RESULTS and DISCUSSION

4.1. Effect of hill spacing on the rate of infestation of cotton seedlings with Aphis gossypii (Glov.) :

4.1.1. Season 1981 :

Statistical analysis of the data in Table (1) and Fig. (1) showed that there were highly significant differences between the aphid infestation in the different hill spacing treatments. The highest number of aphid was recorded in 15 cm. hill spacing which was significantly higher than other hill spacing, followed by the control treatment (20 cm.). The lowest number of aphids was found in 35 cm. treatment while there was no significant difference between 25 and 35 cm. hill spacing.

Analysis of variance showed highly significant differences between the different hill spacing treatments. Data(Table, 1) indicated that a persistent increase of the aphid population was recorded for hill spacing reaching its peak on May,10.

Table (1) : Population of Aphis gossypii (Glov.) per 30 seedlings at different inspections in relation to hill spacing during 1981 season (Bahteem Station).

Date	Hill spacing treatments			
	Control 20 cm.	15 cm.	25 cm.	35 cm.
April 22	59	51	30	26
26	61	66	45	35
29	72	72	54	61
May 3	51	81	60	48
6	69	84	72	61
10	95	132	102	93
13	69	75	45	50
17	64	68	33	47
20	41	49	20	33
Total	581	678	461	454
Average	64.5	75.3	51.2	50.4

$F = 19.09^{**}$

$L.S.D._{0.05} = 7.88$

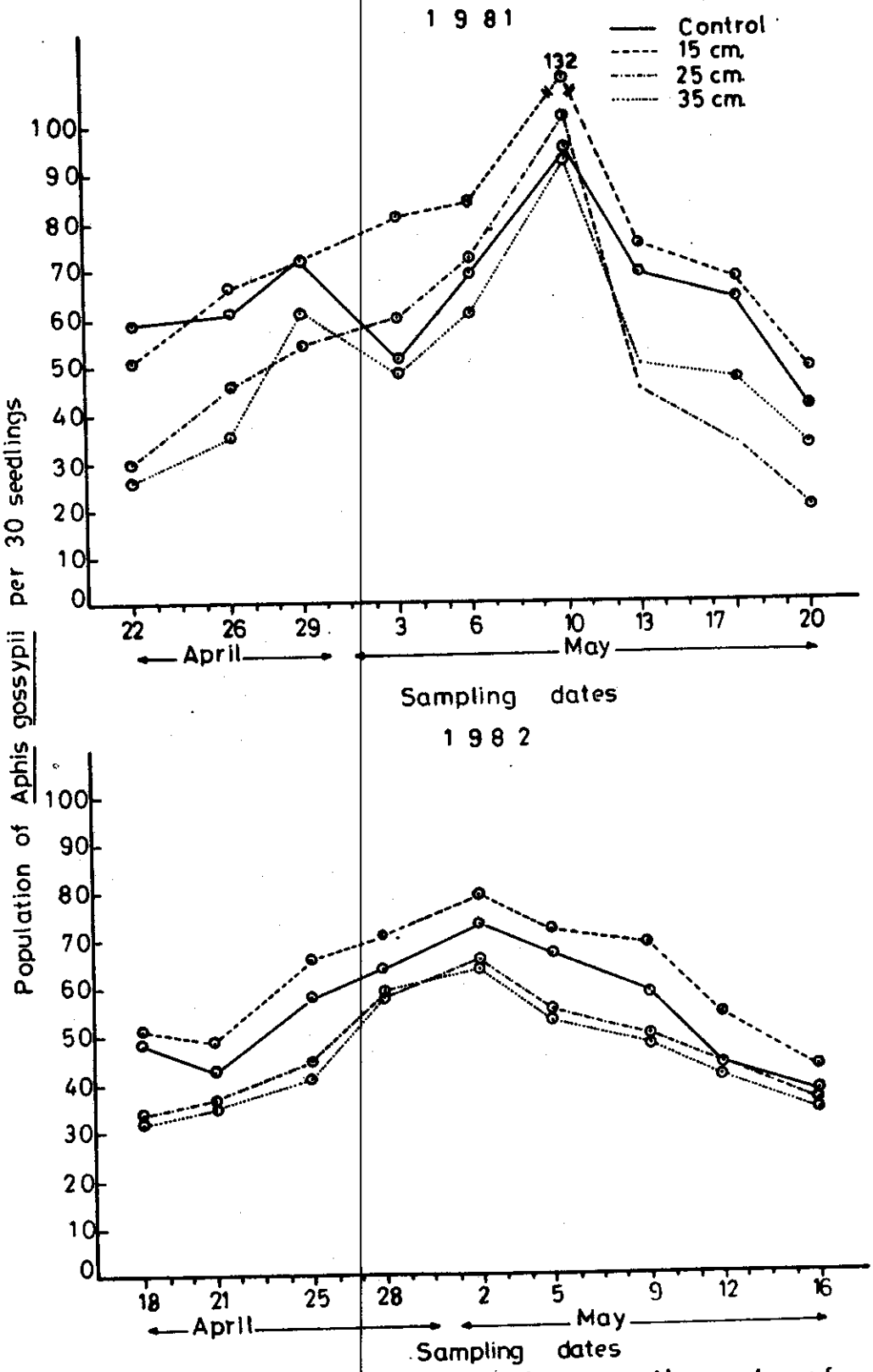


Fig.(1) Effect of hill spacing on the rate of infestation of cotton seedlings with Aphis gossypii (Golv.), Bahteem station (1981 & 1982) seasons.

The lowest population was recorded on May, 20. It seems that in the period of inspection (extended between the third week of April and the third week of May) the aphid has three overlapping generations, the highest seems to be the second one.

Accordingly, the four treatments could be classified into three groups :

Group A	Group B	Group C
15 cm. (75.3)	Control (20 cm.) (64.5)	25 cm. (51.2)
		35 cm. (50.4)

4.1.2. Season 1982 :

According to data in Table (2) and Fig. (1), the highest population of aphids appeared in 15 cm. hill spacing while 35 cm. hill space harboured the lowest number of this insect. Statistical analysis showed that these differences were highly significant. Hill spacing in 15 cm. was significantly higher than the other hill spacing. No significant differences were found between 25 cm., and 35 cm.

The highest population of aphids appeared on May, 2 then gradually decreased until it reached the lowest population on May, 16'.

Accordingly, the four treatments could be classified into three groups :

Group A	Group B	Group C
15 cm. (61.6)	Control 20 cm. (54.9)	25 cm. (47.2)
		35 cm. (45.2)

Table (2) : Population of Aphis gossypii (Glov.) per 30 seedlings at the different inspections in relation to hill spacing during 1982 season (Bahteem Station).

Dates		Hill spacing treatments			
		Control 20 cm.	15 cm.	25 cm.	35 cm.
April	18	48	51	34	32
	21	43	49	37	35
	25	58	66	45	41
	28	64	71	58	59
May	2	73	79	66	64
	5	67	72	55	53
	9	59	69	50	48
	12	44	54	44	41
	16	38	43	36	34
Total		494	554	425	407
Average		54.9	61.6	47.2	45.2

F = 58.82 **

L.S.D.$_{0.05}$ = 2.84

4.2. Effect of row spacing on the rate of infestation of cotton seedlings with Aphis gossypii (Glov.) :

4.2.1. Season 1981 :

Results in Table (3) and Fig. (2) obviously indicate that highly significant differences in the number of aphids were found for 14 rows/2 kassaba. On the other hand, the lower population was recorded in 10 rows/2 kassaba treatment.

Analysis of variance showed that highly significant differences were found between the four tested treatments. The least significant difference showed that the total number of aphids in 14 rows/2 kassaba treatment were significantly higher than those of the other treatments, followed by control treatment (13 rows/2 ka.). While no significant difference was recorded between 12, 10 rows/2 kassaba.

Accordingly, the four treatments could be classified into three groups :

Table (3) : Population of Aphis gossypii (Glov.) per 30 seedlings at the different inspections in relation to row spacing during 1981 season (Bahteem Station).

Dates		Row spacing treatments			
		Control	10 rows/ 2 ka.	12 rows/ 2 ka.	14 rows/ 2 ka.
April	22	59	14	41	65
	26	61	39	48	72
	29	72	69	54	99
May	3	51	39	66	72
	6	69	69	72	93
	10	95	87	102	105
	13	69	57	45	90
	17	64	64	33	83
	20	41	43	37	67
Total		581	481	498	746
Average		64.5	53.4	55.3	82.8

F = 11.06**

L.S.D.$_{0.05}$ = 11.72

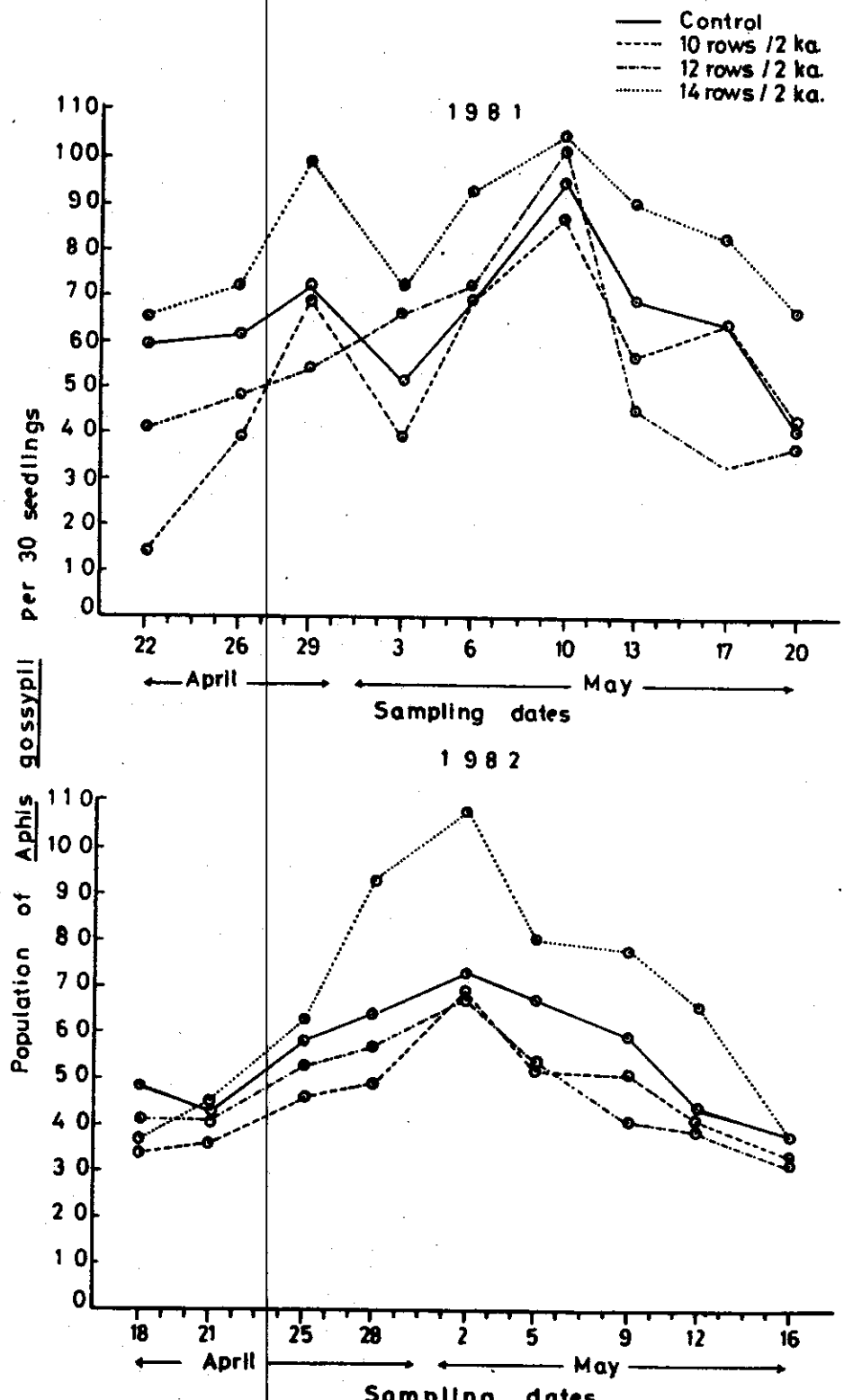


Fig.(2) Effect of row spacing on the rate of infestation of cotton seedlings with Aphis gossypii (Golv.) Bahteem station station (1981 & 1982) seasons.

Group A	Group B	Group C
14 rows/2 ka. (82.8)	Control 13 rows/ 2 ka.(64.5)	12 rows/2 ka. (55.3)
		10 rows/2 ka. (53.4)

The population density of Aphis gossypii was higher comparing with that of 1982 season.

4.2.2. Season 1982 :

From the obtained data in Table (4) and Fig. (2), it could be noticed that the 14 rows/2 kassaba attracted the highest number of aphid, followed by the control treatment (13 rows/2 ka.) and then 12 rows/2 ka. The lowest aphid number were recorded in 10 rows/2 kassaba.

Statistical analysis of the data showed that highly significant differences occurred between the insect infestation in the different row spacing treatments.

L.S.D. showed that 14 rows/2 kassaba treatment was significantly higher than those of the other treatment, followed by control treatments (13 rows/2 ka.). No significant differences were obtained between 12 and 10 rows/2 kassaba. Accordingly the four treatments could be divided into three groups :

Group A	Group B	Group C
14 rows/2 ka. (67.5)	Control 13 rows/2 ka. (54.9)	12 rows/2 ka. (47.3)
		10 rows/2 ka. (45.7)

Table (4) : Population of Aphis gossypii (Glov.) per 30 seedlings at the different inspections in relation to row spacing during 1982 season (Bahteem Station).

Date		Row spacing treatment			
		Control (13 rows/2 ka.)	10 rows/ 2 ka.	12 rows/ 2 ka.	14 rows/ 2 ka.
April	18	48	34	41	37
	21	43	36	41	45
	25	58	46	53	63
	28	64	49	57	93
May	2	73	69	68	108
	5	67	52	54	80
	9	59	51	41	78
	12	44	41	39	66
	16	38	34	32	38
Total		494	412	426	608
Average		54.9	45.7	47.3	67.5

$F = 6.89^{**}$

$L.S.D._{0.05} = 10.97$

4.3. Effect of planting on both side row on the rate of infestation of cotton seedlings with Aphis gossypii (Glov.):

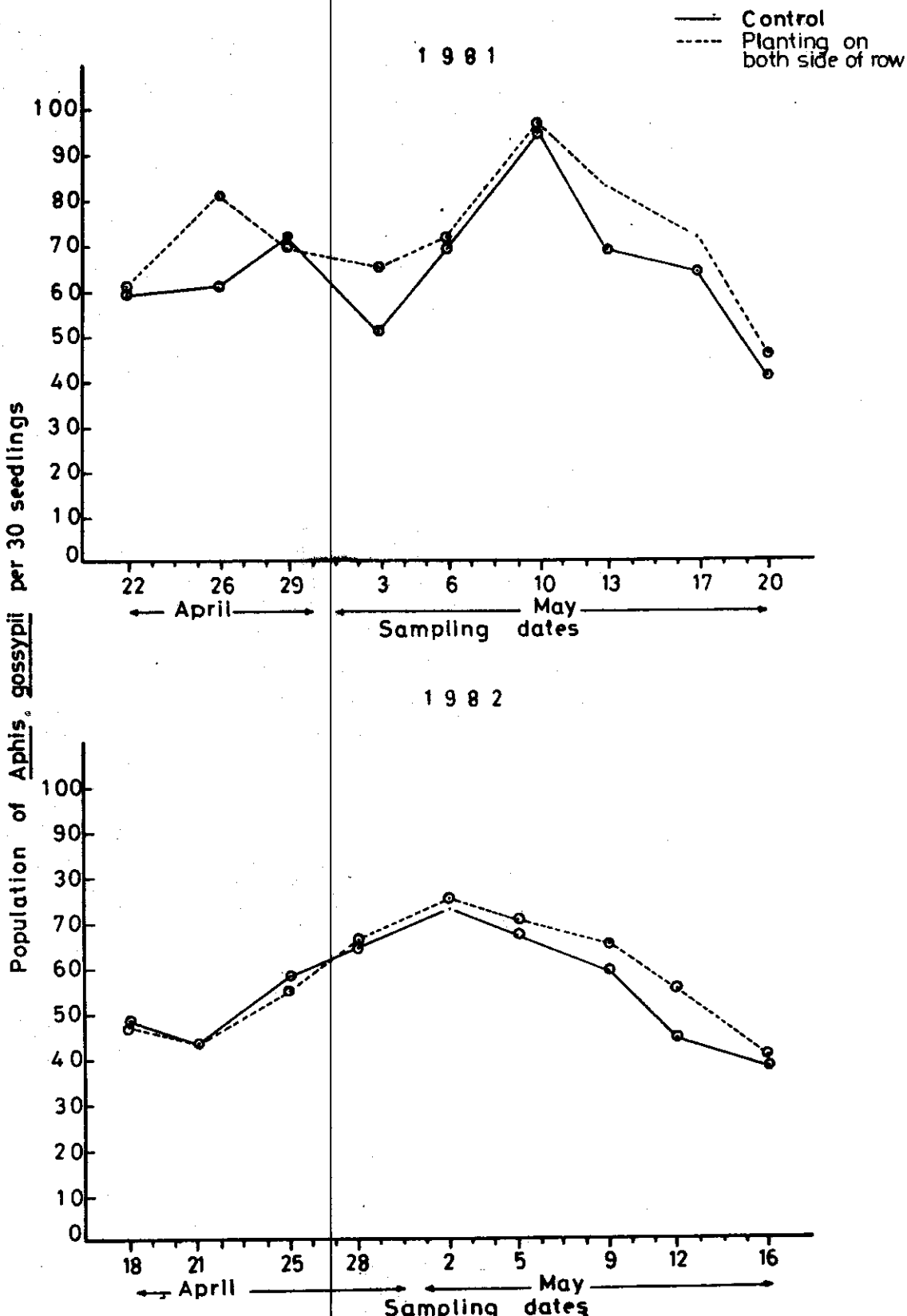
4.3.1. Season 1981 :

The total number of aphids collected during this season, from the two treatments was given in Table (5) and Fig. (3) It was shown that the degree of infestation was relatively higher in the planting on both side rows treatment than in the control (on one side of the row) treatment. Although analysis of variance proved that no significant differences were found in the two treatments, the observed aphids in the case of planting on both sides of the row was higher than in the control, where it was (647) and (581), respectively .

Table (5) : Population of Aphis gossypii (Glov.) per 30 seedlings at different inspections in relation to planting on both sides of the row during 1981 season.(Bahteem Station.)

Date	Planting on one side (control)	Planting on both sides of the row
April 22	59	61
26	61	81
29	72	69
May 3	51	65
6	69	72
10	95	97
13	69	83
17	64	72
20	41	47
Total	581	647

"t" = 1.045



Fig(3) Effect of planting on both side of row on the rate of infestation of cotton seedlings with Aphis gossypii (Golv.) Bahteem station (1981 & 1982) seasons

4.3.2. Season 1982 :

Data in Table (6) and Fig. (3) showed that planting on two sides of the ridge treatment infested with the highest number of aphids than the control treatment (planting on one side) where it was (516) and (494), respectively.

"T" test showed that the differences between the two treatments were insignificant.

Table (6) : Population of Aphis gossypii per 30 seedlings at different inspections in relation to planting on both sides of the row during 1982 season. **(Bahteem Station)**

Dates	Planting on one side (control)	Planting on both sides of the row
April 18	48	47
21	43	43
25	58	55
28	64	66
May 2	73	75
5	67	70
9	59	65
12	44	55
16	38	40
Total	494	516

"t" = 0.689

4.4. Effect of hill spacing on the rate of infesting cotton seedlings with Thrips tabaci (Lind.) :

4.4.1. Season 1981 :

Data in Table (7) and Fig. (4) revealed that there were highly significant differences between the four treatments of infesting with cotton thrips. The highest number of thrips was recorded in 15 cm. hill spacing followed by the control treatment (20 cm.) and 25 cm. On the other hand, the lowest population of thrips was recorded in 35 cm. hill spacing. For the four tested treatments, the population of thrips was gradually increased until it reached the highest peak on May, 6. Then the number of thrips was progressively decreased as seen inthe last sample which was recorded on May, 20 .

L.S.D. showed highly significant differences in infestation between 15 cm. treatment and control 25 cm., and 35 cm., whereas no significant differences in 25 and 35 cm. treatment .

Table (7) : Population of Thrips tabaci (Lind.) per 30 seedlings in the different inspections in relation to hill spacing during 1981 season (Bahteem Station).

Dates		Hill spacing treatments			
		Control 20 cm.	15 cm.	25 cm.	35 cm.
April	22	25	34	12	20
	26	35	42	42	26
	29	40	48	45	33
May	3	48	55	48	36
	6	60	84	54	45
	10	51	73	33	40
	13	35	38	24	30
	17	28	32	22	25
	20	23	28	18	15
Total		345	434	298	270
Average		38.3	48.2	32.7	30

$F = 10.57^{**}$

$L.S.D._{0.05} = 7.10$

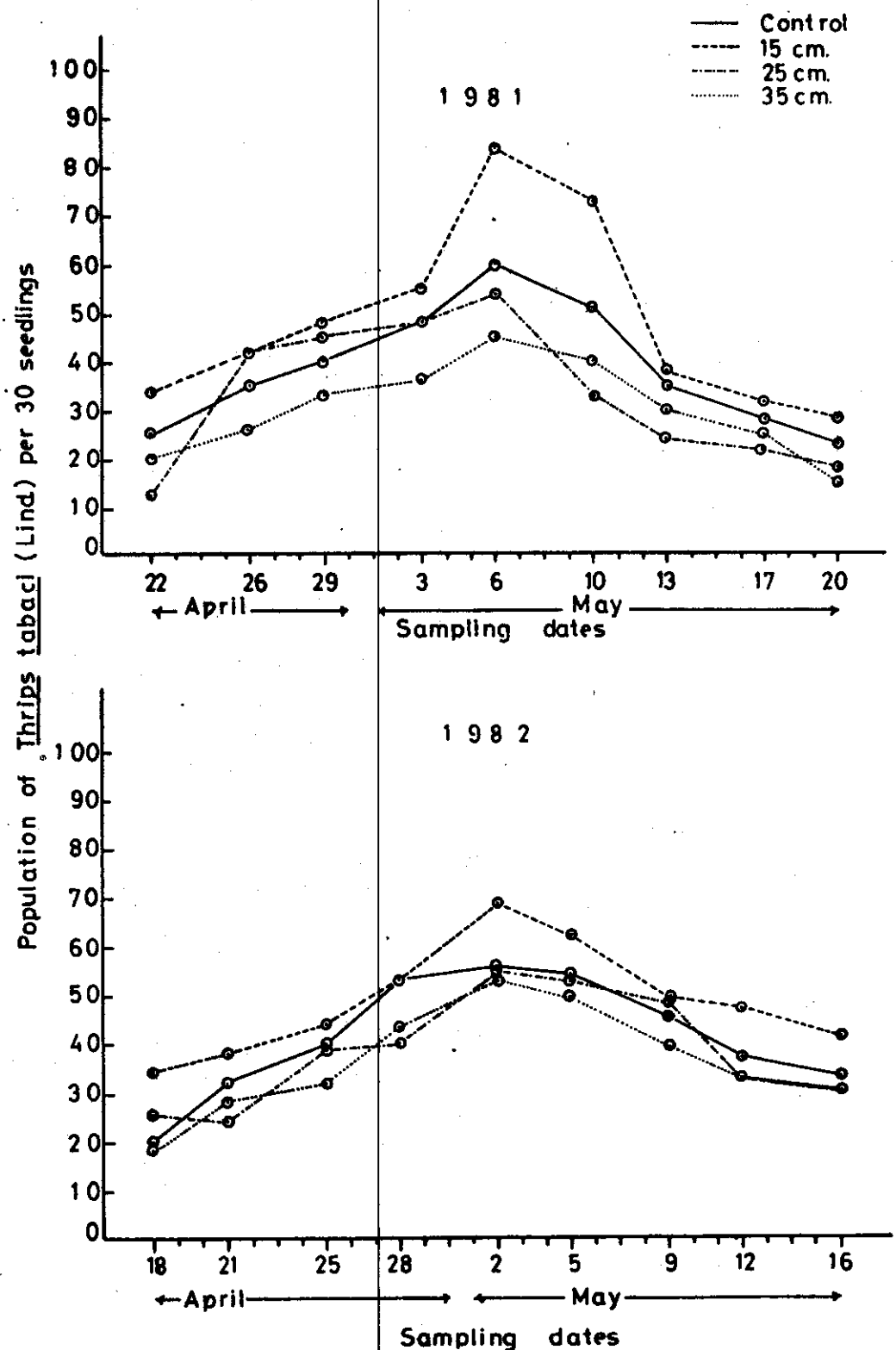


Fig.(4) Effect of hill spacing on the rate of infestation of cotton seedlings Thrips tabaci, (Lind.) Bahteem station (1981 & 1982) seasons.

According to the least values at 5 % level of probability, the following 3 different groups could be illustrated :

Group A	Group B	Group C
15 cm. (48.2/30 seedlings)	Control 20 cm. (38.3/30 seedlings)	25 cm. (32.7/30 seedlings)
		35 cm. (30.0/30 seedlings)

4.4.2. Season 1982 :

Table (8) and Fig. (4) showed that the population of thrips was higher than the previous season. The number of thrips which was found in 15 cm. hill spacing was higher than that of the other treatments, followed by the control treatment, then the 25 cm. hill spacing . The lowest population of thrips was recorded in 35 cm. treatment.

Data presented in the same table cleary indicated that the number of thrips was gradually increased until it reached its peak on May 2 and then the population density of this insect started to decreased reaching the least number on May, 16. The differences between the four treatments was highly significant .

The least values at 5% level of probability gave the following 3 different groups:

Group A	Group B	Group C
15 cm. (48.5/30 seedlings)	Control 20 cm. 41.1/ 30 seedlings)	25 cm. (38.6/ 30 seedlings)
		35 cm. (35.5/ 30 seedlings)

Table (8) : Population of Thrips tabaci (Lind.) per 30 seedlings in relation to hill spacing during 1982 season (Bahteem Station).

Dates		Hill spacing treatments			
		Control 20 cm.	15 cm.	25 cm.	35 cm.
April	18	20	34	25	18
	21	32	38	24	28
	25	40	44	39	32
	28	53	53	40	43
May	2	56	69	55	53
	5	54	62	53	49
	9	45	49	48	39
	12	37	47	33	33
	16	33	41	30	27
Total		370	437	347	322
Average		41.1	48.5	38.6	35.5

$F = 67.4^{**}$

$L.S.D._{0.05} = 4.82$

4.5. Effect of row spacing on rate of infestation of cotton seedlings with Thrips tabaci (Lind.)

4.5.1. Season 1981 :

Table (9) and Fig. (5) illustrated the results which were recorded during 1981 season. According to these data, it could be stated that the population of thrips was higher in 1981 than that of 1982. The number of thrips which was found on seedlings in 14 rows/ 2kassaba was significantly higher than that of the four tested treatments. On the opposite, seedlings in 10 rows/2 kassaba and 12 rows/2 ka. attracted the lowest number of thrips 29.3 and 32.9 respectively . Moderate population of thrips was recorded in the control treatment (13 rows/2 ka.).

Data presented in the same table clearly indicated that the number of thrips was gradually increased until it reached its peak on May,6. The population density of this insect started to decrease and reached its lowest number on May, 20.

Analysis of variance showed that highly significant differences were found between the tested treatments .

Table (9) : Population of Thrips tabaci (Lind.) per 30 seedlings in the different inspections in relation to row spacing during 1981 season (Bahteem Station).

Date		Row spacing treatments			
		Control (13 rows/ 2 ka .)	10 rows/ 2 ka.	12 rows/ 2 ka.	14 rows/ 2 ka.
April	22	25	16	18	33
	26	35	18	26	40
	29	40	25	30	45
May	3	48	32	35	52
	6	51	48	48	96
	10	60	56	52	63
	13	35	27	35	48
	17	28	24	29	30
	20	23	18	23	26
Total		345	264	296	433
Average		38.3	29.3	32.9	48.1

$F = 12.0^{**}$

$L.S.D._{0.05} = 6.9$

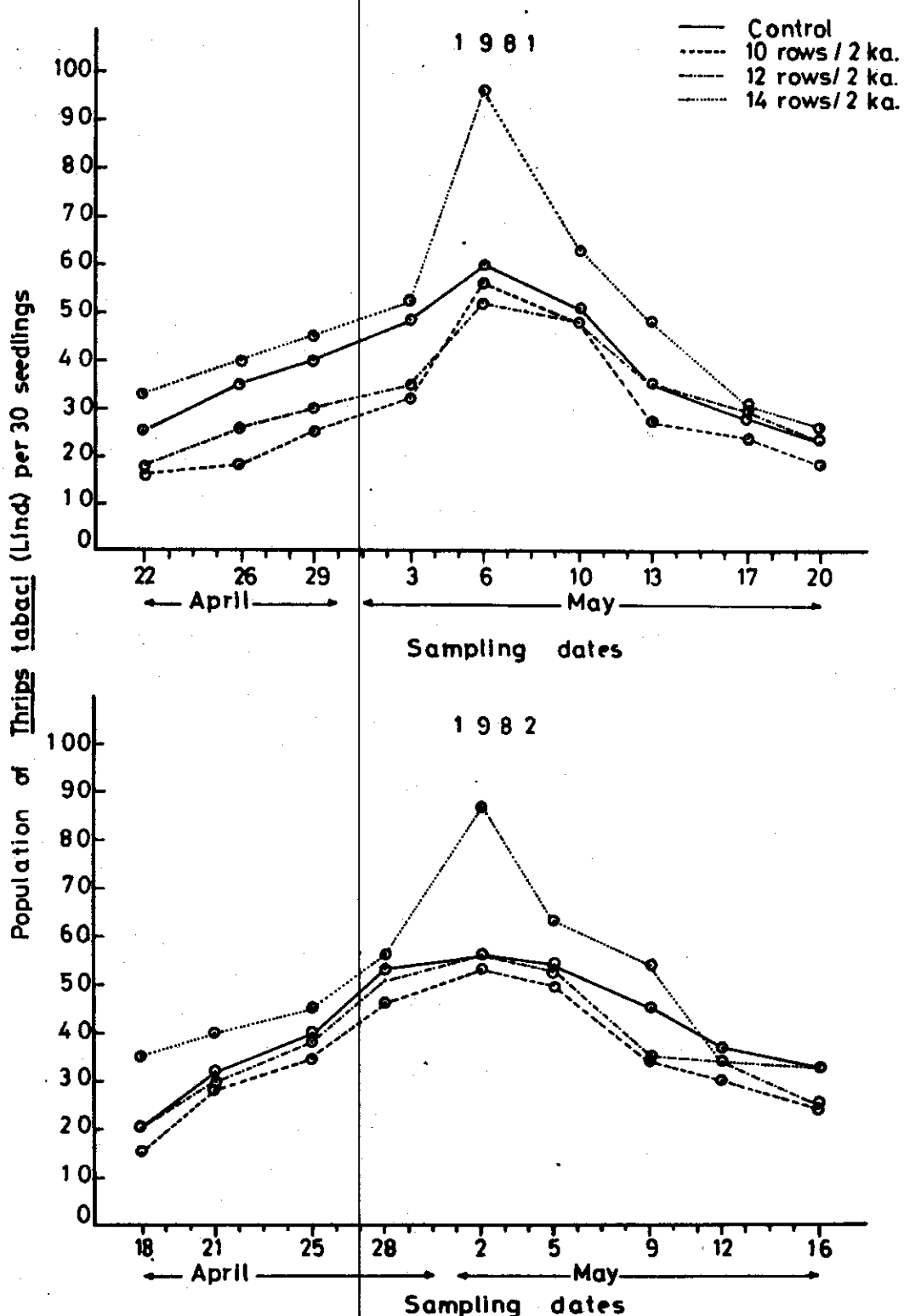


Fig.(5) Effect of row spacing on the rate of infestation of cotton seedlings with Thrips tabaci, (Lind.) Bahteem station (1981 & 1982) seasons.

L.S.D. showed highly significant differences in rate of infestation between 14 rows/2 kassaba and control treatment (13 rows/2 ka.). No significant differences of infestation were recorded between 10, 12 rows/2 kassaba.

According to this least values, it could be divided into 3 different groups :

Group A	Group B	Group C
14 rows/2 ka. (48.1)	Control 13 rows/2 ka. (38.3)	12 rows/2 ka. (32.9)
		10 rows/2 ka. (29.3)

4.5.2. Season 1982:

From data in Table (10) and Fig. (5) it could be stated that the highest population of Thrips tabaci, was recorded in 14 rows/2 kassaba followed by control treatment (13 rows/2 ka.), and 12 rows/2 ka., while 10 rows/2 kassaba attracted the lowest insect population. There were highly significant differences between thrips population in the tested treatments.

The highest population was recorded on May, 2. Analysis of variance showed that highly significant differences were obtained between the four treatments . The least values showed that highly significant difference was between 14 rows/2 ka. and the control treatment (13 rows/2 ka.), while no significant difference between 12 and 10 rows/ 2 kassaba .

According to the least values at 5% level of probability, 3 different groups could be given:

Group A	Group B	Group C
14 rows/2 ka.	Control (13 rows/2 ka)	12 rows/2 ka.
(49.7)	(41.1)	(38.0)
		10 rows/2 ka.
		(35.0)

Table (10) : Population of Thrips tabaci (Lind.) per 30 seedlings in the different inspections in relation to row spacing during 1982 season (Bahteem Station).

Date	Row spacing treatments			
	Control 13 rows /2 kassaba	10 rows/ 2 ka.	12 rows/ 2 ka.	14 rows/ 2 ka.
April 18	20	15	20	35
21	32	28	30	40
25	40	35	38	45
28	53	46	51	56
May 2	56	53	56	87
5	54	50	53	63
9	45	34	35	54
12	37	30	34	34
16	33	24	25	33
Total	370	315	342	447
Average	41.1	35.0	38.0	49.7

$F = 15.32^{**}$

$L.S.D._{0.05} = 4.7$

4.6. Effect of planting on both sides of the row on the rate of infestation of cotton seedlings with Thrips tabaci (Lind.) :

4.6.1. Season 1981 :

From data in Table (11) and Fig. (6) it could be noticed that the highest population of Thrips tabaci was recorded for planting on both sides of the row than in the control treatment. Although "t" test proved that no significant differences were found between thrips numbers on the examined two treatments. In case of planting on both sides of ridge, numbers of thrips were higher than in the control, where it was (364) and (345), respectively.

Table (11) : Population of Thrips tabaci (Lind.) per 30 seedlings in the different inspections in relation to planting on both sides of the row, 1981 season (Bahteem Station).

Dates	Planting on one side (Control)	Planting on both sides of the row
April 22	25	32
26	35	35
29	40	42
May 3	48	47
6	60	60
10	51	51
13	35	43
17	28	31
20	23	23
Total	345	364
Average	38.3	40.4

"t" = 0.370

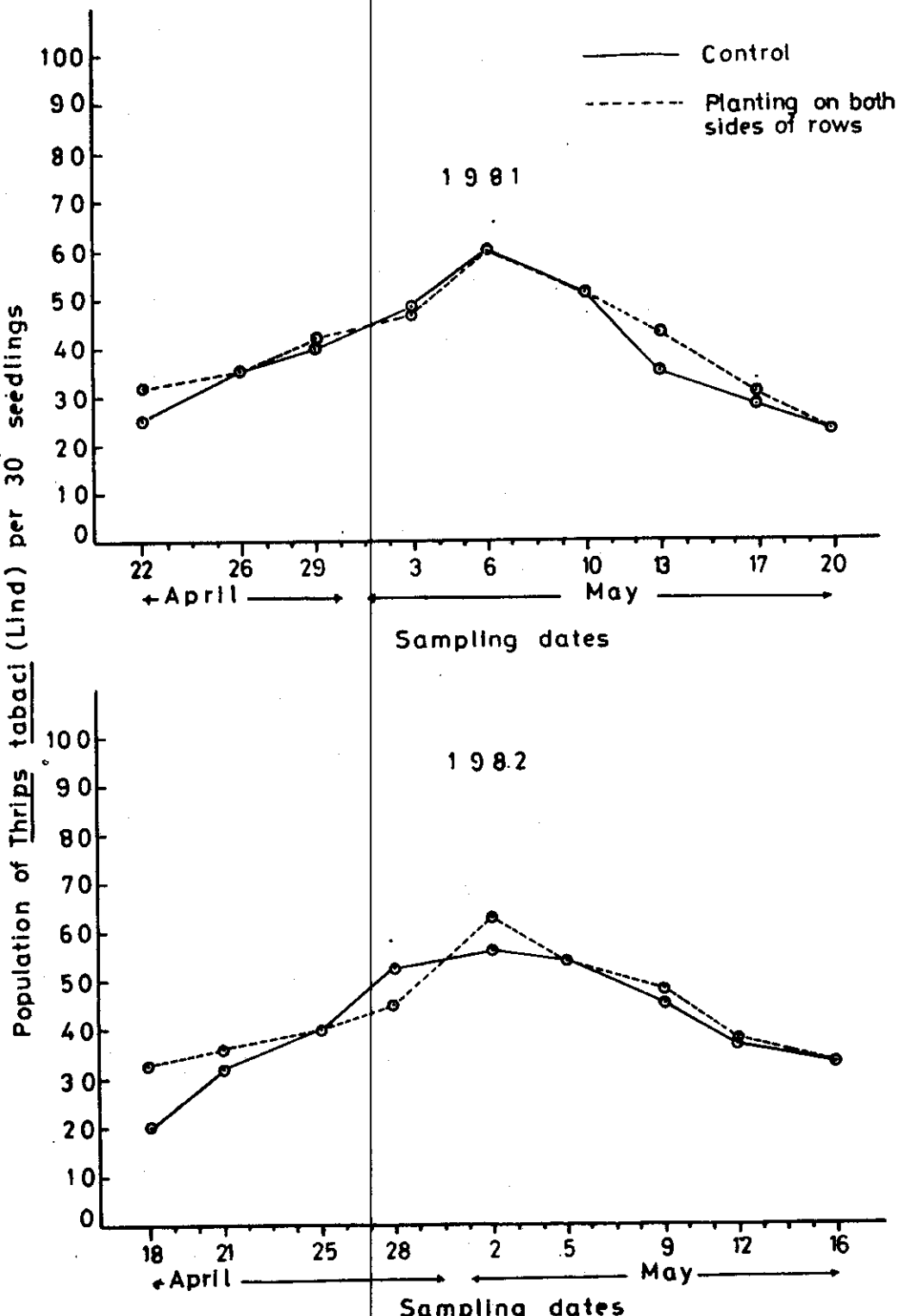


Fig. (6) Effect of planting on both sides of rows on the rate of infestation of cotton seedlings with Thrips tabaci (Lind) Bahteem Station (1981 & 1982) seasons.

4.6.2. Season 1982 :

From the obtained data in Table (12) and Fig. (6) it could be noticed that the number of thrips was higher than in the previous season and also showed that planting on both sides of the row attracted the highest number of thrips than in the control treatment .

"t" test proved that the differences between the tested treatments were insignificant .

The previous results obtained during the two seasons indicated that all the tested treatments were liable to be attacked by the cotton thrips.

Table (12) : Population of Thrips tabaci (Lind.) per 30 seedlings in the different inspections in relation to planting on both sides of the row, 1982 season (Bahteem Station).

Dates	Planting on one side (control)	Planting on both sides of the row
April 18	20	33
21	32	36
25	40	40
28	53	45
May 2	56	63
5	54	54
9	45	48
12	37	38
16	33	33
Total	370	390
Average	41.1	43.3

"t" = 0.418

DISCUSSION

The infestation of seedlings with Aphis gossypii and Thrips tabaci during 1981 season was higher than during 1982 season. This may be due to climatic or any other factors.

The obtained data, could be stated in the following:

1 - The highest population of Aphids and Thrips were found in 15 cm. hill spacing while its lowest numbers were found in 35 and 25 cm. hill spacing. Moderate numbers of Aphids and Thrips were found in 20 cm. hill spacing.

2 - The highest population of Aphids and Thrips were found in 14 rows/2 kassaba, while the lowest numbers were found in 10 and 12 rows/2 kassaba. Moderate numbers of the two insects were found in 13 rows/2 kassaba.

3 - In case of planting on both sides of rows it gave higher numbers of Aphids and Thrips than the control treatment (Planting one of side of row).

These results are in agreement with those obtained by Abdel-Fattah (1975), who found that infestation by Aphids gossypii was higher in 10 cm., than in 20 and 30 cm. spacing between hills.

4.7. Effect of density of the cotton plants on population density of the cotton leafworm, egg-masses Spodoptera littoralis (Boisd.):

4.7.1. Fluctuations of the egg-masses population in cotton fields :

As a matter of fact Spodoptera littoralis has three successive generations during the cotton growing season in Egypt. Bishara (1934) revealed that the main brood of egg-masses appeared on cotton in May - June. In the northern Delta, a second brood by late July and early August. Willcocks and Bahgat (1937) reported that there are three main broods of Prodenia litura F. on cotton plants. Wiesmann (1952) noticed that there is practically no Prodenia generation in July and August in the cotton fields in Egypt. Yet, Abul-Nasr et al. (1966) recorded that in the Delta regions two or three generations may occur, covering the period from mid-May till mid-September.

In the present investigations, S. littoralis egg-masses were counted daily, recorded and the data were smoothed out for two seasons as three

days running mean. This procedure was followed in order to determine the summer distribution curves of the insect with the least interference from the sudden variations in the population density. The smoothed data were used in estimating the summer broods at Bahteem.

The approximate normal distribution curve for each brood was calculated (Figs 7 & 8) then the peak date and the duration of brood were determined as follows :

The first generation:

It appeared from (Figs 7 & 8) that the first generation of the cotton leafworm on cotton occurred between June 15th, thus lasting 15th of July 1981 and between June 18th till July 18th in 1982. The peak of this brood occurred around June 29 in 1981 and June 28 in 1982.

The second generation:

It existed mainly between 15 July and extended to 17 August in 1981 and between 16 July till August 19 in 1982, i.e. for nearly four weeks

with a peak about July 29 in 1981, and July 30 in 1982.

The third generation :

This brood extended between August 8th and continued till September 8th in 1981, while it was between August 11th - September 13th in 1982, thus lasting for about four weeks, with the maximum record during August 22th in 1981 and August 24th in 1982.

The data revealed that the level of infestation, in terms of egg-mass numbers, was generally higher in 1982 than in 1981.

4.7.2. Effect of hill spacing on the abundance of the cotton leafworm, Spodoptera littoralis egg- masses :

4.7.2.1. Season 1981:

Weekly average number of egg-masses collected, during this season, from the different treatments are given in Table (13) and Fig. (7).The data showed that the highest number of egg-masses was found in the 15 cm. treatment followed by the control (20 cm.) treatment then 25 cm. hill spacing. The lowest number of egg-masses was obtained from 35 cm. hill-spacing treatment. Statistical analysis showed that the differences between the four tested treatment respect to their relative infestation to egg-masses in the control were highly significant.

L.S.D. showed no significant differences in infestation between 15 cm. treatment, and control also between 25 cm. and 35 cm. Considering the above results the hill spaces (15, control, 25 & 35 cm.) could be arranged descendingly according to their infestation .

Table (13) : Weekly average number of egg-masses collected from different hill spacing (Bahteem, 1981 season).

Date of inspection	Hill spacing treatments			
	Control (20 cm.)	15 cm.	25 cm.	35 cm.
June 7-13	0.4	1.8	1.8	1.8
14-20	1.1	3.4	1.8	3.4
21-27	2.6	7.2	2.4	3.6
28- 4	4.5	18.0	4.0	8.0
July 5-11	3.0	3.4	3.4	0.0
12-18	6.3	9.0	3.0	6.0
19-25	10.0	18.8	15.4	3.4
26- 1	16.0	15.4	8.6	6.8
Aug. 2- 8	22.3	29.2	10.2	6.8
9-15	8.4	12.0	3.4	0.0
16-22	6.8	3.0	3.0	0.0
23-29	13.9	13.7	5.2	5.2
30- 5	7.4	5.1	3.4	5.2
Sept. 6-12	9.6	3.4	5.2	5.2
Total	112.3	143.4	70.8	55.4
Average	8.02	10.24	5.06	3.9

$F = 7.81^{**}$

$L.S.D._{0.05} = 2.93$

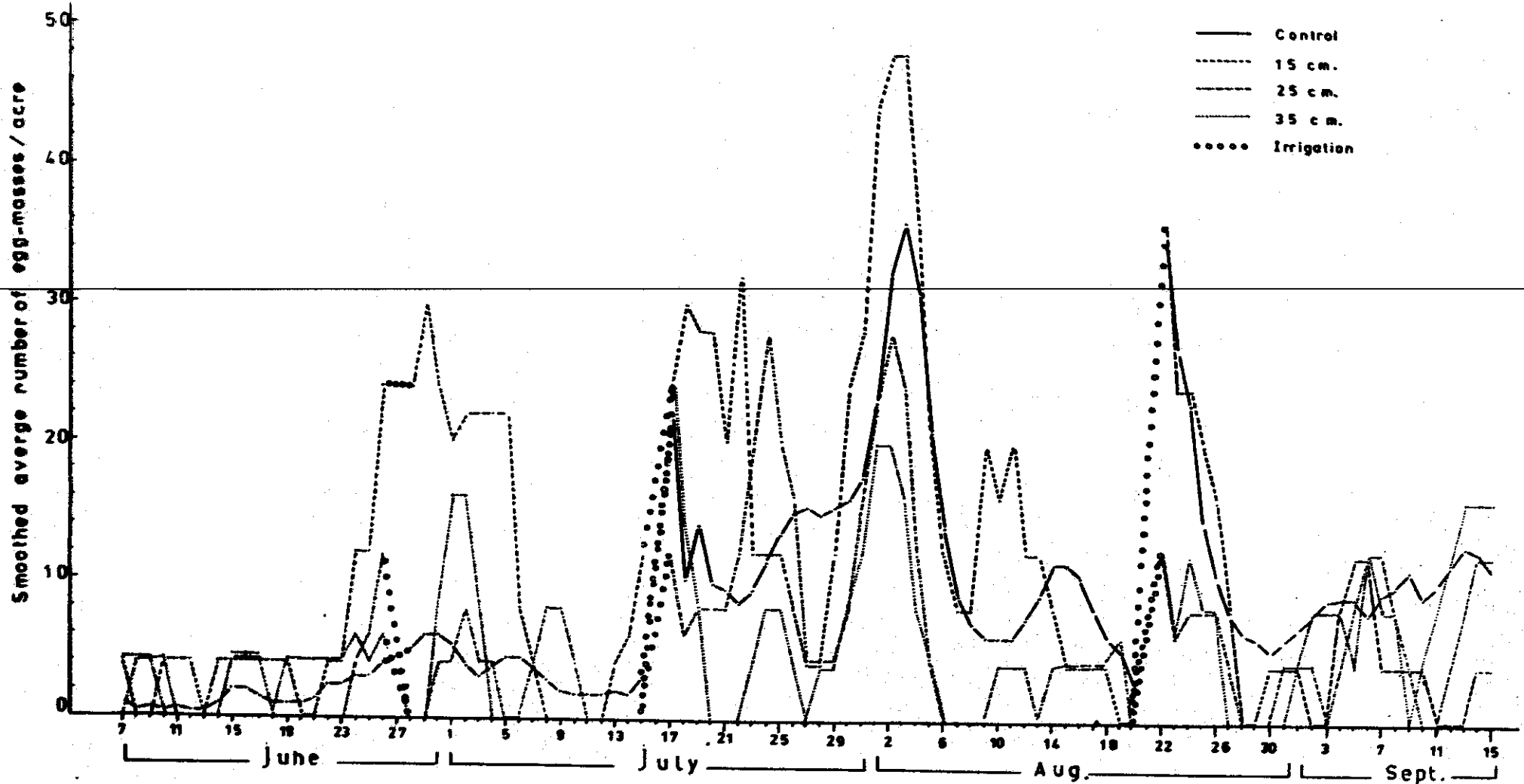


Fig.(7) Fluctuation in the egg-masses populotion in hill spacing Bahteem 1981 season.

taking into consideration, the L.S.D. values at 5 % level of probability to the following 2 significantly different groups:

Group A		Group B	
15 cm.	(10.24/week)	25 cm.	(5.06/week)
control	(8.02 /week)	35 cm.	(3.9 /week)

In all tested varieties, three generations of egg-masses were recorded, the first two generations were small. They occurred on June, 15 and August, 17, while the third started from August, 8 till September, 13 (Fig. 7).

4.7.2.2. Season 1982 :

Table (14) and Fig. (8) showed that the highest number of egg-masses were laid on the 15 cm. treatment, followed by control treatment and 25 cm. The lowest number of egg-masses was collected from 35 cm. hill spacing treatment. Statistical analysis revealed highly significant differences between the collected egg-masses from the all tested treatments. The results of hill spacing of 15 cm., control, 25 & 35 cm.) could be arranged descendingly according to their infestation taking into consideration the L.S.D. values at 5 % level of probability to the following 2 significantly different groups :

Group A	Group B
15 cm. (15.52/week)	25 cm. (9.75/week)
control(13.38/week)	35 cm. (7.35/week)

Table (14) : Weekly average number of egg-masses collected from different hill spacing. (Bahteem, 1982 season).

Date of inspection	Hill spacing treatments			
	Control (20 cm.)	15 cm.	25 cm.	35 cm.
June 6-12	5.4	5.0	0.2	1.6
13-19	6.0	8.4	0.0	8.4
20-26	11.3	8.0	2.0	6.0
27- 3	52.4	64.8	48.0	36.0
July 4-10	14.8	6.8	0.0	5.0
11-17	8.8	12.0	20.4	12.0
18-24	11.7	24.0	27.4	13.6
25-31	9.7	6.8	18.8	0.0
Aug. 1- 7	21.5	15.0	0.0	3.0
8-14	14.0	22.2	1.6	1.6
15-21	8.5	13.6	0.0	0.0
22-28	7.4	13.6	5.0	1.6
29-4Sept.	2.5	1.6	3.4	6.8
Total	174.0	201.8	126.8	95.6
Average	13.38	15.52	9.75	7.35

$F = 6.70^{**}$

$L.S.D._{0.05} = 4.24$

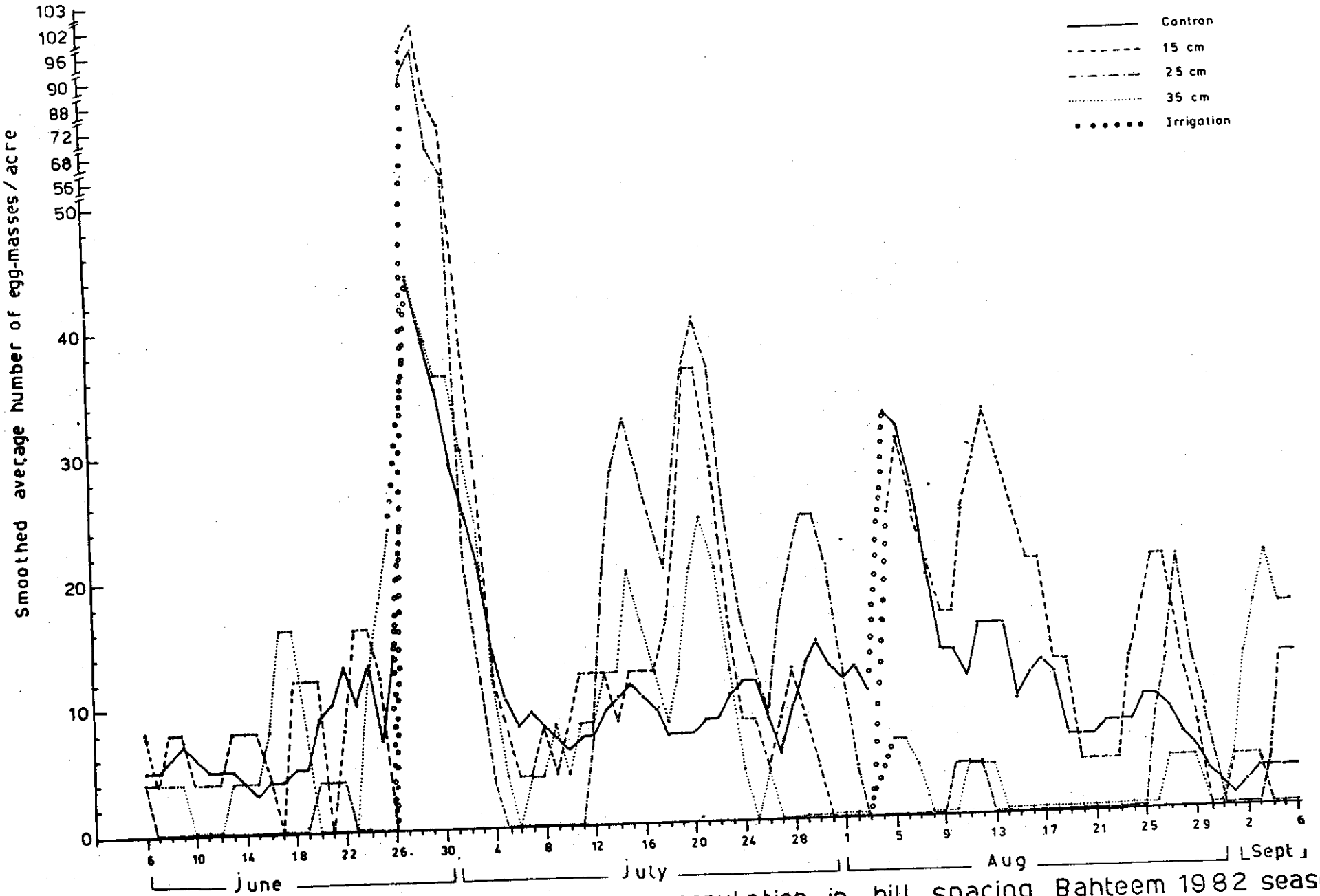


Fig. (8) Fluctuation in the egg-masses population in hill spacing Bahteem 1982 season.

4.7.3. The effect of row spacing on rate of infestation of the cotton leafworm egg-masses :

4.7.3.1. Season 1981 :

Results obtained in Table (15) and Fig. (9) markedly revealed that 14 rows/2 kassaba treatment received the highest egg-masses, followed by the control (13 rows/2 ka.) treatment then the 12 row/2 ka. treatment. While the lowest infestation by the cotton leafworm egg-masses was found in 10 rows/2 kassaba treatment. Analysis of variance revealed highly significant differences between the collected egg-masses from all tested treatments. The least significant differences showed that the total number of egg-masses in 14 rows/2 ka. treatment were significantly higher than those of the other treatments, while there were no significant differences between 10, 12 rows/2 kassaba treatments.

Accordingly the four treatments could be classified into three groups :

Group A	Group B	Group C
14 row/2 ka. (13.32)	13 row/2 ka. (8.02)	12 row/2 ka. (5.18)
		10 row/2 ka. (3.47)

Table (15) : Weekly average number of egg-masses collected from row spacing during 1981 season.

Date of inspection	row spacing treatments			
	Control 13 row/ 2 ka.	10 row/ 2 ka.	12 row/ 2 ka.	14 row/ 2 ka.
June 7-13	0.4	1.7	2.6	1.7
14-20	1.1	0.9	1.7	3.4
21-27	2.6	3.0	4.2	7.2
28- 4	4.5	10.0	7.0	9.0
July 5-11	3.0	6.0	2.6	12.0
12-18	6.3	3.0	6.0	6.0
19-25	10.0	0.9	8.9	11.1
26- 1	16.0	6.0	10.3	11.1
Aug. 2- 8	22.3	5.1	11.9	28.3
9-15	8.4	4.3	0.0	12.9
16-22	6.8	0.0	4.5	13.5
23-29	13.9	6.0	6.9	38.6
30-5Sept.	7.4	0.9	0.9	21.4
6-12	9.6	0.9	5.1	10.3
Total	112.3	48.7	72.6	186.5
Average	8.02	3.47	5.18	13.32

$F = 7.75^{**}$

$L.S.D._{0.05} = 3.83$

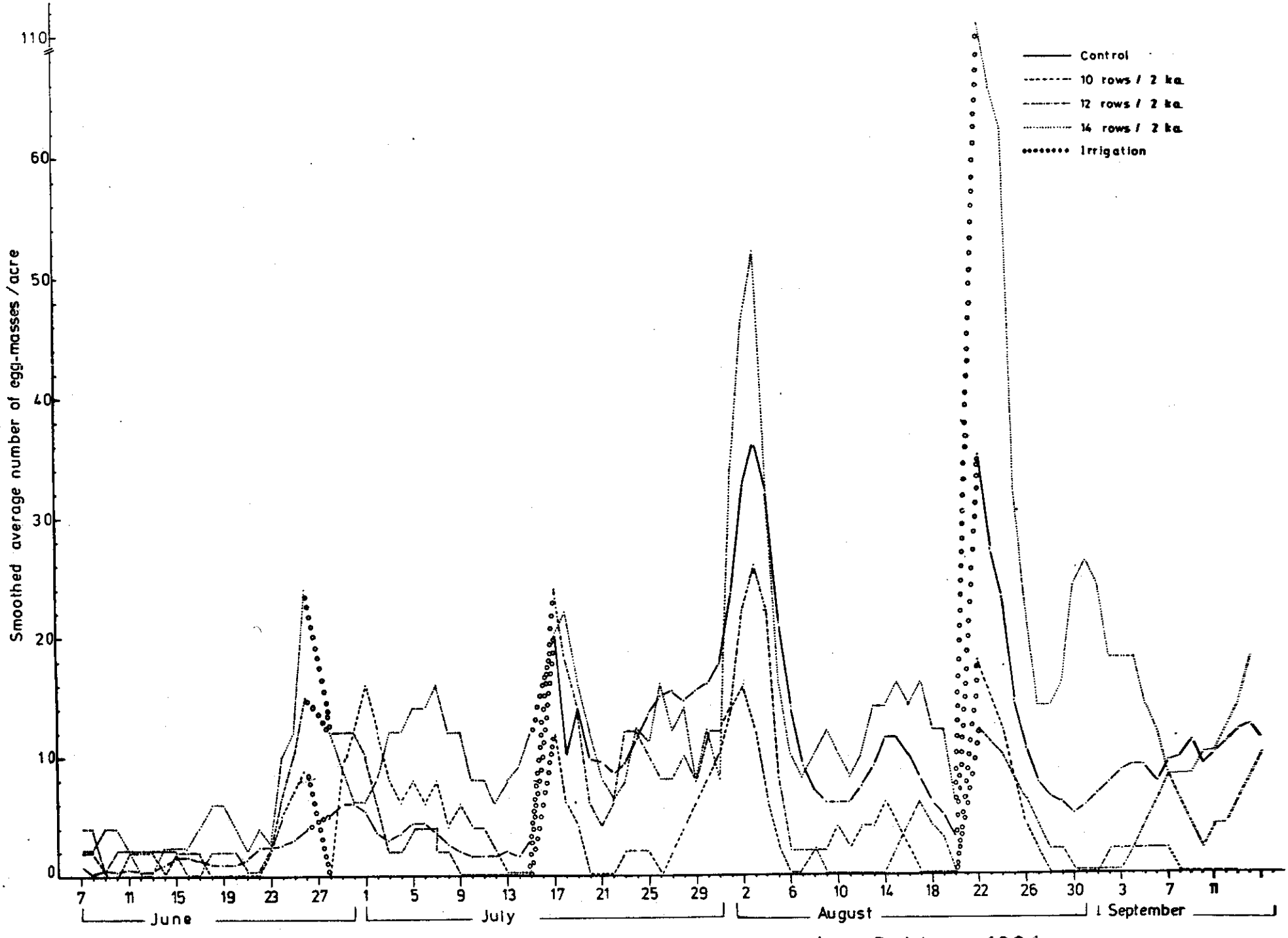


Fig.(9) Fluctuations in the egg mass population in row cropping

4.7.3.2. Season 1982 :

From the obtained data in Table (16) and Fig. (10) it could be noticed that the treatment of 14 row/2 ka. attracted the highest number of female moths to lay their egg-masses, followed by control treatment (13 row/2 kassaba) and 12 row/2 kassaba. The lowest egg-masses were recorded in 10 row/2 kassaba.

During the present season, the number of egg-masses/feddan was higher than the previous one. Analysis of variance showed highly significant differences between the collected egg-masses from all tested treatments.

L.S.D. showed that 14 row/2 kassaba treatment was significantly higher than of the other treatments. Whereas, no significant difference was obtained between 10 and 12 row/2 kassaba.

Accordingly the four treatments could be divided into three groups :

Group A	Group B	Group C
14 row/2 ka. (20.9)	Control 13 row (13.4)	12 row/2 ka. (10.7)
		10 row/2 ka. (9.4)

Table (16) : Weekly average number of egg-masses collected from row spacing during 1982 season.

Date of inspection	row spacing treatments			
	Control 13 rows/2 ka.	10 row/ 2 ka.	12 row/ 2 ka.	14 row/ 2 ka.
June 6-12	5.4	3.4	5.1	12.0
13-19	6.0	0.8	6.8	12.8
20-26	11.3	11.0	11.0	23.0
27-30	52.4	26.2	29.5	53.2
July 4-10	14.8	15.7	11.7	27.1
11-17	8.8	7.5	8.5	21.5
18-24	11.7	11.7	14.0	18.8
25-31	9.7	6.0	7.7	23.0
Aug. 1- 7	21.5	13.8	14.0	29.5
8-14	14.0	9.8	8.8	13.7
15-21	8.5	6.1	12.8	16.0
22-28	7.4	7.1	5.1	12.8
29-4 Sept.	2.5	3.4	4.2	8.8
Total	174.0	122.5	139.2	272.2
Average	13.4	9.4	10.7	20.9

$F = 21.0^{**}$

$L.S.D._{0.05} = 3.2$

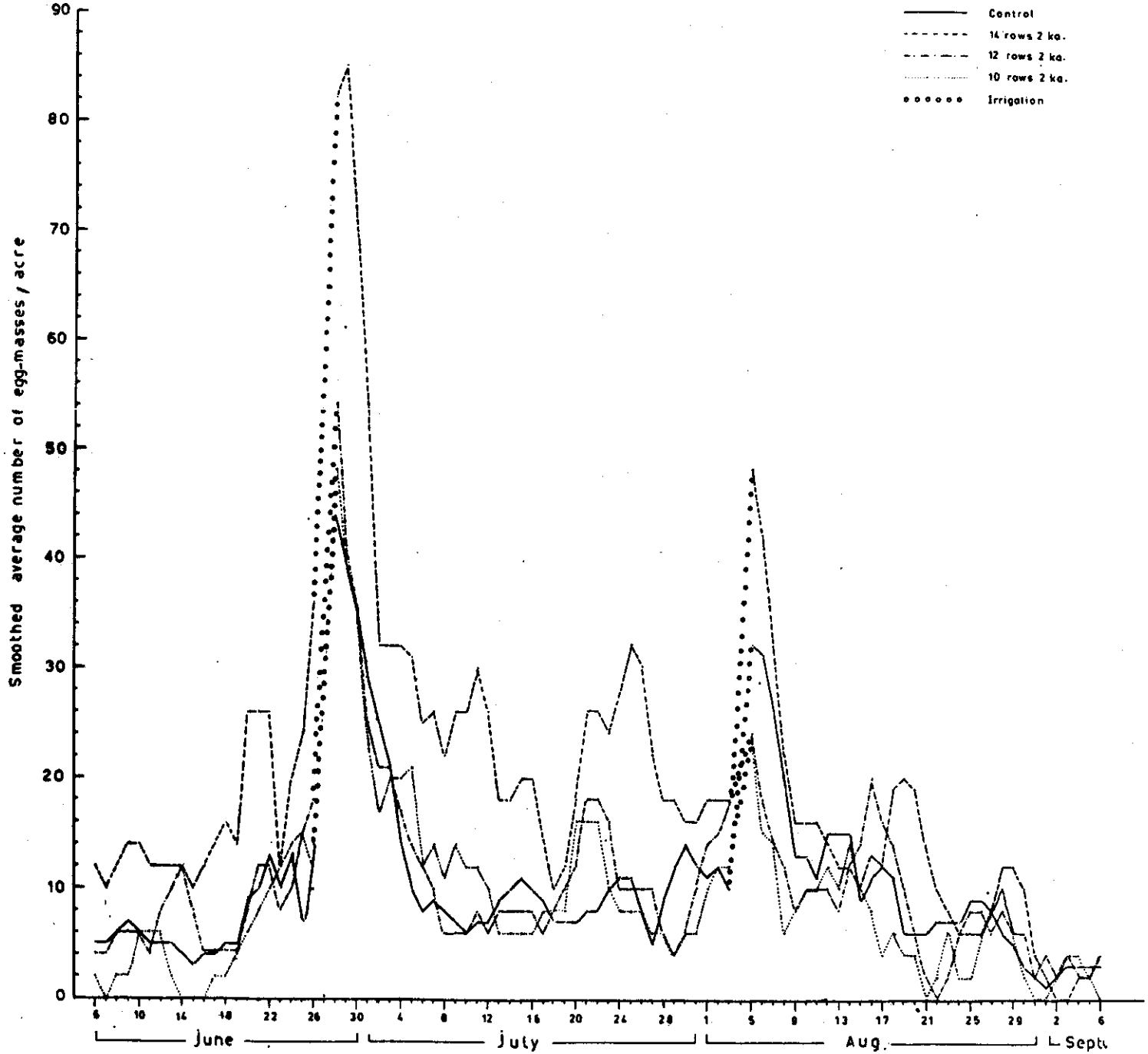


Fig.(10) Fluctuation in the egg-masses population in row spacing Bahteem 1982 season.

4.7.4. The effect of planting on the two sides of the ridge on the rate of infestation of the cotton leafworm egg-masses :

4.7.4.1. Season 1981 :

The total numbers of egg-masses collected, during the present season, from the two treatment are given in Table (17) and Fig. (11). They showed that in all tested treatments three peaks of egg-masses were recorded as shown in the previous part. Data in the table indicated that the level of infestation was relatively higher when plantations took place on the two sides of the ridge treatments than in the control treatment. Although analysis of variance proved that no significant differences were found between the egg-masses found on the examined two treatments, the collected egg-masses in the case of planting on both sides of the ridge was higher than in the control, it was (134.40) and (112.30), respectively.

Table (17) : Weekly average number of egg-masses collected from plants on **both sides of the** ridge during 1981 season.

Date of inspection	Planting on one side (control)	Planting on both sides of the row
June 7-13	0.4	0.9
14-20	1.1	1.4
21-27	2.6	2.8
28- 4	4.5	8.3
July 5-11	3.0	6.8
12-18	6.3	7.5
19-25	10.0	9.1
26- 1	16.0	22.1
Aug. 2- 8	22.3	22.4
9-15	8.4	7.4
16-22	6.8	8.5
23-29	13.9	16.6
30- 5 **Sept.**	7.4	11.7
6-12	9.6	8.9
Total	112.3	134.4
Average	8.02	9.60

" "
t = 0.65

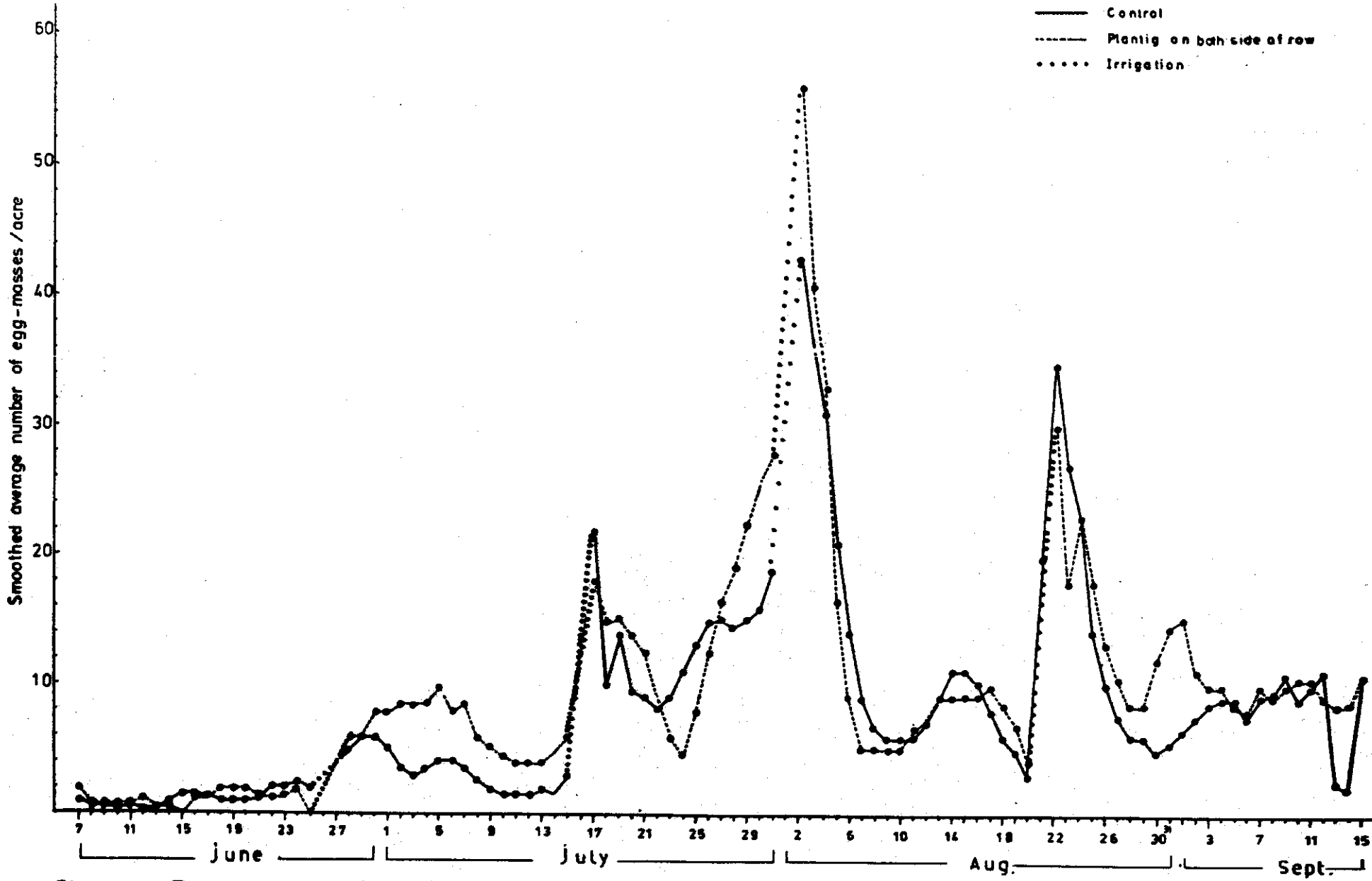


Fig.(11) Fluctuations in the egg-masses population in planting on both side of row Bahteem 1981 season.

4.7.4.2. Season 1982 :

From the obtained data in Table (18) and Fig. (12), it could be noticed that the number of egg-masses/feddan was higher than the previous season and also showed that the two sides of the ridge treatments attracted the highest number of female moths to lay their egg-masses than the control treatment.

Analysis of variance proved that the differences between the tested treatments were insignificant.

It is very clear from the previous results during the two seasons that planting on the two sides of the ridge was preferable to the cotton leafworm moths to lay their egg-masses than the control treatment. But the statistical analysis proved that no significant differences were given between the two treatments. In other words, planting on the two sides of the ridge has no significant effect on the rate of infestation of the cotton leafworm egg-masses.

Table (18) : Weekly average number of egg-masses collected from plants on the two sides of the ridge during 1982 season.

Date of inspection	Planting on one side (Control)	Planting on both sides of the row
June 6-12	5.4	7.4
13-19	6.0	11.1
20-26	11.3	22.6
27-3	52.4	40.0
July 4-10	14.8	10.5
11-17	8.8	11.7
18-24	11.7	14.5
25-31	9.7	8.2
Aug. 1-7	21.5	27.0
8-14	14.0	21.7
15-21	8.5	16.8
22-28	7.4	12.0
29-4 Sept.	2.5	4.8
Total	174.0	208.30
Average	13.38	16.02

"t" = 0.59

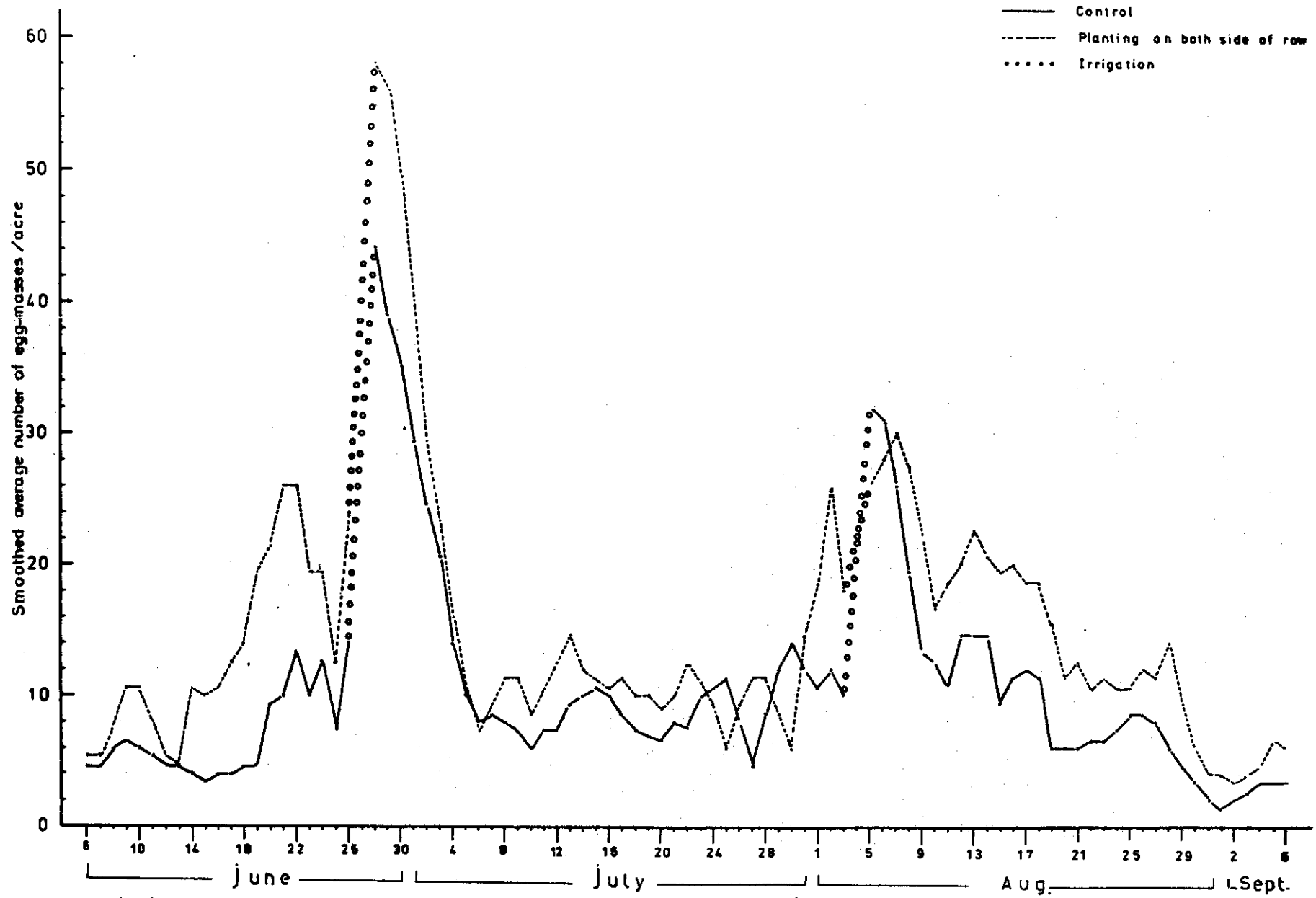


Fig.(12) Fluctuations in the egg-mass population in planting on both side of row Bahteem 1982 season.

DISCUSSION

For applying integrated control against the cotton leafworm, Spodoptera littoralis, knowledgement of its generation numbers, timing of its appearance must be offered. This research revealed that there are three generations of the cotton leafworm, S. littoralis attack cotton plants during the period of growth. Those results are in agreement with those obtained by Bishara (1934) , Willcocks and Bahgate (1937) and Abul-Nasr et al. (1966). The first generation began on June 15 th and lasted till 15 th of July, the second one appeared in July 16 th till August 19 th, while the third generation extended between August 8 th and continued till September 8 th. The variation in the degree of infestation of the cotton leafworm may be due to the climatic factors or any other environmental factor according to Nasr et al. (1972) .

It could be concluded that intensive cultivation by decreasing either hill spacing or decreasing the width of rows, and planting on the two sides of rows as well as were responsible for the high number of egg-masses per feddan .

Intensive cultivation may offer some suitable factors, such as temperature, relative humidity .... etc., which may attract the female moths to lay their egg-loads, and this was in agreement with the found of Nasr and Moawad (1973) that revealed that, S. littoralis moths prefer to deposit its egg-masses in the crowded plants.

4.8 The Relation Between Density of Cotton Plants and Rate of Infestation by Bollworms.

4.8.1. Effect of hill spacing on the rate of infestation of the cotton bollworms :

4.8.1.1. Season 1981 :

Percentage of infestation by pink bollworm :

Data in Table (19) and Fig.(13) proved that pink bollworm population was higher in comparison with the population of spiny bollworm. Pink bollworm was nearly alone during the season, while the spiny bollworm seemed to appear at the end of the season.

It was found that the highest percentage of infestation was recorded in 35 cm. hill spacing followed by the 25 cm. treatment then the 20 cm. control treatment. On the other hand, it was observed that 15 cm. hill spacing attained the lowest rate of infestation . The statistical analysis indicated that there was no significant difference in the percentage of the infestation of the pink bollworm in the different hill spacing. It started at low rates in all

Table (19) : Percentage of infested bolls by cotton bollworms in relation to hill spacing, 1981 season.(Bahteem Station .)

Date of inspection	Percentage of infestation by bollworms							
	Control 20 cm.		15 cm.		25 cm.		35 cm.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 5	0	0	4	0	4	0	4	0
12	8	0	4	0	8	0	8	0
18	16	0	8	0	12	0	12	0
25	16	0	12	0	16	0	16	0
Sept. 1	20	0	20	0	20	0	24	0
8	20	0	20	0	24	0	28	0
18	24	8	24	0	32	4	32	0
22	28	0	28	4	36	4	36	0
29	56	0	40	8	40	12	40	20
Total	188	8	160	12	192	20	200	20
Mean	20.9	0.9	17.8	1.3	21.3	2.2	22.0	2.2

F = 2.2

P.= Pectinophora gossypiella

E.= Earias insulana

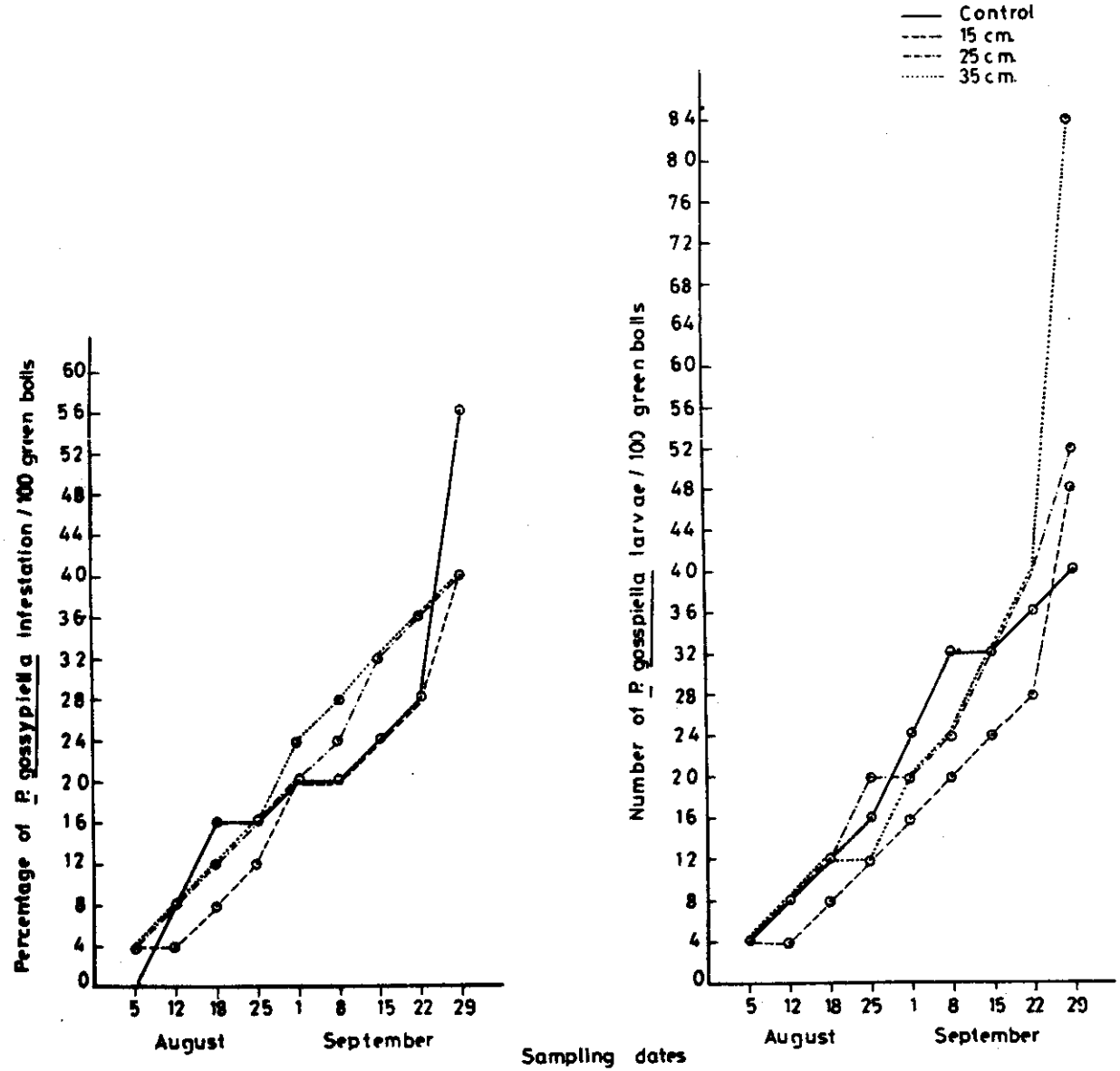


Fig.(13) Effect of hill spacing on the percentage of P. gossypiella infestation and the number of the larvae in 1981 season.

treatments and then increased at the end of the cotton season by this insect.

1.2 Percentage of infestation by spiny bollworm:

Data in the same table, indicated that the degree of infestation by the spiny bollworm was generally low. It started to exist at the end of the season.

Larval number of pink bollworm in green bolls :

The number of larvae in 100 bolls began at low rate , then increased gradually towards the end of the season (Table, 20 and Fig. 13).

In late September, the maximum numbers of larvae were recorded in 35 cm. hill spacing followed by 25 cm., control treatment (20 cm.) and 15 cm. hill spacing which gave the lowest number of larvae.

Analysis of variance for the number of larvae showed no significant differences between hill spacing.

Table (20) : Number of bollworm larvae per 100 bolls in relation to hill spacing, 1981 season. (**Bahteem Station.**)

Date of inspection	Number of bollworm larvae/100 bolls							
	Control 20 cm.		15 cm.		25 cm.		35 cm.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 5	4	0	4	0	4	0	4	0
12	8	0	4	0	8	0	8	0
18	12	0	8	0	12	0	12	0
25	16	0	12	0	20	0	12	0
Sept. 1	24	0	16	0	20	0	20	0
8	32	0	20	0	24	0	24	0
18	32	0	24	0	32	4	32	0
22	36	0	28	4	40	0	40	0
29	40	0	48	8	52	16	84	24
Total	204	0	164	12	212	20	236	24
Mean	22.7	0	18.2	1.3	23.6	2.2	26.2	2.7

F = 2.1

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.1.2. Season 1982 :

Percentage of infestation by pink bollworm:

Data in Table(21) and Fig.(14) indicated that the highest average of percentage of infestation was recorded in 35 cm. hill spacing followed by 25 cm. treatment, then both the control and the 15 cm. treatment.

As previously stated in case of the trend of infestation the hill spacing seems to affect the percentage of infestation by pink bollworm, but "F" value indicated on significant difference. In all treatment the infestation of this insect started at low rate, then increased gradually towards the end of the cotton season, reaching the highest percentage at the end of the season.

Percentage of infestation by spiny bollworm:

Table (21) showed that the degree of percentage of infestation of this insect appeared at the end of the season .

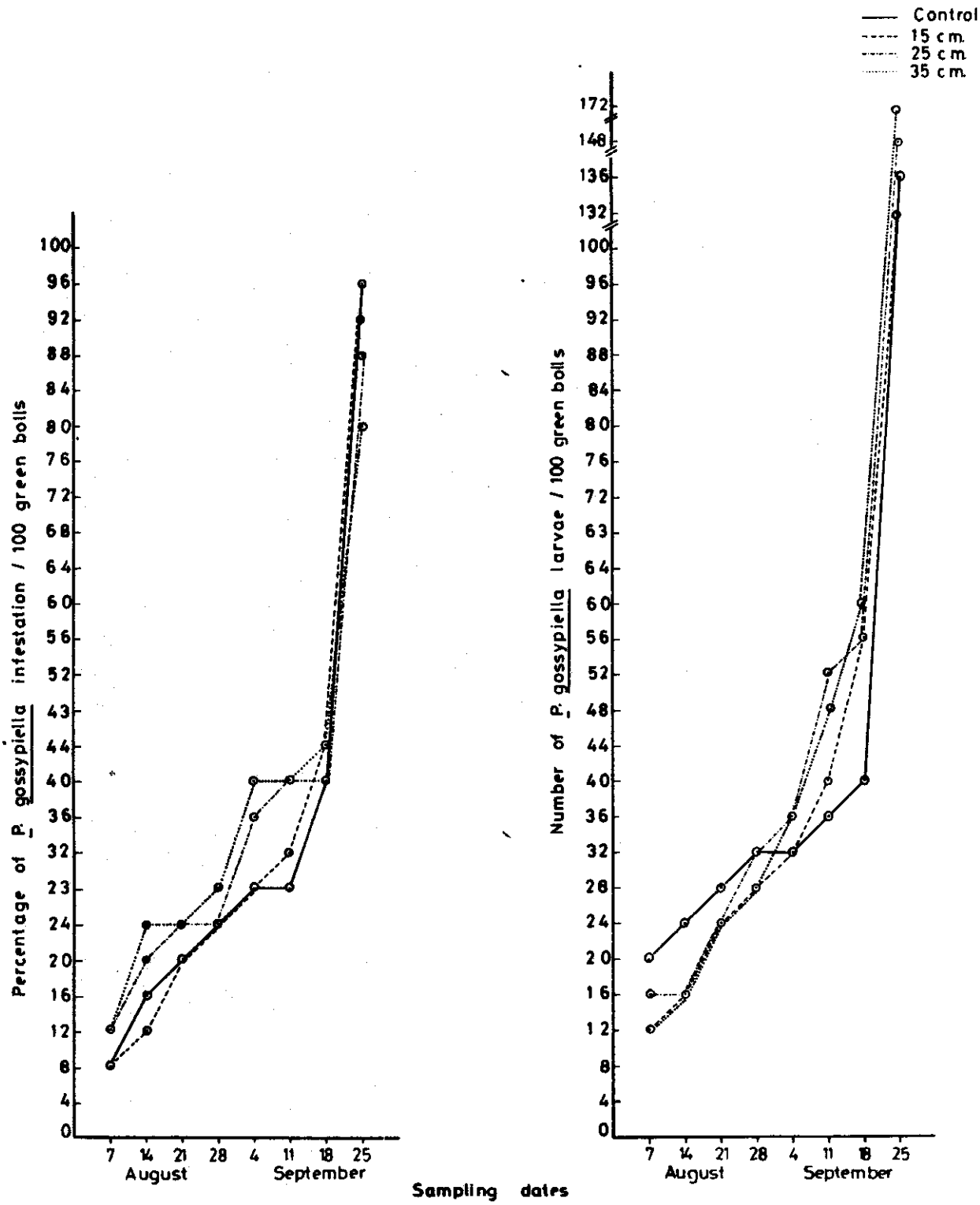
Table (21) : Percentage of infested bolls by cotton bollworms in relation to hill spacing, 1982 season. **(Bahteem Station.)**

Date of inspection	Percentage of bollworms							
	Control 20 cm.		15 cm.		25 cm.		35 cm.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 7	8	0	8	0	12	0	12	0
14	16	0	12	0	20	0	24	0
21	20	0	20	0	24	0	24	0
28	24	0	24	0	24	0	28	0
Sept. 4	28	0	28	0	36	0	40	0
11	28	0	32	0	40	0	40	0
18	40	4	44	4	40	4	44	8
25	96	0	92	0	88	8	80	8
Total	260	4	260	4	284	12	292	16
Mean	32.5	0.5	32.5	0.5	35.5	1.5	36.5	2.0

F = 1.81

P.= Pectinophora gossypiella

E.= Earias insulana



Fig(14) Effect of hill spacing on the percentage of P. gossypiella infestation and the number of the larvae in 1982 season.

Larval number of pink bollworm in green bolls :

As usual, the appearance of the larvae of pink bollworm started alone and continued so for about six weeks at least in the two cotton seasons. Table (22) and Fig. (14) showed that the highest number of larvae was found in 35 cm. treatment followed by 25 cm., control treatment. The lowest number was recorded in 15 cm. hill spacing.

From all above data it could be stated that the spacing has no significant effect either on the percentage of infestation or in the larval number of the two pests on cotton plants.

Table (22) : Number of bollworm larvae per 100 bolls in relation to hill spacing, 1982 season. **(Bahteem Station.)**

Date of inspection	Number of bollworms larvae							
	Control 20 cm.		15 cm.		25 cm.		35 cm.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 7	20	0	12	0	16	0	12	0
14	24	0	16	0	16	0	16	0
21	28	0	24	0	24	0	24	0
28	32	0	28	0	32	0	28	0
Sept. 4	32	0	32	0	36	0	36	0
11	36	0	40	4	52	0	48	0
18	40	4	56	0	56	4	60	0
25	136	0	132	0	148	8	172	0
Total	348	4	340	4	380	12	396	0
Mean	43.5	0.5	42.5	0.5	47.5	1.5	49.5	0

F = 1.48

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.2. Effect of row spacing on the rate of infestation with the cotton bollworm:

4.8.2.1 Season 1981 :

Percentage of infestation by pink bollworm:

Results obtained in Table (23) and Fig.(15) indicated that the highest average percentage of infestation was recorded in 10 row/2 kassaba, followed by the control (13 row/2 ka.), then the 12 row/2 ka. treatment. On the other hand, 14 row/2 ka. treatment gave the lowest rate of infestation. There was no significant difference between the four treatments in the percentage of infestation. In general, the infestation by the pink bollworm was relatively low during the first date of inspection.Then the rate of attack rapidly increased in the last inspection.

Percentage of infestation by spiny bollworm:

Data in Table (23) clearly indicated that the infestation by the spiny bollworm was generally low. The highest rate of infestation was in both 10 row/2 Ka. and 12 row/2 ka. followed by both control (13 row/2 ka.) and 14 row/2 ka., treatments.

Table (23) : Percentage of infested bolls by cotton bollworms in relation to row spacing, 1981 season. **(Bahteem Station.)**

Date of inspection		Percentage of bollworms							
		Control 13 row		10 row/ 2 ka.		12 row/ 2 ka.		14 row/ 2 ka.	
		P.	E.	P.	E.	P.	E.	P.	E.
Aug.	5	0	0	8	0	4	0	4	0
	12	8	0	8	0	8	0	8	0
	18	16	0	12	0	8	0	8	0
	25	16	0	20	0	12	0	12	0
Sept.	1	20	0	20	0	16	0	16	0
	8	20	0	24	0	24	0	20	0
	15	24	8	32	4	32	0	24	0
	22	28	0	36	8	36	4	28	8
	29	56	0	44	4	40	12	40	0
Total		188	8	204	16	180	16	160	8
Mean		20.9	0.9	22.7	1.7	20.0	L.7	17.8	**0.9**

F = 2.7

P.= Pectinophora gossypiella

E.= Earias insulana

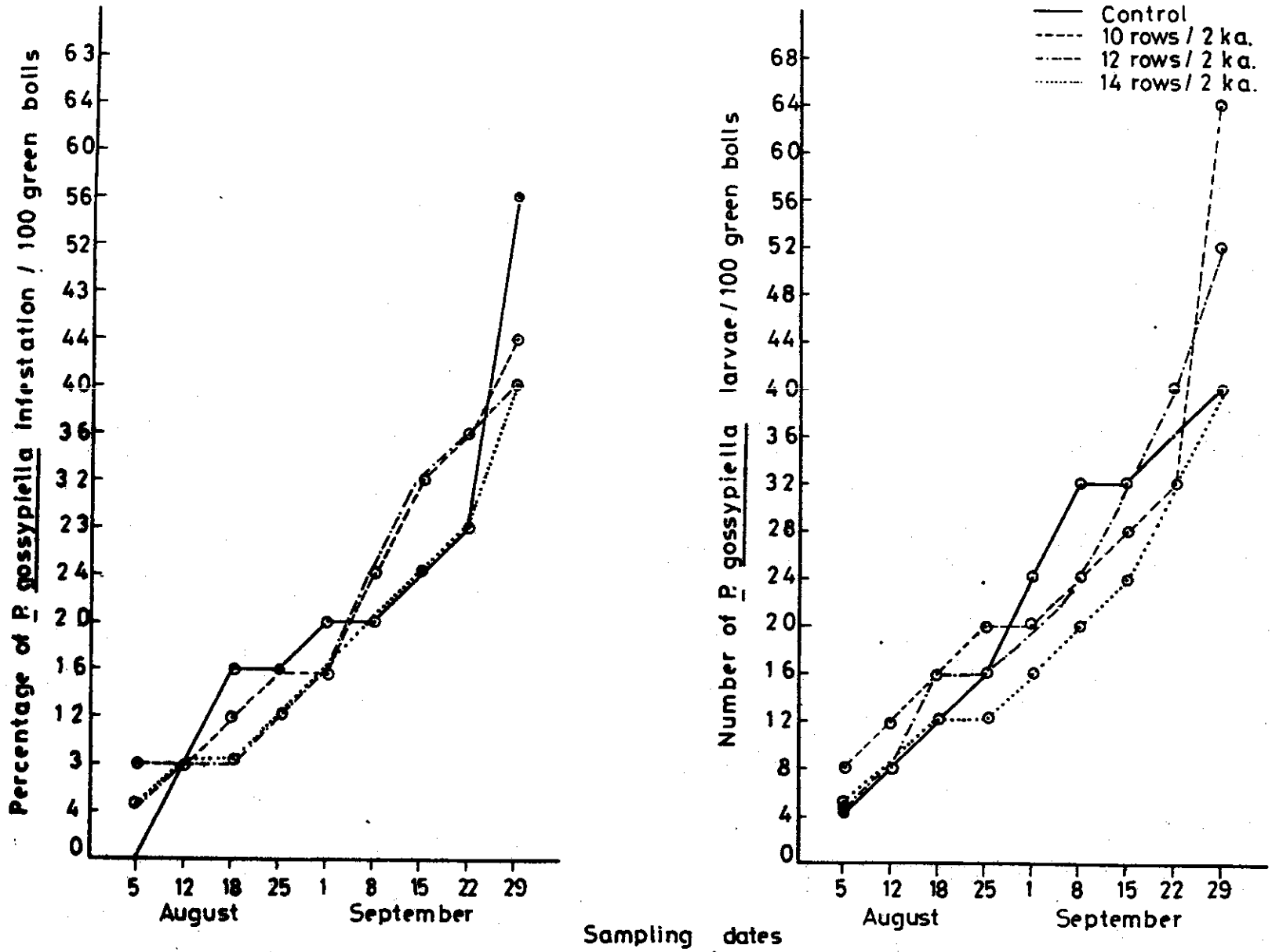


Fig.(15) Effect of row spacing on the percentage of P. gossypiella infestation and the number of the larvae in 1981 season.

Larval number in green bolls :

Results obtained in Table (24) and Fig. (15) indicated that the highest larval population was recorded in 10 row/2 kassaba followed by 12 row/ 2 kassaba, control treatment (13 row/2 ka.) and 14 row/2 ka. which gave the lowest number of larvae. There was no significant difference between the treatments in the infestation of larvae population It could be concluded that the highest number of larvae was found in 10 row/2 ka. On the other hand, the low number of larvae was recorded in 14 row/2 k kassaba treatment .

Table (24) : Number of bollworms larvae per 100 bolls in relation to row spacing, 1981 season. **(Bahteem Station.)**

Date of inspection	Number of bollworm larvae							
	Control 13 row		10 row/ 2 ka.		12 row/ 2 ka.		14 row/ 2 ka.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 5	4	0	8	0	4	0	4	0
12	8	0	12	0	8	0	8	0
18	12	0	16	0	16	0	12	0
25	16	0	20	0	16	0	12	0
Sept. 1	24	0	20	0	20	0	16	0
8	32	0	24	0	24	0	24	0
15	32	0	28	0	32	0	24	20
22	36	0	32	8	40	4	32	0
29	40	0	64	0	52	20	40	0
Total	204	0	224	8	212	24	172	20
Mean	22.7	0	24.9	0.9	23.6	2.7	19.1	2.2

F = 2.7

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.2.2 Season 1982:

Percentage of infestation by pink bollworm:

Results of the analysis of variance for the infestation with Pectinophora gossypiella during the present season showed that the differences betw-een the tested treatments were insignificant. The highest average percentage of infestation was recor-ded in 10 row/2 ka., followed by 12 row/2 ka., control treatment (13 row/2 ka.) . On the other hand, 14 row/ 2 ka. gave the lowest rate of infestation (Table, 25 and Fig. 16). In general, the infestation by the pink bollworm was low at the begining and then increased at the end of the season.

Percentage of infestation by spiny bollworm:

As happened in last season, the degree of infestation by the spiny bollworm was generally low. The highest degree of the insect attack was recorded in 10 row/2 kassaba treatment

Table (25) : Percentage of infested bolls by cotton bollworms in relation to row spacing, 1982 season. **(Bahteem Station.)**

Date of inspection	Percentage of bollworm							
	Control 13 row		10 row/ 2 ka.		12 row/ 2 ka.		14 row/ 2 ka.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 7	8	0	8	0	12	0	8	0
14	16	0	16	0	16	0	16	0
21	20	0	20	0	20	0	20	0
28	24	0	32	0	24	0	20	0
Sept. 4	28	0	36	0	28	0	24	0
11	28	0	36	0	32	0	40	0
18	40	4	40	0	44	0	44	0
25	96	0	88	0	92	0	68	0
Total	260	4	276	0	268	0	240	0
Mean	32.5	0.5	34.5	0	33.5	0	30.0	0

F = 0.99

P.= Pectinophora gossypiella

E.= Earias insulana

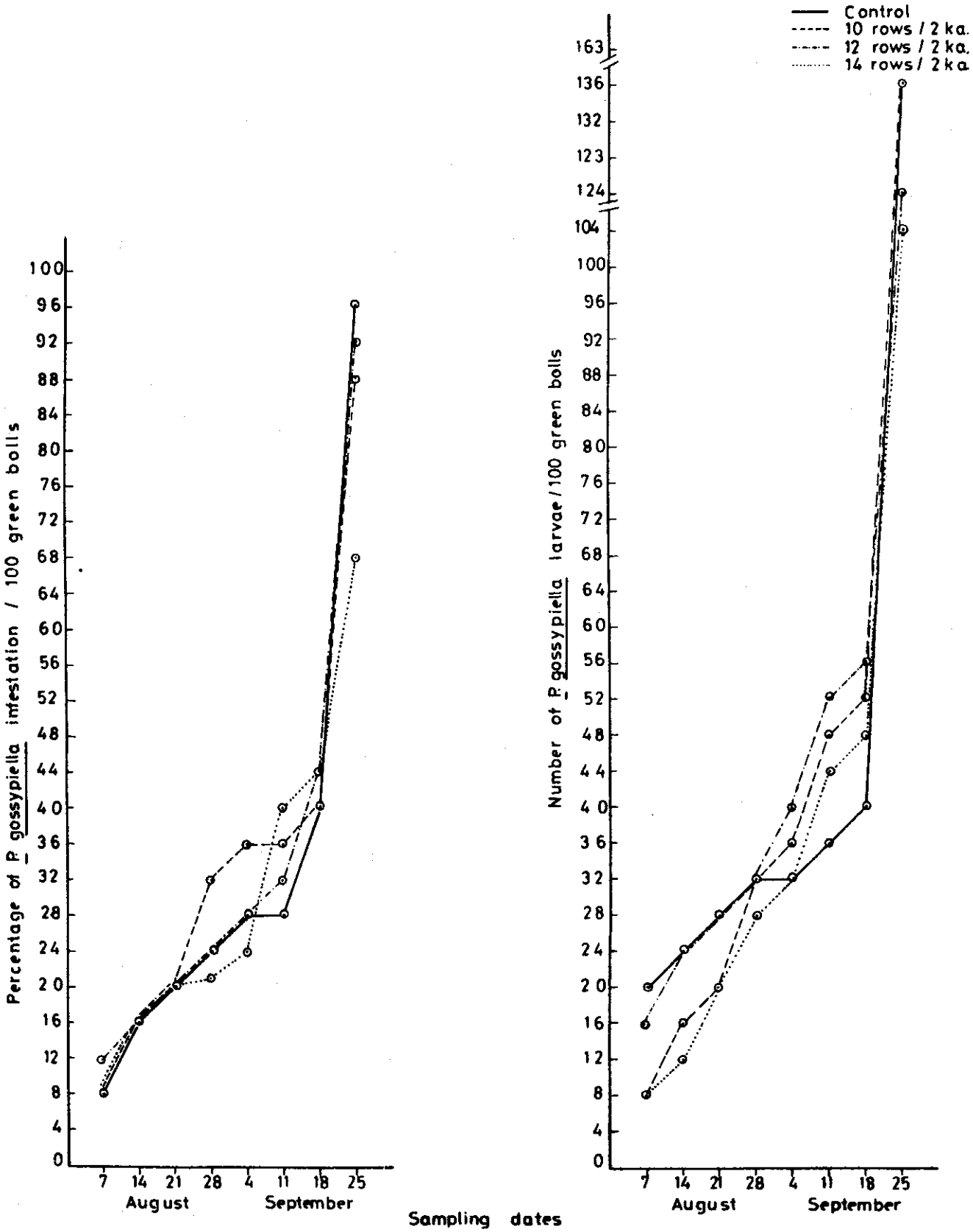


Fig. (16) Effect of row spacing on the percentage of P. gosspiella infestation and the number of the larvae in 1982 season.

Larval number of pink bollworm in green bolls:

Results obtained in Table (26) and Fig. (16) exhibited that 10 row/2 kassaba harboured the highest larval number and on the opposite side,14 row/2 kassaba obtained the lowest larval number.

Statistical analysis presented in Table (26) revealed that there was no significant difference between the tested treatment .

Table (26) : Number of bollworm larvae per 100 bolls, in relation to row spacing, 1982 season. (Bahteem Station.)

Date of inspection	Number of bollworm larvae							
	Control 13 row		10 row/ 2 ka.		12 row/ 2 ka.		14 row/ 2 ka.	
	P.	E.	P.	E.	P.	E.	P.	E.
Aug. 7	20	0	8	0	16	0	8	0
14	24	0	16	0	24	0	12	0
21	28	0	20	0	28	0	20	0
28	32	0	32	0	32	0	28	0
Sept. 4	32	0	36	0	40	0	32	0
11	36	0	48	0	52	0	44	4
18	40	4	52	0	56	0	48	0
25	136	0	168	0	124	0	104	0
Total	348	4	380	0	372	0	296	4
Mean	43.5	0.5	47.5	0	46.5	0	37.0	0.5

F = 1.68

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.3. Evaluation of infestation by bollworms in relation to planting on both sides of the ridge:

4.8.3.1 Season 1981:

Percentage of infestation by pink bollworm:

Data in Table (27) and Fig.(17) showed that the percentage of infestation was higher in case of cultivating the control treatment than planting on both sides of the ridge. There were insignificant differences between the percentages of infestation of the two tested treatments. In all cases, the infestation by P. gossypiella started at low rates, then increased gradually towards the end of the cotton season.

Percentage of infestation by spiny bollworm:

The spiny bollworm shared the pink bollworm in damaging the green bolls at the end of the season. It started to appear in late September.

Data in Table (27) indicated that the population of spiny bollworm was very low. It was (8%) in planting on the two sides of the ridge, at the end of the season, while it was zero in the control.

Table (27) : Percentage of bollworms infestation in relation to planting on both sides of the ridge, 1981 season. **(Bahteem Station.)**

Date of inspection	Percentage of bollworms			
	Control		Both sides of ridge	
	P.	E.	P.	E.
Aug. 5	0	0	4	0
12	8	0	8	0
18	16	0	12	0
25	16	0	16	0
Sept. 1	20	0	20	0
8	20	0	24	0
15	24	0	24	0
22	28	0	28	0
29	56	0	40	8
Total	188	0	176	8
Mean	20.9	0	19.6	0.9

T = 0.20

P.= Pectinophora gossypiella

E.= Earias insulana

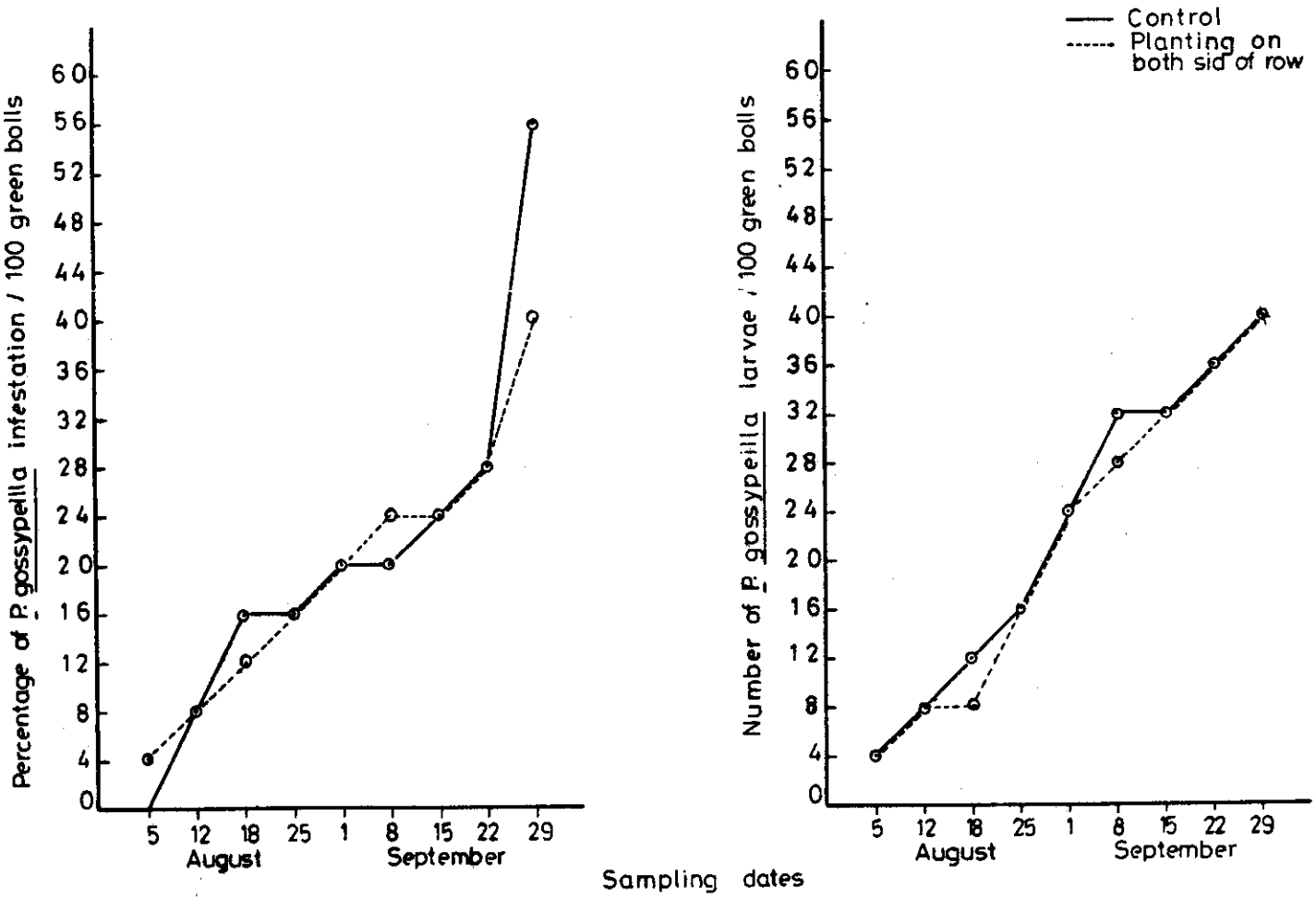


Fig. (17) Effect of planting on both side of row on the percentage of p. gossypiella infestation and number of the larvae in 1981 season.

Larval number of pink bollworm in green bolls:

The total number of larvae/100 bolls were recorded in Table (28) and Fig. (17) Data showed that the number of larvae found in 100 bolls began at low rates then increased gradually towards the end of the season.

Although planting on both sides of the ridge gave lower number of larvae than the control treatment. " T " test showed no significant differences in number of larvae in the two treatments.

Table (28) : Number of bollworms larvae in relation of planting on both sides of the ridge, 1981 season. **(Bahteem Station.)**

Date of inspection		Number of bollworm larvae			
		Control		Both sides of ridge	
		P.	E.	P.	E.
Aug.	5	4	0	4	0
	12	8	0	8	0
	18	12	0	8	0
	25	16	0	16	0
Sept.	1	24	0	24	0
	8	32	0	28	0
	15	32	0	32	0
	22	36	0	36	0
	29	40	8	40	8
Total		204	8	196	8
Mean		22.4	0.9	21.7	0.9

T = 0.10

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.3.2 Season 1982 :

Percentage of infestation by pink bollworm :

Results obtained in Table (29) and Fig. (18) indicated that the higher average of percentage of infestation was recorded in the control treatment than in planting on both sides of the ridge. Analysis of variance of the data obtained, revealed that no significant differences were found between the two treatments. The infestation by the pink bollworm was relatively low during the period started from August, 7. Then the rate of attack increased rapidly until the last inspection on September, 25.

Percentage of infestation by spiny bollwom :

As the same in the previous season this species appeared late in September, and the maximum infestation by this species alone was very low (4 %).

Table (29) : Percentage of bollworm infestation in relation of planting on both sides of the ridge, 1982 season. (Bahteem Station.)

Date of inspection	Percentage of bollworms			
	Control		Both sides of ridge	
	P.	E.	P.	E.
Aug. 7	8	0	8	0
14	16	0	12	0
21	20	0	16	0
28	24	0	24	0
Sept. 4	28	0	28	4
11	28	0	32	0
18	40	4	40	0
25	96	4	84	4
Total	260	8	244	8
Mean	32.5	1.0	30.5	1.0

T = 0.1

P.= Pectinophora gossypiella

E.= Earias insulana

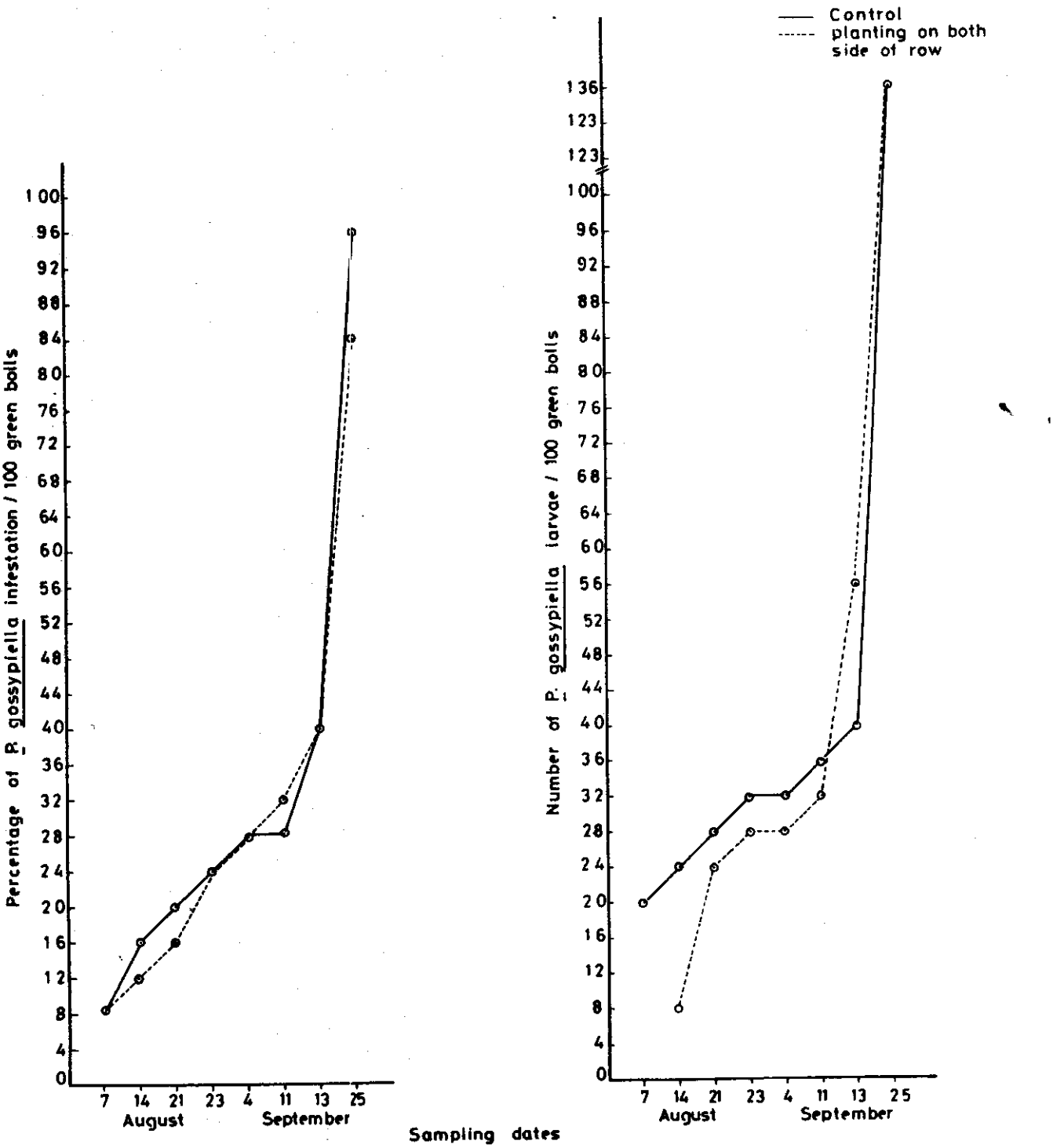


Fig.(18) Effect of planting on both side of row on the percentage of P. gossypiella infestation and the number of the larvae in 1982 season.

Larval number of pink bollworm in green boll :

The number of larvae/100 green bolls, was cleared in Table(30) and Fig.(18). It could be remarked that, the higher number of larvae was recorded in control treatment than the planting on both sides of the ridge . But statistical analysis showed that no significant differences between the number of larvae of the two treatments. The number of larvae was smaller during August, then increased throughout September.

Table (30) : Number of bollworm larvae in relation to planting on both sides of the ridge, 1982 season.(Bahteem Station.)

Date of inspection	Number of bollworm larvae			
	Control		Both sides of ridge	
	P.	E.	P.	E.
Aug. 7	20	0	8	0
14	24	0	8	0
21	28	0	24	0
28	32	0	28	0
Sept. 4	32	0	28	0
11	36	0	32	0
18	40	4	56	0
25	136	0	136	4
Total	348	4	320	4
Mean	43.5	0.5	40.0	0.5

T = 0.17

P.= Pectinophora gossypiella

E.= Earias insulana

4.8.4. Yield loss :

Data in Table (31) showed the percentage of the cotton yield losses. It was proved that:

A - Hill spacing :

The maximum percentages in losses were all in case of plants spaced at 35 cm. in any season. These were 7.8% , 7.2% cotton seasons. while the minimum percentages in losses were all in case of plants spaced at 15 cm. (narrowest spaces) in any season. These were 4.7% , 4.7% in 1981, 1982 respectively.

Row spacing :

The percentages in yield losses were cleared in table (31) which showed that the maximum ones during 1981& 1982 cotton seasons, were accompanied with planting at 10 row/2 kassaba (6.0% , 8.1% respectively) while the minimum ones were when planting at 14 row/ 2 kassaba (4.6% , 6.3% respectively.)

Planting on both sides of row:

Table (31) also showed that the amounts of yield losses increased when planting on one side of row. (6.2% ,10.4%) cotton season .

Table (31) effect of different Agricultural practices in cotton yield losses

Treatments Date and replicates	Control	Planting on both sides of the ridge	hill spacing			row spacing		
			15	25	35	10	12	14
1981	6.2	5.3	4.7	5.3	7.8	6.0	5.2	4.6
1982	10.4	7.8	4.7	5.8	7.2	8.1	6.6	6.3