22	18	0	6	57	48
	3rd	41	30	30	30	15	12	66	63
	4th	42	33	36	32	20	16	72	67
July	1st	48	37	37	33	22	17	81	69
	2nd	61	36	36	34	24	18	96	74
	3rd	69	45	38	36	24	21	108	84
	4th	57	42	39	45	25	24	87	77
August	1st	51	39	40	48	33	24	57	68
	2nd	53	38	57	69	42	33	52	66
	3rd	42	36	45	49	41	35	54	64
	4th	41	30	42	41	43	36	35	54
September	1st	42	27	39	39	48	36	65	72
	2nd	43	33	34	63	51	38	85	81
	3rd	78	60	31	28	67	45	100	90
	4th	57	42	30	29	37	30	98	69
October	1st	46	43	24	12	16	18	92	48
	2nd	42	19	20	7	10	15	80	43
Total		844	616	627	626	518	424	1354	1170

at 26.77°C, 26.48°C with a mean of 54.50% and 49.00% R.H for both seasons respectively. The total numbers of initial occurrence per 200 strokes were 15 and 8 adults in the two seasons respectively.

According to the abundance of *E. lybica* adults on Eggplant plants appeared two peaks occurred during the two seasons of investigation. The first one was recorded at the 3rd week of July with a mean number of 108 and 84 adults/200 strokes in 2002 and 2003 seasons, respectively at 29.91°C 28.48°C with 62.29% and 61.28% R.H for two successive seasons.

The second peak was obtained in the 3rd week of September with mean numbers of 100 and 90 adults / 200 strokes at mean temperature of 27.03°C, 27.41°C with 54.86% and 58.57% R.H for the two seasons, respectively.

Regarding the weekly counts of *E. lybica* on Eggplant plants it clear that these species was more abundant during 2002 than 2003 seasons.

These results argree with those obtained by **El-Kady *et al.* (1973), Herakly (1974), Metwally (1976), Hegab *et al.* (1989c), Hamdi (1992) and Hamdi and Emam (1994).**

4.2.2 winter plantation (Cruciferous plants).

4.2.2.1. Immature stages of whitefly (Aleyrodidae: Homoptera) *Bemisia tabaci* (Genn.).

4.2.2.1.1 On Cabbage (*Brassica oleracea* var. *capitata L.)*

Numbers of immature stages of *B.tabaci* collected from cabbage during 2002/2003 and 2003/2004 seasons are illustrated graphically in **Fig. (15 & 16)**.

Regarding the abundance of *B. tabaci* immature stages in 2002/2003 and 2003/2004 it had also been found that these are three peaks occurred on cabbage plants. The first one was noticed in 3rd week of October with a total number of 1194 eggs, 748 larvae and 80 pupae/sample and 1501 eggs, 219 larvae and 110 pupae/sample at mean temperature of 24.26°C, 24.47°C with 59.00%, 62.71% R.H for both seasons, respectively. The second peak was obtained on cabbage plants at the 2nd of January with a total number of 14 eggs, 53 larvae and 78 pupae/sample and 57 eggs, 46 larvae and 20 pupae/sample in a mean temperature 16.51°C, 15.16°C with 64.14 %, 64.14% R.H for the two seasons, respectively. The third peak was recorded at the end week of February with a mean numbers of 47 eggs , 31 larvae and 6 pupae/sample and 42 eggs, 74 larvae and 19 pupae at a mean temperatures of 11.64°C, 18.89°C, with 60.43%, 63.13% R.H for both seasons, respectively.

It is worth to mention that the number of eggs exceeded those of larvae and pupae stages , such findings are a logic biological phenomenon but this may be due to natural mortality

factors, including climatic condition and the role of natural enemies which suppress.

Regarding the weekly counts of whitefly immature on cabbage presented in **Table (14)**, it is clear that this species was more abundant in 2003/2004 than 2002/2003 seasons.

4.2.2.1.2OnCauliflower (*Brassica oleracea* var *botrytis L.*)

The weekly numbers of *B.tabaci* immature stages collected from cauliflower plants during 2002/2003 and 2003/2004 seasons are shown in **Table (15)** and represented graphically in **Fig. (15& 16).**

Results obtained revealed that there are three peaks of *B. tabaci* immature stages during 2002/2003 and 2003/2004 seasons on cauliflower plants occurred in the 3rd week of October with a mean number, of immature stages 681 eggs, 217 larvae and 47 pupae/sample and 1189 eggs, 316 larvae and 79 pupae at mean temperature 24.26°C, 24.47°C with 59.00 % and 62.71% R.H for both seasons respectively.

The second peak was noticed in the 2nd week of January with a mean numbers of 25 eggs, 23 larvae and 9 pupae/sample and 38 eggs, 30 larvae and 13 pupae/sample at mean temperatures 16.51°C, 15.16°C and 64.14%, 64.14 % R.H for both seasons, respectively.

The third peak was recorded at the end of February with a mean numbers of 15 eggs, 14 larvae and 6 pupae/sample and 16 eggs, 27 larvae and 8 pupae/sample at a mean temperature of 11.64°C, 18.89°C with 60.43%, 63.13 % R.H for both seasons, respectively.

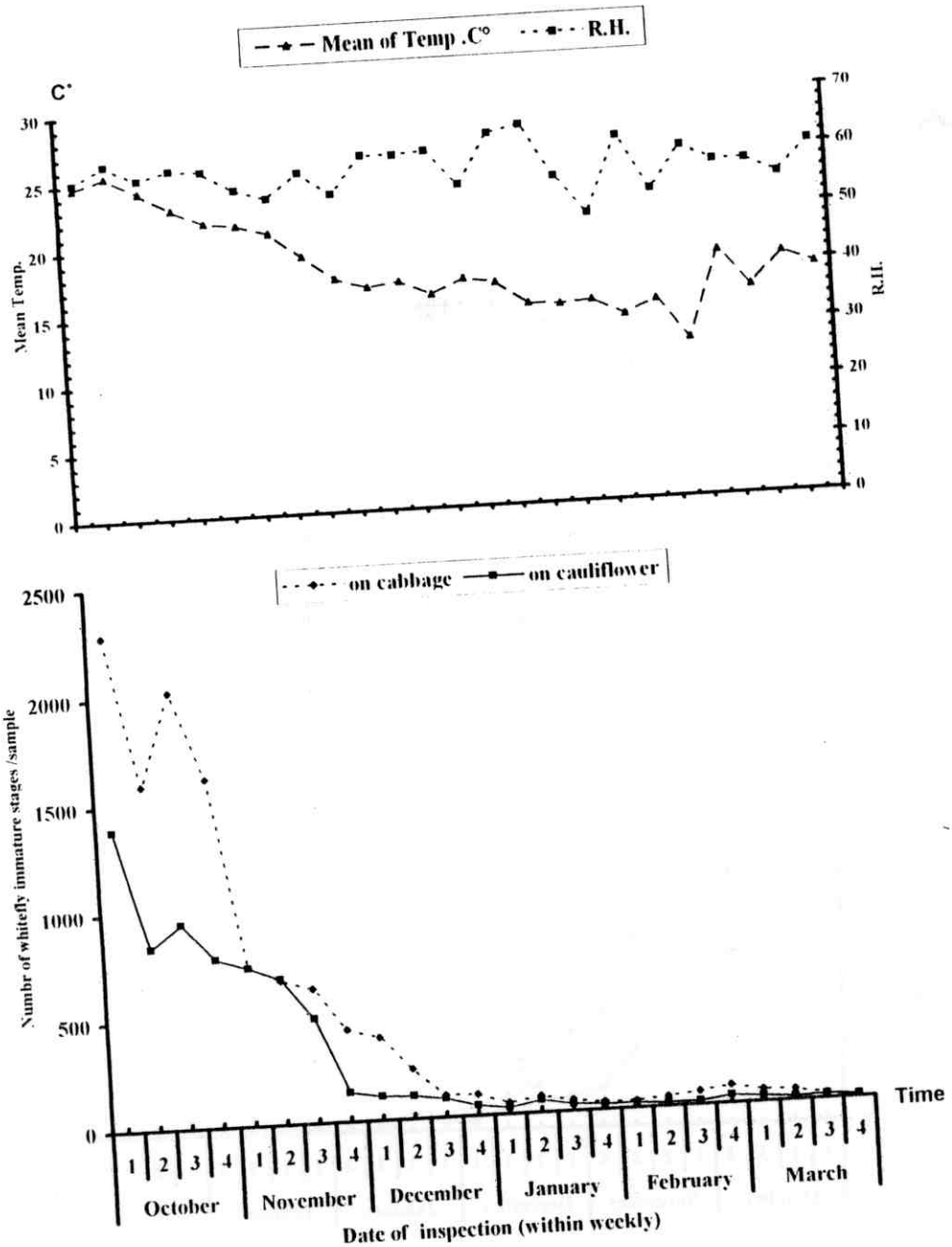

Fig. (15) :Seasonal abundance of whitefly *B. tabaci* (Genn.) (immature stages) infesting Cabbage and Cauliflower plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002 /2003 season.

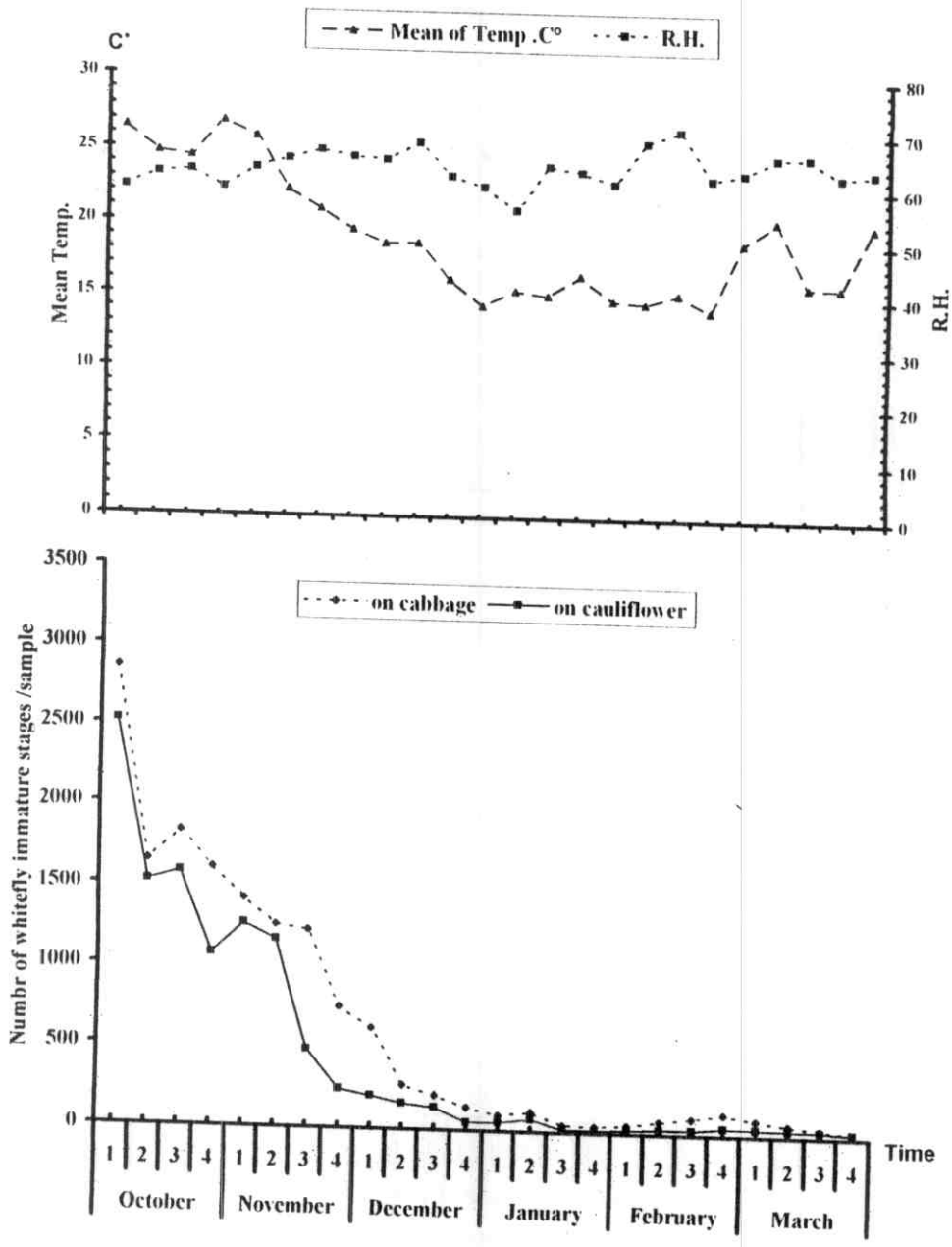

Fig. (16) : Seasonal abundance of whitefly *B. tabaci* (Genn.)(immature stages) infesting Cabbage and Cauliflower plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003/2004 season.

Table (14):Total number of white fly *Bemisia tabaci* (Genn.) immature stages on cabbage plants collected by plant samples at Minia El Kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/2004 seasons.

Date of inspection within weeks		2002/2003				2003/2004			
		E.	L.	P.	total	E.	L.	P.	total
October	1st	1578	594	114	2286	2116	543	200	2859
	2nd	1018	509	63	1590	1238	297	115	1650
	3rd	1194	748	80	2022	1501	219	110	1830
	4th	870	678	66	1614	1383	145	80	1608
November	1st	395	309	28	732	1076	255	85	1416
	2nd	285	345	33	663	515	614	125	1254
	3rd	268	298	55	621	514	539	171	1224
	4th	189	167	73	429	324	275	153	752
December	1st	254	88	42	384	249	273	99	621
	2nd	192	23	16	231	89	151	30	270
	3rd	40	55	7	102	80	117	19	216
	4th	23	69	7	99	53	78	13	144
January	1st	11	38	5	54	40	49	11	100
	2nd	14	53	11	78	57	46	20	123
	3rd	10	38	6	54	19	20	9	48
	4th	7	27	2	36	14	19	9	42
February	1st	15	17	2	34	13	26	15	54
	2nd	36	6	2	45	8	41	35	84
	3rd	41	18	4	63	25	56	24	105
	4th	47	31	6	84	42	74	19	135
March	1st	34	18	5	57	27	57	18	102
	2nd	30	15	5	50	16	44	15	75
	3rd	16	8	3	27	10	30	11	51
	4th	5	2	2	9	7	17	6	30
Total					11364				79314

Table (15): Total number of white fly *Bemisia tabaci* (Genn.) immature stages on cauliflower plants collected by plant samples at Minia El Kamh district, Sharkia Governorate during winter plantation in 2002/ 2003 and 2003/2004 seasons .

Date of inspection within weeks		2002/2003				2003/2004			
		E.	L.	P.	total	E.	L.	P.	total
October	1st	845	456	82	1383	1969	378	176	2523
	2nd	525	267	42	834	1141	274	106	1521
	3rd	681	217	47	945	1189	316	79	1584
	4th	583	162	30	775	815	214	42	1071
November	1st	487	203	36	726	893	289	75	1257
	2nd	344	274	54	672	580	395	186	1161
	3rd	219	209	58	486	201	190	86	477
	4th	44	63	28	135	80	112	51	243
December	1st	39	49	23	111	80	84	40	204
	2nd	46	38	21	105	57	57	30	162
	3rd	47	29	11	87	83	47	11	141
	4th	27	16	5	48	33	18	3	54
January	1st	18	11	3	32	33	19	5	57
	2nd	25	23	9	57	38	30	13	81
	3rd	13	15	5	33	10	8	3	21
	4th	11	15	0	26	9	10	2	21
February	1st	11	12	2	25	10	10	7	27
	2nd	8	7	3	18	7	8	18	33
	3rd	8	6	2	16	9	14	10	33
	4th	15	14	6	35	16	27	8	51
March	1st	14	9	4	27	16	26	6	48
	2nd	9	5	3	17	14	23	5	42
	3rd	13	6	2	21	12	23	4	39
	4th	9	5	1	15	9	17	4	30
Total					6629				10881

Regarding the weekly counts of immature whitefly on cauliflower plants, it is clear that this insect was more abundant in 2003/2004 than 2002/2003.

4.2.2.2 Adult stage of whitefly(Aleyrodidae: Homoptera) *Bemisia tabaci* (Genn.).

4.2.2.2.1 On Cabbage plants

Randomly samples of 60 leaves each were picked up weekly from cabbage plants during the period from 1st week of October to 4th week of march for both experimental seasons at Minia El-Kamh district, Sharkia Governorate. The total numbers are given in **Table (16)** and illustrated graphically in **Fig. (17&18)**.

The first samples were collected in the 1st week of October on Cabbage plants .The total numbers of initial appearance of adult stages *B. tabaci* were 369 and 498 adult insects/sample at mean temperature of 24.79°C, 26.53°C with 58.71%, 59.57% R.H in 2002/2003 and 2003/2004 seasons, respectively.

Fig. (17&18) showed the four peaks on cabbage plants occurred in 2nd week of October with a total number of 495 and 816 insects/sample at mean temperatures of 25.55°C, 24.74°C with 61.71%, 62.14 % R.H in 2002 / 2003 and 2003/2004 seasons, respectively. The second peak of occurrence was recorded in the 1st week of November with total numbers of 441 and 585 insects/sample in two seasons 2002/2003 and 2003/2004 at 21.80°C and 25.91°C with 60.00% and 63.29 % R.H respectively. The third peak of occurrence was recorded in the

4th of January with total numbers 15 and 16 insects/sample in 2002/2003 and 2003/2004 seasons, respectively at 14.71°C, 14.84°C with 56.40%, 61.10% R.H for two seasons.

The fourth peak occurred in the 2nd of March with total numbers 33 and 39 insects/sample in two seasons at mean temperature 15.37°C, 15.94°C with 57.71%, 66.29% R.H for the two seasons, respectively. After this peak, the adult numbers of *B. tabaci* tended to decline until reached its minimal in 4th week of March with total numbers of 9 and 18 adults/sample at 16.79°C, 20.09°C with 60.40%, 63.50 % R.H in 2002/2003 and 2003/2004 seasons, respectively.

Regarding the weekly counts of adults *B. tabaci* on cabbage **Table (16)** it is clear that these insects were also more abundant during 2003/2004 than 2002/2003.

4.2.2.2.2 On Cauliflower plants.

The total numbers of adults whitefly *B. tabaci* collected from cauliflower plants during 2002/2003 and 2003/2004 seasons are shown in **Table (16)** and represented graphically in **Fig. (17&18)**.

Data represented in **Table (16)** and **Fig. (17&18)** indicated that the total number of adults whitefly *B. tabaci*/sample tended to increase until it reached the first peak in 2nd week of October with a total number of 333 and 699 insects / sample in two seasons at mean temperature of 25.55°C, 24.74°C with 61.71%, 62.14% R.H for the two seasons respectively. The second peak occurred in the 1st week of Novembers with a total numbers 312 and 423 insects/sample in 2002/2003 and

2003/2004 seasons respectively at a mean temperature of 21.80°C, 25.91°C with 60.00%, 63.29% R.H for the two seasons, respectively.

The third peak occurred in the 4th of January with a total numbers of 9 and 15 insects/sample in two seasons respectively at mean temperature 14.71°C, 14.84°C with 56.40%, 61.10% R.H for the two seasons respectively.

The fourth peak occurred in the 2nd of March with total numbers 19 and 30 insects/sample in two seasons at mean temperature 15.37°C, 15.94°C with 57.71%, 66.29% R.H for the two seasons, respectively. After this peak, the adult numbers of *B. tabaci* tended to decline until reached its minimal in 4th week of March with total numbers of 8 and 18 adults/sample at 16.79°C, 20.09°C with 60.40%, 63.50% R.H in 2002/2003 and 2003/2004 seasons, respectively.

These results disagree with the finding of **Hegab and Helaly (1989), Soliman (1993), Fouda and Mohammed (1994), Abd El –Maksaud (1997) and El-Dash (2001).**

4.2.2.3 Leafhoppers (Cicadellidae : Homoptera)

4.2.2.3.1 On Cabbage plants.

The following discussion on the population density of the dominant leafhopper species are based on the records of the sweeping nets technique.

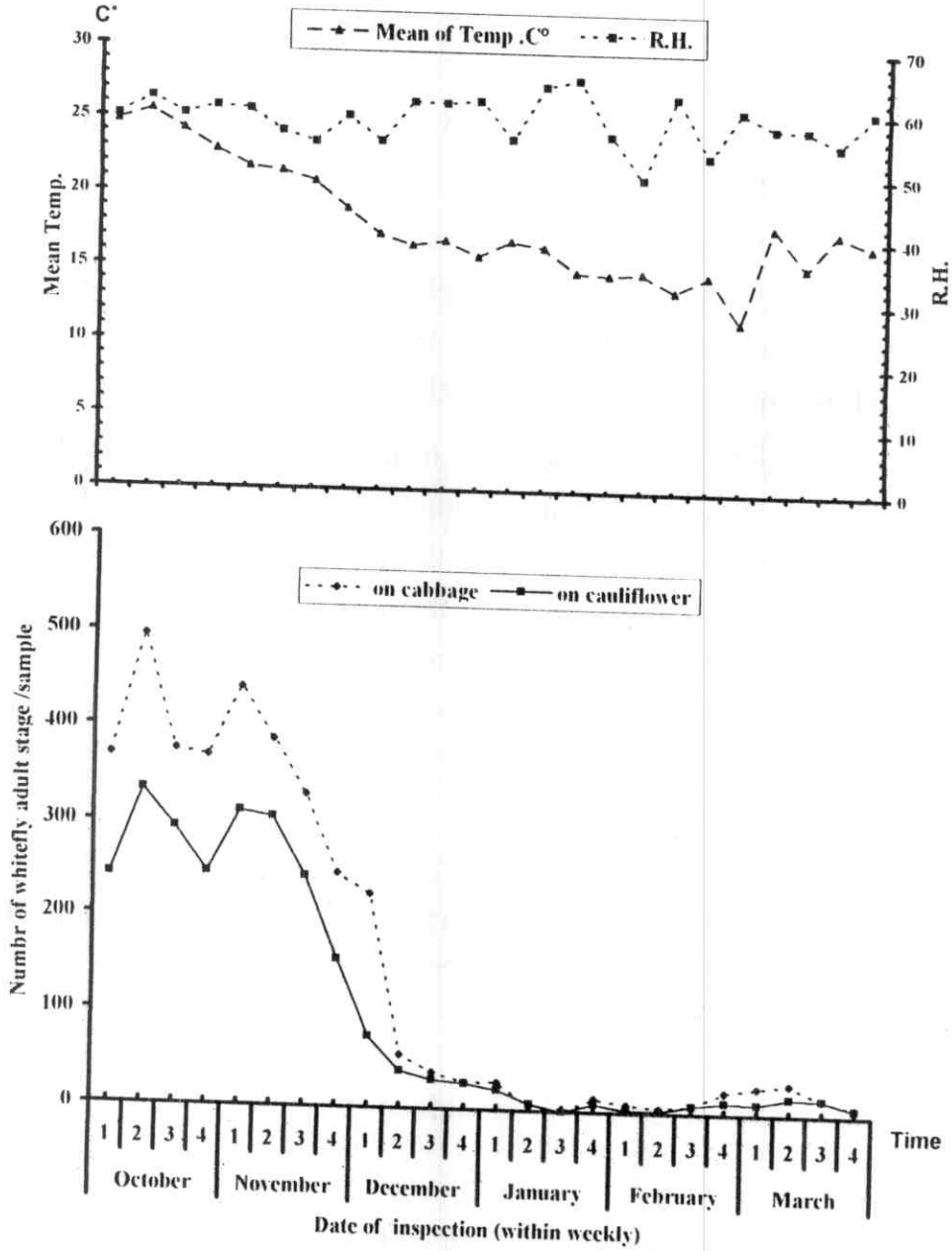

Fig. (17) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (adult stage) infesting cabbage and cauliflower plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2002/2003 season.

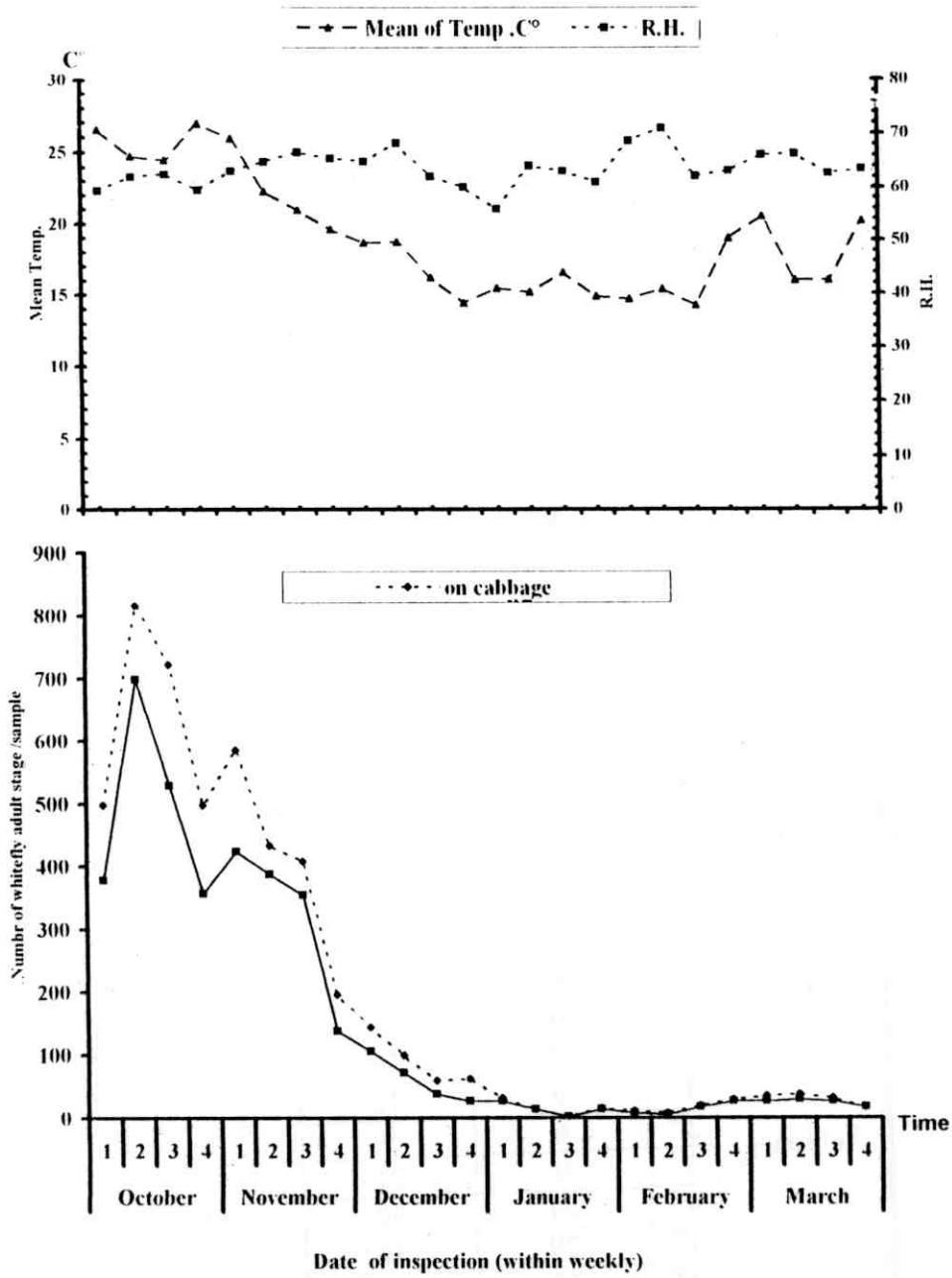

Fig. (18) : Seasonal abundance of whitefly *B. tabaci* (Genn.) (adult stage) infesting cabbage and cauliflower plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003/2004 season.

Table(16) : Total number of whitefly *Bemisia tabaci* (Genn.) adults infesting certain cruciferous vegetable (Cabbage and Cauliflower) plants collected by plant samples at Minia El kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/ 2004 seasons.

Date of inspection within weeks		Cabbage		Cauliflower	
		2002/2003	2003/2004	2002/2003	2003/2004
October	1st	369	498	243	378
	2nd	495	816	333	699
	3rd	375	723	294	528
	4th	369	498	246	357
November	1st	441	585	312	423
	2nd	387	433	306	387
	3rd	330	408	243	354
	4th	247	195	156	138
December	1st	225	144	75	105
	2nd	57	99	40	72
	3rd	39	60	31	39
	4th	29	63	28	27
January	1st	30	33	22	27
	2nd	6	15	8	15
	3rd	0	3	0	3
	4th	15	16	9	15
February	1st	9	12	3	9
	2nd	6	9	3	6
	3rd	9	21	9	18
	4th	24	30	13	27
March	1st	29	36	12	27
	2nd	33	39	19	30
	3rd	18	33	18	27
	4th	9	18	8	18
Total		3551	4787	2431	3729

a) *Empoasca decipiens* (Paoli):

The abundance of *E. decipiens* on cabbage plants during 2002/2003 and 2003/2004 seasons are shown in **Table (17)** and graphically illustrated in **Fig. (19&20).**The data obtained in **Fig. (19&20)**indicated that two peaks representing high population densities for *E. decipiens.* The first one occurred on the 4th week of October with a total numbers 51 and 63 adults/200 strokes in 2002/2003 and 2003/2004 seasons, respectively at a mean temperature of 22.92°C, 26.95°C with 60.40%, 59.60 % R.H in the two investigation seasons respectively.

The second peak was occurred in the end week of January with total numbers of 11 and 21 adults/200 strokes in two seasons respectively at a mean temperature of 14.71°C, 14.84°C with 56.40%, 61.10% R.H for the two seasons respectively.

The third peak occurred only in the 1st week of March in 2003/2004 season with total numbers of 15 adults/200 strokes at a mean temperatures of 20.43°C with 66.14%R.H.

This differences may be due to the variations .of the experimental sites and environmental conditions prevailing during execution of these experiments.

b)*Empoasca decedens* (Paoli).

The total numbers of leafhopper collected from cabbage plants during 2002/2003 and 2003/2004 seasons at Minia El-Kamh district, Sharkia Governorate are shown in **Table (17)** and illustrated graphically in **Fig. (19&20)**.

From **Fig. (19&20)**, the first samples were collected in the 1st week of October and initial occurrence of leafhoppers on cabbage plants were 3 and 6 leafhoppers/sample in 2002/2003 and 2003/2004 seasons, respectively with a mean temperature of 24.79°C, 26.53°C with 58.71%, 59.57% R.H for both seasons, respectively.

Fig. (19&20) indicate that the mean number of leafhoppers on cabbage plants tended increase until reached its first peak at the 2nd week of November showing total numbers 22 and 24 leafhoppers/sample in the two seasons at 12.55°C and 22.27°C with 56.57% and 65.00% R.H for the two seasons respectively. After this peak, the population of leafhoppers on cabbage plants tended to decline until reached its minimal numbers in the 1st week of March with total numbers of zero and zero leafhoppers/sample at mean temperatures 18.01°C, 20.43°C with 57.85% and 66.14% R.H in 2002/2003 and 2003/2004 seasons, respectively.

The data obtained show that the population density of *E. decedens* had one peak on cabbage plants.

c) *Balclutha hortensis* (Lindb).

Sample (200 strokes) were taken by using sweeping net from cabbage plants during 2002/2003 and 2003/2004 seasons. The total number of *B. hortensis* individuals infesting cabbage plants were recorded in **Tables(17)** and represented graphically in **Fig. (19&20)**.

Both Fig. illustrated the total number of *B. hortensis* which firstly collected from cabbage plants during two seasons 18 and 11 individuals/200 strokes at 1st week of October at a mean temperature 24.79°C, 26.53°C with 58.71%, 59.57 % R.H for two seasons, respectively.

One peak was recorded for *B. hortensis* on cabbage plants occurred at the 2nd week of October with a total numbers 46 and 66 individuals/200 strokes at a mean temperature 25.55°C, 24.74°C with 61.71% , 62.14% R.H for two seasons, respectively. Then, the number of *B. hortensis* tended to decline until reached its minimal at the 1st week of March with a total number of zero and zero individuals/200 strokes at a mean temperature of 18.01°C, 20.43°C with 57.85%, 66.14% for two seasons, respectively.

Results in general concerning the population density of leafhopper species on cabbage plants show clearly that *Empoasca . decedens* and *Balclutha . hortensis* has one peak (at the 2nd week of November and 2nd week of October) for two leafhopper species. But the *E. decipiens* two peak at the 4th week of October and 4th week of January during cabbage growing seasons.

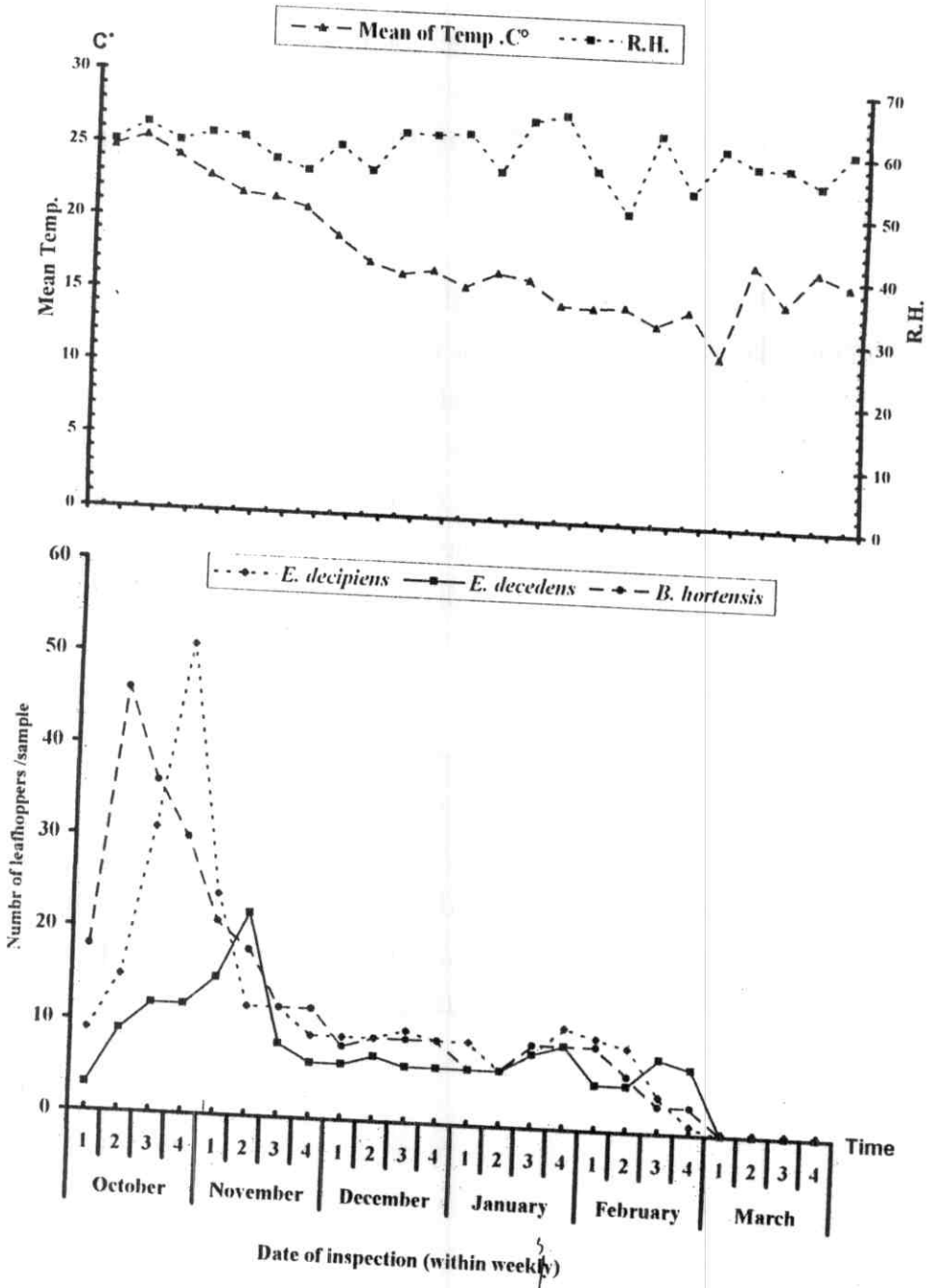

Fig. (19) : Seasonal abundance of leafhoppers *E. decipiens*, *E. decedens* and *B. hortensis* infesting cabbage plants collected by sweeping net at Minia EL- kamh district, Sharkia Governorate during 2002/2003 season.

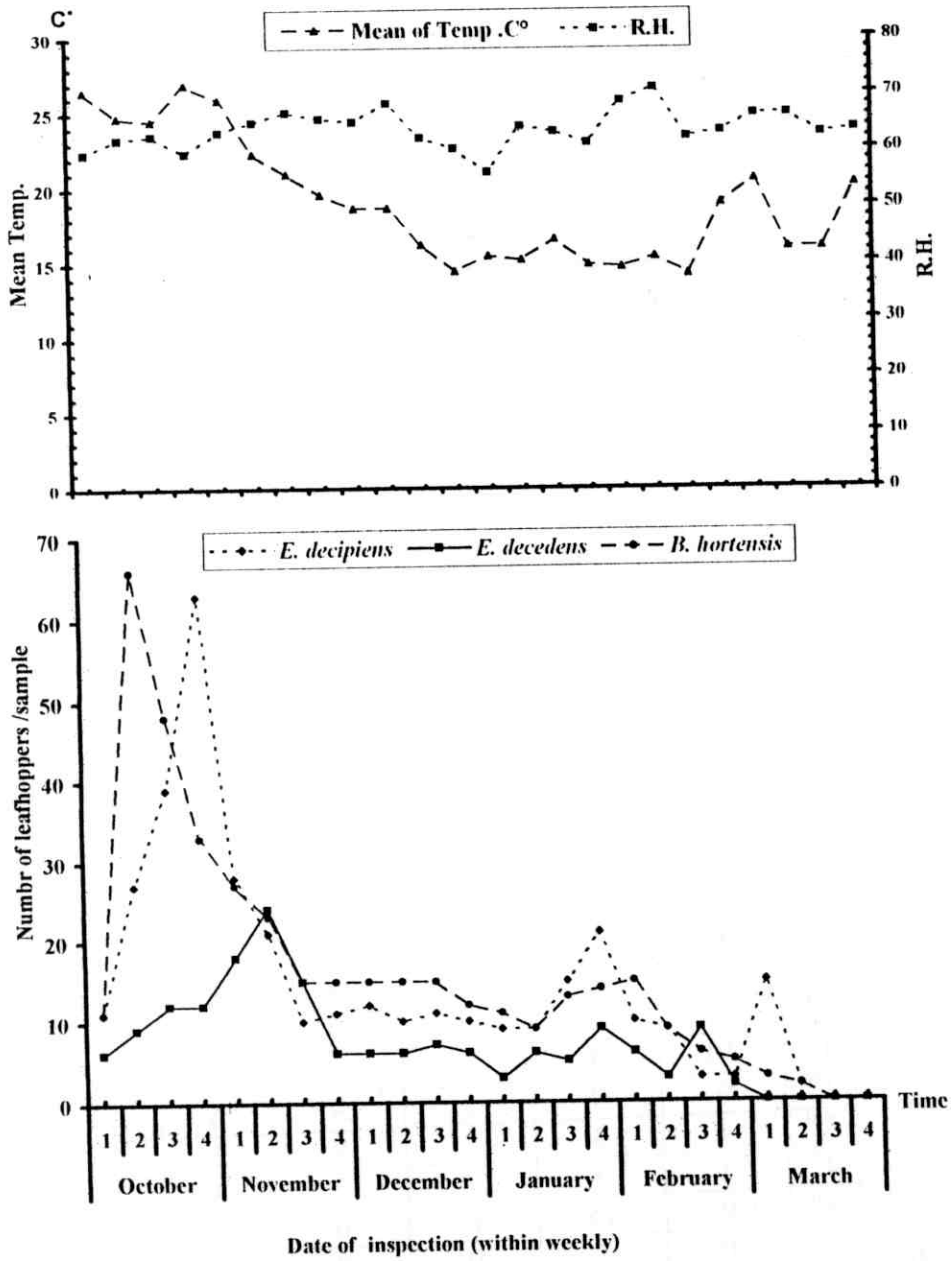

Fig. (20) : Seasonal abundance of leafhoppers *E. decipiens* , *E. decedens* and *B. hortensis* infesting cabbage plants collected by sweeping net at Minia EL- kamh district , Sharkia Governorate during 2003/2004 season.

Table (17): Total number of leafhoppers *Empoasca decipiens* (paoli) *Empoasca decedens* (Paoli) and *Baclutha hortensis* (Lindb.) infesting cabbage plants colleted by sweeping net at Minia El- Kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/2004 seasons.

Date of inspection within weeks		*E. decipiens*		*E. decedens*		*B. hortensis*	
		2002/ 2003	2003/ 2004	2002/ 2003	2003/ 2004	2002/ 2003	2003/ 2004
October	1st	9	11	3	6	18	11
	2nd	15	27	9	9	46	66
	3rd	31	39	12	12	36	48
	4th	51	63	12	12	30	33
November	1st	24	28	15	18	21	27
	2nd	12	21	22	24	18	23
	3rd	12	10	8	15	12	15
	4th	9	11	6	6	12	15
December	1st	9	12	6	6	8	15
	2nd	9	10	7	6	9	15
	3rd	10	11	6	7	9	15
	4th	9	10	6	6	9	12
January	1st	9	9	6	3	6	11
	2nd	6	9	6	6	6	9
	3rd	8	15	8	5	9	13
	4th	11	21	9	9	9	14
February	1st	10	10	5	6	9	15
	2nd	9	9	5	3	6	9
	3rd	4	3	8	9	3	6
	4th	1	3	7	2	3	5
March	1st	0	15	0	0	0	3
	2nd	0	2	0	0	0	2
	3rd	0	0	0	0	0	0
	4th	0	0	0	0	0	0
Total		258	349	166	170	279	382

4.2.2.3.2 On Cauliflower plants

a) *Empoasca decipiens* (Paoli).

The total numbers of *E. decipiens* collected from cauliflower plants during 2002/2003 and 2003/2004 seasons are shown in **Table (18)** and illustrated graphically in **Fig. (21&22).** Indicated that the numbers of *E. decipiens* on cauliflower plants tended to increase until reach its first peak at the end of October with a total numbers of 43 and 47 adults/200 strokes in the two seasons respectively at a mean temperature of 22.92°C, 26.95°C with 60.40%, 59.60% R.H for the two seasons of investigation. The second peak was recorded in the end week of January with total numbers of 19 and 15 adults/200 strokes in 2002/2003 and 2003/2004 seasons respectively at a mean temperature 14.71°C, 14.84°C with 56.40%, 61.10% R.H for the two seasons respectively. But there third peak occurred only in the 1st week of March in 2003/2004 season with total numbers of 12 adults /200 strokes at a mean temperatures of 20.43°C with 66.14 % R.H.

b) *Empoasca decedens* (Paoli)

Results given in the same Table and Fig. show that the individuals of *E. decedens* were first collected from cauliflower plants at the 2nd and 1st week of October with total numbers of 6 and 3 individuals/200 strokes in 2002/2003 and 203/2004 seasons, respectively at 25.55°C, 26.53°C and 61.71% with 59.57% R.H for two seasons, respectively.

Data in **Fig. (21&22)** further indicated that one peak of *E. decedens* during 2002/2003 and 2003/2004 seasons on

cauliflower plants. The peak occurred at the mid November with a total numbers of 18 and 22 individuals/200 strokes at 21.55°C and 22.27°C with 56.57% and 56.00% R.H for two seasons respectively.

c)*Balclutha hortensis* (Lindb).

The total number of *B. hortensis* individuals/200 strokes on cauliflower plants during 2002/2003 and 2003/2004 seasons are shown in **Table (18)** and illustrated in **Fig. (21&22)**.

The first collection of *B. hortensis* individuals was counted at the 1st week of October for two seasons, respectively at 24.79°C, 29.53°C with 58.71%, 59.57% R.H for the two seasons respectively.

The total initial numbers / sample (200 strokes) were 33 and 12 individuals in the two seasons, respectively. According to the abundance of *B. hortensis* individuals on cauliflower plants, there are three peaks recorded at the mid of October with a total number of 59 and 66 individuals/200 strokes 2002/2003 and 2003/2004 seasons, respectively at 25.55°C, 24.74°C with 61.71%, 62.14% R.H for the two seasons, respectively.

The second peak recorded at the 2nd and 1st week of December with a total number 24 and 15 individuals/200 strokes 2002/2003 and 2003/2004 seasons, respectively at 16.57°C, 18.64°C with 61.43% 65.00% R.H for the two seasons, respectively.

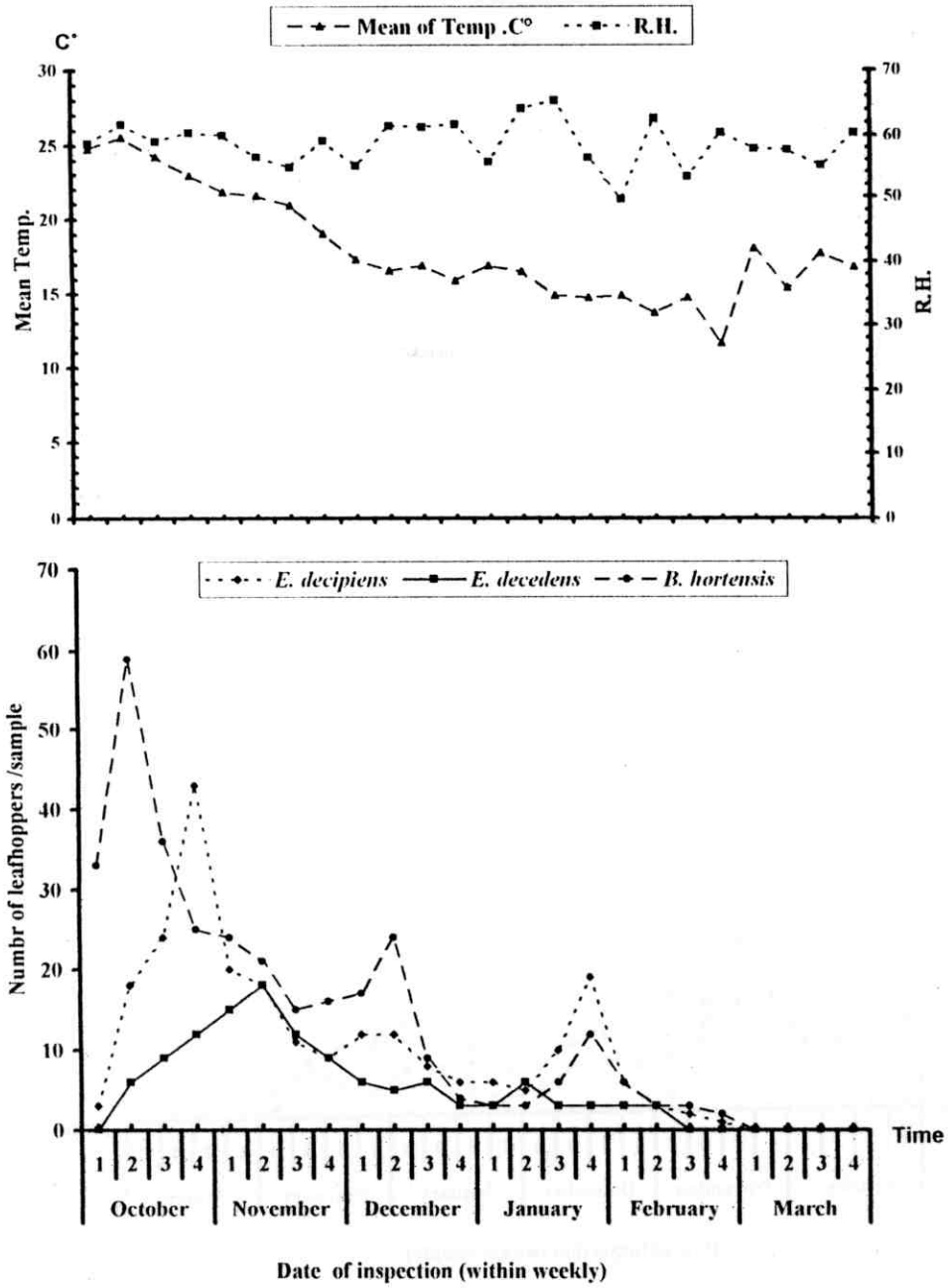

Fig. (21) : Seasonal abundance of f leafhoppers *E. decipiens* , *E. decedens* and *B.hortensis* infesting cauliflower plants collected by sweeping net at Minia EL- kamh district , Sharkia Governorate during 2002/2003 season.

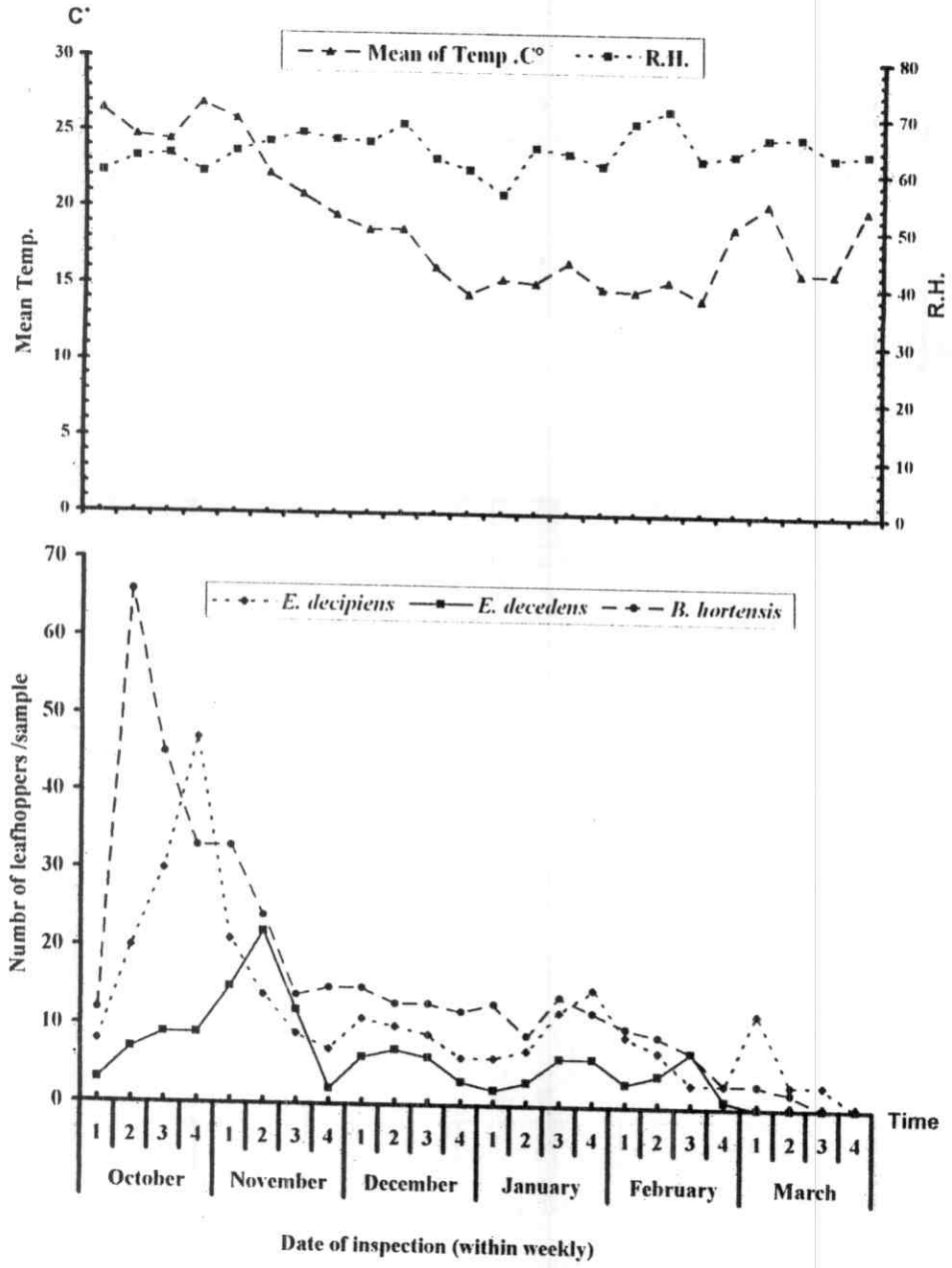

Fig. (22) : Seasonal abundance of leafhoppers *E. decipiens*, *E. decedens* and *B.hortensis* on cauliflower plants collected by sweeping net at Minia EL- kamh district, Sharkia Governorate during 2003/2004 season.

Table (18): Total number of leafhoppers *Empoasca decipiens* (paoli) *Empoasca decedens* (Paoli) and *Baclutha hortensis* (Lindb.) infesting cauliflower plants colleted by sweeping net at Minia El- Kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/2004 seasons.

Date of inspection within weeks		*E. decipiens*		*E. decedens*		*B. hortensis*	
		2002/ 2003	2003/ 2004	2002/ 2003	2003/ 2004	2002/ 2003	2003/ 2004
October	1st	3	8	0	3	33	12
	2nd	18	20	6	7	59	66
	3rd	24	30	9	9	36	45
	4th	43	47	12	9	25	33
November	1st	20	21	15	15	24	33
	2nd	18	14	18	22	21	24
	3rd	11	9	12	12	15	14
	4th	9	7	9	2	16	15
December	1st	12	11	6	6	17	15
	2nd	12	10	5	7	24	13
	3rd	8	9	6	6	9	13
	4th	6	6	3	3	4	12
January	1st	6	6	3	2	3	13
	2nd	5	7	6	3	3	9
	3rd	10	12	3	6	6	14
	4th	19	15	3	6	12	12
February	1st	6	9	3	3	6	10
	2nd	3	7	3	4	3	9
	3rd	2	3	0	7	3	7
	4th	1	3	0	1	2	3
March	1st	0	12	0	0	0	3
	2nd	0	3	0	0	0	2
	3rd	0	3	0	0	0	0
	4th	0	0	0	0	0	0
Total		236	272	122	133	321	377

The third peak recorded at the end and 3rd week of January with a total number 12 and 14 individuals/200 strokes 2002/2003 and 2003/2004 seasons , respectively at 14.71°C, 16.53°C with 56.40% and 63.14 % R.H for the two seasons, respectively.

After the third peak the number of *B. hortensis* decreased until reached its minimal at the first and mid of March with a total number of zero and 2 individuals/200 strokes at a mean temperature of 15.37°C, 15.94°C with 57.71%, 66.29% R.H for two seasons, respectively .

Similar results were found by **Hegab *et al.* (1989d) and Soliman (1993).**

4.2.2.4 Aphids (Aphididae: Homoptera)

4.2.2.4.1 On Cabbage plants

a) *Brevicoryne brassicae* (Linnaeus)

The weekly numbers of *B. brassicae* collected from cabbage plants during 2002/2003 and 2003/2004 seasons at Minia El-Kamh districy, Sharkia Governorate are shown in **Table (19)** and illustrated graphically in **Fig. (23and24).**

The individuals of aphid were collected from samples taken from cabbage plants starting from the 1st week of October for both experimental years **Table (19)**. The total numbers of initial occurrence were 171 and 267 individuals/sample at a mean of 24.79°C, 26.53°C with 58.71%, 59.57% R.H . For the two seasons, respectively.

Then the number of individuals fluctuated, on cabbage plants with general tendency to increase gradually until reached

its peak of population density. **Fig. (23&24)** shown four peaks representing high population of aphid individuals during 2002/2003 and 2003/2004 seasons on cabbage plants. The first on occurred at the 2nd week of October with a total numbers of 492 and 396 individuals/sample at 25.55°C, 24.74°C with 61.71% R.H for the two seasons ,respectively. The second peak occurred at the first week of December and end week of November with total numbers of 207 and 219 individuals / sample at a mean of 19.04°C, 19.56°C with 59.11%, 65.56% R.H for the two seasons, respectively. The third peak occurred at the mid week of February with total numbers of 115 and 156 individuals/sample at a mean of 13.68°C, 15.34°C with 62.57% , 71.00% R.H for two seasons. The fourth peak was recorded at the 3rd week of March with total numbers of 2157 and 2337 aphids/sample at a mean of 17.69°C, 15.93°C with 55.14%, 62.71% R.H for two seasons, respectively.

Regarding the weekly counts of *B. brassicae* on cabbage plants, it is clear that this species was more abundant during 2003/2004 than 2002/2003.

b)*Myzus persicae* (Sulz).

The same Table and Fig. mentioned above showed the weekly numbers of *M. persicae* collected from cabbage plants during 2002/2003 and 2003/2004 seasons.

Data indicated that this species had two peaks. The first occurred in the mid week of October with a total numbers of 15 and 18 aphid/sample at 25.55°C, 24.74°C with 61.71% and 62.14% R.H for the two seasons respectively.

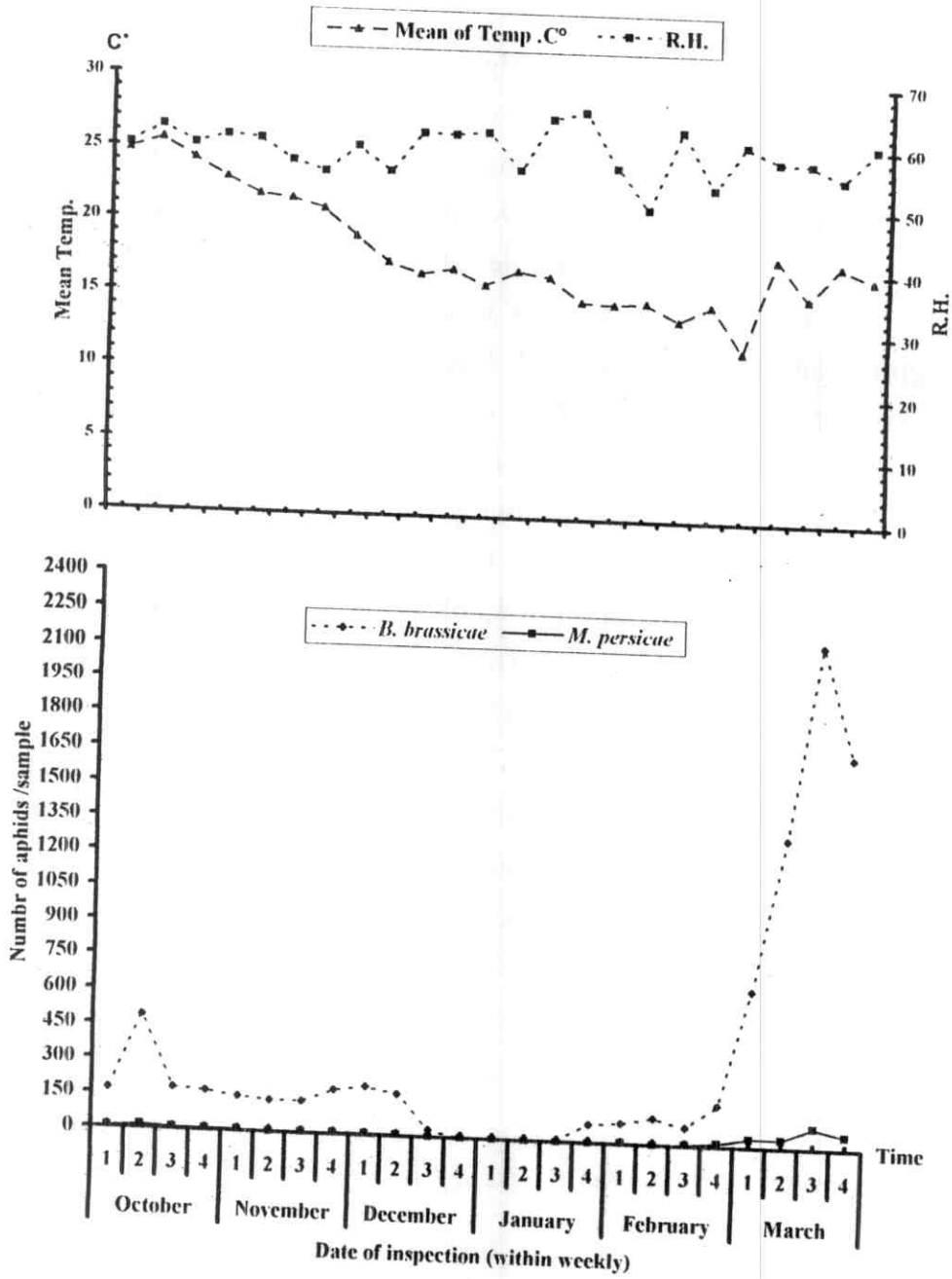

Fig. (23) : Seasonal abundance of aphids *B. brassica* and *M. persicae* infesting cabbage plants collected by plant samples at Minia EL-kamh district , Sharkia Governorate during 2002 /2003 season.

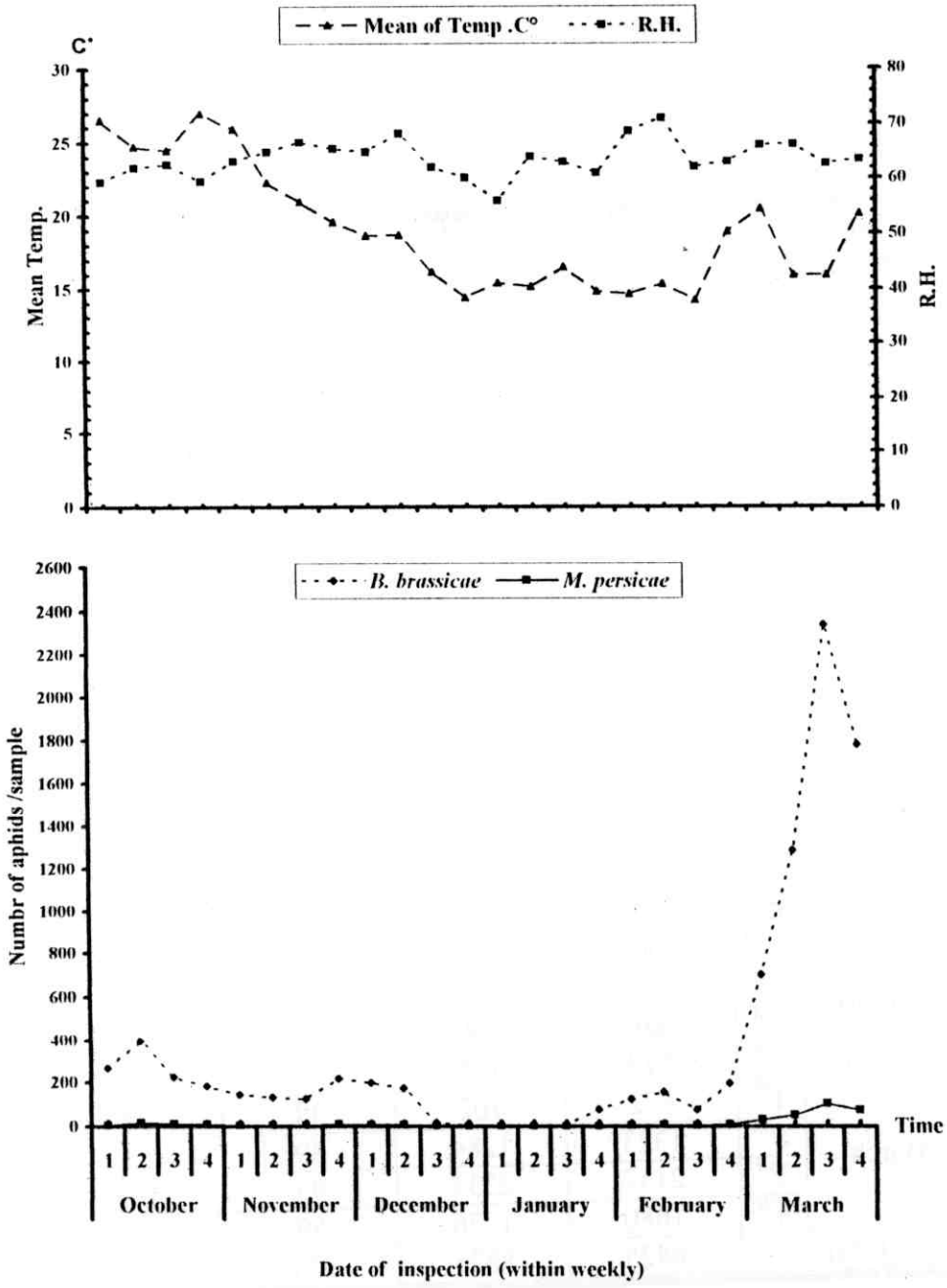

Fig. (24) :Seasonal abundance of aphids *B. brassica* and *M. persicae* infesting cabbage plants collected by plant samples at Minia EL- kamh district , Sharkia Governorate during 2003 /2004 season.

Table (19): Total number of aphid *Brevicoryne brassicae* (L.) and *Myzus persicae* (Sulz) infesting cabbage plants colleted by plant sample at Minia El-Kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/2004.

Date of inspection within weeks		*B. brassicae*		*M. persicae*	
		2002/2003	2003/2004	2002/2003	2003/2004
October	1st	171	267	7	6
	2nd	492	396	15	18
	3rd	179	225	9	12
	4th	171	183	6	9
November	1st	150	144	6	6
	2nd	135	132	3	6
	3rd	135	125	5	6
	4th	189	219	6	9
December	1st	207	198	7	8
	2nd	180	174	6	7
	3rd	33	18	0	0
	4th	0	6	0	0
January	1st	0	0	0	0
	2nd	0	0	0	0
	3rd	9	9	0	0
	4th	80	78	0	0
February	1st	90	123	6	6
	2nd	115	156	3	7
	3rd	80	78	7	6
	4th	177	195	16	9
March	1st	672	702	38	33
	2nd	1323	1284	39	51
	3rd	2157	2337	93	105
	4th	1680	1776	59	74
Total		8425	8825	331	378

The second peak was obtained in 3rd week of March with a total numbers of 93 and 105 individual/sample at a mean of 17.69°C, 15.93°C with 55.14%, 62.71% R.H for the two seasons, respectively.

4.2.2.4.2 On Cauliflower plants.

a) *Brevicoryne brassicae* (Linnaeus).

The total number of *B. brassicae* collected from cauliflower plants during 2002/2003 and 2003/2004 seasons in Minia-El Kamh district, Sharkia Governorate are shown in **Table (20)** and represented graphically in **Fig. (25&26).**

According to results obtained, it can be stated that the aphids were present under the field conditions on cauliflower during the period from 1st week of October to the 4th week of March. The mean numbers of initial occurrence were 72 and 159 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 24.79°C, 26.53°C with 58.71% and 59.57% R.H for the two seasons, respectively.

Fig. (25&26) indicate that the number of *B. brassicae* on cauliflower plants increased until it reached the first peak in 2nd week of October with a total number of 309 and 234 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 25.55°C, 24.74°C with 61.71%, 62.14% R.H for the two seasons, respectively. The second peak of occurrence was recorded in the end of week November with total numbers of 81 and 131 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 19.04°C, 19.56°C with 59.11%, 65.56% R.H for the two seasons. The third peak of occurrence was recorded in

the 3rd week of March with a total number 1030 and 1391 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 17.69°C, 15.93°C with 55.14% and 62.71% R.H for the two seasons.

Regarding the weekly counts of *B. brassicae* on cauliflower plants, it is clear that these aphids were more abundant during 2003/2004 than 2002/2003.

b)*Myzus persicae* (Sulz).

According to **Table (20)** and **Fig. (25&26)**, it can be stated that *M. persicae* was present under the field conditions on the cauliflower plants during the period from 1st week of October to the end week of March. The mean numbers of initial occurrence were 15 and 10 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 24.79°C, 26.53°C with 58.71% and 59.57% R.H for the two seasons, respectively. The first peak in 2nd week of October with a total number of 42 and 26 aphids/sample in 2002/2003 and 2003/2004 seasons, respectively at 25.55°C, 24.74°C with 61.71%, 62.14% R.H for the two seasons, respectively. The second peak of occurrence was recoded in the 4th week of November with total numbers of 19.04°C, 19.56°C with 59.11% and 65.56% R.H for the two seasons. The third peak of occurrence was recorded in the 3rd week of March with a total numbers of 130 and 163 insects/sample in 2002/2003 and 2003/2004 seasons, respectively at 17.69°C, 15.93°C with 55.14% and 62.71% R.H for the two seasons.

Regarding the weekly counts of *M. persicae* on cauliflower plants, it is clear that this insect was more abundant during 2003/2004 than 2002/2003 season.

These results are in harmony with those obtained by **Hegab and Hassan (1989), Soliman (1993), and Araceli *et al*. (2000)** in Aragentina.

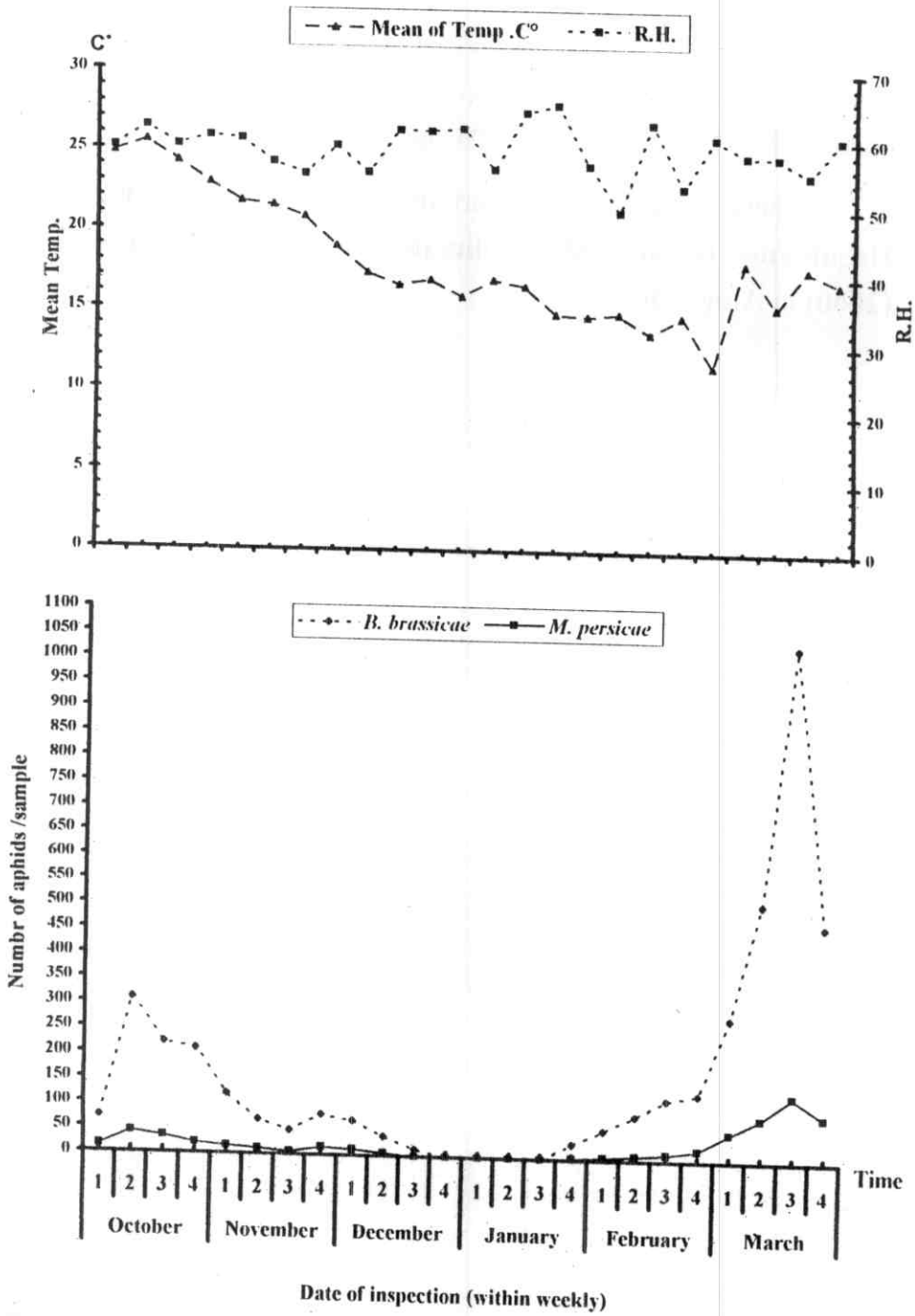

Fig. (25) :Seasonal abundance of aphids *B. Brassica* and *M. persicae* infesting cauliflower plants collected by plant samples at Minia EL-kamh district , Sharkia Governorate during 2002 /2003 season.

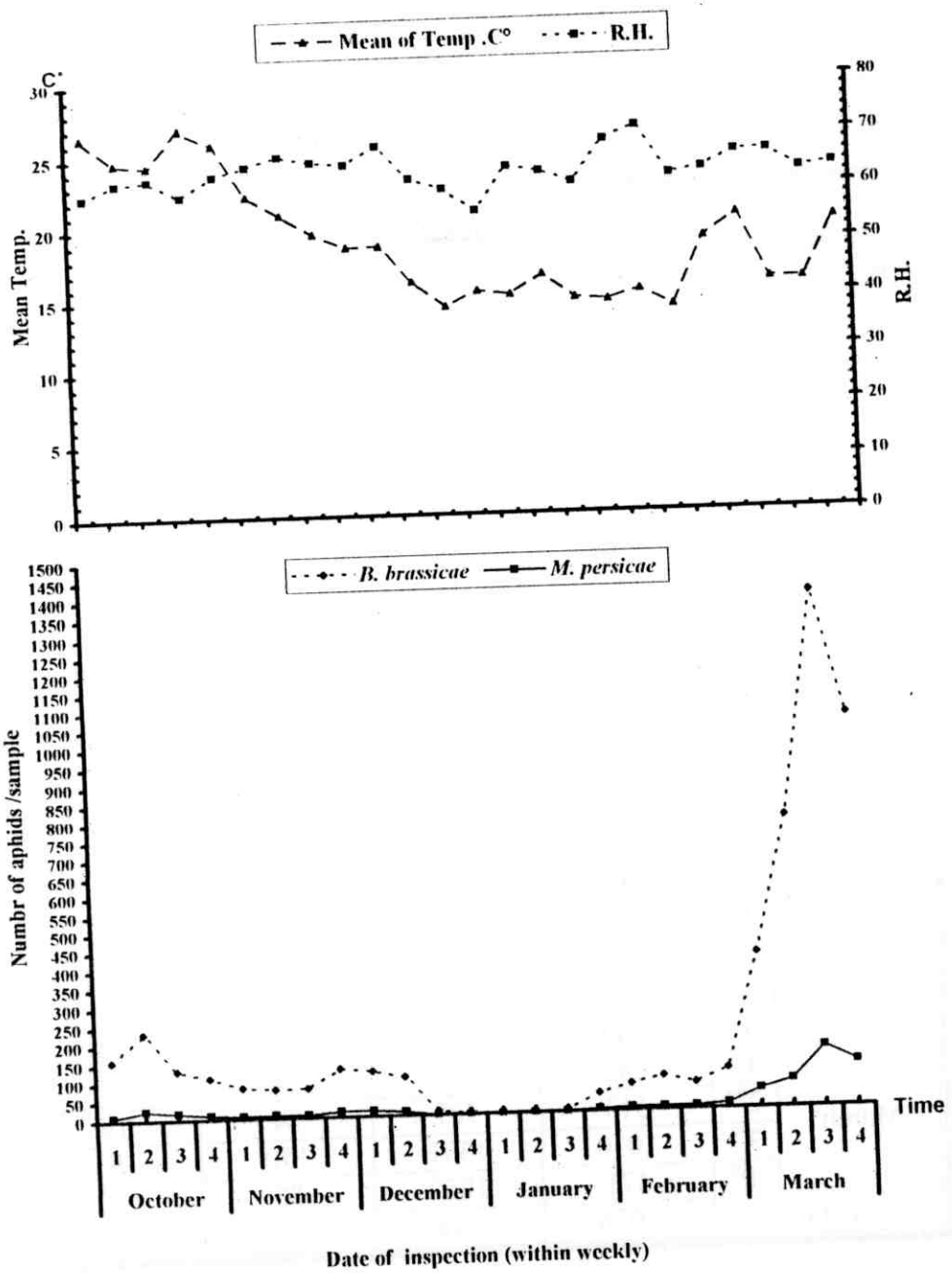

Fig. (26) :Seasonal abundance of aphids *B. Brassica* and *M. persicae* infesting cauliflower plants collected by plant samples at Minia EL-kamh district , Sharkia Governorate during 2003 /2004 season.

Table(20): Total number of aphids *Brevicoryne brassicae* (L.) and *Myzus persicae* (Sulz) infesting cauliflower plants colleted by plant sample at Minia El-Kamh district, Sharkia Governorate during winter plantation in 2002/2003 and 2003/2004.

Date of inspection within weeks		*B. brassicae*		*M. persicae*	
		2002/2003	2003/2004	2002/2003	2003/2004
October	1st	72	159	15	10
	2nd	309	234	42	26
	3rd	222	132	33	18
	4th	210	111	21	12
November	1st	120	84	16	9
	2nd	69	78	12	10
	3rd	48	80	6	9
	4th	81	131	16	16
December	1st	69	123	13	15
	2nd	39	105	6	12
	3rd	15	12	0	0
	4th	0	3	0	0
January	1st	0	0	0	0
	2nd	0	0	0	0
	3rd	0	5	0	1
	4th	30	48	3	6
February	1st	57	72	6	9
	2nd	87	93	9	9
	3rd	120	72	14	9
	4th	132	110	22	14
March	1st	282	417	54	51
	2nd	513	787	84	76
	3rd	1030	1391	130	163
	4th	471	1059	88	123
Total		3976	5306	590	598

4.3. Effect of certain climatic factors on the population density of the dominant homopterous insects infesting some of (Cucurbitaceous, Solanaceous and Cruciferous) vegetable crops.

As clearly shown in **Table (21)** the population density of the dominant homopterous insects was differently affected by the changes in the three tested wither factors. Data of simple correlation between certain climatic factors and the dominant whitefly, leafhoppers and aphids at Minia-El Kamh distric, Sharkia Governorate during (summer plantation) 2002 and 2003 and (winter plantation) 2002/2003 and 2003/2004 seasons are tabulated in **Table (21)** .

4.3.1.summer plantation:

4.3.1.1. Effect of maximum and minimum temperature and relative humidity on the population density of whitefly.

i) Immature stages:

The correlation coefficient between activity of immature stage of whitefly insects and maximum temperature was negative and significant (r_1 = -0.437 *) and negative and insignificant (r_1 =-0.395) in 2002 and 2003 season, respectively. While correlation coefficient between minimum temperature and the numbers of immature stage of whitefly insects was negative and significant and highly significant (r_2 =-0.255*) and (r_2=-0.433**) in 2002 and 2003 seasons, respectively.

There was positive insignificant correlation coefficient between the number of whitefly immature stages and relative

humidity (r_3 = 0.245) and (r_3 = 0.190) in 2002 and 2003 seasons, respectively.

The partial regression between whitefly (immature stage) activity and maximum temperature was negative and insignificant (b_1 = -7.854) and (b_1 = -12.899) in 2002 and 2003 seasons respectively, while partial regression between the numbers of whitefly immature stages and minimum temperature was positive and insignificant (b_2 =4.956) and (b_2 = 12.007) for both seasons respectively. There was negative and insignificant partial regression between the numbers of immature stages and relative humidity (b_3 =-6.101) in 2002 season and negative and significant (b_3 = -4.068*) in 2003 season , respectively.

ii) Adult stage:

The correlation coefficient between the adult of *B. tabaci* and maximum temperature was negative and insignificant (r_1 = -0.300) in 2002 season, positively insignificant (r_1= 0.379) during 2003 season. while it was negative and insignificant (r_2 = -0.230) in season 2002 while positive and significant, (r_2=0.363*) in season 2003 between *B. tabaci* adult and minimum temperature. The correlation coefficient between *B. tabaci* adult and relative humidity were positive and insignificant and significant (r_3=0.328), (r_3=0.452*) in 2002 and 2003 seasons, respectively.

The partial regression between the number of *B. tabaci* adult stage and maximum temperature was negatively insignificant (b_1=-2.666) during 2002 season and it was positively insignificant (b_1=6.431) during 2003.

Positive and insignificant partial regression between number of *B. tabaci* adult and minimum temperature (b_2 = 1.458) in season 2002 while negative and insignificant (b_2 = -4.920) in 2003 season.

The partial regression between *B. tabaci* adult stage and relative humidity was positive and insignificant (b_3 = 2.781) in 2002 and it was positive and highly significant (b_3 = 3.585) in 2003 season.

4.3.1.2 Effect of maximum and minimum temperature and relative humidity on the population of leafhoppers.

a)*Empoasca decipiens* (Paoli) :

The correlation coefficient between *E. decipiens* and maximum temperature was positive and insignificant (r_1=0.262) and positive and insignificant (r_1=0.379) during 2002 and 2003 seasons respectively.

Concerning the relationship between *E. decipiens* and minimum temperature it was positive and insignificant (r_2=0.277) in 2002, but it was positive and highly significant (r_2=0.581**) in 2003 season.

The correlation coefficient between *E. decipiens* and relative humidity was positive and highly significant (r_3=0.361**) and significant (r_3=0.526*) in 2002 and 2003 seasons respectively.

The partial regression between population of *E. decipiens* and maximum temperature was positive and insignificant

(b_1=1.599) and (b_1=1.630) during 2002 and 2003 seasons respectively.

The partial regression between the number of *E. decipiens* and minimum temperature was positive and significant (b_2=1.465*) in 2002 seasons but it was positive and highly significant (b_2= 2.774**) in 2003 season. The partial regression between *E. decipiens* and relative humidity was positive and highly significant (b_3=2.103**) (b_3=1.495**) in 2002 and 2003 seaons, respectively .

b) *Empoasca decedens*

The total numbers of *E. decedens* was positive and insignificant correlation with maximum temperature (r_1=0.266) in 2002 season, but it was positive and highly significant (r_1=0.536**) in 2003 season. There was positive and significant correlation coefficient between the number of the insect and minimum temperature (r_2=0.344*) in 2002 season, but it was positive and highly significant (r_2 = 0.765**) in 2003 season.

The correlation coefficient between *E. decedens* and relative humidity was positive and highly significant (r_3=0.434**) and it was negative and insignificant (r_3=-0.477*) for both seasons, respectively.

The partial regression between *E. decedens* and maximum temperature was positive and insignificant (b_1=1.049) and negative and insignificant (b_1=-0.533) in 2002 and 2003 seasons, respectively.

There was positive and highly significant partial regression between the number of *E. decedens* and minimum

temperature (b_2=1.142**) in 2002 season and it was positive and highly significant (b_2=3.932**) in 2003 season.

While partial regression between the number of *E. decedens* and relative humidity was positive and highly significant (b_3=1.730**) and it was negative and highly significant (b_3=-1.088**) in 2002 and 2003 seasons, respectively.

c) *Balclutha hortensis*

The correlation between numbers of *B. hortensis* and maximum temperature was positive and insignificant (r_1 = 0.255) in 2002 seasn but it was positive and significant (r_1=0.641*) in 2003 season.

Similar trend was also recorded in 2002 and 2003 seasons between *B. hortensis* and minimum temperature (r_2=0.365)in 2002 season, but it was insignificant in 2003 (r_2=0.421). Concerning the correlation between *B. hortensis* and relative humidity it was positive and insignificant (r_3=0.404) in 2002 and negative and insignificant (r_3=-0.285) in 2003 season.

The partial regression between *B. hortensis* and maximum temperature was positive and insignificant (b_1=0.519), (b_1=3.013) in both season respectively.

There was positive and insignificant partial regression between the number of *E. decedens* and minimum temperature (b_2=0.978) and it was negative and insignificant (b_2=-0.885) in 2002 and 2003 seasons.

While partial regression between the number of *E. decedens* and relative humidity was positive and insignificant (b_3=1.230) and (b_3=0.452) in 2002 and 2003 seasons, respectively.

d) *Cicadulina chinai* (Ghauri):

Negative and insignificant correlation coefficient was obtained between number of *C. chinai* and maximum temperature (r_1=-0.189) in 2002 but it was positive and insignificant (r_1=0.204) in 2003 season. The correlation coefficient between *C. chinai* and minimum temperature was positive and insignificant (r_2=0.147) in 2002 season but it was positive and significant (r_2=0.509*) in 2003 season. There was positive and highly significant correlation coefficient between *C. chinai* and relative humidity (r_3=0.516**) and (r_3=0.574**) in the two seasons, respectively.

The partial regression between *C. chinai* and maximum temperature was negative and insignificant (b_1=-2.066) and positive and insignificant (b_1=2.753) in 2003 season. The partial regression between *C. chinai* and minimum temperature was positive and insignificant (b_2=0.890) and negative and insignificant (b_2=-1.243) in 2002 and 2003 seasons, respectively . The partial regression between *C. chinai* and relative humidity was positive and highly significant (b_3=1.718**) in 2002 season, while it was positive and significant (b_3=2.022*) in 2003 season.

e)*Empoasca lybica* (de Berg):

The total number of *E. lybica* was negative and insignificant correlated with maximum temperature (r_1=-0.135)

in 2002 season, while it was positively insignificant (r_1=0.223) in 2003 season. There was negative and insignificant correlation coefficient between the number of *E. lybica* and minimum temperature (r_2=-0.039) in 2002 season , while it was positive significant (r_2=0.573*) in 2003 season. There was positive and insignificant correlation coefficient between the number of *E. lybica* and relative humidity (r_3=0.189) in 2002 season, but positive and highly significant correlation coefficient between *E. lybica* and relative humidity (r_3=0.607**) in 2003 season.

The results obtained in **Table (21)** revealed that the partial regression between the number of *E. lybica* and maximum temperature was negative and insignificant (b_1=-1.401) in 2002 season. It was positive and insignificant (b_1=2.444) in 2003 season. Partial regression between the *E. lybica* and minimum temperature was positive and insignificant (b_2=0.075) and (b_2=3.447) in 2002 and 2003 seasons, respectively . The partial regression between number of *E. lybica* and relative humidity was positive insignificant (b_3=1.416) in 2002 season, but in 2003 season, it was positive and significant (b_3=2.953*).

4.3.1.3. Effect of maximum and minimum temperature and relative humidity on the population density of aphids.

a) *Aphis gossypii* (Glover):

The correlation coefficient between *Aphis gossypii* and maximum temperature was negative and highly insignificant (r_1=-0.837**) and (r_1=-0.764**) in 2002 and 2003 seasons, respectively.

The number of *A. gossypii* was negative and insignificant correlation with minimum temperature (r_2=-0.817) in 2002 season and it was negative and highly insignificant (r_2=-0.849**) in 2003 season. The correlation coefficient between *A. gossypii* and relative humidity was negative and insignificant (r_3=-0.628*) in 2002 season while it was positive and insignificant (r_3=0.037) in 2003 season.

The partial regression between the number of *A. gossypii* and maximum temperature was negative and highly insignificant (b_1=-7.950**) in 2002 season but it was positive and insignificant (b_1=0.353) in 2003 season.

Also it positive and insignificant partial regression between *A. gossypii* and minimum temperature (b_2= 1.871) in 2002 season but it was negative and insignificant (b_2=-7.106) in 2003 season. Negative and insignificant partial regression between number of *A. gossypii* and relative humidity (b_3=-7.202) in 2002 season, but it was positive and insignificant (b_3=2.121) in 2003 season.

4.3.2. winter plantation:

4.3.2.1. Effect of maximum and minimum temperature and relative humidity on the population density of whitefly.

i) immature stages:

The correlation coefficient between activity of immature stage of whitefly insect and maximum temperature was positive and highly significant (r_1=0.857**) and (r_1=0.836**) in 2002/2003 and 2003/2004 season, respectively. While

correlation coefficient between minimum temperature and the number of immature stages of whitefly insect was positive and highly significant (r_2=0.849**) and (r_2=0.864**) in 2002/2003 and 2003/2004 seasons , respectively.

There was positive insignificant correlation coefficient between the numbers of whitefly immature stages and relative humidity (r_3=0.082) in 2002/2003 season, but in 2003/2004 season, it was negative and insignificant (r_3=-0.272).

The partial regression between whitefly immature stage activity and maximum temperature was positive and significant (b_1=69.857*) in 2002/2003 season, it was positive and insignificant (b_1=23.282) in 2003/2004 season, while partial regression between the numbers of whitefly immature stages and minimum temperature was positive and insignificant (b_2=55.074), but it was positive and significant (b_2=134.233*) in 2003/2004 season. There was positive and insignificant (b_3=13.302) partial regression between the number of immature stages and relative humidity in 2002/2003 season, while partial regression between it was negative and insignificant (b_3= -33.611) in 2003/2004 season.

ii) Adult stage:

The correlation coefficient between the adult of *B. tabaci* and maximum temperature was positive and highly significant (r_1=0.896**) and (r_1=0.863**) in 2002/2003 and 2003/2004 seasons, respectively. Similar trend was also recorded between the adult of whitefly and minimum temperature was positive and highly significant (r_2=0.896**) and (r_2=0.863**) in 2002/2003

and 2003/2004 seasons, respectively. concerning the correlation between whitefly and relative humidity, it was positive and insignificant in 2002/2003 season (r_3=0.017), while it was negative and insignificant (r_3=-0.175) in 2003/2004 season.

The partial regression between the number of *B. tabaci* adult stages and maximum temperature was positive and highly significant (b_1=22.644**) in 2002/2003 season, but in 2003/2004 season , it was positive and insignificant (b_1=7.920). The partial regression between the number of *B. tabaci* adult stages and minimum temperature was positively insignificant (b_2=13.197) in 2002/2003 seasons, but in 2003/2004 season, it was positive and highly significant (b_2=42.801**). Partial regression between the *B. tabaci* adult stages and relative humidity was positively insignificant (b_3=1.051) in 2002/2003 seasons, but in 2003/2004 season, it was negative and insignificant (b_3=-3.941).

4.3.2.2. Effect of maximum, minimum temperature and relative humidity on the population density of leafhoppers.

a)*Empoasca decipiens* (Paoli):

The correlation coefficient between *E. decipiens* and maximum temperature was positive and highly significant (r_1=0.557**) and (r_1=0.627**) in 2002/2003 and 2003/2004 seasons, respectively. Similar trend was also recorded in 2002/2003 and 2003/2004 seasons between *E. decipiens* and minimum temperature (r_2=0.559**) and (r_2=0.661**) concerning the correlation between *E. decipiens* and relative humidity, it was positive and insignificant in 2002/2003 season (r_3=0.122),

while it was negative and insignificant (r_3=-0.241) in 2003/2004 season.

The partial regression between *E. decipiens* and maximum temperature was positive and insignificant (b_1=0.907) and (b_1=0.150) in 2002/2003 and 2003/2004 season, respectively . While the partial regression between *E. decipiens* and minimum temperature was positive and insignificant (b_2=0.706) and (b_2=1.795) in 2002/2003 and 2003/2004 seasons, respectively. The relationship between the abundance of *E. decipiens* and relative humidity was positive and insignificant (b_3=0.366) in 2002/2003 season , but in 2003/2004 season, it was negative and insignificant (b_3=-0.595).

b)*Empoasca decedens* (Paoli):

The total numbers of *E. decedens* was positive and highly significant correlation with maximum temperature (r_1=0.589**) and significant (r_1=0.396*) in 2002/2003 and 2003/2004 seasons, respectively.

The correlation coefficient between *E. decedens* and minimum temperature was positive and significant (r_2=0.554*) in 2002/2003 season, but it was positive and highly significant (r_2=0.541**) in 2003/2004 season.

The correlation between numbers of *E. decedens* and relative humidity was positive and insignificant (r_3=0.033) and it was negative and insignificant (r_3=-0.046) in 2002/2003 and 2003/2004 seasons, respectively.

The partial regression between *E. decedens* and maximum temperature was positive and insignificant (b_1=0.634) in

2002/2003 season , but in 2003/2004 season, it was negative and insignificant (b_1=-0.767). The relationship between the abundance of *E. decedens* and minimum temperature was positive and insignificant in 2002/2003 season (b_2=0.150), but in 2003/2004 season , it was positive and significant (b_2=1.644*). While, the partial regression between *E. decedens* and relative humidity was positive and insignificant (b_3=0.075) in 2002/2003 season, but in 2003/2004 season, it was negative and insignificant (b_3=-0.075).

c)*Balclutha hortensis* (Lindb):

The correlation coefficient between *B. hortensis* and maximum temperature in 2002/2003 and 2003/2004 season was positive and highly significant (r_1=0.788**) and (r_1=0.586**). There was positive and highly significant correlation coefficient between minimum temperature and *B. hortensis* (r_2=0.799**) and (r_2=0.631**) in 2002/2003 and 2003/2004 seasons, respectively. While the correlation coefficient between *B. hortensis* and relative humidity was positive and insignificant (r_3=0.173) in 2002/2003 season, but it was negative and insignificant (r_3=-0.186) in 2003/2004 season.

The partial regression between *B. hortensis* and maximum temperature was positive and insignificant (b_1=1.456) in 2002/2003 season, but it was negative and insignificant (b_1=-0.157) in 2003/2004 season.

Positive and insignificant partial regression between *B. hortensis* and minimum temperature (b_2=1.387) and (b_2=2.608) in 2002/2003 and 2003/2004 seasons, respectively. While the

partial regression between *B.hortensis* and relative humidity was positive and insignificant (b_3=0.619) in 2002/2003 season, but it was negative and insignificant (b_3=-0.556) in 2003/2004 season.

4.3.2.3. Effect of maximum, minimum temperature and relative humidity on the population density of Aphids

a)*Brevicoryne brassicae* (Linnaeus):

The correlation coefficient between the number of aphid and maximum temperature was positive and insignificant (r_1=0.221) and (r_1=0.028) in 2002/2003 and 2003/2004 seasons, respectively. There was positive and insignificant correlation coefficient between minimum temperature and *B. brassicae* (r_2=0.158) in 2002/2003, but it was negative insignificant (r_2=-0.104) in 2003/2004 season. Also the correlation coefficient between aphid number and relative humidity was negative and insignificant (r_3=-0.117), but it was positive and insignificant (r_3=0.070) in 2003/2004 season.

The partial regression between *B. brassicae* and maximum temperature was positive and insignificant (b_1=66.601) and (b_1=89.674) in 2002/2003 and 2003/2004 seasons, respectively. While the partial regression between aphid number and minimum temperature was negative and insignificant (b_2= -23.548) and (b_2=-111.977) in both mentioned above seasons, respectively. The results obtained in Table (21) revealed also that the partial regression between the number of *B. brassicae* and relative humidity was negative and insignificant

(b_3=-17.494) and it was positive and insignificant (b_3=25.525) in 2003/2004 season.

b)*Myzus persicae* (Sulz.):

The correlation coefficient between activity of *Myzus. persicae* (Sulz.) insects and maximum temperature was positive insignificant (r_1=0.052) and (r_1=0.013) in 2002/2003 and 2003/2004 seasons , respectively. While correlation coefficient between minimum temperature and the numbers of *M. persicae* was negative insignificant (r_2=-0.056) and (r_2=-0.112) in 2002/2003 and 2003/2004 seasons ,respectively.

There was negative insignificant correlation coefficient between the numbers of *M. persicae* and relative humidity (r_3=-0.156) in 2002/2003 season and it was positive insignificant (r_3=0.077) in 2003/2004 season.

The partial regression between *M. perasicae* aphid activity and maximum temperature was positive and insignificant (b_1=2.536) and (b_1=5.793) in 2002/2003 and 2003/2004 seasons, respectively. While partial regression between the number of *M. persicae* and minimum temperature was negative and insignificant (b_2=-2.562) and (b_2=-7.338) in 2002/2003 and 2003/2004 seasons, respectively. There was negative and insignificant partial regression between the numbers of *M. persicae* and relative humidity (b_3=-0.932) in 2002/2003 season, but it was positive and insignificant (b_3=1.724) in 2003/2004 season.

4.3.2.4. Combined effects of metrological factors on the homopterous insects:

Data in **Table (22)** values of explained variance by the maximum, minimum temperatures and relative humidity show that the considered factors have played a conspicuous role in dectecting the activety of these pestes during the two investigated seasons of 2002/2003 and 2003/2004.

These results ensure that the tested weather factors play a great role in regulating the population density and seasonal abundance of such inscet pest.

The same resulted data were reported by **Hegab *et al.* (1989); El-Sharkawy (1989) ; El-Gindy (1997, 2002); Hashim (1997)** and **Hegab- Ola (1997,2001)** which greatly correspond with the present results.

Table(21): partial regression and simple correlation coefficients between maximum temperature , minimum temperature and relative humidity and total number of certain homopterous insects infesting some summer and winter vegetable plantations during 2002/2003 and 2003/2004 seasons.

season	Insects	Simple correlation						Partial regression					
		2002/2003			2003/2004			2002/2003			2003/2004		
		r1	r2	r3	r1	r2	r3	b1	b2	b3	b1	b2	b3
Summer	*B. tabaci* immature	-0.437*	-0.255*	0.245	-0.395	-0.433**	0.190	-7.854	4.956	-6.101	-12.899	12.007	-4.068*
	B. tabaci adult	-0.300	-0.230	0.328	0.152	0.363*	0.452*	-2.666	1.458	2.781	6.431	-4.920	3.585**
	E. decipiens	0.262	0.277	0.361**	0.379	0.581**	0.526*	1.599	1.465*	2.103**	1.630	2.774**	1.495**
	E. decedens	0.266	0.344*	0.434**	0.536**	0.765**	-0.477*	1.049	1.142**	1.730**	0.533	3.932**	-1.088**
	B. hortensis	0.255	0.365	0.404	0.642*	0.421	-0.285	0.519	0.978	1.230	3.013	-0.885	0.452
	C .chinai	-0.189	0.147	0.516**	0.204	0.509*	0.574**	-2.066	0.890	1.718**	2.753	-1.243	2.022*
	E . lybica	-0.135	-0.039	0.189	0.223	0.573*	0.607**	-1.401	0.075	1.416	2.444	3.447	2.953*
	A. gossypii	-0.837**	-0.817	-0.628*	-0.764**	-0.849**	0.037	-7.950**	1.871	-7.202	0.353	-7.106	2.121
winter	*B. tabaci* immature	0.857**	0.849**	0.082	0.836**	0.864**	-0.271	69.857*	55.074	13.302	23.282	134.233*	-33.611
	B. tabaci adult	0.896**	0.870**	0.017	0.823**	0.863**	-0.175	22.644**	13.197	1.051	7.920	42.801**	-3.941
	E. decipiens	0.557**	0.559**	0.122	0.627**	0.651**	-0.241	0.907	0.706	0.366	0.150	1.795	-0.595
	E. decedens	0.589**	0.554*	0.033	0.396*	0.541**	-0.046	0.634	0.150	0.075	-0.767	1.644*	-0.075
	B. hortensis	0.788**	0.799**	0.173	0.586**	0.631**	-0.186	1.456	1.387	0.619	-0.157	2.608	-0.556
	B. brassicae	0.221	0.158	-0.117	0.028	-0.104	0.070	66.601	-23.548	-17.494	89.674	-111.977	25.525
	M. persicae	0.052	-0.056	-0.156	0.013	-0.112	0.077	2.536	-2.562	-0.932	5.793	-7.338	1.724

r1=correlation coefficient between max. temp. and number of insects b1=Partial regression between max. temp. and number of insects

r2=correlation coefficient between min. temp. and number of insects b1= Partial regression between min. temp. and number of insects

r3= correlation coefficient between R. H. and number of insects b1= Partial regression between R.H. and number of insects

Table (22): Explained and unexplained variance and the effects of maximum, minimum temperature and relative humidity on the total numbers of homopterous insects infesting summer and winter vegetable plantations during 2002/2003 and 2003/2004 seasons.

Seasons	Insects	Explained variance		Unexplained variance	
		2002/2003	2003/2004	2002/2003	2003/2004
Summer	*B. tabaci* immature	0.35	0.36	0.65	0.64
	B. tabaci adult	0.24	0.39	0.76	0.61
	E. decipiens	0.40	0.60	0.60	0.40
	E. decedens	0.52	0.72	0.48	0.28
	B. hortensis	0.20	0.43	0.80	0.57
	C .chinai	0.41	0.53	0.59	0.47
	E . lybica	0.04	0.53	0.96	0.47
	A. gossypii	0.83	0.77	0.17	0.23
Winter	*B. tabaci* immature	0.78	0.78	0.22	0.22
	B. tabaci adult	0.83	0.75	0.17	0.25
	E. decipiens	0.34	0.45	0.66	0.55
	E. decedens	0.38	0.36	0.62	0.64
	B. hortensis	0.69	0.41	0.31	0.59
	B. brassicae	0.09	0.13	0.91	0.87
	M. persicae	0.05	0.12	0.95	0.88

4.4. Effect of certain agriculture practices on population density of certain insects (whitefly, leafhoppers and aphids).

The influence of certain agriculture practices on the occurrence of certain insects attacking the aforementioned **cucurbitaceous** and **solanaceous** vegeTable crops under the natural environmental conditions of El-Muhammadiya village, Minia El-Kamh destrict was studied during two consecutive growing seasons 2002 and 2003. The tested practices were varieties and potassium fertilization.

4.4.1. On Squash plants

4.4.1.1. Effect of varieties.

4.4.1.1.1. Whitefly.

a)Immature stages:

Date given in **Table (23)** revealed that the difference between mean numbers of immature stage for whitefly on the three tested squash varieties were statistically highly significant during 2002 season and were statistically insignificant during 2003 season. The most susceptible variety was v_3(Top kapi) (8.24 and 7.65) in 2002 and 2003 seasons, respectively. Where, the least susceptible cultivars was v_2(Escandarani) (7.01 & 4.64) in 2002 and 2003 seasons, respectively. While, v_1(Amco star) was recorded intermediate rang of infestation in two seasons.

b) Adult stage:

Results in **Table (23)** showed that the differences between mean number of adult stage for whitefly on the three tested

squash varieties were statistically highly significant during 2002 season and were statistically insignificant during 2003 season.

The intensity of whitefly infestation in 2002 and 2003 seasons measured as mean number of insects/sample could be arranged in 2002 and 2003 seasons in descending order as follows, v_3(Top kapi) (5.40 and 5.20), v_1(Amco star) (4.82 and 4.62) and v_2 (Escandarani) (4.36 and 3.91).

It was obvious that in the two seasons of study, cultivars v_2(Escandarani) proved to be the least susceptible host plant for whitefly infestation, while the variety v_3(Top kapi) appeared to be the most susceptible squash variety.

Generally, it is obvious that all tested squash cultivars were highly infested in 2002 season than in 2003 season Table(25).This may be due to the differences in environmental factors e.g. weather factors and natural enemies prevailing in the two seasons of investigation .

4.4.1.1.2. Leafhoppers

a) *Empoasca decipiens* (paoli).

From results given in **Table (23),** it could be noticed that significant effect was detected between tested varieties during 2002 and 2003 seasons. The most susceptible variety was v_3 (Top kapi) (3.442 and 2.834) in 2002 and 2003 seasons, respectively. Whereas the least susceptible variety was v_2(Escandarani) (2.591and1.468) in the first and second seasons, respectively, while v_1(Amco star) recorded intermediate rank of infestation (3.289 and 2.069) in 2002 and 2003 seasons, respectively.

b)*Empoasca decedens* (paoli) :

Significant differences were obtained between *E. decedens* infestation on all tested squash varieties during 2002 and insignificant in 2002 seasons. The most susceptible variety was v_3(Top kapi) (2.648) in 2002 and v_1(Amco star) (2.33) in 2003 seasons. Whereas the least susceptible variety was v_2 (Escandarani) (2.083 and 1.373) in 2002 and 2003 seasons, respectively, while v_1(Amco star) (2.328) in 2002 season and v_3(Top kapi) (2.295) in 2003 season recorded intermediate rank of infestation during the first and the second seasons.

c) *Balclutha hortensis* (Lindb) :

Also, significant differences were obtained between *B. hortensis* infestation v_3(Top kapi) and other tested varieties v_1(Amco star) and v_2(Escandarani), while no significant differences was found between v_1(Amco star) and v_2 (Escandarani) during 2002 and between all tested varieties (v1.v2 and v3) during 2003 season. The most susceptible variety was v_3(Top kapi) (2.980 and 2.578) in 2002 and 2003 seasons respectively. Whereas, the least susceptible variety was v_2 (Escandarani) (2.435 and 1.943) in 2002 and 2003 seasons, respectively, while v_1(Amco star) (2.75 and 2.268) in 2002 and 2003 recorded intermediate rank of infestation during the first and second seasons.

4.4.1.1.3. Aphids

a) *Aphis gossypii* (Glover):

Date given in **Table (23)** showed that the differences between mean numbers of aphid on the three tested squash varieties were not statically significant during 2002 season and

were significant during 2003 season. The most susceptible variety was v_3(Top kapi) (3.56 and 2.866) in 2002 and 2003 seasons, respectively. Whereas, the least susceptible variety was v_2(Escandarani) (2.68 and 1.923) in 2002 and 2003 seasons, respectively, while, v_1(Amco star) (3.06 and 2.558) recorded intermediate rank of infestation in 2002 and 2003 seasons, respectively.

4.4.1.1.4. Mean yield (kg / plot).

With regard to the influence of squash plants cultivars on squash yield, data presented in **Table (23)** show that yield was affected no significant by cultivars. V2 (Escandarani) yielded the highest mean of (56.00) and (64.25) kg/plot in 2002 and 2003 seasons, respectively, followed by v1 (Amco star) cultivars yield mean of (48.75 and 57.58) kg/plot in two seasons, respectively. While v_3 (top kapi) yielded the lowest mean of (42.75 and 48.58) kg/plot in first and second seasons, respectively.

The results agee with finding of **Herakly and Abou-El-Ezz (1970) , Bellows *et al* . (1988), Hegab and Helaly (1989) , Hady (1994), Aly (1996), Hashem (1997)** and **El-Gindy (2002)** who reported that varieties varieties of Cucurbitaceous and Leguminous plants had a great effect on the incidence of homopterous insects .

4.4.1.2. Effect of fertilization :

The recommended rates and four treatment of potassium fertilization were applied to clear there effects on the population abundance of most dangerous pests attacking squash plants grown during two successive seasons of 2002 and 2003.

The obtained results could be discussed as follows.

Table(23): Effect of different varieties on the infestation of squash plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Varieties	Mean of insects number / sample												Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers						Aphid			
	Immature stages		Adult stage		*E.decipiens*		*E.decedens*		*B.hortensis*		*A.gossypii*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
V_1	7.63	6.99	4.82	4.62	3.289	2.069	2.328	2.33	2.75	2.268	3.06	2.558	48.75	57.58
V_2	7.01	4.64	4.36	3.91	2.591	1.468	2.083	1.373	2.435	1.943	2.68	1.923	56.00	64.25
V_3	8.24	7.65	5.40	5.20	3.442	2.834	2.648	2.295	2.980	2.578	3.56	2.866	42.75	48.58
F.V	11.735*	2.049	69.282**	2.224	24.347**	9.575*	15.517*	8.608	21.358**	5.929	0.553	9.115*	3.389	2.320

V1=Amco star V2=Escandarani f1 V3=Top kapi Hybrid squash

4.4.1.2.1. Whitefly

a) Immature stages

Date recorded in **Table (24)** revealed that the differences between mean numbers of immature stage whitefly recorded with different studied fertilization treatments were statistically significant during the two seasons (2002 and 2003). During the first year (2002), the four treatments could be arranged in a descending order according to their efficiency on the incidence of whitefly (immature) insects on squash leaves as follows: f4 (control or without potassium fertilization) (11.14), f_1(50 kg/feddan of potassium fertilization) (7.45), f_2(100 kg/feddan of potassium fertilization) (6.44) and f3(200 kg/feddan of potassium fertilization) (5.46). The second season of 2003 the descending order of these treatments was as follows : f_4(control) (8.18),f_1(50 kg/feddan of potassium fertilization) (6.92) , f_2(100 kg/feddan of potassium fertilization) (5.73) and f_3(200 kg/feddan of potassium fertilization) (4.89).

b)Adult stage:

In respect to the influence of fertilizers on the adult stage of white fly population density, statistical analysis of variance of the data presented in **Table (24)** indicated that the fertilization treatments had a significant effect on the levels of population abundance of whitefly (adult stage) in both season. The highest number of adult stage population density was obtained with f_4(control) showing (7.35 and 5.56) adult stages/sample in the first and second season, respectively. The corresponding lowest population (3.30 and 3.59) were recorded incase of f_3(200

kg/feddan of potassium fertilization) treatment in 2002 and 2003 seasons.

4.4.1.2.2. Leafhoppers:

a)*Empoasca decipiens* (Paoli)

Analysis of variance of the data recorded in **Table(24)** showed that the effects of various tested fertilization treatments on the rate of infestation of squash by *E. decipiens* were significant in the first and second seasons.

Data given in **Table (24)** show that the highest mean numbers of the squash *E. decipiens* (4.440 and 2.616) insects/sample occurred on the f_4(control) squash plants during 2002 and 2003 seasons, respectively. Whereas the lowest population density of this pest was recorded with f_3(200 kg/feddan of potassium fertilization) treatment (2.231 and 1.589) in 2002 and 2003 seasons.

b)*Empoasca decedens* (paoli).

In respect to the influence of fertilization on the *E. decedens* population density, statistical analysis of variance of the data presented in **Table (24)** indicated that the fertilization treatment had a significant on the levels of population abundance of *E. decedens* in both seasons. The highest number of *E. decedens* population density was obtained with f_4(control) showing (3.51 and 2.44) *E. decedens* / sample in the first and second seasons respectively. The corresponding lowest population (1.48 and 1.60) were recorded in case of f_3 (200 kg/feddan of potassium fertilization) treatment in 2002 and 2003 seasons.

c) *Balclutha hortensis* (Lindb):

The data recorded in **Table (24)** show that the effect of using various fertilizers on the rate of infestation of squash plants with *B. hortensis* were statistically significant during the two seasons of study.

During 2002 and 2003 seasons, the four treatment could be arranged in a descending order according to mean numbers of *B. hortensis*, recorded/sample as follows: f_4(control) (3.922 and 2.700), f_1(50 kg/feddan of potassium fertilization) (2.896 and 2.566), f_2(100 kg/feddan of potassium fertilization) (2.308 and 2.196) and f_3(200 kg/feddan of potassium fertilization) (1.761 and 1.489) in 2002 and 2003 seasons, respectively.

4.4.1.2.3. Aphids

a) *Aphis gossypii* (Glover):

Data presented in **Table (24)** revealed that the differences between mean numbers of aphids recorded with different studied fertilization treatments were not statistically significant during 2002 season and were statistically significant during 2003 season. During the first year, the four treatments could be arranged in a descending order according to their efficiency on the incidence of aphids insects on squash sample as follows: f_4(control)(3.91), f_1(50 kg/feddan of potassium fertilization) (3.24), f_2(100 kg/feddan of potassium fertilization) (2.82) and f_3(200 kg/feddan of potassium fertilization) (2.44), the second season of 2003, the descending order of these treatments was as follows: f_4(control) (3.29), f_1(50 kg/feddan of potassium fertilization) (2.65), f2(100 kg/feddan of potassium fertilization) (2.24) and f_3(200 kg/feddan of potassium fertilization) (1.61).

In general, as clearly shown from the results in Table (26) f_4(control) plants appeared a relatively high degree of susceptibility to whitefly, leafhoppers and aphids invasion as composed with fertilized this indicate that f_1(50 kg/feddan of potassium fertilization), f_2(100 kg/feddan of potassium fertilization) and f_3(200 kg/feddan of potassium fertilization) increase the relative resistance of plants against this insects attack.

4.4.1.2.4. Mean yield (kg/plot).

As clearly shown from the results in **Table (24)** , the yield of squash plants treated with the different tested treatments was highly significant influenced by changing the fertilization program in the two seasons. The highest yield (70.33 and 76.44) kg/plot was recorded with f3 (200 kg potassium fertilization/ feddan) in 2002 and 2003 seasons. Whereas, the lowest yield of (37.00 and 38.78 kg/plot) was obtained in case of f4 (control without potassium fertilization/feddan) treatments during the first and second seasons, respectively. The other tested treatments gave a moderate yield.

Generally, in all treatments, the mean yield in the first season of 2002 was lowest than that obtained in the second of 2003.

The obtained results are in agreement with those obtained by **Ram** and **Gupta (1992), Hashem (1998),** and **El-Sisi** and **Mousa (2001)** who stated that the incidence of the aforementioned homopterous insects on squash plants varied greatly according to the applied fertilizers.

Table (24) : Effect of different levels of potassium fertilization on the infestation of squash plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Fertilization	Mean of insects number / sample												Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers						Aphid			
	Immature stages		Adult stage		*E.decipiens*		*E.decedens*		*B.hortensis*		*A.gossypii*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
F_1	7.45	6.92	5.08	5.10	3.077	2.360	2.503	2.14	2.896	2.566	3.24	2.650	40.00	49.67
F_2	6.44	5.73	3.72	4.05	2.677	1.931	1.906	1.83	2.308	2.196	2.82	2.238	49.33	62.33
F_3	5.46	4.89	3.30	3.59	2.231	1.589	1.488	1.60	1.761	1.489	2.44	1.616	70.33	76.44
F_4	11.14	8.18	7.35	5.56	4.440	2.616	3.513	2.44	3.922	2.700	3.91	3.291	37.00	38.78
F.V	51.876**	4.598*	65.512**	4.153*	24.479**	5.328**	26.795**	3.215*	45.875**	8.595**	1.906	25.982**	6.248**	9.722**

F1= 50kg of potassium fertilization / feddan. **F2**=100kg of potassium fertilization / feddan.

F3=200kg of potassium fertilization / feddan. **F4**=control (without potassium fertilization).

4.4.2. Pepper plants (*Capsicum annum L.*).

4.4.2.1. Effect of varieties.

4.4.2.1.1. Whitefly:

a) Immature stages:

Data presented **in Table (25)** show that the differences between mean number of whitefly on v_1(Anaheium) and other varieties v_2(Marconi) and v_3(Yellow wander) were statistically significant for the first (2002) season of study, but no significant differences were found between varieties in second (2003) season.

The intensity of whitefly infestation in 2002 and 2003 seasons measured as mean number of insects/sample could be arranged in 2002 season in a ascending order as follows : v_1(Anaheium) (5.096), v_2(Marconi) (5.653) and v_3(Yellow wander) (6.334) insects/sample, while in 2003 season, these varieties could be also arranged descending as follows: v_3(Yellow wander) (4.987), v_2(marconi) (4.564) and v_3(Anaheium) (4.268) insects/sample.

It was obvious that in the two seasons of study, cultivars v_1(Anaheium) proved to be the least susceptible host plant for whitefly infestation, while the variety v_2 (marconi) and v_3 (Yellow wander) appeared to be the most susceptible pepper varieties.

Generally, it is obvious that all tested pepper varieties were highly infested in 2002 season than in 2003 season, **Table (25).** This may be due to the differences in environmental factors

e.g. weather factors and natural enemies prevailing in the two seasons of investigation.

b)Adult stage:

Data given in **Table (25)** revealed that the differences between mean numbers of whitefly on the three tested pepper varieties were statistically highly significant during 2002 season and were statistically insignificant during 2002 season. The most susceptible variety was v_3 (Yellow wander) (4.33) and (2.824) in 2002 and 2003 seasons, respectively. Where the least susceptible cultivars was v_1(Anaheium) (2.99) and (2.319) in 2002 and 2003 seasons , respectively. While v_2(marconi) (3.33 and 2.527) in 2002 and 2003 seasons, respectively recorded intermediate rank of infestation.

4.4.2.1.2. Leafhoppers

a) *Empoasca decipiens* (Paoli):

Highly significant differences could be obtained between *E. decipiens* infestation on all tested pepper varieties during 2002 and 2003 seasons, **Table (25).**

The most susceptible variety was v_3 (Yellow wander) (3.264 and 2.522) in 2002 and 2003 seasons , respectively . whereas the least susceptible v_1(Anaheium) (1.990 and 1.982) in 2002 and 2003 seasons respectively, while v_2(Marconi) cultivars recorded intermediate rank of infestation (2.922 and 2.255) in 2002 and 2003 seasons, respectively.

b) *Empoasca decedens* **(Paoli):**

Also, highly significant differences were obtained between *E. decedens* infestation on v_1(anaheium) and other tested varieties v_2(Macroni) and v_3 (Yellow wander) in 2002 season while no significant differences was found between v_1, v_2 and v_3 during 2003 season. The most susceptible variety was v_3 (Yellow wander) (2.175 and 1.758) in 2002 and 2003 seasons respectively. Whereas, the least susceptible variety was v_1(Anaheium) (1.266 and 1.259) in 2002 and 2003 seasons respectively, while v_2(Marconi) (1.934 and 1.592) in 2002 and 2003 seasons recorded intermediate rank of infestation during the first and second seasons.

c) *Cicadulina chinai* **(Ghauri):**

Data given in **Table (25)** showed that the differences between mean numbers of *C. chinai* on the three tested pepper varieties were statically significant during 2002 season and were not significant during 2003 season. The most susceptible variety was v_3 (Yellow wander) (1.780 and 1.580) in 2002 and 2003 seasons, respectively. Whereas, the least susceptible variety was v_1(1.142 and 1.268) in 2002 and 2003 seasons, respectively, while v_2(Marconi) recorded intermediate rank of infestation (1.658 and 1.434) in 2002 and 2003 seasons, respectively.

4.4.2.1.3. Mean yield (kg / plot).

With regard to the influence of pepper varieties on pepper yield, data presented in **Table (25)** show that the yield was highly significant affected by varieties v_1 (Anaheium) yielded the highest mean of (37.58 and 47.17) kg/plot in 2002 and 2003

Table (25) : Effect of different varieties on the infestation of pepper plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Varieties	Mean of insects number / sample										Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers							
	Immature stages		Adult stage		*E.decipiens*		*E.decedens*		*C.chinai*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
V_1	5.096	4.268	2.99	2.319	1.990	1.982	1.266	1.259	1.142	1.268	37.58	47.17
V_2	5.653	4.564	3.33	2.527	2.922	2.255	1.934	1.592	1.658	1.434	28.08	31.58
V_3	6.334	4.987	4.33	2.824	3.264	2.522	2.175	1.758	1.780	1.580	21.83	24.67
F.V	9.668*	0.308	21.139**	1.029	29.052**	1.174	144.05**	5.424	12.027*	2.185	21.411**	56.53**

V1=Anaheium **V2**=Marconi (sweet pepper) **V3**=Yellow wander

seasons, respectively, followed by v_2 (Marconi) cultivars yielded mean of (28.08 and 31.58) kg/plot in first and second seasons, respectively. While v_3(yellow wander) yielded the lowest mean (21.83 and 24.67) kg/plot in 2002 and 2003 seasons, respectively.

These results agreed with the finding of **Hegab *et al.* (1989c), Zidan (1993)** at Egypt and **Yasarakinci** and **Hincal (2000)** in Turkey who reported that varieties of Solanaceous plants had agreed effect on the incidence of homopterous inscets.

4.4.2.2. Effect of fertilization.

4.4.2.2.1. Whitefly:

a) Immature stages:

Data given in **Table (26)** show that the highest mean numbers of the immature stages of whitefly (6.807 and 5.496) insects/sample occurred on the zero or without potassium fertilization during 2002 and 2003 seasons, respectively.

Whereas, the lowest population density of these insects was recorded with f_3 (200 kg of potassium/feddan) (4.472 and 3.620) insects/sample in the first and second seasons.

In the two seasons the four treatment could be arranged in a descending order according to their influence on pepper infestation with immature stages of whitefly as follows: zero level (6.807 and 5.496), 50 /kg of potassium/feddan (6.381 and 4.993), 100/kg of potassium/feddan (5.117 and 4.316), 200/kg of potassium/feddan (4.472 and 3.620) insects/sample in the first and second season respectively.

b) Adult stage:

Results recorded in **Table (26)** show that the effect of using various level of potassium fertilization on the rate of infestation of pepper plants with adult of whitefly was statistically highly significant during the two seasons of study.

The highest mean number of adult of whitefly (4.416 and 3.163) occurred on f_4 during 2002 and 2003 season respectively. The four treatments could be arranged in a descending order according to their influence on pepper infestation with adult of whitefly as follows: control or without potassium fertilization/ feddan (4.416 and 3.163), 50 kg potassium/feddan (3.888 and 2.698), 100kg potassium/feddan (3.328 and 2.401) and 200 kg potassium/feddan (2.562 and 1.964) insects/sample during 2002 and 2003 seasons respectively.

4.4.2.2.2 Leafhoppers :

a) *Empoasca decipiens* (Paoli)

Analysis of variance of the data recorded in **Table(26)** showed that the effects of various tested fertilization treatments on the rate of infestation of pepper by these species of leafhoppers were highly significant in the first and second season.

During 2002 and 2003 seasons, the four treatments could be arranged in a descending order according to mean number of *E. decipiens* recorded per sample as follows: zero potassium fertilization (3.579 and 2.671), 50kg potassium/feddan (2.966 and 2.428), 100 kg potassium/ feddan (2.427 and 2.117) and 200

kg potassium/feddan (1.930 and 1.796) for two seasons, respectively.

b) *Empoasca decedens* (Paoli)

The highest mean numbers of *E. decedens* (2.392 and 2.012) insects/sample occurred on control or without potassium fertilization/feddan pepper plants during 2002 and 2003 seasons respectively. Whereas, the lowest population density of this pest was recorded with 200 kg potassium/feddan (1.180 and 1.048), 100 kg potassium/feddan (1.601 and 1.431) and 50 kg potassium/feddan (1.993 and 1.654) insects/sample during two seasons respectively.

c) *Cicadulina chinai* (Ghauri)

Results in **Table (26)** show that the effect of the use four treatments on the rate of infestation of pepper plants with *C. chinai* was statistically significant during the two seasons of study.

The highest mean numbers of *C. chinai* (1.924 and 1.901) insects/sample occurred on the control or without potassium fertilization/feddan pepper plants during 2002 and 2003 seasons, respectively. whereas, the lowest population density of this pest was recorded with 200 kg potassium/ feddan (1.370 and 1.282), 100kg potassium/feddan (1.128 and 0.976) and 50kg potassium/ feddan (1.684 and 1.551) insects/sample during two seasons respectively.

Table (26) : Effect of different levels of potassium fertilization on the infestation of pepper plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Fertilization	Mean of insects number / sample										Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers							
	Immature stages		Adult stage		*E.decipiens*		*E.decedens*		*C.chinai*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
F_1	6.381	4.993	3.888	2.698	2.966	2.428	1.993	1.654	1.684	1.551	26.78	29.78
F_2	5.117	4.316	3.328	2.401	2.427	2.117	1.601	1.431	1.370	1.282	30.44	38.67
F_3	4.472	3.620	2.562	1.964	1.930	1.796	1.180	1.048	1.128	0.976	39.00	44.11
F_4	6.807	5.496	4.416	3.163	3.579	2.671	2.392	2.012	1.924	1.901	20.44	25.33
F.V	9.511**	2.734	9.493**	6.446**	40.649**	7.356**	18.586**	6.663**	10.946**	18.799**	10.953**	6.536**

F1= 50kg of potassium fertilization / feddan. **F2**=100kg of potassium fertilization / feddan.
F3=200kg of potassium fertilization / feddan. **F4**=control (without potassium fertilization).

4.4.2.2.3. Mean yield (kg / plot)

As clearly shown from the results in **Table (26),** the yield of pepper plants treated with the different tested treatments was highly significant in flounced by fertilization treatments in the first and second seasons. The highest yield of (39.00 and 44.11) kg / plot was recorded with f_3(200 kg potassium fertilization/ feddan) in first and second seasons, respectively. Whereas, the lowest yield of (20.44 and 25.33) kg/plot were obtained in case of f_4(control) in 2002 and 2003 seasons, respectively. The other tested treatments gave a moderate yield.

These results agreed with obtained by **El-Sharkawy (1989) , Hashem (1998)** and **Baghour *et al.* (2001)** and **El-Gindy (2002)** who stated that the incedent of the aforementioned homopterous insects on wheat, leguminous and Solanaceous plants varied greatly according to applied fertilizers.

4.4.3. Eggplant plants

4.4.3.1. Effect of varieties

4.4.3.1.1. Whitefly:

a) Immature stages:

As seem from **Table (27)** immature stages of whitefly on the three tested eggplant varieties the difference between mean numbers were statistically not significant for the two seasons of study. v_3(Longpurple) showed the lowest mean numbers of immature stages of whitefly infestation recording (17.64 and 11.664) insects/sample for both seasons respectively. Whereas those of three varieties appeared relatively high numbers of

immature stages recording (21.17 and 16.347) individuals/ sample in case of v1(Black beauty) during the first and second seasons respectively. While v_2 (White Baladi) cultivars recorded intermediate rank of infestation (19.81 and 14.992) for two seasons respectively.

b) Adult stage:

Data given in **Table (27)** obtained highly significant in 2002 season but not significant in 2003 between whitefly immature stage infestation on three varieties cultivars. The highest mean numbers of whitefly recorded v_1(Black beauty) (9.50 and 7.364) individuals/sample for both seasons respectively. Whereas the v_2 (White Baladi) cultivars recorded intermediate rank of infestation (8.099 and 6.343) for the two seasons respectively. While v_3(Longpurple) cultivars recorded the lowest population density of (4.992 and 5.733) individuals/sample recorded for both seasons, respectively.

4.4.3.1.2. Leafhoppers

a) *Empoasca decipiens* (Paoli):

Date shown in **Table (27)** indicated that three varieties tested can be arranged descending according to the degree of eggplant infestation with *E. decipiens* as follows v_1(Black beauty) (4.461 and 4.290), v_2(White Baladi) (3.969 and 3.760) and v_3(Longpurple) (3.702 and 2.70) individuals/200 strokes for the first and second seasons respectively.

Statistical analysis indicate that the differences between mean numbers of *E. decipiens* and the three eggplant plants

varieties were not significant and highly significant during the two seasons of experimentations.

b) *Empoasca decedens* (Paoli):

Statistical analysis of obtained data appeared not significant differences between mean numbers of *E. decedens* and the three eggplant plants varieties. Data in Table (27) indicated that the lowest mean numbers recorded on v_3 (Longpurple) variety attacked by (2.750 and 2.746) insects/200 stroks. Whereas the highest mean numbers recorded on v_1(Black beauty) variety with (3.852 and 3.425) individuals/200 strokes for both seasons respectively.

c) *Cicadulina chinai* (Ghauri):

From data in **Table (27)** indicated that the three varieties tested can be arranged descending according to the degree of eggplant plants infestation with *C. chinai* as follows: v_1(Black beauty) variety infested with (3.113 and 2.848), v_2 (White Baladi) infested by (2.917 and 2.568) and v_3(Longpurple (2.272 and 1.860) individuals/sample during two seasons respectively.

Statistical analysis indicated that differences between mean numbers of *C. chinai* on the three eggplant varieties were not significant during two seasons.

d) *Empoasca lybica* (de Berg):

Data given in **Table (27)** obtained the highest mean numbers of *E. lybica* recorded on v_1(Black beauty) variety with (8.786 and 6.163) individuals/sample for both seasons respectively. Whereas the lowest population density recorded on

Table (27): Effect of different varieties on the infestation of eggplant plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Varieties	Mean of insects number / sample												Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers									
	Immature stages		Adult stage		*E.decipiens*		*E.decedens*		*C.chinai*		*E.lybica*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
V_1	21.17	16.347	9.50	7.364	4.461	4.29	3.852	3.425	3.113	2.848	8.786	6.163	47.50	58.00
V_2	19.81	14.992	8.099	6.343	3.969	3.76	3.530	3.179	2.917	2.568	7.917	5.777	69.33	71.33
V_3	17.64	11.664	4.992	5.733	3.702	2.70	2.750	2.746	2.272	1.860	5.939	5.132	73.58	78.17
F.V	1.932	3.324	41.511**	8.630	2.096	12.188**	0.280	6.436	3.855	0.521	5.112	8.749	24.645**	1.451

V1=Black beauty **V2**=White Balady **V3**=Longpurple

v_3(Longpurple) variety infested by (5.939 and 5.132) individuals/ sample for both seasons, while the variety v_2 (White Baladi) recorded intermediate rank of infestation with (7.917 and 5.777) individuals/sample for both seasons respectively.

Statistical analysis indicated that the differences between mean numbers of *E. lybica* on the three eggplant varieties were not significant during two seasons of 2002 and 2003.

4.4.3.1.3. Mean yield (kg / plot)

With regard to the influence of eggplant varieties on eggplant yield, data presented in **Table (27)** show that the yield was affected highly significant in 2002 season but no significant in 2003 season by varieties. V_3(longpuple) yielded the highest mean of (73.58 and 78.17) kg/plot in 2002 and 2003 seasons, respectively. While v_1(Black beauty) yielded the lowest mean (47.50 and 58.00) kg/plot in 2002 and 2003 seasons, respectively.

These results agreed with findings of **El-Blook (1976), El-Sharkawy (1989), Hegab *et al.* (1989b and 1989c)** and **Fouda** and **Mohamed (1994)** who reprted that varieties of Solanaceous plants had agreat effect on incidece of homopterous insects.

4.4.3.2. Effect of fertilization.

4.4.3.2.1. Whitefly:

a) Immature stages.

Data given in **Table (28)** show that the highest mean numbers of whitefly immature stage f_4(23.22 and 16.71)

insects/sample occurred with control or without potassium fertilization/feddan during 2002 and 2003 seasons, respectively. Whereas the lowest population density of this pest was recorded with f_3(200kg potassium fertilization/feddan) (15.35 and 12.00) in the first and the second seasons, respectively. In the first season highly significant difference could be obtained between control and f_3 (200kg potassium fertilization/feddan) and all other tested fertilizers while the second seasons was not significant differences could be obtained between control and all other tested fertilizers.

b) Adult stage:

Analysis of variance of the data recorded in **Table(28)** showed that the effects of various tested fertilization treatments on the rate of eggplant plants infestation by adult stages were highly significant in the first and second seasons.

During 2002 and 2003 seasons, the four treatments could be arranged in a descending order according to mean number of adult stages recorded per sample as follows:control potassium fertilization/feddan f_4(11.28 and 8.988), (50kg potassium fertilization/feddan) f_1(8.292 and 6.569), (100kg potassium fertilization/feddan) f_2(6.332 and 5.501) and (200kg potassium fertilization/feddan) f_3(4.217 and 4.861) insects/sample respectively.

4.4.3.2.2. Leafhoppers

a) *Empoasca decipiens* (Paoli) :

The degree of infestation of eggplant plants by *E. decipiens* measured as mean numbers/sample as influenced by

four treatments of fertilization during to successive seasons of 2002 and 2003 are given in **Table (28).** Statistical analysis showed that the difference between the insects population densities recorded with four fertilizers treatment were significant in first season and highly significant in second season.

The highest levels of insects abundance were recorded with control or without potassium fertilization/feddan f_4(4.791 and 5.088) insects/sample during first and second seasons, respectively while the lowest insect abundance were observed by application of(200 kg potassium fertilization/feddan) f_3(3.158 and 1.796) insects/sample in the first and season seasons, respectively.

b) *Empoasca decedens* (paoli) :

Data recorded in **Table (28)** showed that differences between the four tested fertilization treatments proved to be statistically significant in 2002 season and highly significant during 2003 season of study.

During the first and second seasons the four treatments could be arranged in a descending order according to mean numbers of *E. decedens* recorded per sample as follows: f_4(control) (4.451 and 4.193), (50 kg potassium fertilization/ feddan) (4.151 and 3.720), (100kg potassium fertilization/ feddan) f_2(2.754 and 2.496) and (200 kg potassium fertilization/ feddan) f_3(2.152 and 2.058) insects/sample respectively.

c) *Cicadulina chinai* (Ghauri):

Data given in **Table (28)** show that the highest mean numbers *C. chinai* (3.759 and 3.380) insects/sample occurred

with f_4 (control) or without of potassium fertilization/feddan during 2002 and 2003 seasons, respectively. Whereas the lowest population density of this pest was recorded with (200 kg potassium fertilization/feddan) f_3(1.954 and 1.476) in the first and season seasons respectively. In the first season highly significant but the second season no significant differences could be obtained between f_4(control) and f_3(200 kg potassium mfertilization/feddan) and all other tested fertilizers.

d) *Empoasca lybica* (de Berg):

The given data in **Table(28)** showed that the effect of using for fertilization treatments on the rate of eggplant plants infestation with *E. lybica* was statistically highly significant during two seasons of study.

The highest mean numbers of *E. lybica* (9.814 and 6.843) insects/sample occurred on the f_4(control) during 2002 and 2003 seasons, respectively. While the lowest population density of this pest was recorded with f_3 (200 kg potassium fertilization/feddan) (5.369 and 4.556) insects/sample during the two seasons of study.

4.4.3.2.3. Mean yield (kg / plot)

As clearly shown from the results in **Table (28)** the yield of eggplant plants treated with the different tested treatments was highly significant between f_4(control) and other treatments influenced by changing the fertilization program in the two season. The highest yield of (77.78 and 85.78) kg/plot was recorded with f_3(200 kg potassium fertilization/feddan) in 2002 and 2003 seasons, respectively, whereas, the lowest yield of

Table (28) : Effect of different levels potassium fertilization on the infestation of eggplant plants by certain leaf insects along with yield during 2002 and 2003 seasons.

Fertilization	Mean of insects number / sample												Mean yield kg / plot	
	Whitefly *B.tabaci*				Leafhoppers									
	Immature stages		Adult stages		*E.decipiens*		*E.decedens*		*C.chinai*		*E.lybica*			
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
F_1	21.09	15.43	8.292	6.569	4.397	4.192	4.151	3.720	3.023	2.867	8.328	6.153	57.44	60.33
F_2	18.50	13.19	6.332	5.501	3.831	3.257	2.754	2.496	2.332	1.978	6.678	5.210	68.67	80.78
F_3	15.35	12.00	4.217	4.861	3.158	1.796	2.152	2.058	1.954	1.476	5.369	4.556	77.78	85.78
F_4	23.22	16.71	11.28	8.988	4.791	5.088	4.451	4.193	3.759	3.38	9.814	6.843	50.00	49.78
F.V	12.301**	2.399	32.897**	14.798**	4.638*	5.367**	3.512**	22.125**	8.684**	2.203	5.278**	8.557**	6.422**	6.290**

F1= 50kg of potassium fertilization / feddan. **F2**=100kg of potassium fertilization / feddan.
F3=200kg of potassium fertilization / feddan. **F4**=control (without potassium fertilization).

f_4(control) (without potassium fertilization/feddan) treatment (50.00 and 49.78) kg/plot during the first and second seasons, respectively. The other tested treatments gave a moderate yield.

Generally in all treatments, the mean yield in the second season 2003 was highly than that obtained in the first one of 2002.

The obtained results with those obtained by **Harrewijn (1970), Ram** and **Gupta (1992), Baghour *et al.* (2001), Hegab-Ola (2001)** and **El-Gendy (2002)** who stated that the incedence of aforementioned homopterous insects on plants varied greatly according to the applied fertilizers.

4.4.4. Cabbage plants

4.4.4.1. Effect of varieties

4.4.4.1.1. Whitefly

a) Immature stages:

From data given in **Table (29),** it could be stated that no significant difference was found between immature stages of whitefly infestation on v_1(Baladi) and other tested varieties v_2(Brunswick) and v_3(Copenhagen Market) during 2002 / 2003 season, while significant difference was found between v_1(Baladi), v_2(Brunswick) and v_3(Copenhagen Market) during 2003/2004 season.

The intensity of immature infestation on 2002/2003 and 2003/2004 seasons measured as mean numbers of insects/sample could be arranged in 2002/2003 and 2003/2004 seasons in a ascending order as follows: v_1(Baladi) (39.459 and 51.365),

v_2(Brunswick) (46.456 and 56.50) and v_3(Copenhagen Market) (50.302 and 63.328). It was obvious that in the two seasons of study, cultivars v_1(Baladi) proved to be the least susceptible host plant for immature stages of whitefly infestation, while the v_3(Copenhagen Market) and v_2(Brunswick) appeared to be the most susceptible cabbage variety.

Generally, it is obvious that all tested cabbage varieties were highly infested in 2003/2004 than in 2002/2003 season on **Table (29).**

b)Adult stage:

Data given in **Table (29)** revealed that the differences between the mean numbers of adult stages of whitefly on the three tested cabbage varieties were statistically no significant during 2002/2003 and 2003/2004 seasons. The most susceptible variety was v_3(Copenhagen Market) (16.352 and 20.888) in 2002/2003 and 2003/2004 seasons , respectively. Whereas the least susceptible variety was v_1(Baladi) (12.33 and 16.620) in 2002/2003 and 2003/2004 seasons. respectively. While v_2(Brunswick) (15.433 and 18.635) in two seasons recorded intermediate rank of infestation.

4.4.4.1.2. Leafhoppers

a) *Empoasca decipiens*

From results given in **Table (29),** it could be noticed that no significant effect was detected between all tested varieties during 2002/2003 and 2003/2004 seasons. The most susceptible variety was v_3(Copenhagen Market) (1.284 and 1.427) in two season respectively. Whereas the least susceptible variety was

v_1(Baladi) (0.895 and 1.213) in the first and second seasons, respectively. While v_2(Brunswick) recorded intermediate rank of infestation (1.059 and 1.272) in 2002/2003 and 2003/2004 seasons, respectively.

b) *Empoasca decedens*

As seen from **Table (29)** , *E. decedens* infestation on the three tested cabbage varieties were statistically no significant during the two seasons. The most susceptible variety was v_3(Copenhagen Market) (0.769 and 0.768) followed by v_2(Brunswick) (0.699 and 0.706) whereas v_1(Baladi) variety was the least susceptible, recording the respective values (0.575 and 0.591) individuals/sample in two seasons.

c) *Balclutha hortensis* (Lindb)

from results given in **Table (29),** it could be noticed that highly significant and no significant effect for the two seasons of study respectively. The intensity of *B. hortensis* infestation in 2002/2003 and 2003/2004 season measured as mean numbers of insects/sample varied infestation could be arranged in a descending order as follows: v_3(1.550 and 1.560), v_2(Brunswick) (1.423 and 1.514) and v_1(Baladi) (0.968 and 1.328).

It was obvious that in the two seasons of study, cultivars v_1(Baladi) proved to be least susceptible host plant for *B. hortensis* infestation, while the variety v_3(Copenhagen Market) appeared to be the most susceptible cabbage variety.

4.4.4.1.3. Aphids

a) *Brevicor yne brassicae* (Linnaeus)

As seen from **Table (29),** *B. brassica* infestation on the three tested cabbage varieties were statistically no significant and highly significant during the 2002/2003 and 2003/2004 seasons respectively. The most susceptible variety was v_3(Copenhagen Market) followed by v_2(Brunswick) whereas v_1(Baladi) variety was the least susceptible, recorded the respective values (38.550, 36.529 and 29.253) individuals/sample in 2002/2003 season and (49.219, 42.792 and 30.643) individuals/sample in 2003/2004 season.

b) *Myzus persicae* (Sulz)

From results given in **Table (29),** it could be noticed that no significant and significant effect was detected between varieties of cabbage in 2002/2003 and 2003/2004 seasons, respectively. The most susceptible variety was v_3(Copenhagen Market) (1.418 and 1.972) in two seasons, respectively.

Whereas the least susceptible v_1(Baladi) (1.150 and 1.313) in 2002/2002 and 2003/2004 seasons, respectively. While v_2(Brunswick) recorded intermediate rank of infestation (1.219 and 1.838) in two seasons, respectively.

4.4.4.1.4. Mean yield (kg/plot)

With regard to the influence of cabbage varieties on cabbage yield, data presented in **Table (29),** show that yield was affected highly significantly by cultivars. v_1(Baladi) yielded the highest mean of (91.00) and (84.17) kg/plot in 2002/2003 and

Table (29): Effect of different varieties on the infestation of cabbage plants by certain leaf insects along with yield during 2002/2003 and 2003/2004 seasons.

Varieties	Mean of insects number / sample														Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers						Aphids					
	Immature stages		Adult stages		*E.decipiens*		*E.decedens*		*B.hortensis*		*B.brassicae*		*M.persicae*			
	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04
V_1	39.459	51.365	12.33	16.620	0.895	1.213	0.575	0.591	0.968	1.328	29.253	30.643	1.150	1.313	91.00	84.17
V_2	46.456	56.50	15.433	18.635	1.059	1.272	0.699	0.706	1.423	1.514	36.529	42.792	1.219	1.838	67.25	61.58
V_3	50.302	63.328	16.352	20.888	1.284	1.427	0.769	0.768	1.550	1.560	38.550	49.219	1.418	1.972	64.08	59.00
F.V	0.718	11.964*	1.077	4.770	3.82	2.775	5.573	2.61	32.46**	2.757	1.337	25.91**	1.958	16.13*	72.09**	20.93**

V1= Baladi V2= Brunswick V3= Copenhagen Market

2003/2004 seasons, respectively, followed by v_2(Brunswick) cultivars yield mean of (67.25 and 61.58) kg/plot in two seasons, respectively. While v_3(Copenhagen) yielded the lowest mean of (64.08 and 59.00) kg/plot in first and second seasons, respectively.

Generally, in all varieties, the mean yield in the first season of 2002/2003 was higher than that obtained in the second season of 2003/2004.

These results agreed with the findings of **Abd El-Maksaud (1997), Soliman (1993), Hegab** and **Hassan (1989), Hegab *et al.* (1989d), Hegab** and **Helaly (1989) Ahman (1990), Soliman (1993), Ellis** and **Farrell (1995)** in England, **Ellis *et al.* (1999), Araceli *et al.* (2000)** in Argentina who reported that varieties of Cruciferous plants had a great effect on the indidence of homopterous insects.

4.4.4.2. Effect of fertilization

4.4.4.2.1. Whitefly

a) Immature stages

Data given in **Table (30)**, show that the highest mean numbers of immature stages (54.356 and 70.722) insects/sample occurred with f_4(control without potassium fertilization/feddan) during 2002/2003 and 2003/2004 seasons respectively. Whereas the lowest population density of this pest was recorded with f_3(200 kg potassium fertilization/feddan) (36.144 and 38.93) in the first and second seasons respectively. In 2003/2004 season highly significant and no significant in the 2002/2003 season

differences could be obtained between f_4(control) and all other tested fertilizers.

b) Adult stage:

Data recorded in **Table (30)** , showed that differences between the four tested fertilization treatments proved to be statistically highly significant during the 2003/2004 season and no significant during 2002/2003 season of study.

During 2002/2003 and 2003/2004 seasons, the four treatments could be arranged in a descending order according to mean number of adult stages of whitefly recorded per sample as follows: f_4(control) (19.376 and 23.282), f_1(50 kg potassium fertilization/feddan) (14.871 and 21.787), f_2(100kg potassium fertilization/feddan), (12.928 and 17.352) f_3 (200 kg potassium fertilization/feddan) (11.644 and 12.837) insects / sample respectively.

4.4.4.2.2. Leafhoppers

a) *Empoasca decipiens:*

Analysis of variance of the data recorded in **Table(30)** showed that the effects of various tested fertilization treatments on the rate of cabbage plants infestation by *E. decipiens* were highly significant in the first and second seasons.

During 2002/2003 and 2003/2004 seasons, the four treatments could be arranged in a descending order according to mean number of *E. decipiens* recorded per sample as follows: f_4(control) (1.374 and 1.700), f_1(50 kg potassium fertilization/ feddan) (1.260and1.513) f_2(100kg potassium fertilization/

feddan) (1.027 and 1.333) and f_3(200 kg potassium fertilization/ feddan) (0.655 and 0.668) insects/ sample, respectively.

b) *Empoasca decedens*

The degree of infestation of cabbage plants by *E. decedens* measured as mean numbers/sample as influenced by four treatments of fertilization during two successive season of 2002/2003 and 2003/2004 are given in**Table (30).** Statistical analysis showed that the differences between the insects population density recorded with four fertilizers treatment were highly significant.

The highest levels of insects abundance were recorded with f_4(control) (0.918 and 1.010) insects/sample during the first and second season respectively while the lowest insects abundance were observed by application of f_3(200kg potassium fertilization/feddan) (0.348 and 0.367) insects/sample in the first and second seasons respectively.

c) *Balclutha hortensis:*

Analysis of variance of the data recorded in **Table (30)** showed that the effects of various tested fertilization treatments on the rate of cabbage plants infestation by *B. hortensis* were highly significant in the second season and no significant in the first season.

During 2002/2003 and 2003/2004 seasons, the four treatments could be arranged in a descending order according to mean number of *B. hortensis* recorded per sample as follows: f_4(1.627 and 1.997), f_1(1.404 and 1.800), f_2(1.204 and 1.201) and f_3(1.019 and 0.872) insects/sample, respectively.

4.4.4.2.3. Aphids

b) *Brevicoryne brassicae* (Linnaeus)

Data recorded in **Table (30)** revealed that the differences between mean numbers of *B. brassicae* recorded with different studied fertilization treatments were statistically no significant in 2002/2003 season and highly significant, during 2003/2004 season.

During the two seasons, the four treatments could be arranged in a descending order according to their efficiency on the incidence of *B. brassicae* on cabbage plants as follows: f_4(control) (40.430 and 58.029), f_1(50kg potassium fertilization/ feddan) (37.460 and 47.432), f_2(100kg potassium fertilization/ feddan) (33.440 and 37.592) and f_3(200kg potassium fertilization / feddan) (27.779 and 20.486) insects/sample in 2002/2003 and 2003/2004 seasons respectively.

b)*Myzus persicae* (Sulz)

The given data in **Table (30)** showed that the effect of using four fertilization treatments on the rate of cabbage plants infestation with *M. persica* was statistically highly significant during the two seasons of study.

The highest mean numbers of *M. persicae* (1.723 and 2.477) insects/sample occurred on the f_4(control) during 2002/2003 and 2003/2004 seasons, respectively, While the lowest population density of this pest was recorded with f_3(200 kg potassium fertilization/feddan) (0.826 and 0.677).

Table(30): Effect of different levels potassium fertilization on the infestation of cabbage plants by certain leaf insects along with yield during 2002/2003 and 2003/2004 seasons.

Fertilization	Mean of insects number / sample														Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers						Aphids					
	Immature stages		Adult stages		*E.decipiens*		*E.decedens*		*B.hortensis*		*B.brassicae*		*M.persicae*			
	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04
F_1	49.340	66.104	14.871	21.787	1.260	1.513	0.827	0.868	1.404	1.800	37.460	47.432	1.416	2.080	61.56	56.44
F_2	41.782	52.501	12.928	17.352	1.027	1.333	0.632	0.509	1.204	1.201	33.440	37.592	1.084	1.598	87.33	80.33
F_3	36.144	38.93	11.644	12.837	0.655	0.668	0.348	0.367	1.019	0.872	27.779	20.486	0.826	0.677	87.78	81.44
F_4	54.356	70.722	19.376	23.282	1.374	1.700	0.918	1.010	1.627	1.997	40.430	58.029	1.723	2.477	59.77	54.78
F. V	1.042	161.70**	1.482	28.990**	6.733**	49.301	35.83**	39.55**	2.179	26.22**	1.944	86.519**	61.54**	146.96**	10.658**	16.735**

F1= 50kg of potassium fertilization / feddan. **F2**=100kg of potassium fertilization / feddan.
F3=200kg of potassium fertilization / feddan. **F4**=control (without potassium fertilization).

4.4.4.2.4. Mean yield (kg/ plot)

As clearly shown from the results in **Table (30),** the yield of cabbage plants treated with the different tested treatments was highly significant influenced by changing the fertilization program in the two seasons. The highest yield (87.33, 80.33) and (87.78, 81.44) kg/plot were recorded with f2 and f3 (100 and 200 kg potassium fertilization/feddan) in 2002/2003 and 2003/2004 seasons. Whereas, the lowest yield of (59.77 and 54.78) kg/plot was obtained in case of f_4(control without potassium fertilization/feddan) treatments during the first and second seasons, respectively. The other tested treatments gave a moderate yield.

Generally, in all treatments, the mean yield in the first season of 2002/2003 was highest than that obtained in the second of 2003/2004.

The obtained results are in agreement with those obtained by **Van Emden** and **Wearing (1965), Perrenoud (1977), Hegab – Ola (2001)** and **El-Gendy (2002)** who stated that the incidence of the aforementioned homopterous inscets on plants varied greatly according to the applied fertilizers .

4.4.5. Cauliflower plants

4.4.5.1. Effect of varieties.

4.4.5.1.1. Whitefly.

a) Immature stages:

Data given in **Table (31)** revealed that the differences between mean numbers of immature stages of whitefly on the

three tested cauliflower varieties were statistically no significant during 2002/2003 season, while highly significant difference was found between v_1(Sultani), v_2(Original) and v_3(Early Snowball) during 2003/2004 seasons.

The most susceptible variety was v_1(Sultani) (36.650 and 62.918) in 2002/2003 and 2003/2004 seasons, respectively. Whereas the least susceptible variety was v_3(Early Snowball) (23.018 and 37.783) in two seasons, respectively. While v_2(Original) in the first and the second seasons, respectively recorded intermediate rank of infestation.

b) Adult stage:

Highly significant differences were obtained between adults stages of whitefly infestation on all tested cauliflower varieties during 2003/2004 season and no significant in 2002/2003 season. The most susceptible variety was v_1(Sultani) (11.758 and 21.490) in two season. Whereas, the least susceptible variety was v_3(Early Snowball) (8.441 and 12.948) in 2002/2003 and 2003/2004 seasons, respectively. While v_2(Original) (9.972 and 19.378) in first and second seasons recorded intermediate rank of infestation during the two seasons.

4.4.5.1.2. Leafhoppers.

a)*Empoasca decipiens.*

from results given in **Table (31),** it could be noticed that no significant effect was detected between all tested varieties during 2002/2003 and 2003/2004 seasons, the most susceptible variety was v_1(Sultani) (1.161 and 1.444) in first and second seasons, respectively. Whereas the least susceptible variety was

v_3(0.820 and 0.944) in two seasons. While v_2(Original) (0.962 and 1.342) in 2002/2003 and 2003/2004 recorded intermediate rank of infestation during the first and second seasons.

b) *Empoasca decedens:*

from results given in **Table (31),** it could be noticed that highly significant effect was detected between v_3(Early Snowball), v_2(Original) and v_1(Sultani) during 2002/2003 and 2003/2004 seasons. While the most susceptible variety was v_1(0.678 and 0.733) in the first and second seasons, respectively.

Whereas the least susceptible v_3(Early Snowball) (0.425 and 0.463) insects/sample in first and second seasons, respectively. While v_2(Original) recorded intermediate rank of infestation (0.564 and 0.651) insects/sample in 2002/2003 and 2003/2004 seasons, respectively.

c) *Balclutha hortensis :*

As seen from **Table (31)** *B. hortensis* infestation on the three tested cauliflower statistically highly significant during 2002/2004 season and no significant during 2002/2003 season. The most susceptible variety was v_1(Sultani) (1.353 and 2.06) insects/sample. Followed v_2(Original) (1.208 and 1.886) individuals/sample. Whereas v_3(Early Snowball) (1.113 and 1.309) insects/sample was the least susceptible in the first and second seasons, respectively.

4.4.5.1.3. Aphids :

a) *Brevicoryne brassicae* (Linnaeus)

Data given in **Table (31)** revealed that the differences between mean numbers of *B. brassica* on the three tested cauliflower varieties were statistically no significant and highly significant for the first and the second seasons of study. The most susceptible cauliflower variety was v_1(Sultani) (19.397 and 30.168) insects/sample while the least susceptible cauliflower variety was v_3(Early Snowball) (13.807 and 18.423) insects/ sample in two seasons of study.

b) *Myzus persicae* (Sulz)

data given in **Table (31)** show that the highest mean numbers of *M. persicae* (2.508 and 3.469) individuals/sample occurred with v_1(Sultani) in two seasons, respectively. Whereas the lowest population density of this pest was recorded. v_3(Early Snowball) (2.048 and 2.078) in two seasons, respectively while v_2(Original) in the first and the second seasons, respectively recorded intermediate rank of infestation (2.321 and 3.141) insects/sample.

Generally, from the obtained results in could be concluded that v_1(Sultani) cauliflower variety was more susceptible to infestation with whitefly, leafhoppers and aphids, while v_3(Early Snowball) was the least susceptible ones.

4.4.5.1.4. Mean yield (kg/plot)

With regard to the influence of cauliflower varieties on cauliflower yield, data presented in **Table (31)** show that yield

Table(31): Effect of different varieties on the infestation of cauliflower plants by certain leaf insects along with yield during 2002/2003 and 2003/2004 seasons.

Varieties	Mean of insects number / sample														Mean yield kg/plot	
	Whitefly *B.tabaci*				Leafhoppers						Aphids					
	Immature stages		Adult stages		*E.decipiens*		*E.decedens*		*B.hortensis*		*B.brassicae*		*M.persicae*			
	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04	02/03	03/04
V_1	36.650	62.918	11.758	21.490	1.161	1.444	0.678	0.733	1.353	2.06	19.397	30.168	2.508	3.469	42.50	38.00
V_2	32.046	56.708	9.972	19.378	0.962	1.342	0.564	0.651	1.208	1.886	17.818	27.098	2.321	3.141	45.83	41.75
V_3	23.018	37.783	8.441	12.948	0.820	0.944	0.425	0.463	1.113	1.309	13.807	18.423	2.048	2.078	56.75	51.83
F.V	1.390	378.01**	0.665	160.77**	2.070	5.453	27.73**	22.18**	0.434	116.50**	2.957	24.24**	1.723	14.79*	48.68**	12.21*

V1=Sultani V2=Original V3=Early snowball

was affected highly significantly by cultivars. V3 (Snowball) yielded the highest mean of (56.75) and (51.83) kg/plot in 2002/2003 and 2003/2004 seasons, respectively, followed by v_2(Original) cultivars yield mean of (45.83 and 41.75) kg/plot in two seasons, respectively. While v_1(Sultani) yielded the lowest mean of (42.50 and 38.00) kg/plot in first and second seasons, respectively.

Generally, in all varieties, the mean yield in the first season of 2002/2003 was higher than that obtained in the second season of 2003/2004.

These results agreed with the findings of **Abd El-Maksaud (1997) , Soliman (1993) , Hegab** and **Hassan (1989), Hegab *et al.* (1989d), Hegab** and **Helaly (1989) Ahman (1990), Soliman (1993), Ellis** and **Farrell (1995)** in England, **Ellis *et al.* (1999), Araceli *et al.* (2000)** in Argentina who reported that varieties of Cruciferous plants had a great effect on the indidence of homopterous insects.

4.4.5.2. Effect of fertilization.

4.4.5.2.1. Whitefly.

a) Immature stages:

Data recorded in **Table (32)** revealed that the differences between mean numbers of immature stages of whitefly recorded with different studied fertilization treatments were statistically highly significant, during 2002/2003 and 2003/2004 seasons.

During the two seasons, the four treatments could be arranged in descending order according to their efficiency on the

incidence of immature stages of whitefly on cauliflower plants as follows: control f_4(without potassium fertilization/feddan (41.680 and 67.083): f_1(50 kg potassium fertilization/feddan) (33.001 and 56.709), f_2(100kg potassium fertilization/feddan) (25.654 and 46.197) and f_3(200 kg potassium fertilization/ feddan) (21.949 and 39.890) insects/sample in 2002/2003 and 2003/2004 seasons respectively.

b) adult stage:

The given data in **Table (32)** showed that the effect of using four fertilization treatments on the rate of cauliflower plants infestation with adult stages was statistically no significant and highly significant during the two seasons of study.

The highest mean numbers of adult stages (12.881 and 22.911) insects/sample occurred on the f_4(control) during first and second seasons, respectively. While the lowest population density of this pest was recorded with f_3(200 kg potassium fertilization/feddan) (7.861 and 13.654) insects/sample during the two seasons of study.

4.4.5.2.2. Leafhoppers.

a) *Empoasca decipiens*.

Data recorded in **Table (32)** revealed also that the differences between mean numbers of *E. decipiens* recorded with different studied fertilization treatments were statistically highly significant. During the two seasons, the four treatments could be arranged in a descending order according to their efficiency on the incidence of *E. decipiens* insects on cauliflower plants as follows: f_4(control) (1.309 and 1.621), f_1 (50kg potassium