Results and Discussion

RESULTS AND DISCUSSION

PART I

1-Population density of tomato whilefly, *Bamsia tabaci* on certain vegetable crops and relationship with some meteorological factors during growing seasons:

1-Summer Plantations:

Susceptibility of certain vegetable crops to tomato whitefly, *Bemisia tabaci* (Genn) were tested on three crops (Squash & tomato and Eggplant) to give an idea about the preference of the insect to those hosts under some meteorological factors of Max & Min temperature and relative humidity. The experiment period was from 22 *th* June to 27*th* September 1998, while the second season was from 12th July to 18 *th* October 1999. Data were presented in table 1 & 2 during summer season as follow:

1-A. Tomato whitefly adults during season 1998:

1-A. a Squash crop:

The results of tomato whitefly, *B. tabaci* (*Homoptera: Aleyrodidae*) on squash in table 1 and fig 1 showed that the infestation started from June 22, giving 169 adults/sample (10 leaves) and fluctuated reaching the maximum 370 adult/sample on August 23 *rd* and declined to 233 adults on 2 *th* August.

The population of adults recorded 3 peaks on squash, the first 307 individuals sample on July 26 *th*, the second was on August 23 *th* recording 370 adults/sample and the third was 342 adults/sample on September 13 *th* during season 1998.

Statistical analysis showed that non significant correlation between the Max and Min of temperature &

relative humidity and population of adults on squash during 1998.

1-A. b. Tomato crops:

Weekly records of *B. tabaci* adults abundance were presented in table (1) and illustrated in Fig (1) indicate that tomato leaves were found infested with numbers of adults throughout the whole period of plant growth. The recorded means of adults varied between increasing and decreasing from one week; to another but three peaks in the adults abundance could be detected in tomato plants in 1998, the highest one estimated 311 adults samples on July 26 while the two other peaks estimated 292 and 303 adults/sample that were recorded on August, 23 and September, 13 respectively. The end of gorowing season was 245 adults on 27 *th* September.

Statistical analysis showed non significant positive correlation between the maximum and minimum temperature and the population of *B. tabaci* adults on tomato plants while it was non significant and negative with the relative humidity.

1. A. c Eggplant crops:

It is clearly evident from data present in table (1) that plants of eggplant harbourd lower population than the two other vegetable crops (squash and tomato) at the beginning of summer seasons (134 adults/sample) while by the end season (the last five inspections).

The population increased on eggplants. Throughout the plant growth period, the numbers of *B. tabaci* adults recorded "3" peaks. The mean number of adults of the highest peak was 425 adults/sample by the end of September. The second peak was noticed on July 12 *th* recording 178 adults/sample and the third one was "288" adults/sample in 23 *rd* of August.

Table (1): Population density of tomato white fly adults on certain vegetable crops and relationship with meteorological factors during season 1998.

Sampling Date	Vegetable crops			Meteorological factors		
	Squash	Tomato	Egg plant	Temp max	Min	R. H%
Jun 22	169	163	134	33.2	18.9	85
29	236	219	126	34.6	21.0	86
Jul 5	234	237	142	38.2	22.2	86
12	235	228	178	33.3	20.2	86
19	260	243	132	35.0	23.0	87
26	307	311	166	35.5	21.2	86
Aug 2	233	197	196	38.4	25.0	81
9	239	224	213	40.9	27.5	78
16	260	200	211	37.2	25.2	80
23	370	292	288	37.9	26.5	80
30	320	244	361	37.0	24.8	80
Sept 6	322	301	398	37.2	23.8	84
13	342	303	366	40.4	24.5	79
20	320	238	414	37.8	22.0	77
27	308	245	425	33.3	20.7	78
Total	4155	3645	3750	549.9	346.5	1233

Max. temp: N. S(+): N.S (+): N S (+)
Min. temp: N.S (+) N.S (+): N.S (+)
R.H: N.S (–) N.S (–): S. (+) r = 0.718 8c t_r = 3.72

N.S = non significant
S = Significant.

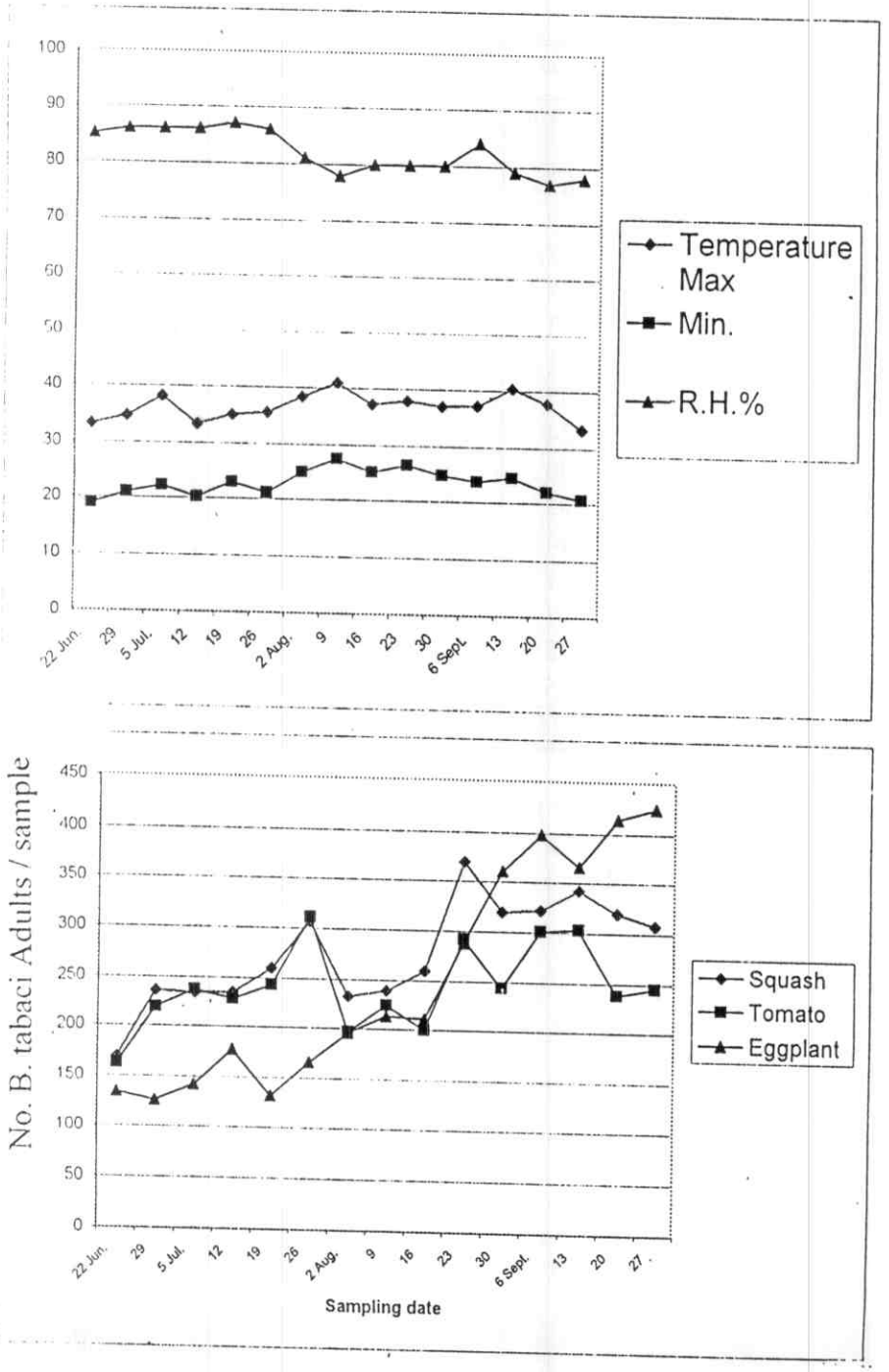


Fig. (1) : Population density of tomato whitefly adults on certain vegetable crops and relationship with some meteorological factors during season 1998

According the obtained correlation values, it is clear that there was non significant correlation with maximum and minimum temperature, while it was significant and positive with R.H in table (1) and fig (1).

Data in table (1) appeared that during 1998 summer season the squash received highest total number 4155 adults of *B. tabaci*/sample followed eggplants 3750 and the lowest total number was on tomato plants 3645 adults.

1. B. Tomato whitefly adults during the second season 1999:

1. B. a. Squash:

Data obtained in table (2) and fig (2) cleared that the number of *B. tabaci* began with 147 adults/sample on 12 *th* July and increased to reach the 1 *st* peak 302 adults/sample on 23 *th* August and infestation decreased and raised to reach 2 *nd* peak 287 adults on 4 *th* October and decreased to reach 194 adults/sample on 18 *th* October.

1. B. b. Tomato crop:

Tomato plants cultivated in summer plantation were found to be infested with *B. tabaci* adults but the considerable infestations were noticed and recorded peaks during 1999 summer season. The beginning of infestation was 152 adults/sample and the numbers increased gradually to 229 on 26 *th* July to appear the population curve as fastened during the next three weeks, and reaching to first peak 247 adults/sample at 9 *th* August, while decreased gradually to reach the lowest number (150 adults/sample) on 13 *th* September population raised to each the second peak (228 adults/sample) on the 4 *th* of October and the number declined to reach 138 adults at the end of the summer season.

Table (2): Population density of tomato white fly adults on certain vegetable crops and relationship with meteorological factors during season 1999.

Sampling Date	Vegetable crops			Meteorological factors		
	Squash	Tomato	Egg plant	Temp max	Min	R. H%
Jul. 12	147	152	135	34.6	22.4	81
19	173	191	136	36.0	23.0	80
26	223	229	183	38.8	22.3	81
Aug 2	265	246	188	34.3	21.6	81
9	223	247	186	34.2	22.4	81
16	231	224	172	37.8	23.4	84
23	302	197	234	38.6	27.0	84
30	191	176	178	35.8	25.7	84
Sept 6	231	169	227	30.9	21.0	72
13	206	150	186	36.0	24.7	84
20	217	160	209	36.7	23.9	84
27	220	215	188	36.7	24.3	84
Oct 4	287	228	205	36.6	29.0	85
11	220	166	154	34.6	23.3	84
18	194	138	194	33.9	23.0	84
Total	3330	2888	2775	535.5	357.0	1233

Max. temp: N. S(+): N.S (+): N S (–)
Min. temp: N.S (+) N.S (+): N.S (+)
R.H: N.S (+): N.S (+): N.S (+)

N. = non significant
S = Significant.

1. B. c. Eggplant crop:

Data presented in table (2) and fig (2) indicated that adult number started with 135 adults/sample on 12 *th* July and increased to reach a peak 234 adults on 23 *th* August. Population of *B. tabaci* fluctuated to reach the 2 *nd* peak 205 adults/sample on 4 *th* October and decelined to 154 adults/sample on 11 *th* October.

Regarding the seasonal total numbers of *B. tabaci* adults on the three vegetable summer crops it is clear that the highest population of *B. tabaci* adults was on squash (3330 adults/sample) followed by tomato (2888 adult/sample) and the lowest one was on eggplant (2775 adult/sample).

Statistical analysis showed non singnificant correlation between meteorological factors including (Max & Min temperature and R.H.) and *B. tabaci* adults on the three tested crops (squash, tomato and eggplant) which was negative with max temperature on eggplant and positive with min temperature and relative humidity during 1999 summer season.

1. C. Tomato whitefly nymphs during season 1998:

1. C. a. Squash crop:

Data in table (3) & fig (3) cleared that the population of nymphs was "132" nymphs/sample (10 $inch^2$) on 22, June and fluctuated between the increased and decreased until reached to the 1 *st* peak 171 nymphs/sample on July, 26 and 2 *nd* peak 216 nymphs/sample on August 23 *rd* and the third peak was "206" nymphs/sample on September, 20 after that declined to 176 nymphs/sample on 27 *th* September.

The correlation between max & min temperature and nymphs on squash was non significant and positive but with relative humidity was significant and negative during 1998 summer season.

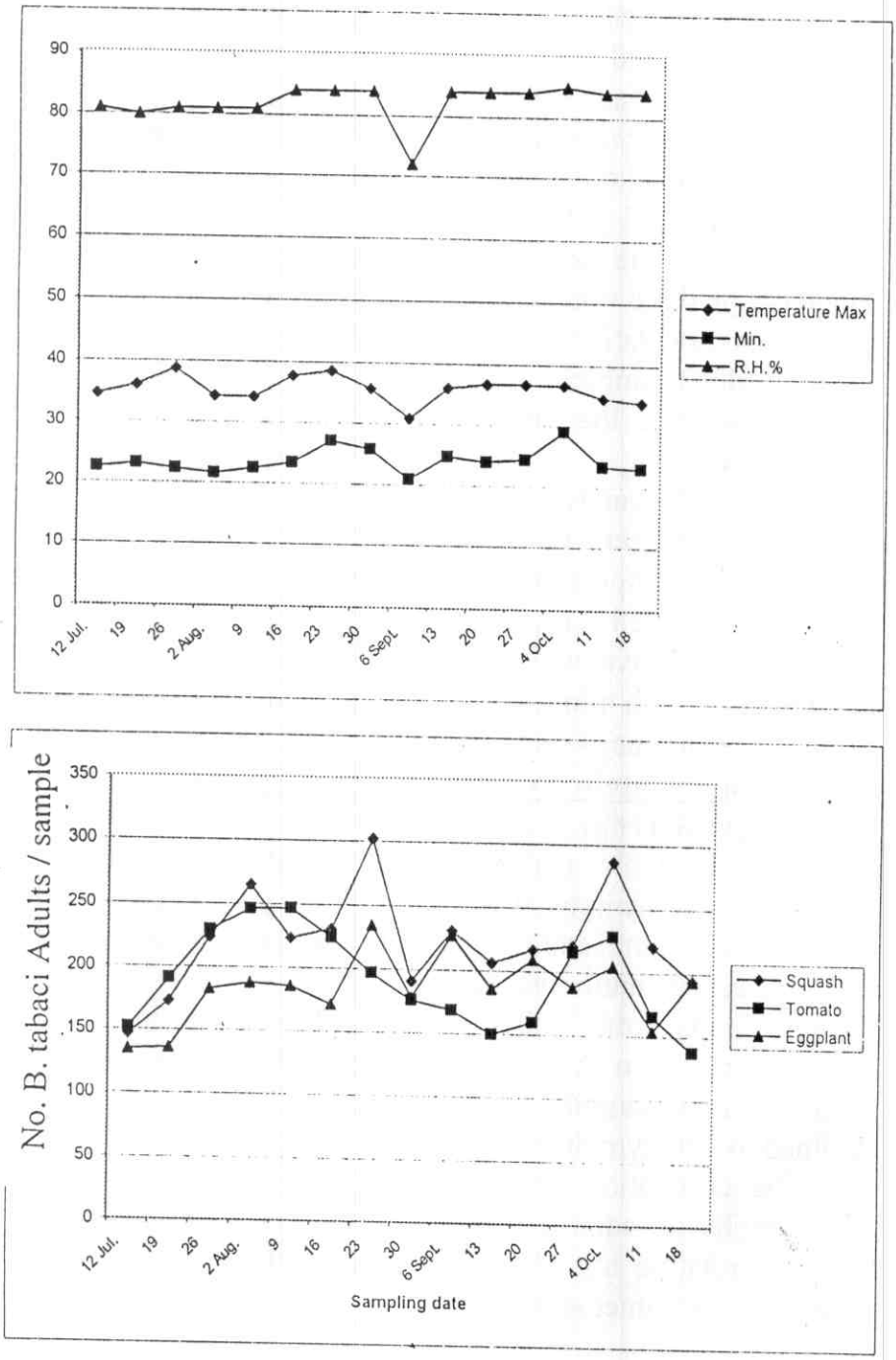


Fig. (2) : Population density of tomato whitefly adults on certain vegetable crops in relationship with some meteorological factors during season 1999.

Table (3): Population density of tomato white fly nymphs on certain vegetable crops and relationship with meteorological factors during season 1998.

Sampling Date	Vegetable crops			Meteorological factors		
	Squash	Tomato	Egg plant	Temp max	Min	R. H%
Jun. 22	132	132	104	33.2	18.9	85
29	154	198	166	34.6	21.0	86
Jul 5	150	153	116	38.2	22.2	86
12	144	200	128	33.3	20.2	86
19	134	225	118	35.0	23.0	87
26	171	207	140	35.5	21.2	86
Aug 2	140	187	118	38.4	25.0	81
9	140	200	122	40.9	27.5	78
16	157	161	118	37.2	25.2	80
23	216	211	142	37.9	26.5	80
30	141	194	112	37.0	24.8	80
Sept 6	136	203	194	37.2	23.8	84
13	188	234	132	40.4	24.5	79
20	206	230	183	37.8	22.0	77
27	176	235	132	33.3	20.7	78
Total	2385	2970	2025	549.9	346.5	1233

Max. temp: N. S(+): N.S (+): N.S (+)
Min. temp: N.S (+) N.S (+): N.S (–)
R.H: S (–) r = 0.559 (–): N.S (–): N.S (+)
r = - 2.43*
N.S = non significant
S = Significant.

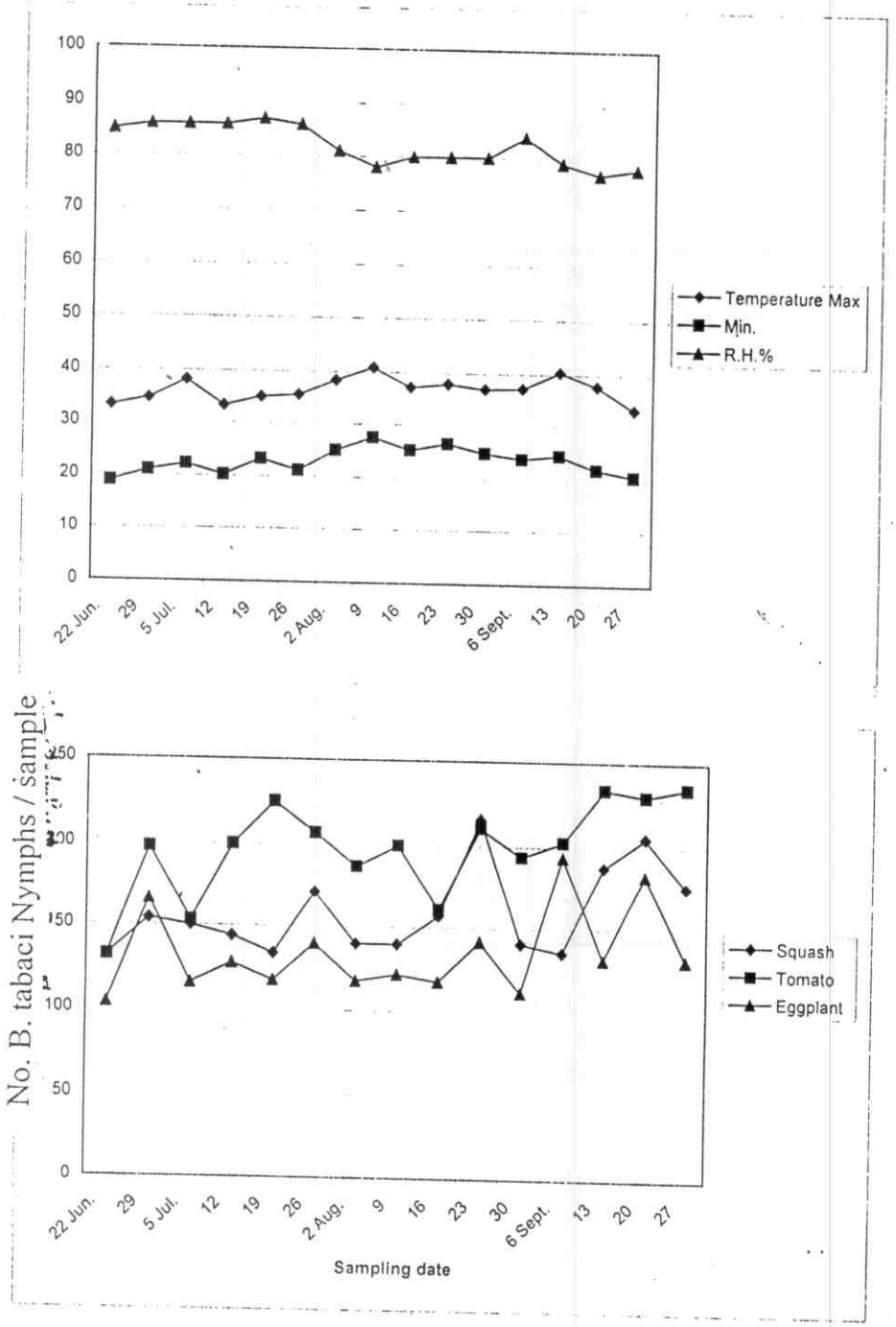


Fig. (3) : Population density of tomato whitefly nymphs on certain vegetable crops and relationship with some meteorological factors during season 1998.

1. C. b. Tomato crop:

Most of tomato leaf samples in summer plantation harbourd *B. tabaci* nymphs during 1998 season of data in Table (3) and fig (3) showed that the mean number of nymphs counted "132" nymphs/sample (10 inch^2) at the beginning of examination and fluctuated ups and down until reached to the 1 *st* peak 225 nymphs/sample on July 19 *th* and increased gradually until reached the second peak 200 nymphs/sample on August 9. The third peak 211 nymphs/sample was noticed on 23 *th* August while the fourth one "234" nymphs on september, 13. The calculated correlation factor indicated non significant positive with maximum temperature and positive with minimum temperature while was negative with R.H during growing season 1998.

1. C. c. Eggplant crop:

Data of table (3) & fig (3) appearance that started infestation was 104 nymphs/sample and the population fluctuated ups and down recording "5" peaks. The highest one was "194" nymphs/sample in the 6 *th* September.

Correlation values between population and max temperature & R.H. showed non significant positive correlation but it was negative with the Min temperature. From data in table (3) it is clear that tomato had the highest infestation (2970 nymphs/sample) followed by squash (2385 nymphs/sample) and the lowest population was 2025 nymphs/sample on eggplant during 1998 summer season.

1. D. Tomato whitefly nymphs during season 1999:

1. D. a. Squash crop:

Regarding the *B. tabaci* nymphs population during 1999 summer plantation of data in table (4) and illustrated in fig (4) showed that the number of *B. tabaci*

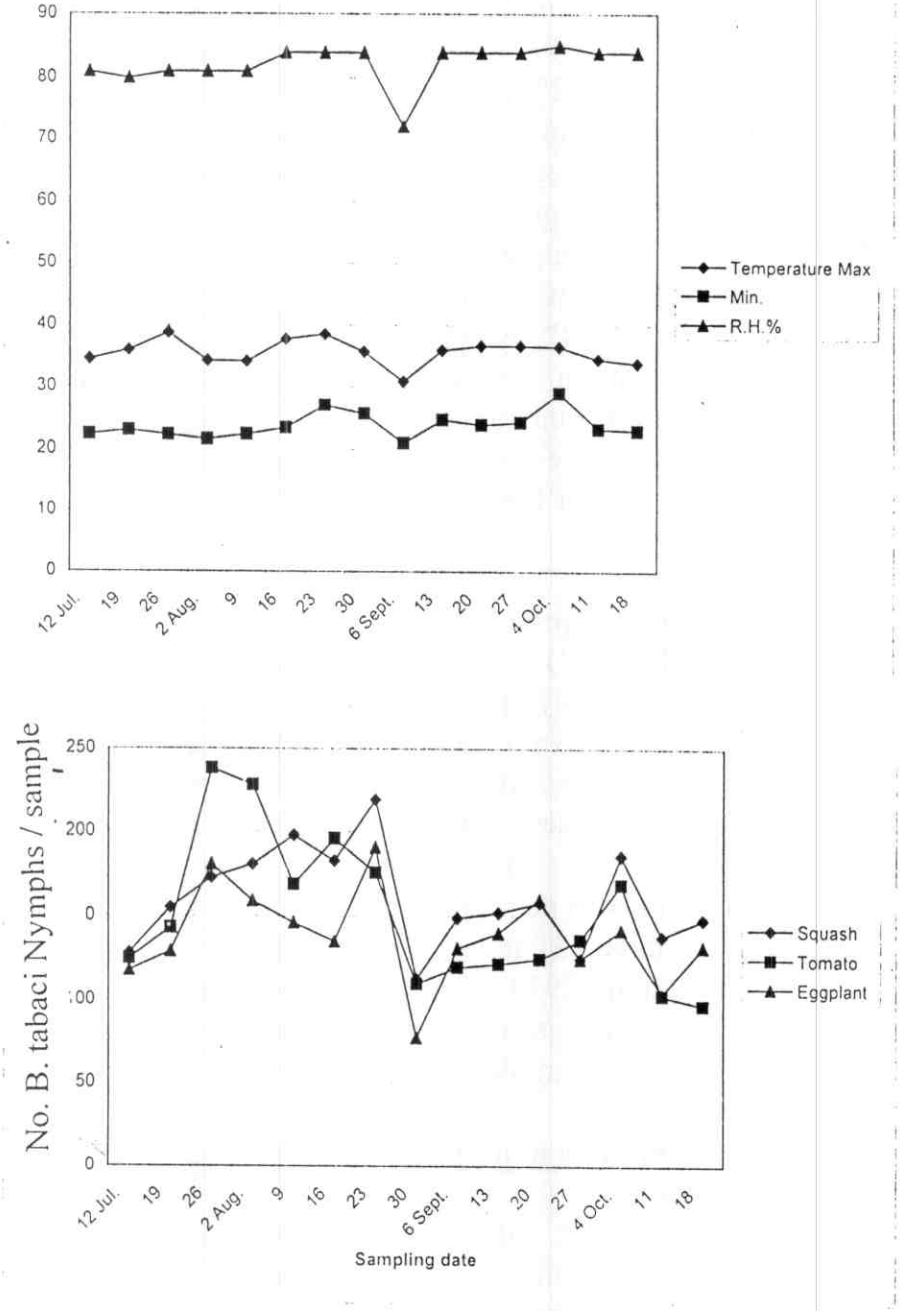


Fig. (4) : Population density of tomato whitefly nymphs on certain vegetable crops and relationship with some meteorological factors during season 1999.

nymphs on squash plants began with "128" nymphs/sample on 12 *th* July and increased to reach 1 *st* peak 219 nymphs/sample (10 inch^2) on 23 *th* August and the infestation decreased sharply and after that raised gradually to reach the 2 *nd* peak 186 nymphs/sample on 4 *th* October and declined to be the end of inspections.

1. D. b. Tomato crop:

Nymphs number on tomato on the beginning of infestation was "125" nymphs/sample and increased gradually during two weeks reaching the highest peak of abundance estimated "238" nymphs/sample on July 26 *th*. Two other peaks were detected on the 16 *th* of August (196 nymphs/sample) and on October 4 *th* (169 nymphs/sample) and after that the nymphs population declined by the end of season.

1. D. c. Eggplant crop:

Estimation of the population density of nymphs of *B. tabaci* on eggplant during 1999 summer season cleared that the beginning of recorded population was 118 nymphs/sample on 12 *th* July and increased to reach 1 *st* peak 181 nymph/sample on 26 *th* of July and the 2 *nd* peak 191 nymph/sample on August 23 *rd* and the 3 *rd* peak was "160" nymphs/sample on September 20 *th* and fluctuated for four weeks between increase and decrease to reach 132 nymphs/sample on 18*th* October. Statistical analysis indicated that the correlation between max & min temperature and *B. tabaci* nymphs population was non significant and positive in squash & tomato and eggplant and also with R.H. except for on tomato which was non significant negative correlation during growing season 1999 as in table (4) it is clear that total high population (2406 nymphs) was on squash plants followed by tomato (2257 nymphs) and the lowest one was 2070 nymphs in the case of eggplant.

Table (5) Overall seasonal abundant of *B. tabaci* adults & nymphs total number on rule three hosts of vegetable crops.

vegetable crop / Summer season	Squash		Tomato		Eggplant	
	No. B. tabaci		*No. B. tabaci*		*No. B. tabaci*	
	adults	nymphs	adults	nymphs	adults	nymphs
1998	4155	2385	3645	2970	3750	2025
1999	3330	2406	2888	2257	2775	2070
Total	7485	4791	6533	5227	6525	4095
Mean	3742.5	2395.5	3266.5	2613.5	3262.5	2047.5

From the previous data in table 1, 2, 3 and 4, it may be concluded that squash plants was the most preferred one from the three tested summer vegetable crops to attract *B. tabaci* adults population with total population record of adults during the two summer season 7485 adults followed by tomato and eggplant plants which nearly harboured the same total record of adult population during the two seasons (6533 and 6525 adults respectively). As for, nymphs tomato plants occupied the first class in receiving (5227 nymphs) during the two seasons followed by squash and finally eggplants within the three summer vegetable hosts as in table (5).

2. Winter plantations:

2. A. Tomato whitefly adults during season 1997/98:

2. A. a. Pisum crop:

Pisum plants cultivated in winter plantation were found to be infested with *B. tabaci* adults but the considerable infestations were noticed during January and February. Data in Table (6) and Fig (5) showed that the infestation started very low (52.0 adult/sample) on 15 *th* December 97 and increased to reach the 1 *st* peak 120 adults/sample on January 5 *th* and the 2 *nd* peak 210 adults/sample in the 2 *nd* February 1998 and decreased by the end of the season. The total counts of adults recorded during the season was "1500" adults.

2. A. b. Phaseolus crop:

Most of the phaseolus leaf samples in winter season received *B. tabaci* adults but the population started very low with mean count 66.0 adults/sample on 15 *th* December 1997 and increased gradually to reach 1 *st* peak (228 adults/sample) on January 5*th* and the 2 *nd* peak (300 adults/sample) on February 9 *th* and decreased to "130" adults on 2 *th* March. With seasonal total

Table (6): Population density of tomato white Fly adults on certain vegetable crops in relationship with meteorological factors during winter season 97/98.

Sampling Date	Vegetable crops		Meteorological factors		
	Pisum	Phaseolus	max	Temp min	R. H%
Dec 97: 15	052	066	19.7	10.0	76
22	086	068	19.5	8.8	76
29	066	138	19.6	7.4	78
Januar 98:5	120	228	17.2	5.9	90
12	090	208	17.8	7.6	88
19	102	182	18.9	6.7	87
26	204	202	19.5	8.4	80
Feb 2	210	262	21.4	5.2	89
9	190	300	22.2	8.8	90
16	155	218	18.6	8.3	90
23	125	182	19.5	7.6	88
Marc 2	100	130	20.1	7.7	88
Total	1500	2184	234.0	92.4	1020

Max temp: N. S(+): N.S (+)
Min temp: N.S (–): N.S (–)
R.H: N.S (+): S.r = 0.854 & t_r = 5.19

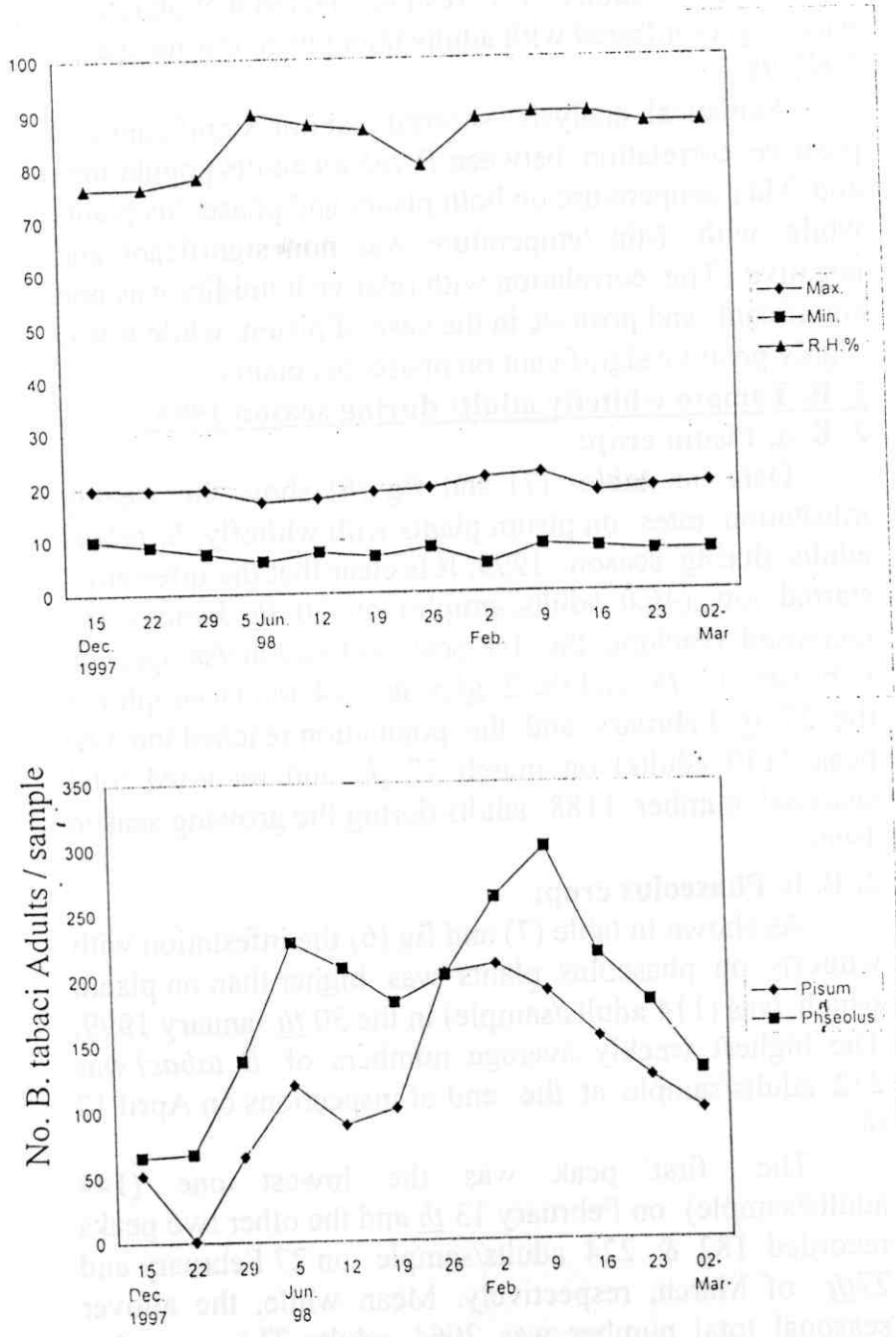


Fig. (5) : Population density of tomato whitefly adult on pisum & phaseolus crops and relationship with some meteorological factors during season 1998.

number 2184 adults. The results cleared that phaseolus was higher infested with adults than pisum during season 1997/98.

Statistical analysis showed that non significant and positive correlation between *B. tabaci* adults populations and Max temperature on both pisum and phaseolus plants while with Min temperature was non significant and negative. The correlation with relative humidity was non significant and positive in the case of pisum, while it was highly positive significant on phaseolus plants.

2. B. Tomato whitefly adults during season 1999:

2. B. a. Pisum crop:

Data in table (7) and fig (6) show the weekly infestation rates on pisum plants with whitefly, *B. tabaci* adults during season 1999. It is clear that the infestation started low (46.0 adults/sample) on 30 *th* January and increased reaching the 1st peak (116 adults/sample) on February 13 *th* and the 2 *nd* peak (104 adults/sample) in the 27 *th* February and the population reached the 3 *rd* peak (140 adults) on march 27 *th*, and recorded total seasonal number 1188 adults during the growing season 1999.

2. B. b. Phaseolus crop:

As shown in table (7) and fig (6) the infestation with whitefly on phaseolus plants was higher than on pisum which was (114 adults/sample) in the 30 *th* January 1999. The highest weekly average numbers of *B. tabaci* was 232 adults/sample at the end of inspections on April 17 *th*.

The first peak was the lowest one (144 adults/sample) on February 13 *th* and the other two peaks recorded 182 & 224 adults/sample on 27 February and 27*th* of March, respectively. Mean while, the allover seasonal total number was 2064 adults. This mean that phaseolus plants were, more attractant whitefly adult

Table (7): Population density of tomato white F/y adults on certain vegetable crops in relationship with meteorological factors during winter season 1999.

Sampling Date	Vegetable crops		Meteorological factors		
	Pisum	Phaseolus	Max	Temp min	R. H%
Jan 30	046	114	20.9	8.8	84
Feb 6	064	132	19.4	8.0	74
13	116	144	20.5	8.4	83
20	080	118	21.7	9.5	84
27	104	182	18.2	6.4	83
Mar 6	082	172	18.1	6.7	72
13	102	136	22.6	9.9	83
20	124	222	24.7	10.9	83
27	140	224	23.0	10.5	82
Apri 3	116	198	26.7	13.1	81
10	098	190	25.6	11.3	82
17	116	232	28.6	12.3	81
Total	1188	2064	270.0	115.8	972

Max temp: N. S(+): Sr = 0.596 *
t = 2.35 *
Min temp: N.S (+): N.S (+)
R.H: N.S (+): N.S (+)

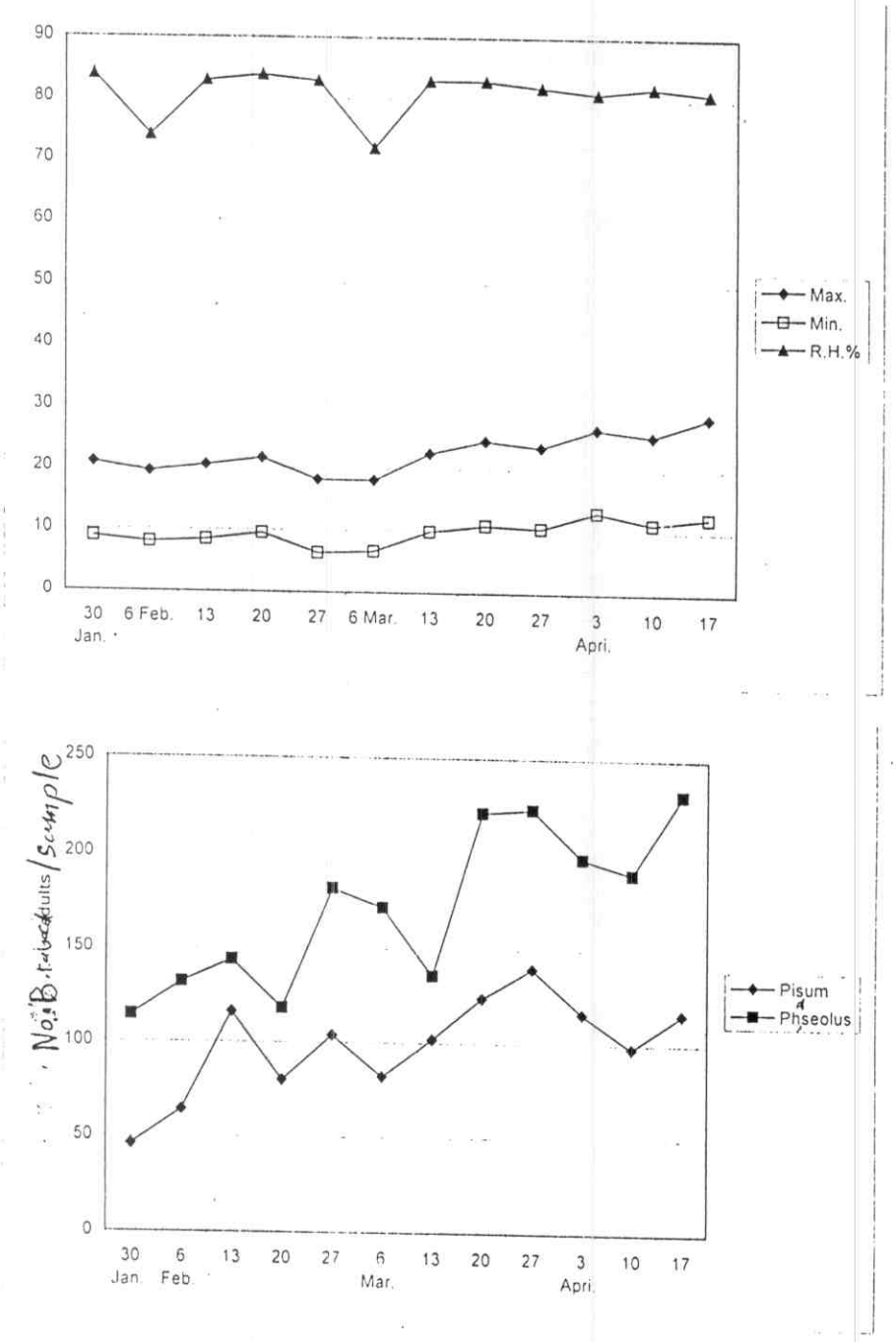


Fig. (6) : Population density of tomato whitefly adult on Pisum/Phaseolus Crops and relationship with some meteorological factors during season 1999.

population than pisum plants in winter plantation of season 1999.

Statistical analysis indicates that there was non significant correlation between Max temperature and adults population on pisum plants, while it was significant and positive on phaseolus. As for, with Min temperature and R.H. the correlation was non significant and positive on both pisum and phaseolus during winter season 1999.

2. C. Tomato whitefly nymphs during the first season 1997/1998:

2. C. a. Pisum:

From data presented in table (8) and illustrated in fig (7), it is clear that the starting of recording nymphs population in the first season 97/98 was very low (10 nymphs/sample) in the 15 *th* December 97 and increased gradually to reach peak "116" nymphs/sample on February 9 1998 and declined to 86 nymph/sample on February 16 *th* and increased to reach (124 nymphs/sample) recording the second peak on February 23 *th* with allover seasonal total number 696 nymphs/sample.

2. C. b. Phaseolus crop:

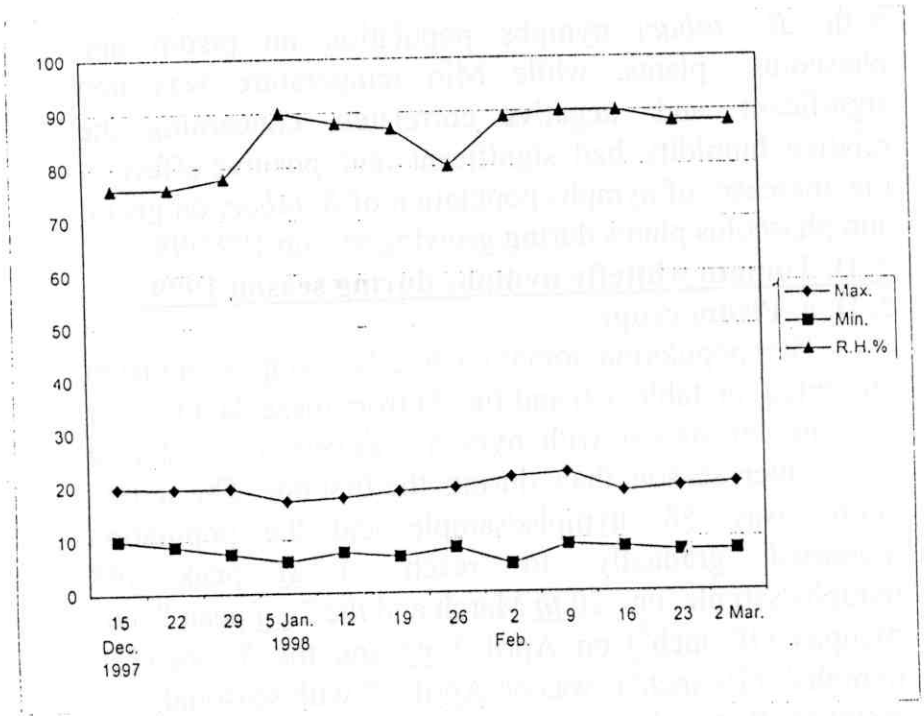
As shown table (8) and seen in fig (7) the infestation rate of phaseolus plants with *B. tabaci* was higher than on pisum plants either in starting of inspection (16 nymphs/sample) or by the end of counting "118" nymphs recording after that the population of *B. tabaci* nymphs between increase and decrease recording two peak, the first one was (178 nymphs/sample) in the 2 *nd* February and the other was 158 nymphs/sample on February, 23 with total seasonal counts 1140 nymphs which was more than on pisum during winter season 1997/1998.

The statistical analysis showed that Max temperature was non significant and positive correlated

Table (8): Population density of tomato white f/y nymphs on certain vegetable crops in relationship with meteorological factors during winter season 97/1998.

Sampling Date	Vegetable crops		Meteorological factors		
	Pisum	Phaseolus	Max	Temp min	R. H%
Dec 97:15	10	16	19.7	10.0	76
22	12	36	19.5	8.8	76
29	14	28	19.6	7.4	78
Jan 98:5	16	82	17.2	5.9	90
12	22	66	17.8	7.6	88
19	38	66	18.9	6.7	87
26	64	136	19.5	8.4	80
Feb 2	90	178	21.4	5.2	89
9	116	126	22.2	8.8	90
16	086	130	18.6	8.3	90
23	124	158	19.5	7.6	88
Mar 2	104	118	20.1	7.7	88
Total	696	1140	234.0	92.4	1020

Max temp: N. S(+): N.S (+)
Min temp: N.S (–): N.S (–)
R.H: Sr = 0.598: = 0.662
tr = 2.36 : = 2.79



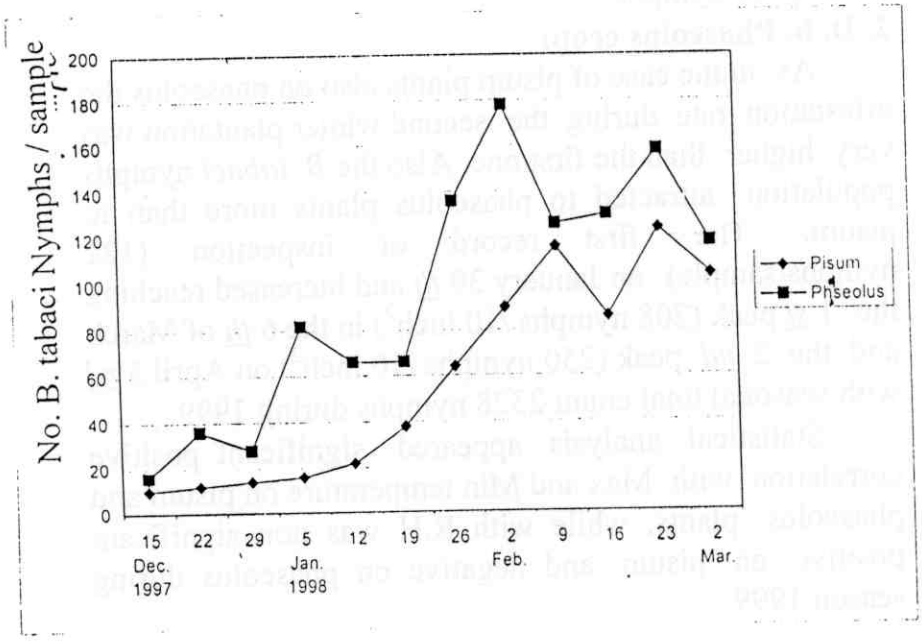


Fig. (7) : Population density of tomato whitefly nymphs on Pisum & Phaseolus crops and relationship with some meteorological factors during season 1998.

with *B. tabaci* nymphs population on pisum and phaseolus plants, while Min temperature was non significant and negative correlated, concerning the relative humidity had significant and positive effect on the increase of nymphs population of *B. tabaci* on pisum and phaseolus plants during growing season 1997/98.

2. D. Tomato whitefly nymphs during season 1999:

2. D. a. Pisum crop:

The population tomato whitefly nymphs on pisum presented in table (9) and fig (8) from these data is clear that the infestation with nymph was very higher during this winter season than during the first one. The started count was 58 nymphs/sample and the population increased gradually to reach 1 *st* peak 168 nymphs/sample on 20 *th* March and the 2 *nd* peak "180" nymphs (10 inch^2) on April 3 *rd* and the 3 one (170 nymphs) (10 inch^2) was on April, 17 with seasonal total count 1560 nymphs.

2. D. b. Phaseolus crop:

As in the case of pisum plants also on phaseolus the infestation rate during the second winter plantation was very higher than the first one. Also the *B. tabaci* nymphs population attracted to phaseolus plants more than to pisum. The first record of inspection (122 nymphs/sample) on January 30 *th* and increased reaching the 1 *st* peak (208 nymphs /10 inch^2) in the 6 *th* of March and the 2 *nd* peak (250 nymphs /10 inch^2) on April 3 *rd* with seasonal total count 2328 nymphs during 1999.

Statistical analysis appeared significant positive correlation with Max and Min temperature on pisum and phaseolus plants, while with R.H was non significant positive on pisum and negative on phaseolus during season 1999.

Table (1): Population density of tomato white F/y nymphs on certain vegetable crops in relationship with meteorological factors during winter season 1999.

Sampling Date	Vegetable crops		Meteorological factors		
	Pisum	Phaseolus	Max	Temp min	R. H%
Jan 30	58	122	20.9	8.8	84
Feb 6	78	154	19.4	8.0	74
13	102	156	20.5	8.4	83
20	130	164	21.7	9.5	84
27	134	178	18.2	6.4	83
Mar 6	124	208	18.1	6.7	72
13	148	184	22.6	9.9	83
20	168	220	24.7	10.9	83
27	136	238	23.0	10.5	82
Apri 3	180	250	26.7	13.1	81
10	132	226	25.6	11.3	82
17	170	228	28.6	12.3	81
Total	1560	2328	270.0	115.8	972

Max temp: S.r = 0.737: 0.654
t = 3.45: t = 2.73
Min. temp: S.r = 0.625: 0.643
t = 2.531=2.66
R.H: N.S (+): N.S (–)

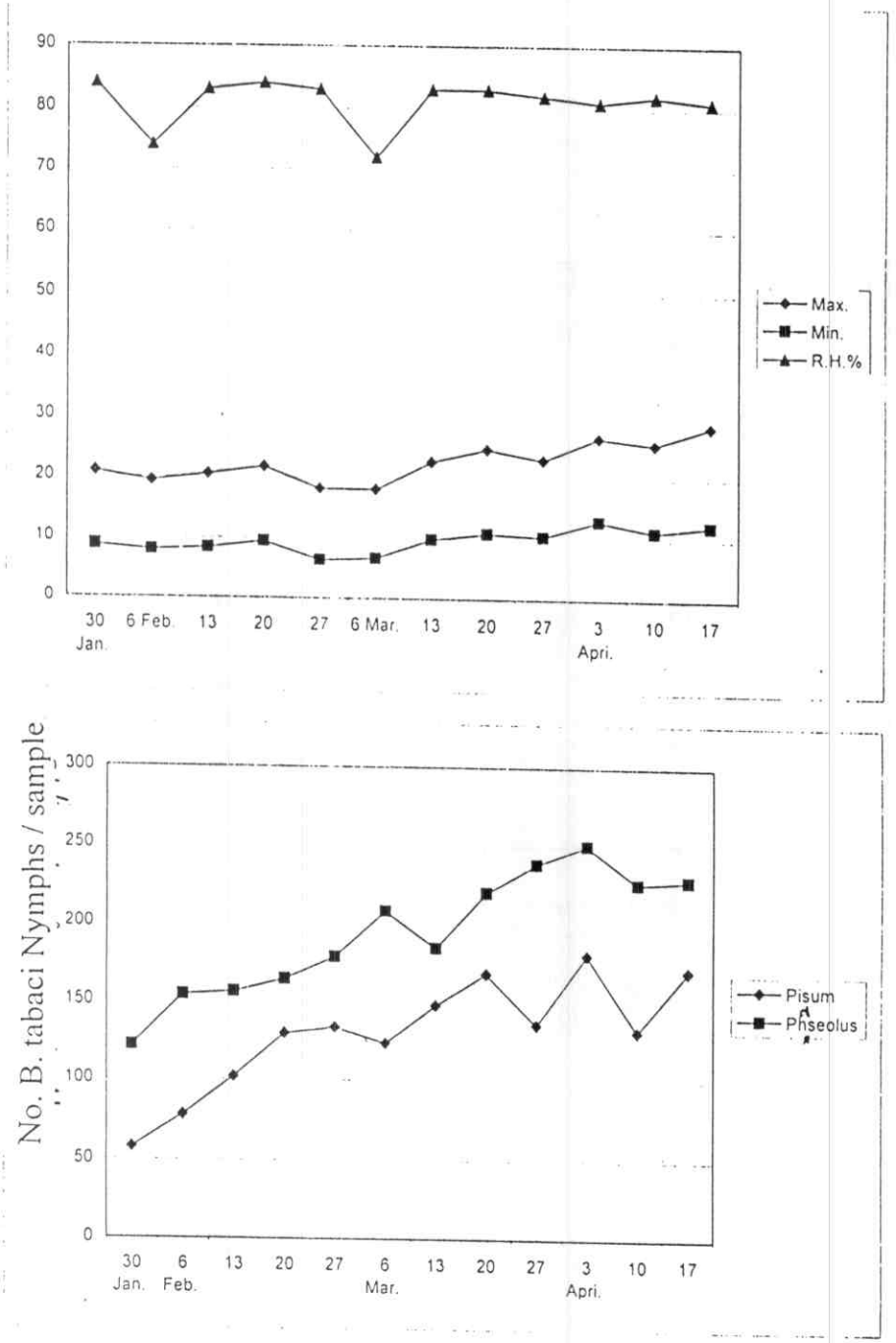


Fig. (8) : Population density of tomato whitefly nymphs on Pisum sativum Phaseolus crops and relationship with some meteorological factors during season 1999.

Many researchers, worked in this scale of them:

Butler et al (1983) in **USA**, reported that emergence of *B. tabaci* adults generally occur during the day and the rate of emergence is highest during the first four hours after sunrise.

El-sayed (1986) in **Egypt**, found heavy rates of infestation with *B. tabaci* on summer plantation crops than on winter plantation which showed generally moderate rates of infestation. He found that broad been and *pisum sativum* were the least infested plants in or during winter plantation. Period of higher infestation rates were August and September for summer plantation, October and November for winter plantation and July & august for the early summer plantation.

El-sharkawi (1989) in **Egypt**, showed that the infestation with *B. tabaci* on tomato, eggplant and pepper were at mean of temperature 21 °C and relative humidity 59%, where gave the higher peak 1522, 3680 and 228 on tomato, eggplant and pepper, respectively of immature stages at 30 August during season 1986/87.

Soliman (1993) in **Egypt**, found that the effect of temperature was significantly on the populations of *B. tabaci* adults on cabbage and also, relative humidity with correlation by *B. tabaci* infestation during season 1990/1991.

Hady (1994) in **Egypt**, showed that the effects of temperature on *B. tabaci* infestation to vegetable summer plantation: eggplant, tomato, okra, phaseolus and cucumber and winter vegetable plantation of cabbage, tomato, pisum, phaseolus and squash was significant, while the effect the relative humidity was non significant during investigation seasons.

Abd-El-Maksoud (1997) in **Egypt**, with cultivation "6" vegetable crops of tomato, Potato, cabbage,

cauliflower, squash and cucumber during early summer and winter plantation, found that the effect of temperature on population density of *B. tabaci* was significant during investigation season 1994 & 1995.

Hady. (1999) in **Egypt**, found positive correlation between Max & Min temperature & relative humidity and population density of *B. tabaci* eggs and nymphs on *Vigna radiata* during two successive seasons 1995 & 1996 and was less during season 1995 than season 1996.

PART II

2. Susceptibility of some vegetable varieties to infesting with tomato whitefly, *B. tabaci* during summer season:

Susceptibility of six vegetable varieties to tomato whitefly infestation were tested on three species of vegetable crops included six varieties squash variety (*cucurbita pepo var eskanandarani*) two of tomato (*Lycopersicon esculantum var strain "B" & Casel rock*) and three of eggplant (*solanum melongena var romy & black arousy and white arousy*) to give an idea about host preference to insect infestation.

A. Tomato whitefly, *B. tabaci* adults:

Results obtained in table (10) and fig (9) show seasonal mean number of *B. tabaci* adults on six vegetable varieties. From these data, it is clear that the eskandarani squash variety is the most received to *B. tabaci* adults both in 1998 and 1999 seasons recording 277 and 222 adults/sample for the two seasons respectively with mean average 250 adults/sample of the two seasons. The lowest infested variety was eggplant (*solanum melongena var blacy arousy*) with 236 adults/sample, during season 1998 while in the second season 1999 was 185 adults/sample on the variety white arousy and there was no significant difference between all varieties in receiving *B. tabaci* adults population except for squash variety.

From statistical analysis in table "10" the mean of two seasons, it could be concluded that difference between the infestations with *B. tabaci* adults to summer vegetable crops was significant between squash and the other varieties in the two season and between romy & white arousy and black arousy varieties in the first season. There was no any significant difference between the two tomato varieties during the first season.

B. Tomato whitefly, *B. tabaci* eggs:

Data in table (11) and fig (10) showed that the highest number of *B. tabaci* eggs was on tomato Casel rock 326 eggs and the lowest was on egg plant romy 242 eggs in the first season 1998. While in the second season 1999, the highest infestation was on squash "246" eggs and the lowest infestation was on eggplant romy & white arousy.

General mean count of the two seasons indicated that the highest egg population was on tomato *strain B & Casel rock* 282 eggs/sample followed by squash 275 eggs/sample, eggplant black and white arousy 232 eggs/sample and the lowest infestation on egg plant romy 228 eggs/sample.

Statistical analysis in table (11) cleared that there were significant differences between the mean numbers on the six vegetable varieties in the first and second season.

From the data of the two seasons, it may be apprivate that the occurrence of egg population on these varieties was more on tomato, and squash plants than on the three varieties of eggplant which showed the lowest host in harbouring *B. tabaci* eggs.

C. Tomato whitefly *B. tabaci* nymphs:

Data presented in table (12) and fig (11) show the infestation rates with *B. tabaci* nymphs on the six vegetable varieties. It is clear that nymphs counts varied according to species and variety. As for the allover mean counts in 1998 season for nymphs in various varieties were 200 individuals. On strain "B" tomato variety which was the highest infested one and 198, 159, 147, 138 and 135 for Casel rock tomato variety, squash eskandarani, romy, black arousy and white arousy eggplant varieties, respectively. The same previous arrangement was in the second season 1999 with more acceptation that squash

Table (12): Mean number of tomato white F/y nymphs infesting six vegetable crops during two successive seasons 1998 & 1999.

Season	Squash	Tomato		Egg plant		
		Strain B	Casel rock	Romy	B. arousy	W.arousy
1988	159	200	198	147	138	135
1999	160	158	150	149	144	138
General mean	159	179	174	148	141	136

"F" test 1998 = 12.4 "S"
L.S.D = 24.0
0.05
"F" test 1999 = 6.37
L.S.D = 21.6
0.05

Table (13): Mean number of tomato white F/y pupae and infesting six vegetable crops during two successive seasons 1998 & 1999.

Season	Squash	Tomato		Egg plant		
		Strain B	Casel rock	Romy	B. arousy	W.arousy
1988	092	105	106	074	083	077
1999	108	100	092	094	097	091
General mean	100	103	99	84	90	84

"F" test 1998 = 1.80 "N.S"
"F" test 1999 = 2.30 "N.S"

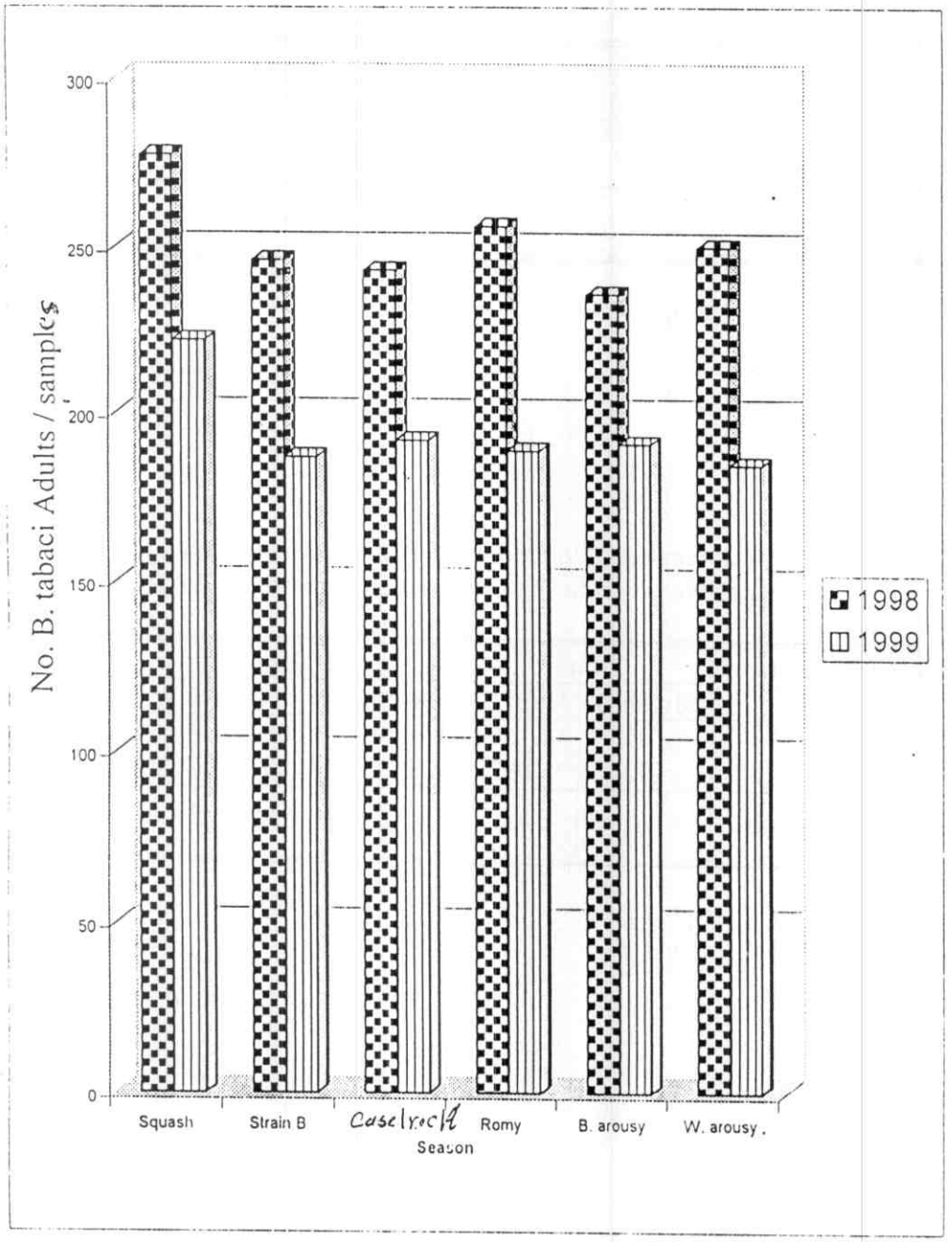


Fig. (9) : Mean number of tomato whitefly adults infesting six vegetable crops during two successive seasons 1998 & 1999.

Table (9): Mean number of tomato white F/y adults infesting six vegetable crops during two successive seasons 1998 & 1999.

Season	Squash	Tomato		Egg plant		
		Strain B	Castel rock	Romy	B. arousy	W.arousy
1988	277	246	243	256	236	250
1999	222	187	192	189	191	185
General mean	250	217	218	223	214	218

"F" test 1998 = 13.8 **
L.S.D = 24.8 **
"F" test 1999 = 7.1 *
L.S.D = 14.8 *
0.05

Table (10): Mean number of tomato white F/y eggs infesting six vegetable crops during two successive seasons 1998 & 1999.

Season	Squash	Tomato		Egg plant		
		Strain B	Castel roke	Romy	B. arousy	W.arousy
1988	303	325	326	242	247	249
1999	246	238	240	214	217	214
General mean	275	282	282	228	232	232

"F" test 1998 = 11.9 "S" **
L.S.D = 34.2 **
0.05
"F" test 1999 = 4.65 *
L.S.D = 19.74 *
0.05

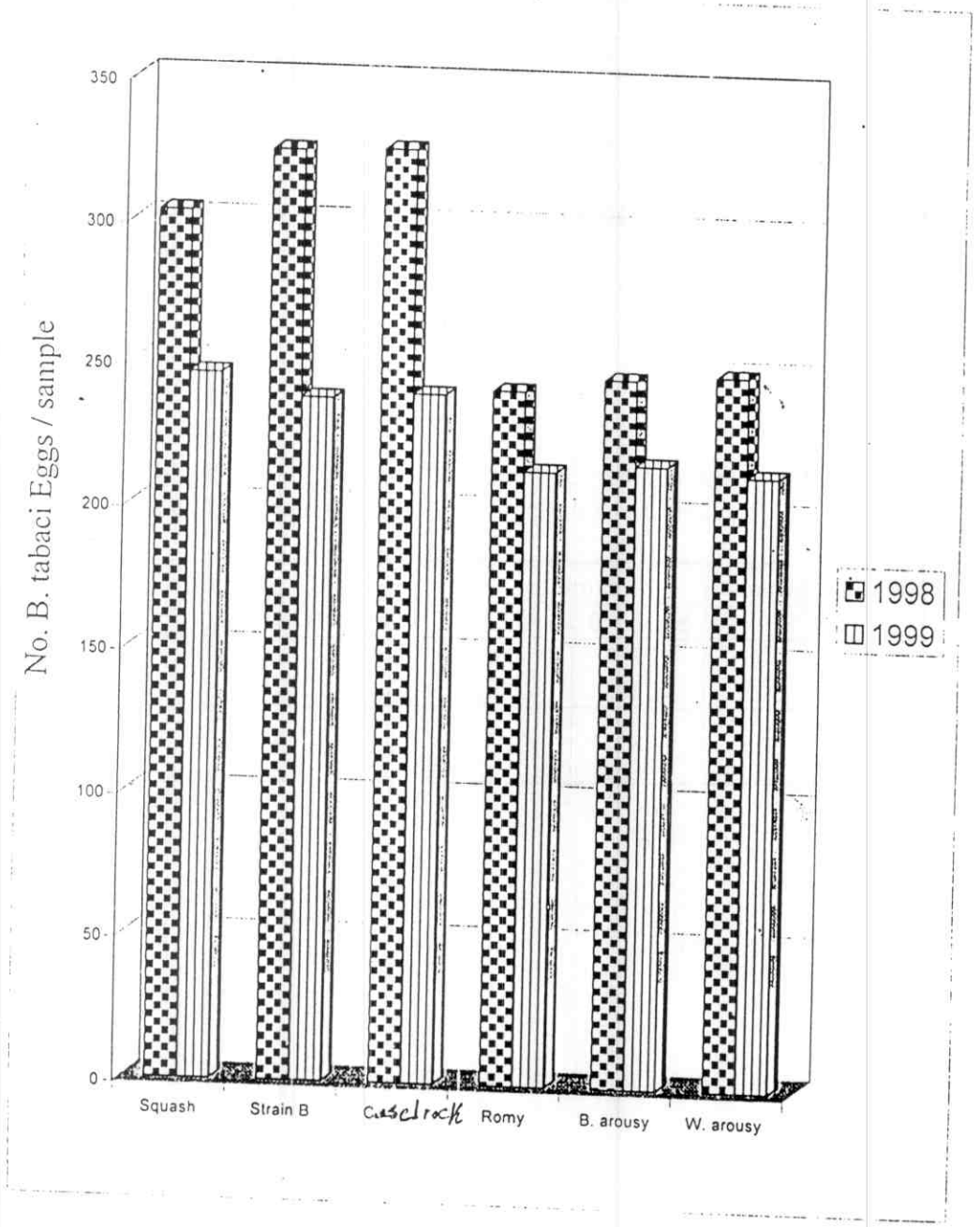


Fig. (10) : Mean number of tomato whitefly eggs infesting six vegetable crops during two successive seasons 1998 & 1999.

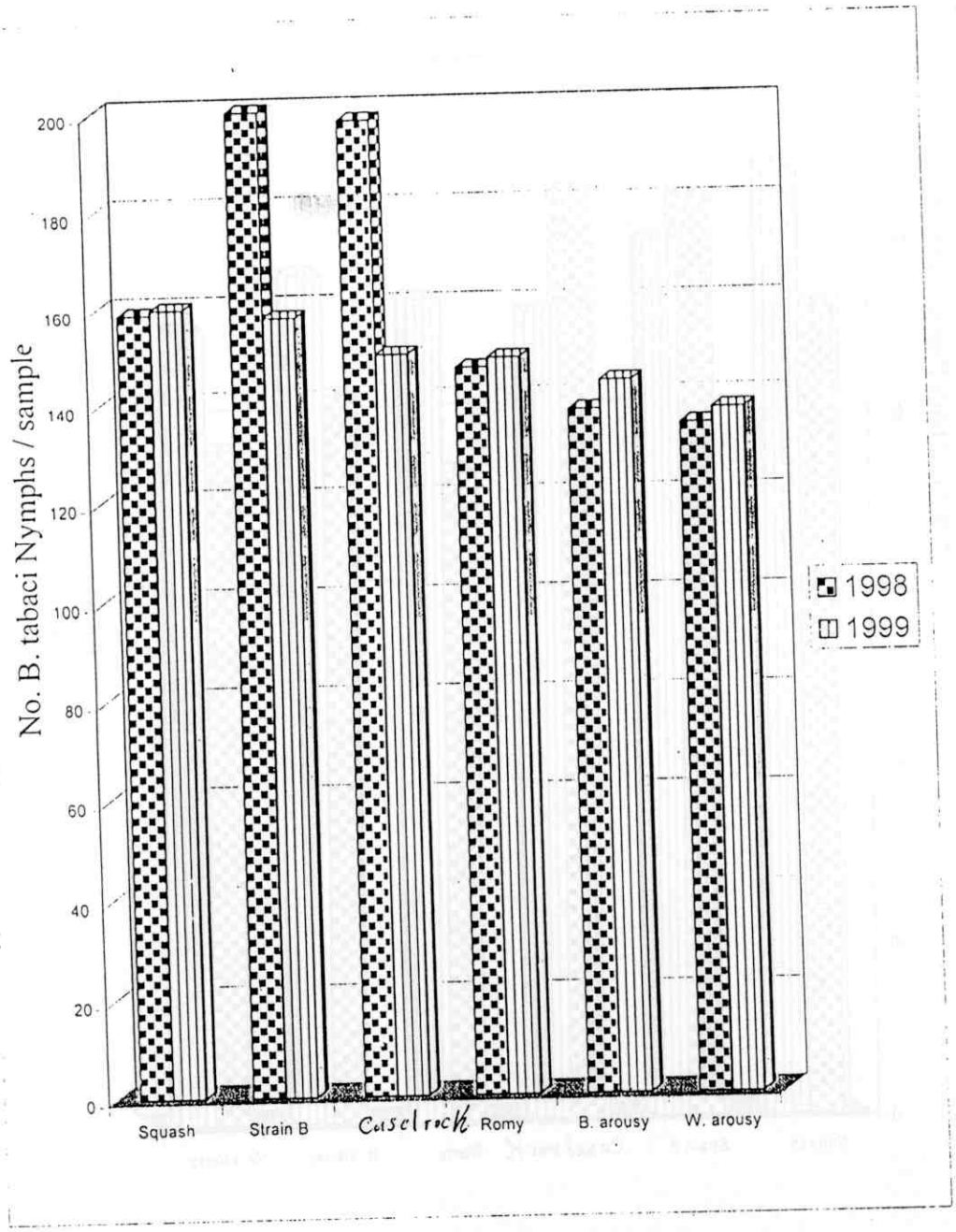


Fig. (11) : Mean number of tomato whitefly nymphs infesting six vegetable crops during two successive seasons 1998 & 1999.

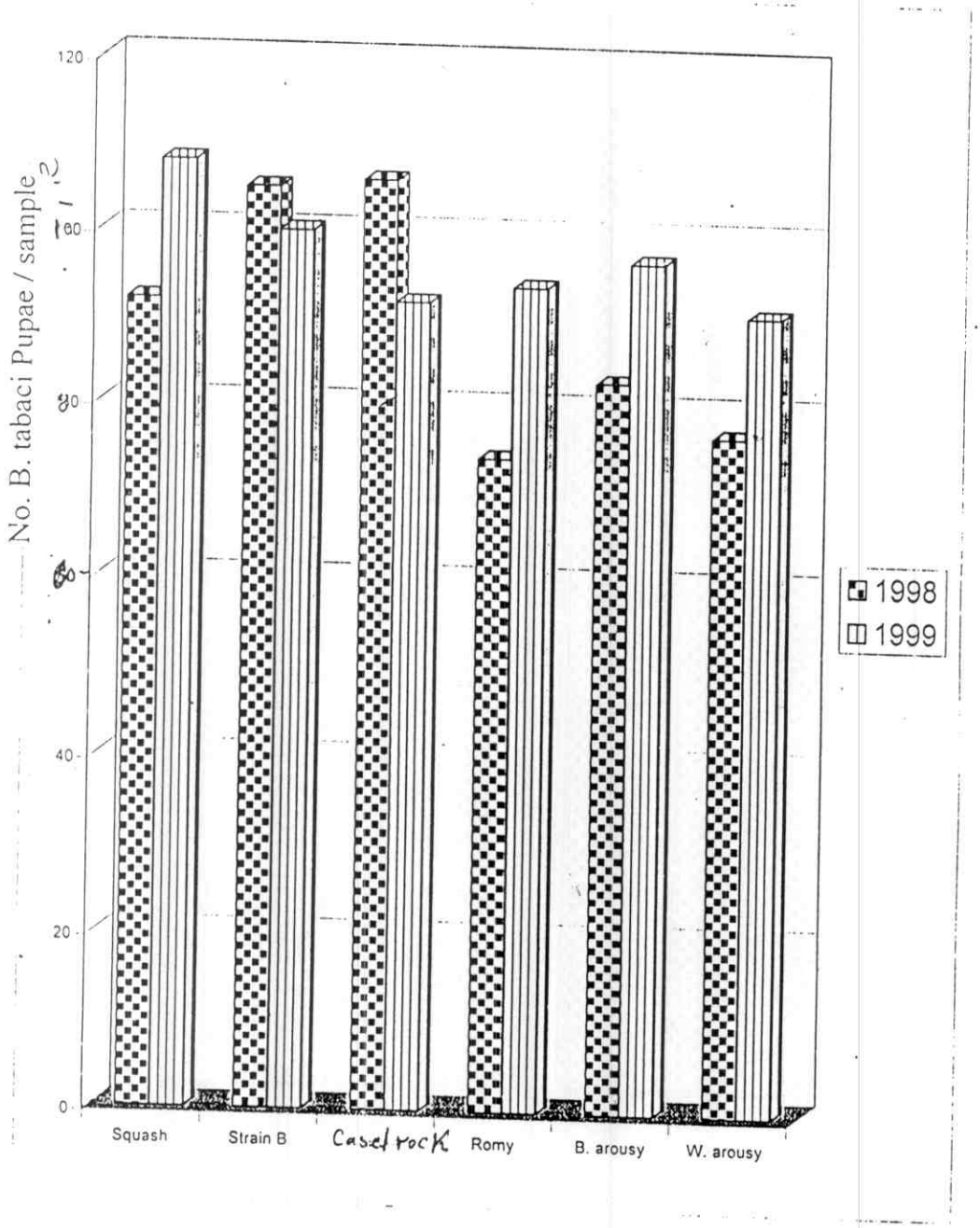


Fig. (12) : Mean number of tomato whitefly pupae infesting six vegetable crops during two successive seasons 1998 & 1999.

variety come to the first class receiving 160 nymphs/sample.

Statistical analysis in table (12) show significant differences in 1998 and in 1999 between the means of number of nymphs on the different varieties.

As for the allover mean counts of the two season for *B. tabaci*, it could be concluded that white arousy eggplant variety was the best one in avoiding the infestation with nymphs while tomato strain "B" variety was the most infested one.

D. Tomato whitefly *B. tabaci* pupae:

Seasonal mean counts of *B. tabaci* pupae presented in table (13) and fig (12) appeared that it varied according to variety. The highest infestation was on the two varieties of tomato 106 & 105 pupae/sample followed by squash which harbourd in the 1 *st* season 92, while the lowest infestation appeared on eggplant romy 74 pupae/sample during 1998 summer season .

Concerning 1999 summer season, the highest infestation was 108 pupae/sample on squash plants followed by tomato strain "B" which received 100 pupae/sample and the lowest infestation was "91" pupae/sample on eggplant white arousy.

The general mean of the two seasons indicated that high infestation were 103, 100, 99 pupae on tomato strain "B" & squash eskandrani and tomato Casel rock, respectively and the lowest one was of pipae on eggplant romy and white arousy during the two seasons 1998 & 1999.

Although occurrence of previous differences in population counts of statistical analysis in table (13) cleared that these differences were non significant during the two inspected seasons.

From the previous results it could be concluded that the squash was the highest infested host with adults &

eggs followed by tomato and eggplant during seasons 1998 & 1999, while the nymphs and pupae were found higher on tomato during 1998,but squash plants come the first infested host class during season 1999.

These results were accurred to findings by some researches as follows:

Cohen and Nitzany (1966) found that 80% of the plants infected when three whiteflies were caged on each tomato plants for this vector transmit several virus diseases. Same authors, studied that the susceptibility of tomato varieties for *B. tabaci* infestation in the world and Egypt.

Gameel (1974) In the **Sudan**, reported that the eggs laying capacity averaged 161.43 eggs/female and the daily egg production 8.42/female. Females usually laid their first egg on the lower surface of the leaf on which they emerged, but soon moved to young leaves higher up on the same plant.

Aly F. (1979), in **Egypt**, indicated that investigation of the tested tomato varieties was the most susceptible to egg and pupal counts. *Supermarmand* variety gave the least egg population and the highest larval populations, while it was the least variety to pupal infestation, and *Ace* variety was the least susceptible one to larval counts. The highest population resulted from *strain "B"* while the lowest was on *supermarmand.*

El-sayed (1981) in **Egypt**, found that *B. tabaci* infestation varied significantly according to the tomato variety and tansplanting date. The tested tomato varieties showed highly significant differences in rates of the immature stages of *B. tabaci Supermarmand* and *marmand-extra* varieties were relatively susceptible to infestation, while pritchard and Ace varieties proved to be a least infested. The late summer plantation from August

to the end of November was subjected to relatively higher rate of infestation than that on the other plantation.

EL-Sayed (1989) in **Egypt**, mentioned that some host plants were more suitable for rearing and multiplication of *B. tabaci* than others; vegetable marrow, cucumber, eggplant and been were associated with higher numbers of attracted *B. tabaci* females, lower natural mortality rates of immature stages, longest adult longevities and oviposition period and highest number of eggs were deposited on these plants.

Hassanein et al (1994) in **Egypt**, studied daily flight activity of certain leaf insects attacking potato, common bean and squash plants and efficiency of in capturing them during season 1991 & 1992 during summer, winter and nili plantation, the number of *Emposca decipicns swept* from potato, common bean and squash fields was significantly affected by the daily time of sweeping in summer, whereas *M. persica* and *Thrips tabaci* had significant affect in winter potato, common bean and squash adults of both *B. tabaci* and *E, decipicns* were insignificantly affected.

PART III

3. Effect of kinds and rates of fertilization on tomato whitefly infestation in legeminacea crops:

This experiment was carried out to study the effect of three fertilization treatments on the infestation of winter vegetable crops (pea and bean) with *B. tabaci.*

The three treatments were:

1- Amonium nitrate 33.5% with rate 144 kg/feddan

2- Amonium nitrate + potasium sulphate 48% with rate 108 kg/feddan

3-Without any kind of fertilization control.

These treatments were applied at two dose, the first was before the first irrigation and the second was added in the flowering stage.

3. A. Tomato whitefly adult infestation during seasons 1998 & 1999:

3. A. a. pea crop:

Mean number of tomato whitefly, *Bemisia tabaci* adults in table (14) and fig (13) appeared that the infestation was higher during the 1*st* season 1997/98 than the 2 *nd* season 1998/1999 on pea varieties under most levels of fertilization.

During 1997/1998, winter plantation was the highest infested with *B. tabaci* adults on pea plants recorded on the plants which did not received any kind and rate of fertilization this was in the case of little marven and sugar varieties (150 and 155 adults/sample respectively), while in the case of linkolen variety the treatment with mixture of n+k come to the first category under different levels of fertilization.

Table (14): Effect of nutrient elements fertilization on tomato white Fly, B. tabaci adults infestation on pisum varietes during two successive seasons 1998 & 1999.

Season	Pisum linkolen			P. little marven			Sugar pisum		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997-1998	125	126	131	150	138	130	155	150	138
1999	099	104	112	113	119	125	130	142	146
General mean	112	115	122	132	129	128	143	146	142

"F" test 1998 = 2.11:N.S
"F" test 1999 = 20.3 **
L.S.D. = 10.49 **
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

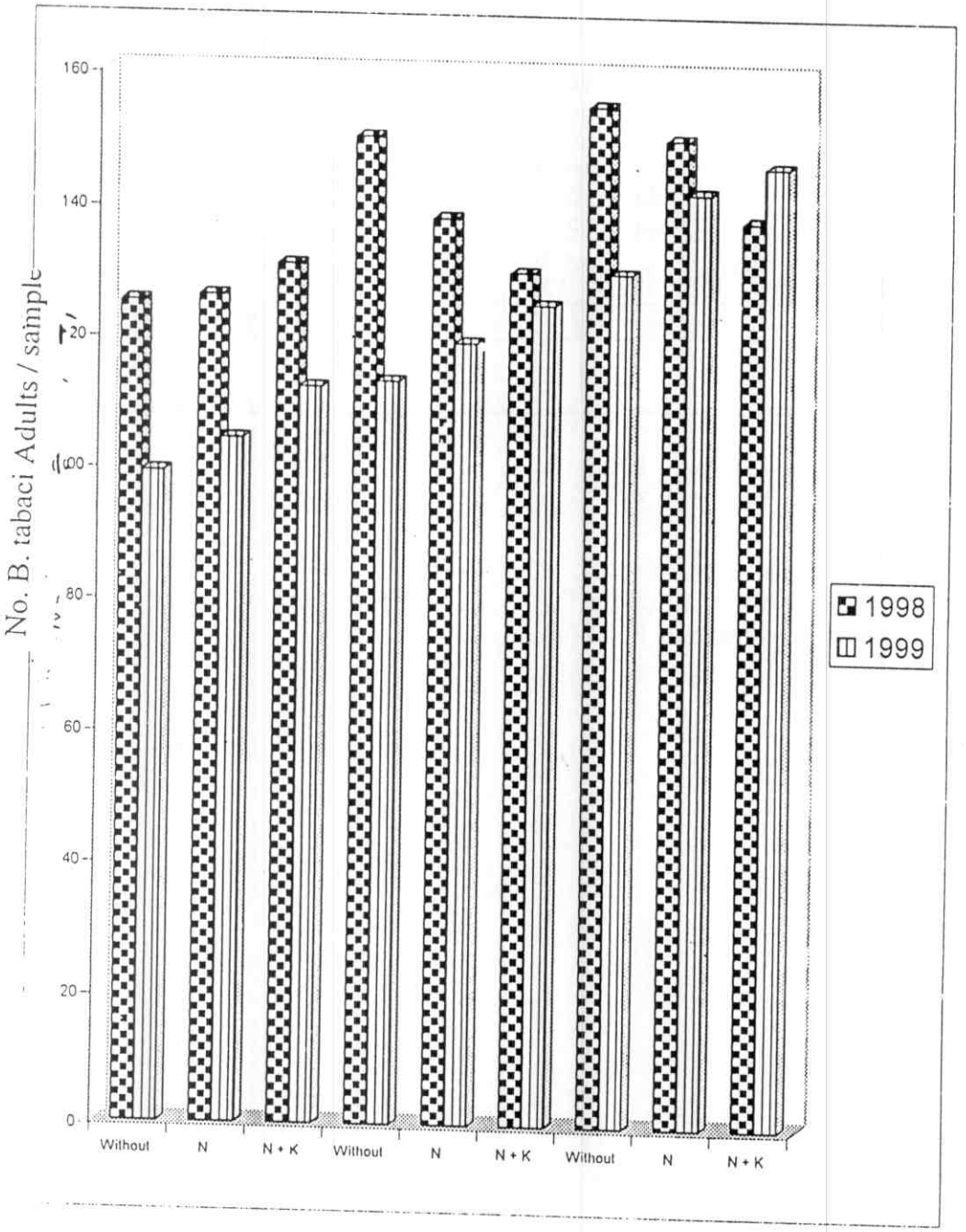


Fig. (13) : Effect of fertilization on tomato whitefly *B. tabaci* adults infestation to varieties of pea during two successive seasons.

On the other hand in the 2 nd season 1999, the plants received (N+K) fertilization attracted the highest numbers of *B. tabaci* adults for all the three varieties (112, 125 and 146 adults/sample) for linkolen, little marven and sugar varieties respectively followed by amonium nitrat treatment without significant difference and with significant difference with the lowest one which did not fertilize with any kind.

Comparing the whole two season mean counts of *B. tabaci* adults on pea varieties after fertilizers treatments, it is clear that sugar variety harbourd the highest population and the adding of nitrogen increased insignificant of these population (146) adults/sample). The linkolcn variety attractive the lowest population of adults (112, 115 and 122 adults/sample) for without, N only and N+K treatments respectively).

Concerning the little marven variety the differences between treatments were very small where non fertilization plants come to the first class in attraction *B. tabaci* adults population and the plants that received N+K treatment harbourd the lowest adult population without any significance.

3. A. b. Bean crop:

During season 1997/98.in table (15) and fig (14) The highest infestation was (175 and 172 adults/sample) on Giza3 and Swiss plan phaseolus varieties without fertilization, while the lowest infestation was (156 and 151 adults/sample) on Swiss plan & Giza6 bean varieties with nitrogen fertilization, respectively.

During season 1999, the all over seasonal counts of high infestation (196, 194.adults/sample) on Giza "6" phaseolus variety without and with nitrogen fertilization, respectively, while the lowest infestation was (172 adults/sample) on Swiss plan variety without and with N+K fertilization.

Table (16): Effect of nutrient elements fertilization on tomato white F/y, B. tabaci eggs infestation on pisum varietes during two successive seasons 1998 & 1999.

Season	Pisum linkolen			P. little marven			Sugar pisum		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1998	118	135	129	124	121	114	128	135	139
1999	185	196	196	185	190	188	208	191	204
General mean	152	166	163	155	156	151	168	163	172

"F" test 1998 = 2.17: N.S
"F" test 1999 = 7.14 **
L.S.D. 1999 = 8.98.
0.05
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

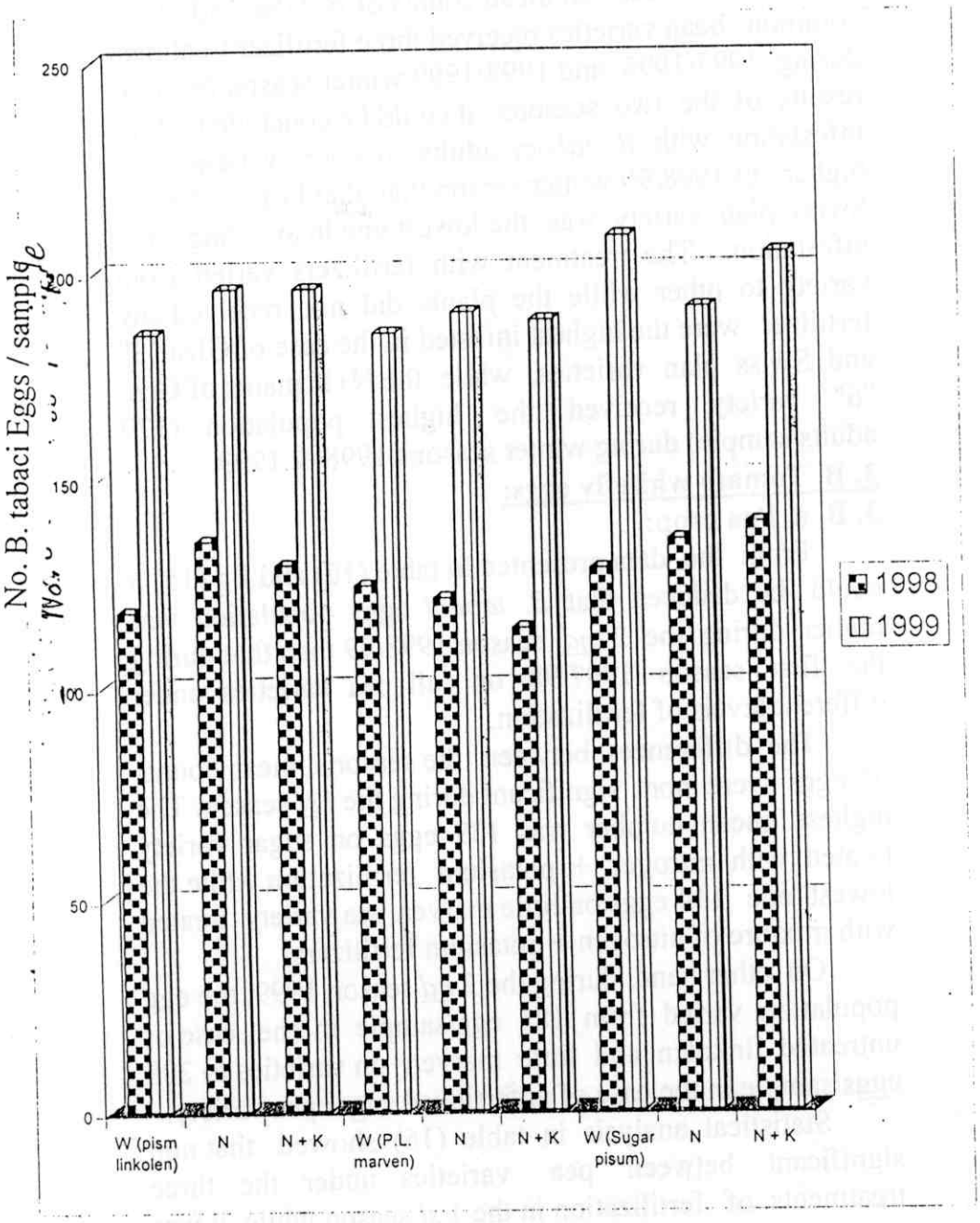


Fig. (15) : Effect of fertilization on tomato whitefly *B. tabaci* egg population on three varieties of pea during two successive seasons.

Statistical analysis appeared significant differences between the seasonal mean counts of *B. tabaci* adults on common bean varieties received three fertilizer treatment during 1997/1998 and 1998/1999 winter season from the results of the two seasons it could be conclude that the infestation with *B. tabaci* adults to bean varieties was higher in 1998/99 winter season than that in 1997/98 and Swiss plan variety was the lowest one in avoiding adult infestation. The treatment with fertilizers varied from variety to other while the plants did not received any fertilizer were the highest infested in the case of Giza "3" and Swiss plan varieties, while the N+K plants of Giza "6" variety received the highest population (179 adults/sample) during winter seasons 1998 & 1999.

3. B. Tomato whitefly eggs:

3. B. a. Pea crop:

From the data presented in table (16) and fig (15) it could be deduced that *B. tabaci* eggs population was higher during the 2 *nd* season 1998/99 than that during the first season 1997/98 on all pea varieties under different levels of fertilization.

The differences between the seasonal mean counts of eggs were non significant during the 1*st* season. The highest mean number was 139 eggs on sugar variety treated with nitrogen + potasium fertilization while the lowest one 114 eggs on little marven pea variety treated with mixture of nitrogen + potasium fertilizers.

On other hand, during the 2 *nd* season 1999, the egg population varied from 185 egg/sample in the case of untreated linkolen and little marven on varieties to 208 eggs/sample in the case of unfertilized sugar pea variety.

Statistical analysis in table (16) showed that non significant between pea varieties under the three treatments of fertilization in the 1 *st* season while it was significant in the second season, 1998/1999.

Table (15): Effect of nutrient elements fertilization on tomato white F/y, B tabaci adults infestation on phaseolus varietes during two successive seasons 1998 & 1999.

Season	Phaseolus sues plan			Phaseolus Giza "3"			Phaseolus Giza "6"		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1998	172	156	164	175	162	169	159	151	164
1999	172	174	172	178	185	183	196	194	193
General mean	172	165	168	177	174	176	178	173	179

"F" test 1998 = 2.76
L.S.D = 17.8
"F" test 1999 = 23.0
L.S.D. = 6.09
0.05
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

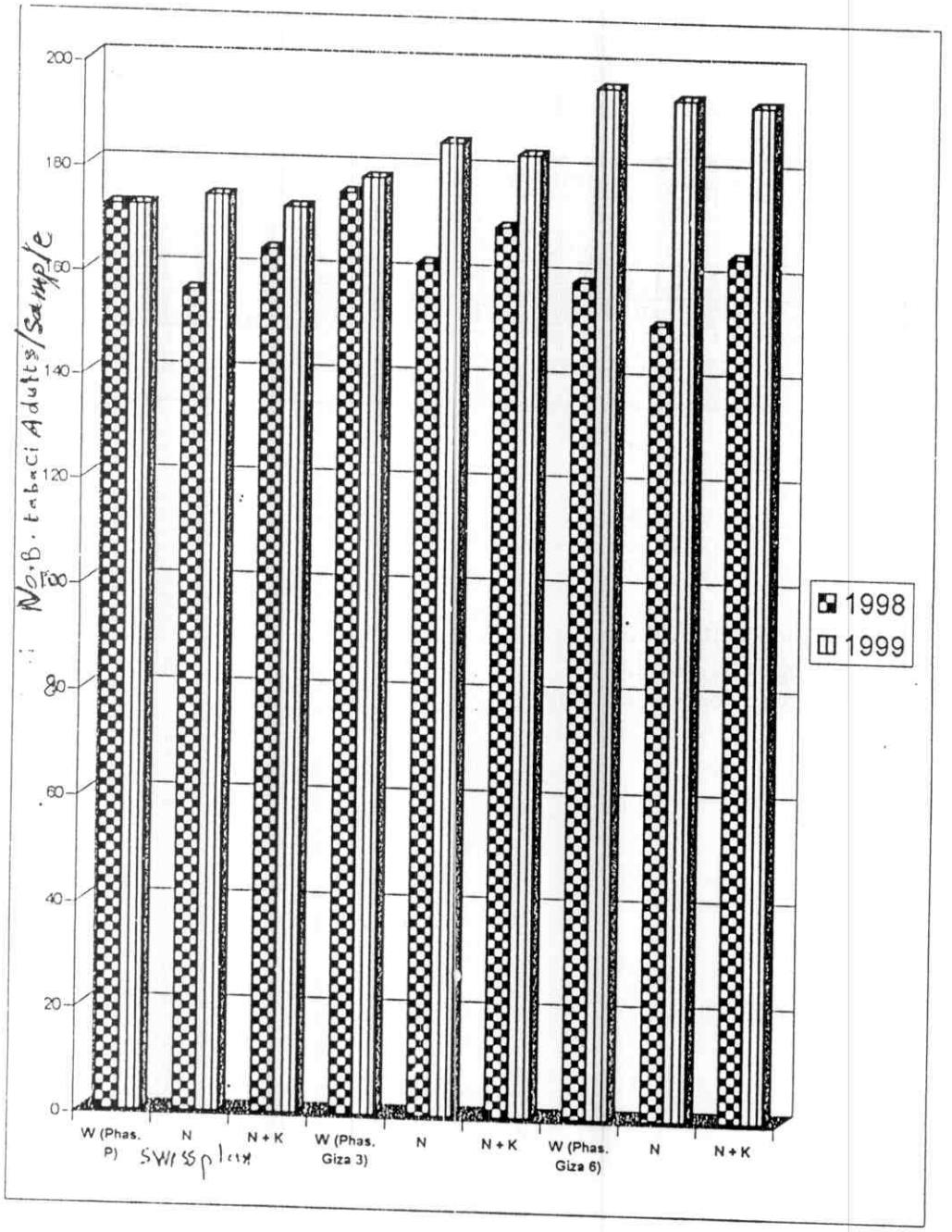


Fig. (14) : Effect of fertilization on tomato whitefly *B. tabaci* adult population on three varieties of bean during two successive seasons.

Table (17): Effect of nutrient elements fertilization on tomato white F/y, B. tabaci eggs infestation on phaseolus varietes during two successive season 1998 & 1999.

Season	Phaseolus sues plan			Phaseolus Giza "3"			Phaseolus Giza "6"		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997/1998	172	156	164	175	162	169	159	151	164
1999	259	257	238	252	261	259	273	266	273
General mean	216	207	201	214	212	214	216	209	219

"F" test 1998 = 1.6:N.S
"F" test 1999 = 2.35 "S"
L.S.D. 1999 = 20.37
0.05
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

From the results of the two seasons, it could be approvated that pea sugar variety is the most susceptible one within the three varieties in receiving eggs population while the little marven variety is the lowest one attracting *B. tabaci* oviposition. As for, the effect of fertilization, it differed from variety to other. The "N" treatment on eggs population in the case of linkolen (166 eggs/sample) but (N+K) treatment was the most effective on egg population on the plants of sugar variety (172 eggs/sample)

3. B. b. Bean crop:

From data presented in table (17) and illustrated in Fig (16) it is clear that the seasonal mean numbers of eggs was higher during the 2 *nd* season 1999 than that during the 1 *st* season on the three common bean varieties.

During the 1 *st* season 1997/98, it varied from 151 to 175 eggs/sample opposed to from 238 to 273 eggs/sample during 1998/99 winter season. The highest population of eggs during the first season was 175 eggs/sample on phaseolus Giza "3" without fertilization, while the lowest population was 151 eggs/sample on Giza "6" phaseolus variety with "N" treatment.

During the 2 *nd* season 1998/1999, the highest population was 273 eggs/sample on the plants of Giza "6" non fertilized & treated with mixture of N+K and the lowest was 238 eggs/sample on Swiss plan plants received nitrogen + potasiun fertilization.

Statistical analysis in table (17) cleared that non significant between seasonal mean number of eggs and common bean varieties under different levels fertilization during the 1 *st* season, while during the 2 *nd* season 1999 was significant.

From the results of the two season, it is clear that the infestation with eggs varied from season to another

when was at the 2 *nd* season higher than the first one. Also, it different according to the common bean variety, where Swiss plan was the most avoiding to receive egg population while Giza "6" was the highest variety shelter to *B. tabaci* eggs.

The fertilizers treatments also in their effect on eggs population according to cultivated common bean while the lowest egg numbers recorded on Swiss plan plants received N+K the same treatment led to increase in eggs population on Giza "6" variety. This may be due to the difference in the nutrient needs of variety.

3. C. Tomato whitefly nymphs infestation during 1998 & 1999:

3. C. a. Pea crop:

Data in table (18) and fig (17) showed that the population of *B. tabaci* nymphs were higher during the 2 *nd* season 1999 than that of the 1 *st* season 1998.

During 1 *st* season 1998, it noticed that the highest infestation to pea plants was 67 nymphs/sample on sugar variety when it fertilized with nitrogen and potasium and on linkolen variety received nitrogen fertilization, while the lowest infestation "57" nymphs/sample recorded on little marven variety with nitrogen fertilization only.

During the 2 *nd* season 1999, the highest mean number of infestation was 151 nymphs/sample on the plants of sugar variety either received N+K treatment or without fertilization while the lowest population was "126" nymphs/sample on little marven without fertilization.

Statistical analysis in table (18) appeared that the difference between nymphs population on pea varieties under fertilization treatments was non significant during the first season 1998 and significant during the 2 *nd* season 1999.

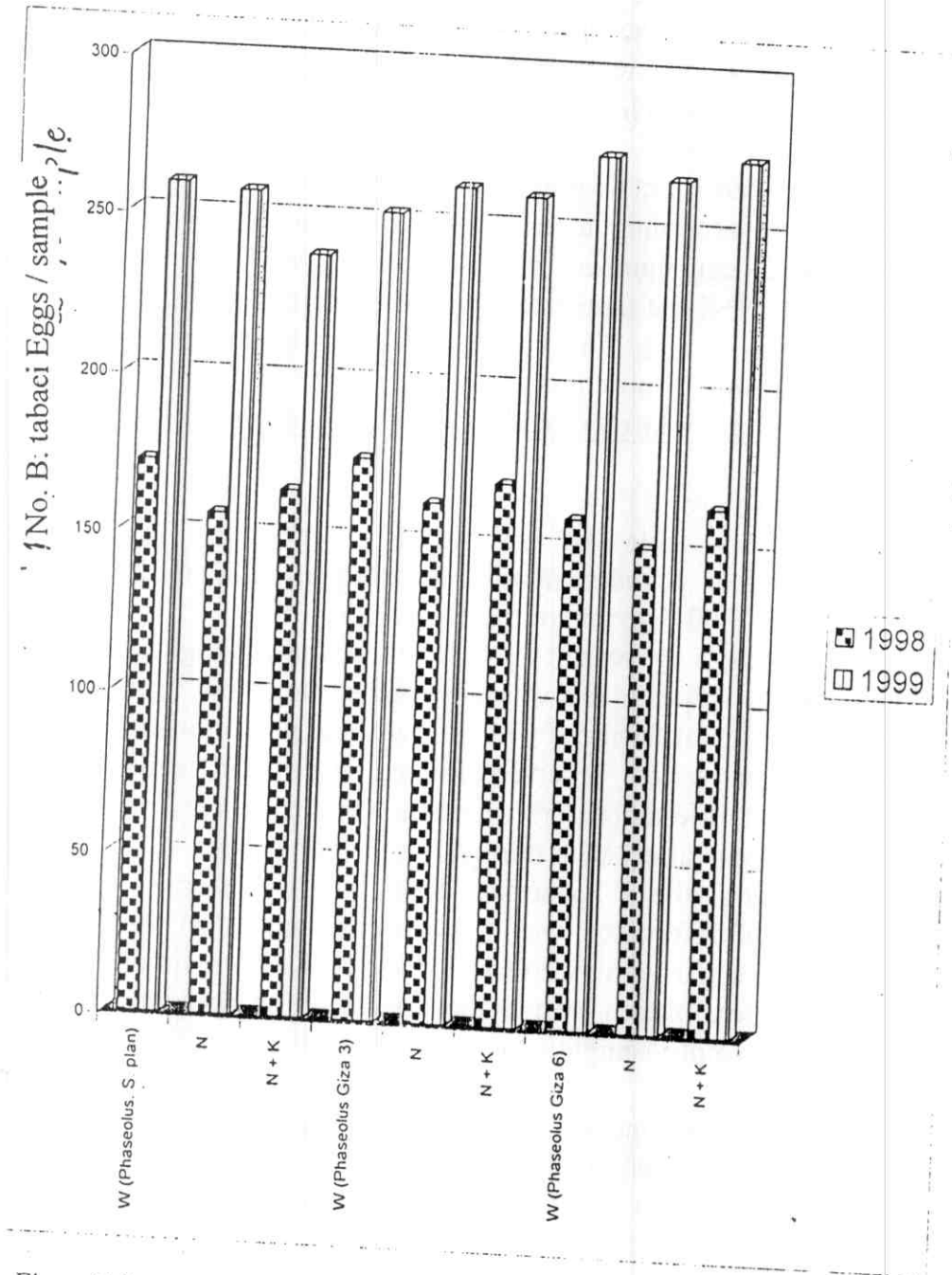


Fig. (16) : Effect of fertilization on tomato whitefly *B. tabaci*, egg infestation on three varieties of bean during two successive seasons.

Table (18): Effect of nutrient elements fertilization on tomato white F/y, B. tabaci nymphs infestation on pisum varietes during two successive seasons.

Season	Pisum linkolen			P. little marven			Sugar pisum		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997/1998	58	67	63	60	57	059	65	62	67
1999	130	138	138	126	137	133	151	140	151
General mean	94	103	101	93	97	96	108	101	109

"F" test 1998 = 1.45:N.S
"F" test 1999 = 3.04 "S"
L.S.D. 1999 = 14.19
0.05
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

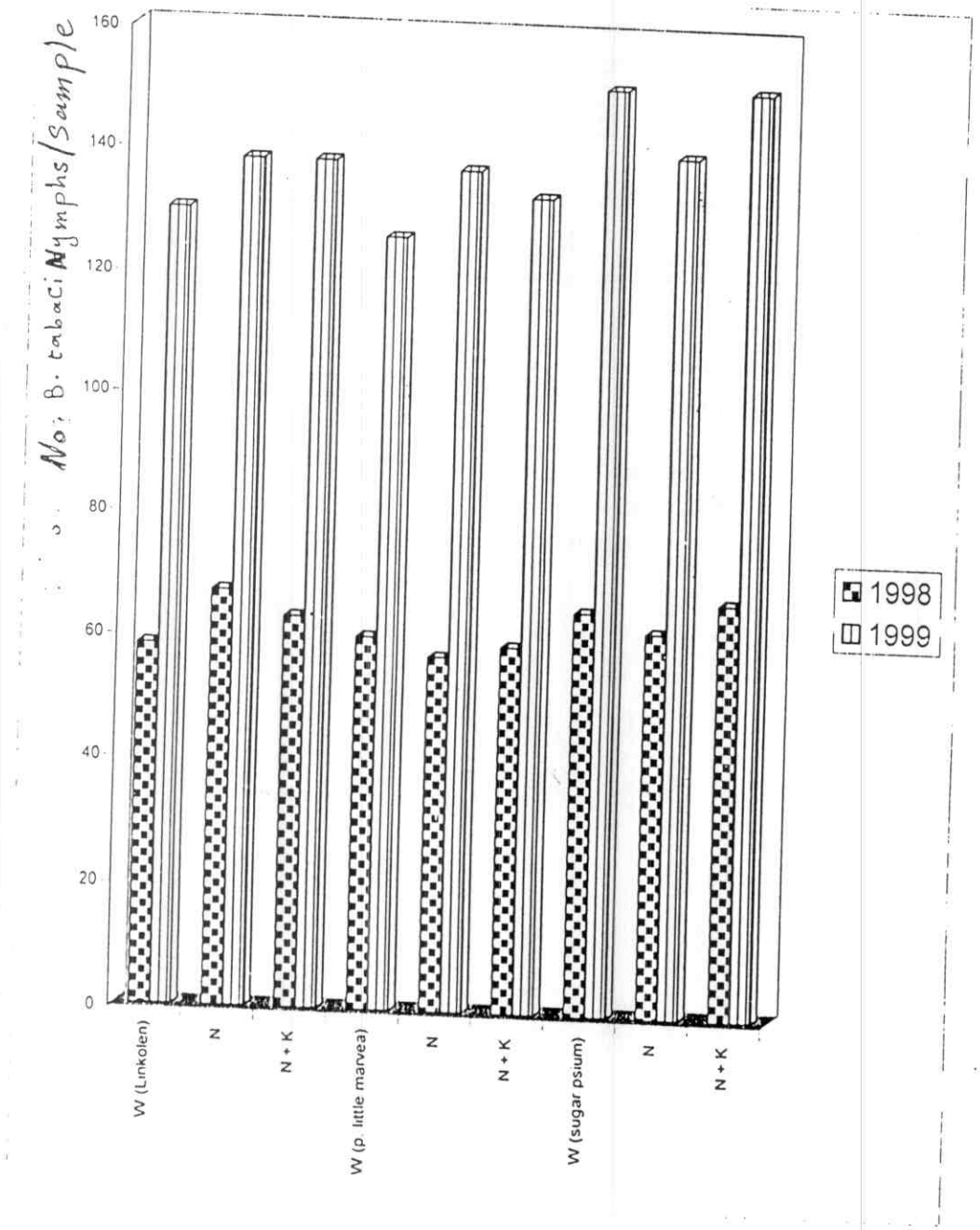


Fig. (17) : Effect of fertilization on tomato whitefly *B. tabaci*, nymphs infestation on three varieties of pea during two successive seasons.

From the previous results, it could be concluded that the population of *B. tabaci* nymphs varied from variety to another and also from fertilization treatment to another.

Generally, mean average was high on sugar variety treated (nitrogen + potasium) and did not receive any fertilization and on linkolen variety with nitrogenious treatment and (nitrogen + potasium) fertilization

3. C. b. Bean crop:

Data of mean numbers of *B. tabaci* nymphs infested common bean varieties under fertilization treatments in table (19) and fig (18) showed that as in the case of common bean crop infestation was higher during the 2 *nd* season 1999 than on the 1 *st* season 1998.

During the 1 *st* season 1998, the highest population was "95" nymphs on Swiss plan variety and Giza "3" without any fertilization treatment, while the lowest infestation was 82 nymphs on Giza "3" treated with (N+K) fertilizers.

On other hand, during the 2 *nd* season 1999, the highest numbers was 197 nymphs on the plants of Giza "6" variety without any fertilization and the lowest was 172 nymphs on Swiss plan with N+K treatment.

These differences were non significant during the 1 *st* season and the 2 *nd* season.

3. D. Tomato whitefly pupae infestation:

3. D. a. Pea crop:

Data presented in table (20) and fig (19) cleared that the mean numbers of *B. tabaci* pupae on the plants of pea varieties when three fertilization treatments were applied during two successive winter seasons. The population was higher during the 2 *nd* season 1999 than the 1*st* season 1998.

During the 1*st* season, the highest infestation was "39" pupae/sample on the plants of linkolen variety received nitrogen only, while the lowest was "33"

Table (19): Effect of nutrient elements fertilization on tomato white Fly, B. tabaci nymphs infestation on phaseolus varietes during two successive seasons1998 & 1999.

Season	Phaseolus sues plan			Phaseolus Giza "3"			Phaseolus Giza "6"		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997/1998	95	84	91	95	87	82	89	88	88
1999	194	183	172	185	184	182	197	190	189
General mean	145	134	132	140	136	132	143	139	139

"F" test 1998 = 1.85:N.S
"F" test 1999 = 1.43:NS"
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

Table (20): Effect of nutrient elements fertilization on tomato white F/y, B. tabaci pupae infestation on pisum varieties during two successive seasons 1998 & 1999.

Season	Pisum linkolen			P. little morven			Sugar pisum		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997/1998	38	39	37	34	34	33	34	35	38
1999	77	88	82	76	82	81	90	83	90
General mean	58	64	60	55	58	57	62	59	64

"F" test 1998 = 0.27:N.S
"F" test 1999 = 2.57 "S"
L.S.D. 1999 = 9.49
0.05
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

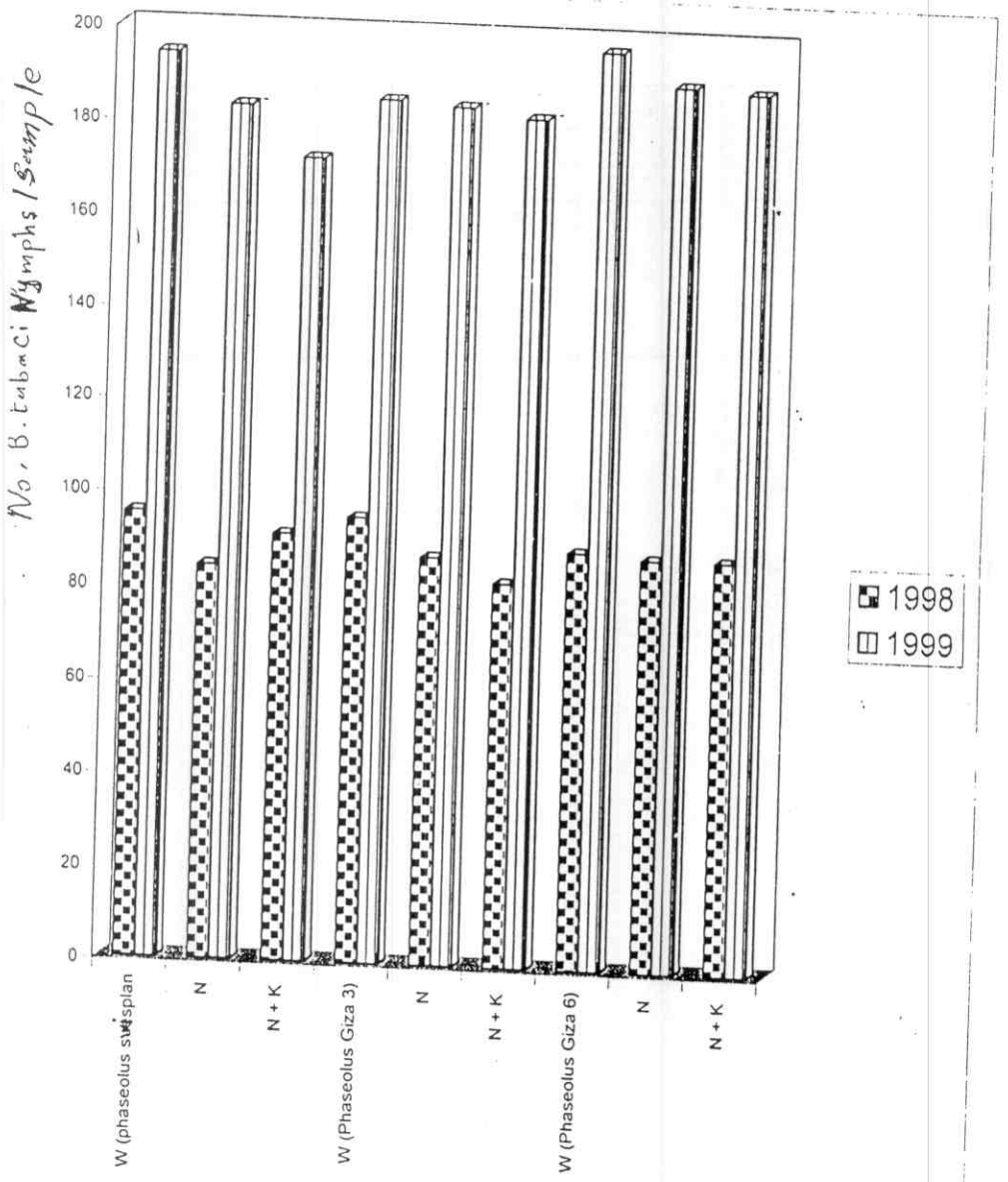


Fig. (18) : Effect of fertilization on tomato whitefly *B. tabaci*, nymphs infestation to bean varieties during two successive seasons.

pupae/sample on litte marven variety treated (nitrogen + potasium) fertilization.

During the 2 *nd* season, the highest infestation was "90" pupae/sample on sugar variety did not receive any fertilization and also on the plants of some varieties applied with (N+K) treatment, The lowest record of *B. tabaci* pupae was "76" individuals on untreated plants of little marven variety.

Statistical analysis in Table (20) indicated that there differences were non significant in the 1 *st* season 1998 and significant in the case of the 2 *nd* season 1999. By calculating the general mean number of pupae of the two seasons 1998 and 1999, it is evident that the most effective treatment to in cease population of pupae was the adding of "N" to the plants of linkolen variety and (N+K) to the plants of sugar variety recording "64" pupae/sample the unfertilized plants were the lowest ones avoiding the high popilation in the case of linkolen and little marven varieties (58 and 55 pupae/sample).

3. D. b. Bean crop:

As shown in table (21) and illustrated in fig. (20) mean number of tomato whitefly pupae was higher during the second season 1999 than the 1 *st* season 1998.

During the 1 *st* season 1998, the infestations were very little and varied between 37 pupae/sample on unfertilized plants of Giza "6" variety to "50" pupae in the case of Swiss plan variety, while during the 2 *nd* season the infestation were higher and ranged between 110 pupae/sample on Giza "3" variety applied with (N+K) to "172" pupae on Swiss plan variety received the same treatment. This lead to the explanation that this varieties are different in their needs to fertilization and also different from the side of fertilizers effects on *B. tabaci* population.

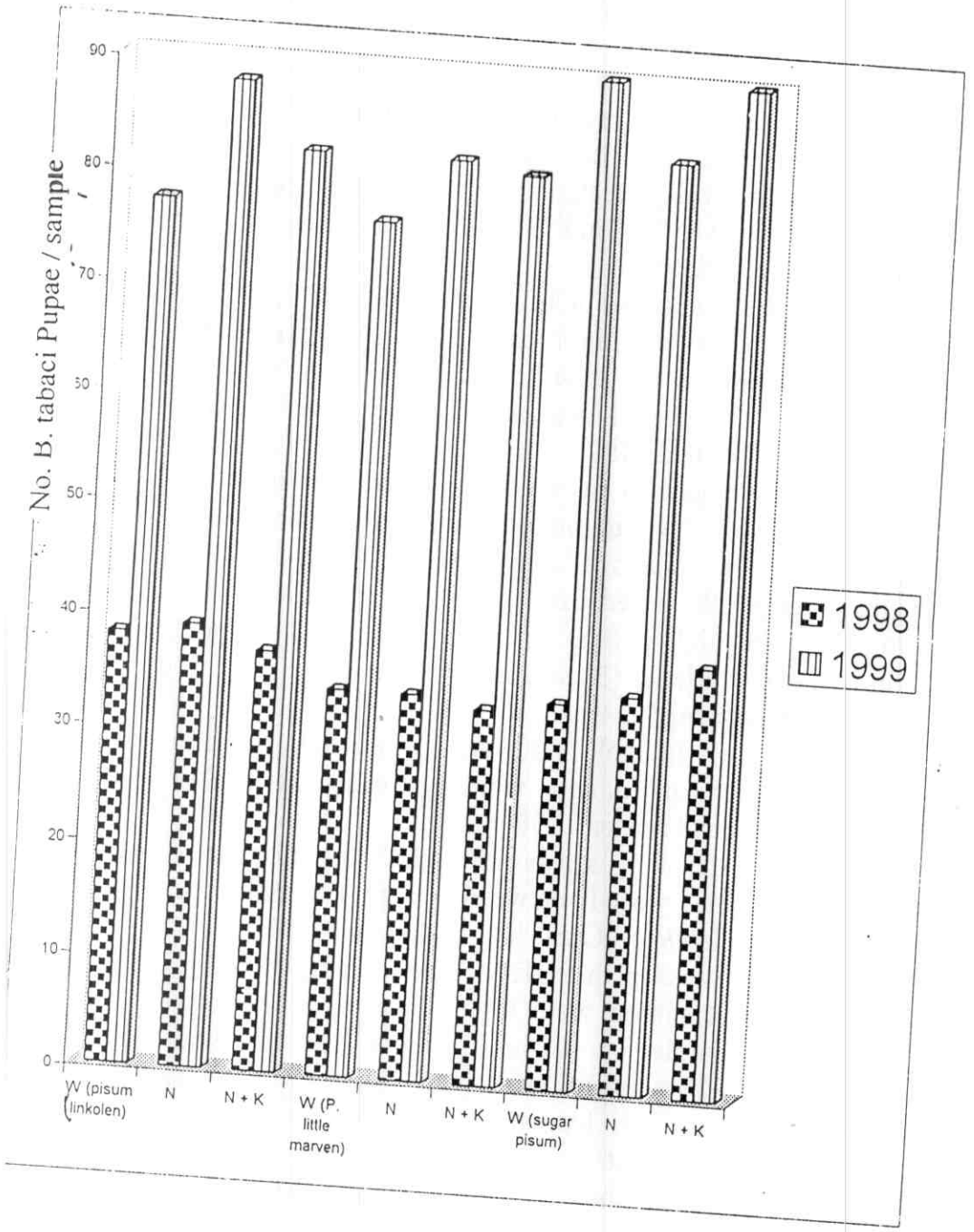


Fig. (19) : Effect of fertilization on tomato whitefly *B. tabaci*, pupae infestation to pea varieties during two successive seasons.

Table (21): Effect of nutrient elements fertilization on tomato white F/y, B. tabaci pupae infestation on phaseolus varietes during two successive seasons1998 & 1999.

Season	Phaseolus sues plan			Phaseolus Giza "3"			Phaseolus Giza "6"		
	Fertilization			Fertilization			Fertilization		
	Without	N	N+K	Without	N	N+K	Without	N	N+K
1997/1998	50	47	48	48	45	48	37	42	47
1999	121	115	172	115	112	110	117	114	116
General mean	86	81	110	82	79	79	77	78	82

"F" test 1998 = 0.17: N.S
"F" test 1999 = 0.74 : N.S
W: Without fertilization
N: Nitrogen fertilization
N + K: Nitrogen + Potasium.

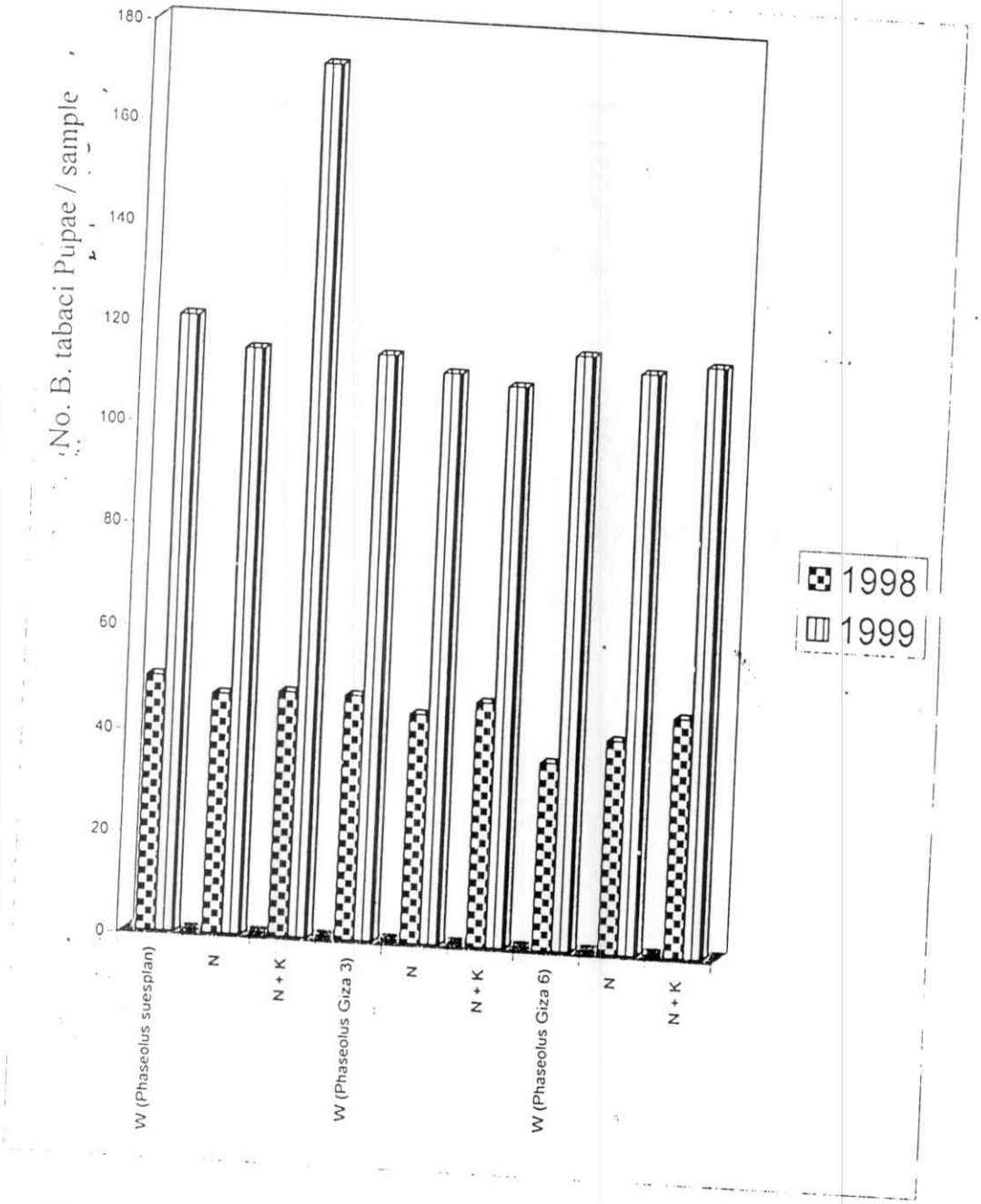


Fig. (20) : Effect of fertilization on tomato whitefly *B. tabaci*, pupae infestation to bean varieties during two successive seasons.

Statistical analysis in table (21) appeared that this differences were non significant during the two winter seasons 1998 & 1999.

Generally, the average was highest on Swiss plant variety under different levels fertilizations and Giza "6" with nitrogen and potasium fertilization, the lowest was on Giza "3" and Giza "6" with nitrogen fertilization during two successive seasons 1998 & 1999.

In this scale some authors, mentioned that using different levels of fertilization were affect on B. tabaci infestation as follow:

Aly F., (1979), in **Egypt**, noticed that number of eggs *Bemisia tabaci* and highest larval population was on tomato plants treated with heavy level of (N) fertilization, while the highest pupal population was record on the plants after receiving normal rate of (N) fertilizer during 1977 & 1978 seasons.

Said and El-Farouk, (1991), in **Egypt**, mentioned that the increase in the amount of nitrogen increase whitefly *B. tabaci* infestation.

Aly SH. (1996), in **Egypt**, studied the affect of different levels of fertilization on population on *B. tabaci* and their predator in squash and cucumber plants.

He showed that squash var eskandarani gave highest population of the insect and their predators, and mentioned that non significant between levels of different fertilization on insect pest population and their predators on squash and cucumber during 1990 & 1991.

Hashem, (1997), in **Egypt** showed that the highest population was in the case of pisum caltivated on 19 *th* October, while the lowest was on the caltivated at 9 *th* November. And on phaseolus the highest number was on the plants of 26 *th* April and the lowest was on the plants of 16 *th* April. The effect of ground fertilization on *B. tabaci* was less than in case of leaf treatment on pisum,

while on phaseolus the higher population of *B. tabaci* was recorded after the treatment with leaf fertilizer (Granzoit) but the lowest one on the plants received the soprogrow during 1995 & 1996 seasons.

Hammam, (2000), in **Egypt**, the present results on tomato plants treated with heavy level of (N) fertilization (Amonium sulphate 20.5%), (Calsium super phosphate 15% P_2O_5) and (Potasium sulphate 48% K_2O) gave high numbers of *B. tabaci* infestation. He found that lowest level of *B. tabaci* infestation was recorded after the treatment with nitrogen fertilization (150 unit/feddan) of the same fertilizers.

PART IV

4. Evaluation of some treatments to control *B. tabaci* on three summer vegetable crops

The present experiment was designed to evaluate the efficiency of "5" treatments (Reldan 50% E.C, chemisol 95% E.C, Natrielo 90% E.C, Jojoba oil 95% E.C and Bioflay $3x10^7$) to control adult and nymphal stages of *B. tabaci* on the summer vegetable crops (squash, tomato and eggplant) throughout two successive seasons.

A. squash plants:

1. *B. tabaci* adults:

The effect of different treatment on the reduction of *B. tabaci* adult population during two successive summer seasons (1998&1999) presented in tables (22 and 23). Data showed that the *B. tabaci* adult were more effected by treatments in 1998 than 1999 summer seasons. Reldan was the most effective one during two seasons reaching the highest initial reduction 80.6 and 74.2 % for 1998 and 1999 summer season respectively followed by Jojoba oil 79 and 72.0% initial reduction after 24 hours. The lowest initial reduction was in the case of Bioflay treatment recording 77 and 65% in the two summer season.

The general mean of the residual effect of the five treatments after 7 days of application proved that all five treatments reduced *B. tabaci* adult population compared with untreatment. The response of adults to treatment was higher in the first season than in the second one. The variations between the reduction in different treatments were very near in the first season than in the second. Reldan 50% was the most effective treatment in reduction *B. tabaci* adult population and occupied the first category with general mean reduction 75 and 69.5% during 1998&1999 summer seasons followed by Chemisol 95%, Naterilo 90%, Jojoba 95% and Bioflay which caused

Table (22): Effect of some insecticides against tomato white Fly. *B. tabaci* adults on squash plants at Moshtohor Farm during season 1998.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill		Residual effect							
			24 hours		3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	300	60	80.6	90	73.0	85	75.0	80	77.0	85	75.0
Chemisol 95% Ec	1000cm	320	75	77.2	105	70.6	100	72.3	85	77.0	97	73.3
Naterilo 90% Ec	625cm	310	70	78.0	100	71.1	95	72.8	87	76.0	94	73.2
Jogoba 95%Ec	1000cm	325	70	79.0	100	72.4	98	73.3	88	77.0	95	74.2
Bio flay 3×10^7	100cm	338	80	77.0	110	71.0	100	74.0	95	76.0	102	73.4
Control	–	233	240	–	260	–	263	–	270	–	264	–

Table (23): Effect of some insecticides against tomato white Fly. ***B. tabaci*** adults on squash plants at Moshtohor Farm during season 1999.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill		Residual effect							
			24 hours		3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	226	62	74.2	78	68.2	80	66.4	74	73.0	077	69.5
Chemisol 95% Ec	1000cm	254	85	69.0	86	68.8	97	63.8	94	69.4	092	67.6
Naterilo 90% Ec	625cm	246	80	69.0	97	63.6	100	61.5	96	67.8	098	64.4
Jogoba 95%Ec	1000cm	258	78	72.0	97	65.3	110	59.6	106	66.1	104	63.9
Bio flay 3×10^7	100cm	220	82	65.0	96	59.8	108	53.5	106	60.2	103	58.1
Control	–	237	252	–	257	–	250	–	287	–	265	–

(73.3 and 67.6%) (73.2 and 64.4%), (74.2 and 63.9%) and (73.4 and 58.1) reduction % for the two above mentioned season respectively.

2. *B. tabaci* nymphs:

Data in tables 24 and 25 present the effect of different treatment on the reduction of *B. tabaci* nymphal population in 1998 and 1999 successive squash seasons. Obtained results indicate that the effect of these treatments approximately took the same trend in the two seasons with an exceptions.

The general means of residual effect of these treatments were 67.7% reduction after treatment with Reldan occupied the first category followed by 60.9 in the case of Naterilo 57.2% reduction after Bioflay treatment, 54.8 after Chemisol application and finally Jojoba treatment recording 52.3% reduction in nymphs population in 1998.

The same trend of 1998 recorded in 1999 squash season when Reldan treatment caused 71.2% nymphs reduction ranked the first class between the five treatments followed the by Chemisol 63.2%, Jojoba and Naterilo recording 58.2% and 58.1% and finally Bioflay treatment 51.1% reduction.

The previous results lead to the conclusion that within the five treatment Reldan come to the first category in reducing *B. tabaci* population either in adult or nymphal stages. The variations in reductions in the case of adults stages were very closed because of the other treatments except for Reldan may be play role as repellent to *B. tabaci* adults and this minimized the variation in reduction between Reldan and other treatments. The variation in reduction between Reldan and other treatments increased in the case of nymph because stability of nymphs on levels and weren't influenced with the treatments that may be have repellent

ffect of some insecticides against tomato white fly. ***B. tabaci*** nymphs on squash plants at Moshtohor Farm ng 1998.

nt	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
n Ec	250cm	168	60	67.0	65	65.0	55	71.4	60	67.7
ol	1000cm	160	85	50.4	80	55.0	75	59.0	80	54.8
lo c	625cm	171	75	59.0	77	59.3	70	64.2	74	60.9
a c	1000cm	161	90	47.8	85	52.3	80	56.5	85	52.3
ay 7	100cm	171	80	56.3	85	55.0	78	60.0	81	57.2
ol	–	140	150	–	155	–	160	–	155	–

Effect of some insecticides against tomato white fly. ***B. tabaci*** nymphs on squash plants at Moshtohor Farm uring 1999.

tment	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
dan % Ec	250cm	132	44	69.3	41	68.9	40	75.4	41	71.2
nisol Ec	1000cm	156	63	62.8	58	62.8	64	66.4	62	63.2
erilo % Ec	625cm	148	76	52.7	71	52.0	55	69.5	67	58.1
oba %Ec	1000cm	164	71	60.2	86	47.6	65	67.5	74	58.2
flay 10^7	100cm	142	69	55.3	85	40.2	70	59.6	75	51.1
trol	–	150	163	–	150	–	183	–	162	–

effect. To minimize the use of Chemisol treatments and subsequently environmental pollution it is suggested that to control *B. tabaci*, the first spray is with any of Jojoba oil, Chemisol, Naterilo or Bioflay to reduce adult population and the following spray with Reldan.

In this scale to control B. tabaci Laservic (1970) used dimethoate followed by methyl parathion.

Laserevic (1970) and Zaazuc et al (1973), reported that mineral oils were highly effective to control whitefly ***Butler and Henneberry (1991)*** found that on or two applications of 1-2% of plant derived oils water repelled or hilled adults and immature stages of *B. tabaci* on squash plants. ***Hady (1999)*** recorded that actellic 50% and Jojoba oil were very affection in reducing *B. tabaci* nymph population.

B. Tomato plants:

1. *B. tabaci* adults:

The effect of tested treatments in the reduction of *B. tabaci* adult population in 1998 and 1999 tomato season in tables (26 and 27) proved that as in the case of squash plants the variation in reductions between treatments were very small either in the form of initial kill after 24 hours which ranged between the maximum reduction 77.6 by Reldan treatment to the lowest on 67.0% reduction in the case of Naterilo in 1998 tomato season. The same trend was recorded in 1999 season with noticed lowering in the response of adults to treatments which varied between 66.4 to 56.8% reduction of Reldan and Bioflay.

Concerning the general mean reduction of 4 inspection after 7 days of treatment Reldan was the highest effective treatment reducing 76.4% adult population in 1998 and 64.0% in the following season (1999) ranking the first category with were variation with

Table (26): Effect of some insecticides against tomato white Fly. ***B. tabaci*** adults on tomato plants at Moshtohor Farm during season 1998.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill		Residual effect							
			24 hours		3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	260	65	77.6	80	74.0	64	77.0	55	79.0	66	76.4
Chemisol 95% Ec	1000cm	280	75	76.0	95	71.0	75	75.0	68	75.4	79	73.8
Naterilo 90% Ec	625cm	200	73	67.0	85	63.6	70	67.2	65	68.0	73	66.1
Jogoba 95%Ec	1000cm	290	80	75.3	100	70.5	76	75.4	70	76.0	82	73.7
Bio flay 3×10^7	100cm	300	85	74.6	100	71.4	80	75.0	74	75.3	85	73.7
Control	–	197	220	–	230	–	210	–	197	–	212	–

Table (21): Effect of some insecticides against tomato white fly. *B.tabaci* adults on tomato plants at Moshtohor Farm during season 1999.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill 24 hours		Residual effect 3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	175	60	66.4	70	58.4	62	63.4	55	69.0	62	64.0
Chemisol 95% Ec	1000cm	167	65	61.9	85	47.1	79	51.8	62	63.0	75	54.3
Naterilo 90% Ec	625cm	179	70	61.7	83	51.8	81	54.0	60	67.0	75	57.4
Jogoba 95%Ec	1000cm	166	70	58.7	88	44.9	77	52.8	63	62.3	76	53.5
Bio flay 3×10^7	100cm	170	75	56.8	87	46.8	75	55.2	65	62.0	76	54.6
Control	–	185	189	–	178	–	182	–	186	–	182	–

the other treatments in the first season and some what noticed variation in the second season.

2. *B. tabaci* nymphs:

Obtained results in (tables 28 and 29) indicated that the estimated percentages of *B. tabaci* nymphal population reduction estimated as the general mean of 3 inspections after 7 days of treatment were 67.7 in the case of spraying with Reldan in the first season and 61.6 in the second season (1999). There were variations in the response of nymphs to treatments in the two seasons of study and this appeared in the reductions of the nymph population Data also observed that Chemisol caused 62.0 and 56.3 reduction % followed by Naterilo (61.0 and 53.7) Jojoba (58.3 and 46.3) and Bioflay which reduced nymphs population 57.3 and 47.5% in the two seasons 1998 and 1999 respectively.

From the above mentioned results, it is clear that Reldan treatment gave the most effective protection to tomato plants from *B. tabaci* population while the spraying with Bioflay was the lowest one. There was reduction in the efficiency of all treatments appeared in the second season 1999.

Singh et al (1974) found that after four application with mineral oil at 3.0 litre/feddan of tomato reduction in *B. tabaci* population and subsequently 90% reduction in tomato caused leaf curl virus.

Butler and Henneberry (1991), obtained good reduction in *B. tabaci* adult and nymph population after one or two application of 1.2% plant derived oils in water.

C. Eggplant plants:

1. *B. tabaci* adults:

Data of evaluation five insecticides during season 1998 in table (30) cleared that percentage of mortality after 24 hours ranged between 65.4% reduction with

Table (28): Effect of some insecticides against tomato white fly. ***B. tabaci*** nymphs on tomato plants at Moshtohor Farm during season 1998.

Treatment	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	187	60	70.0	75	60.0	51	73.4	62	67.7
Chemisol 95% Ec	1000cm	185	70	64.0	85	54.0	65	66.0	73	62.0
Naterilo 90% Ec	625cm	180	70	63.0	82	54.5	64	65.4	72	61.0
Jogoba 95%Ec	1000cm	180	75	60.4	85	53.0	70	62.0	77	58.3
Bio flay 3×10^7	100cm	187	80	59.4	90	52.0	77	60.0	82	57.3
Control	–	190	200	–	190	–	195	–	195	–

Table (29): Effect of some insecticides against tomato white fly. *B. tabaci* nymphs on tomato plants at Moshtohor Farm during season 1999.

Treatment	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	099	43	53.8	35	63.0	33	67.0	37	61.6
Chemisol 95% Ec	1000cm	101	49	48.3	43	55.5	38	63.0	43	56.3
Naterilo 90% Ec	625cm	102	46	52.0	48	50.8	43	59.0	46	53.7
Jogoba 95%Ec	1000cm	088	50	39.5	47	44.2	40	55.0	46	46.3
Bio flay 3×10^7	100cm	092	54	37.5	47	46.6	40	57.0	47	47.5
Control	–	115	108	–	110	–	117	–	112	–

Table (3.1): Effect of some insecticides against tomato white fly. *B. tabaci* adults on egg plant plants at Moshtohor Farm during season 1999.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill		Residual effect							
			24 hours		3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	224	78	66.6	72	62.3	69	67.8	63	72.0	68	67.7
Chemisol 95% Ec	1000cm	226	95	59.7	84	56.4	78	63.9	74	67.5	79	63.0
Naterilo 90% Ec	625cm	210	90	58.9	77	57.0	73	63.7	70	67.0	73	63.0
Jogoba 95%Ec	1000cm	202	94	55.4	82	52.4	79	59.1	80	61.0	80	58.0
Bio flay 3×10^7	100cm	221	92	60.1	86	54.3	86	59.3	83	63.0	85	59.0
Control	–	230	240	–	196	–	220	–	232	–	216	–

Table (30): Effect of some insecticides against tomato white fly. ***B. tabaci*** adults on egg plant plants at Moshtohor Farm during season 1998.

Treatment	Rate/100 L.Water	No. pre-treatment	Initial kill		Residual effect							
			24 hours		3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	200	70	65.4	80	62.4	73	67.3	60	76.5	71	69.2
Chemisol 95% Ec	1000cm	207	85	59.4	90	59.0	85	63.2	80	69.7	85	64.4
Naterilo 90% Ec	625cm	207	73	65.1	85	61.4	80	65.4	70	73.5	78	67.4
Jogoba 95%Ec	1000cm	217	80	63.5	95	59.0	90	63.0	80	71.2	88	65.0
Bio flay 3×10^7	100cm	227	90	60.8	100	59.0	95	62.5	85	71.0	93	64.5
Control	–	188	190	–	200	–	210	–	240	–	217	–

Reldan to 59.4% with Chemisol. The initial reduction could be arranged descendingely as follows, Reldan, Naterilo, Jojoba Bioflay and Chemisol during season 1998, while during season 1999 were arranged descendingely as follows: Reldan (66.6%) Bioflay (60.1%), Chemisol (59.7%), Naterilo (58.9%) and finally Jojoba (55.4%) reduction of table "31" the residual effect mortality was ranged after "3" days of tables (30 and 31) between Reldan (62.4 and 62.3) to (59.0 and 54.3%) reduction on Bioflay during 1998, 1999 season. After "5" days, the mortality percentage ranged between (67.3 and 67.8%) with Reldan to (62.5 and 59.3) reduction % with Bioflay. The mortality percentage after "7" days ranged between (76.5 and 72.0) reduction % with Reldan to (69.7 and 61.0) reduction on Chemisol and Jojoba during 1998&1999 seasons.

General mean of mortality percentage ranged between the highest mortality 69.2% of Reldan and the lowest 64.4% on Chemisol during 1998, while it was ranged between 67.7% (Reldan) to 58.5% (Jojoba) during 1999 season. The average of mortality could be arranged descendengly as follows: Reldan, Chemisol, Naterilo, Bioflay and Jojoba.

2. *B. tabaci* nymphs:

Data in table 32 indicated that the residual effect mortality after "3" days of spray insecticides was ranged between the highest percentage 48.7% with Reldan and the lowest one 29.9% with Chemisol. After "5" days mortality percentage ranged between 42% Reldan to 34% on Jojoba and Chemisol during 1*st* season 1998. General mean mortality ranged between the highest percentage 50.5% with Reldan and the lowest one 37.5% with Chemisol. Mortality percentage of the tested insecticides could be arranged descendingly as follows: Reldan, Bioflay, Naterilo, Jojoba and chemisol.

Table (32): Effect of some insecticides against tomato white Fly. ***B. tabaci*** nymphs on egg plant plants at Moshtohor Farm during season 1998.

Treatment	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	120	64	48.7	78	42.0	59	60.0	67	50.5
Chemisol 95% Ec	1000cm	122	89	29.9	90	34.0	80	46.4	86	37.5
Naterilo 90% Ec	625cm	122	78	38.5	88	36.0	70	53.0	79	42.6
Jogoba 95%Ec	1000cm	132	82	40.3	98	34.0	77	52.0	86	42.2
Bio flay 3×10^7	100cm	152	92	41.8	100	41.3	90	51.3	94	45.2
Control	–	125	130	–	140	–	152	–	141	–

Table (33): Effect of some insecticides against tomato white Fly. ***B. tabaci*** nymphs on egg plant plants at Moshtohor Farm during season 1999.

Treatment	Rate/100 L.Water	No. pre-treatment	Residual effect							
			3 days		5 days		7 days		Mean	
			No	%	No	%	No	%	No	%
Reldan 50% Ec	250cm	142	50	57.1	45	68.7	40	73.2	45	67.0
Chemisol 95% Ec	1000cm	130	57	46.6	56	57.5	43	68.5	52	58.4
Naterilo 90% Ec	625cm	138	53	53.2	50	64.2	43	70.0	49	63.1
Jogoba 95%Ec	1000cm	136	56	49.8	55	60.1	50	65.0	54	58.7
Bio flay 3×10^7	100cm	134	60	45.4	60	55.8	53	62.0	57	55.8
Control	–	156	128	–	158	–	164	–	150	–

During 2nd season 1999, mortality percentage recorded in table 33 noticed that after "3" days of the spray, it ranged between 57.1% (Reldan) to 45.4% (Bioflay. After "5" days of the spray, the mortality percentage ranged between the highest mortality 68.7% on Reldan and the lowest one 55.8% on Bioflay, also after "7" days the mortality percentage ranged between 73.2% (Reldan) to 62.0% (Bioflay) during season 1999.

General mean mortality ranged between 67.0% on Reldan to 55.8% on Bioflay. Mean of mortality could be arranged descendingly as follows: Reldan , Naterilo, Jojoba, Chemisol and Bioflay.

In breifly good insecticides applied to control *B. tabaci* adults and nymphs could be arranged descendingly as follows: Reldan 50% E.C at rate 250cm/100litre water, Naterilo 90% E.C at rate 625 cm /100litre water, Bioflay $3x10^7$ V at rate 100cm/100litre water, Jojoba 95% E.C at rate 1000cm/100 litre water and Chemisol 90% E.C at rate 1000 cm/100litre water.

Evaluation experiments of the testes insecticides on squash, tomato and eggplant against *B. tabaci* adults and nymphs indicated that mortality percentage of these insecticides could be arranged descendingly as follows: Reldan 50% E.C at 250 cm /100litre water Netrilo 90% E.C at 625cm /100 litre water, Chemisol 95% E.C at 1000cm /100 litre water, Jojoba 95% at 1000 cm / litre water and Bioflay $3x10^7$ V at 100cm /100 litre water.

In this scale, ***Hady (1999)***, obtained high reduction (more than75%) in *B. tabaci* nymphs population after the application with actelic 50% followed by Jojoba oil (lower than 75%) while Zanzalakht extract reduced lower than 65%.

PART V

5. Effect of admire insecticide on population density of tomato whitefly, B. tabaci adults & nymphs and squash silver leaf appearance during winter season 1999

Data of the admire insecticide effiecncy on *B. tabaci* adults & nymphs population and appearance of silver leaf symptoms on squash plants *(cucurbita pepo va eskandarani)* presented in table 34 and illustrated in Fig. (21) cleard that the infestation with adults on the related squash was 232 adult sample at the beginning of the season and fluctuated ups and down to reach the 1*st* peak 246 adults/samples at 23*rd* October and the 2*nd* one 230 adult/sample at November 20 while on the squash without spray, the infestation was 388 adults/sample at the beginning and increased to reach 1*st* peak 428 adults/sample on October 30 and the 2*nd* peak 472 adults/sample on 20*th* November with total Number 3708 adults which was high comparing with 1953 adults on squash plants related with admire.

The population of nymphs was 135 nymph/sample at the beginning of experiment on treated squash and increased to reach the 1*st* peak 211 nymphs/sample at October 23 then fluctuated ups and down to reach the 2*nd* peak 203 nymphs/sample on December 4, while on untreated squash (control) the nymphs number were varied ups and down until reach to a peak 271 nymphs/sample on November 13 and decreased to the end of the season. The population of the nymphs on untreated squash plants were more than on sprayed one.

Table (34) Effect of Admire insecticides on density of tomato whitefly *B. tabaci* adults & nymphs and squash silver leaf appearance during winter season 1999.

Sampling / Date	Number of *B. tabaci*/sample						Temperature		RH%	Silver leaves	
	Treatment		Control		% Mortality						
	adults	nymphs	adults	nymphs	adults	nymphs	Max	Min		Treatment	Control
Oct. 9	232	135	388	240	40.2	43.8	31.3	23.3	62	15	140
16	179	123	325	264	44.9	53.4	33.4	21.2	61	24	165
23	246	211	345	243	28.7	13.2	30.1	18.5	63	21	199
30	225	163	428	247	47.4	34.0	33.1	21.5	63	16	245
Nov. 6	182	145	413	227	55.9	36.1	28.5	17.2	57	16	285
13	224	167	435	271	46.2	38.4	27.4	16.5	56	08	305
20	230	170	427	236	51.3	28.0	28.6	16.4	57	04	355
27	194	168	438	233	55.7	27.9	29.3	16.5	56	03	320
Dec. 4	241	203	464	244	46.1	16.8	29.2	15.4	56	03	300
Total	1953	1485	3708	2205	47.3	32.7	270.9	166.5	531	110	2014
Max temp	N.S (-)	N.S (-)	N.S (-)	N.S (+)					T test=23.2**	N.S=2.04	
Min temp	N.S (-)	N.S (-)	N.S (-)	S=-0.6531	t=−2.18						
R.H	N.S (+)	N.S (+)	S=−0.6849	N.S (+)							
T test=10.37**			t=−2.49								
T test=4.32*											

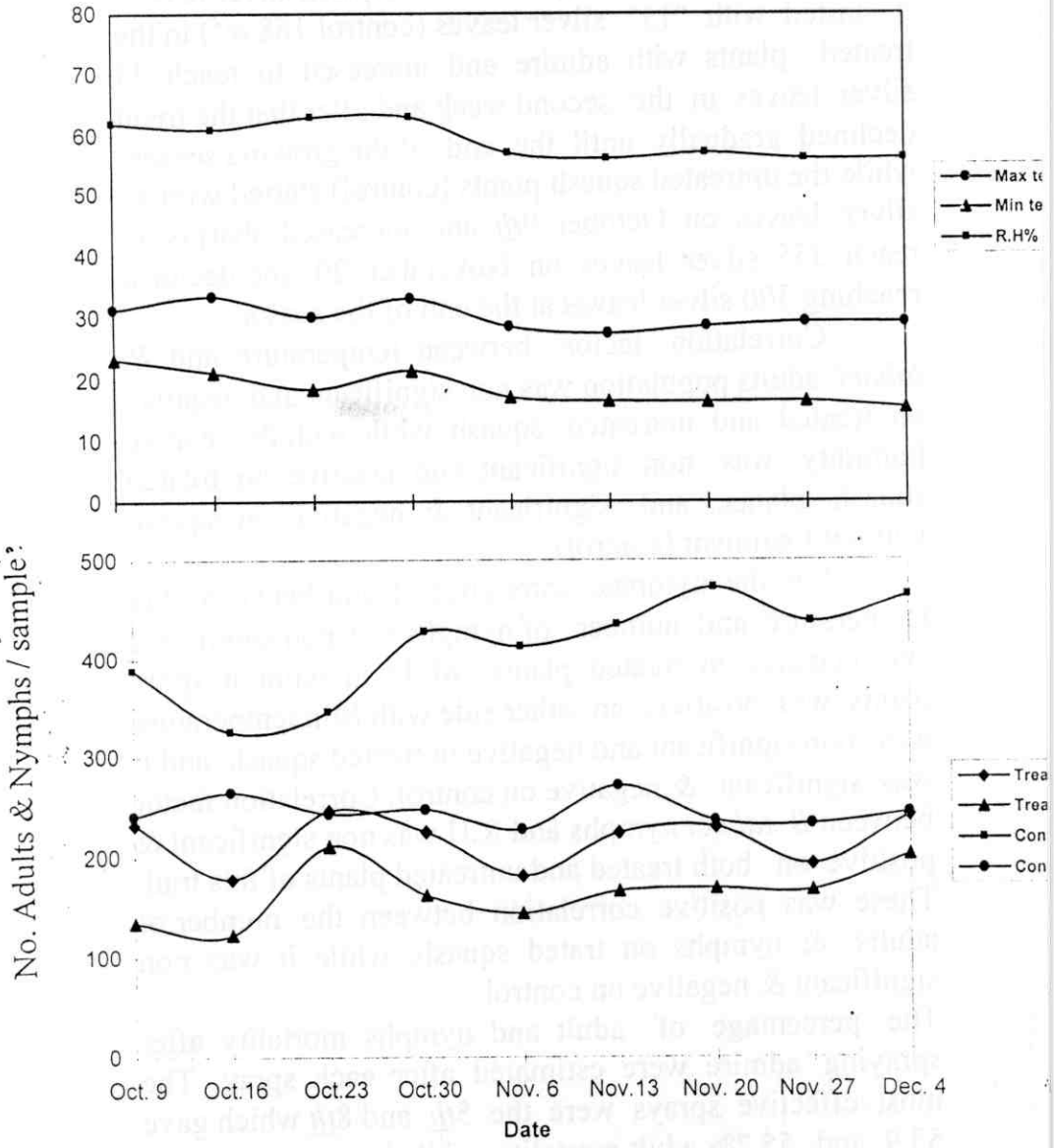


Fig. (21) Effect of admire insecticide on population density of whitefly, *B. tabaci* adults, nymphs and relationship with some meteorological factors to squash silver leaf appearance during season 1999.

Concerning the appearance of squash silver leaves, it started with "15" silver leaves (control 168 m^2) in the treated plants with admire and increased to reach 24 silver leaves in the second week and after that the trend declined gradually until the end of the growing season, while the untreated squash plants (control) started with 40 silver leaves on October 9th and increased sharply to reach 355 silver leaves on November 20 and declined reaching 300 silver leaves at the end of the season.

Correlation factor between temperature and *B. tabaci* adults population was non significant and negative on treated and untreated squash, while with the relative humidity was non significant and positive on treated squash plants, and significant & negative on squash without treatment (control).

For the nymphs, correlation factor between Max temperature and number of nymphs was non significant and negative in treated plants, while in without spray plants was positive, on other side with Min temperature was non significant and negative in treated squash, and it was significant & negative on control. Correlation factor between *B. tabaci* nymphs and R.H was non significant & positive on both treated and untreated plants of this trail. These was positive correlation between the number of adults & nymphs on trated squash, while it was non significant & negative on control.

The percentage of adult and nymphs mortality after spraying admire were estimated after each spray. The most effective sprays were the 5th and 8th which gave 55.9 and 55.7% adult mortality, while in case of nymphs the 2nd spray were the most effective in killing nymphs giving 53.4% on October 16th while the 3rd and 9th spray gave the lowest reductions of nymphal population during this trail.

Statistical analysis in table (34) with (T) test showed high significance between the population of adults on treated and untreated squash when the adults were more on control than on treated squash plants with total number 3708 & 1953 adult respectively and also, there were significant differences between the nymphs number on treated and untreated squash plants during 1999 season with total number 1485 & 2205 nymphs on treated squash and control plants respectively. On other hand, statistical analysis between the number of squash silver leaves and adults was high significant in treated squash with admire, while it was non significant on untreated squash (control).

Some authors in the world indicated that *B. tabaci* & *B. argentifolii* were responsible than silver leaf appears symptoms on squash and cucumber plants which its were induced to two sizes of double stranded R.N.A detected in whitefly infesting in yellow summer squash of both adults and nymphs and its ability to silver leaf appearance such as:

Perring et al (1991) in **U.S.A** confirmed that there are two strains of *B. tabaci* (Genn), the cotton strain and the poinsttia strain that caused squash silver leaf symptoms has expended host rang produced more honydew during feeding and laid more eggs on squash leaves.

Brown and Rosell (1992), compared between *Bemisia tabaci* populations derived from different host, plants and geographic locations world wide by assaying their ability to transmit 15 different geminivirues and their ability to induce phytotoxic symptoms such as silver leaf and hony suckle vein yellowing. Some populations had abroad hoste range, induced phytotoxic symptoms and were efficient vectors of many viruses tested. These population are referred to a the " B " biotype and spread

in the middle east throughout the Mediterranean, in south Africa, the Caribbean and central and North American.

Coasta et al (1993b), studied the ability of *B. tabaci* adult and immature stages to appear squash silver leaf, they found the exposure of zucchini plants to adults for 48 h. and removing the offspring did not allow to appearance of silver leaf symptoms. All plants exposed to adults, but on which immatures were allowed to develop showed symptoms of silver leaves.

Yokomi et al (1995), in **U.S.A** suggested that leaf silvering induced by gibbreallic acid biosynthesis inhibitors, silver of white results from hormonally mediated attractions in the plant physiology.

Usinc et al (1997), In **Spaini** indicated that the "B" Biotype is the only one to produce silvering but symptoms of this disorder vary depending on squash caltivars and *B. tabaci* populations. And noticed ***Secker et al (1998)*** that the differences between the "B" biotype and other indigenous biotype relating to host plant adaptations virus transmission efficacies and insecticide resistance.

The "B" biotype is unique in its ability to induce phytotoxic responses.

In certain plant species. Indication of silver leaf response in squash has been documented as the only reliable method of identifying "B" biotype and the only indicator plant for "B" biotype in field crops.

In a study ***Cardosa et al (1999)***. Some squash genotype to the appearance of silver leaf symptoms they suggest that tolerance to whitefly feeding is a major mechanism of resistance to the disorder in the resistance genotype.