

## POPULATION DYNAMIC OF APHIDS, WHITEFLY, SOME PREDATORS AND SEED-COTTON YIELD AS INFLUENCED BY COTTON SOWING DATE.

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### **Abstract**

Field experiments were conducted at cotton fields of Biala district, Kafr El-Sheikh, Governorate, Egypt to study the effect of sowing date of cotton Var. Giza 86 on the population densities of *A.gossypii*, *B. tabaci* and some associated predators and seed-cotton yield during 2003 and 2004.

Plants sown early during March infested with the lowest means of aphids (124.39 and 116.70 / 100 leaves ), and immature whiteflies (647.3 and 126.4 / 100 leaves) harboured the highest accumulative number of green bolls (159.1 and 191.4 / plant) during the scouting period of 20 weeks. And produced the highest seed-cotton yield (8.53 and 9.56 Kentar / feddan) in 2003 and 2004, respectively.

On contrary, plants sown in late April infested with the highest means of aphids (494.29 and 270.67 / 100 leaves) and immature whiteflies (768.2 and 455.1 / 100 leaves), harboured the lowest accumulative number of green bolls (118.5 and 148.9/ plant) during the scouting period of 20 weeks, and produced the lowest seed-cotton yield (5.97 and 6.73 Kentar / feddan) in 2003 and 2004, respectively. The plants sown in early April showed intermediate results. The population density of predators in late sowing date significantly differed comparing to the other two sowing dates in the two seasons .

### **INTRODUCTION**

In the last few decades, cotton aphid, *Aphis gossypii* Glover and cotton whitefly, *Bemisia tabaci* Gennadius considered a very serious pests of cotton in many tropical and subtropical areas of the world . Damage to cotton resulting feeding on plant sap, infection by leaf crumple virus and contamination of lint with honeydew causing problems of picking, ginning and spinning . Cultural control methods are very important component of integrated pest management programs, including adequate

sowing date (El-Refai and Emam, 1994 ; Nassef, 1995 and Das et al. 1999) and optimum intervals of irrigation treatments (Watson et al., 1992 and flint et al., 1994) which keep the population densities of sucking pests lower than economic injury levels and treated chemical control as possible.

Therefore, the objective of the present work was to study the effect of different cotton sowing dates on the population densities of cotton aphids, whitefly and associated predators and seed-cotton yield.

## MATERIALS AND METHODS

The experiments were conducted at cotton fields of Biala districts, Kafr El-Sheikh Governorate during 2003 and 2004 seasons. An area of three feddans (1.26 hectare) was divided into 12 plots each of 1050 m<sup>2</sup> and sowed with cotton var. Giza 86 in March 21, April 10 and April 30 during 2003 and in March 19, April 8 and April 28 during 2004 season. Four replicates (four plots) were prepared for every sowing date. All other cultural practices were normally applied without any insecticides treatments throughout the whole season . Complete randomized block design was adopted.

For scouting the population density of *A. Gossypii*, in the field by using lens (5x), 25 cotton leaves were carefully examined weekly from each plot early in the morning . The chosen leaves were taken from the upper, middle and lower levels of the plant (2, 1 and 2 leaves, respectively) . The count of whitefly immature stages was carried out in the lab. using binocular microscope on 25 leaves from each plot .

The larval stages of both *Coccinella spp.* , *Scymnus spp.* and *Chrysoperla carnea* were counted on weekly randomly chosen 10 cotton plants from each plot in the field using lens (5x) .

Weekly samples of 10 plants / plot were inspected to count the number of squares and green bolls . With the last scouting, the number of total bolls and percentage of green bolls / plant were estimated. The seed-cotton yield of each sowing date was weighted and recorded in Kentars / feddan . The sampling started immediately after seedling thinning and continued till approximately 80 % opening of green bolls . statistical analysis was made to show the significant differences between treatments according to Duncan (1955) .

## RESULTS AND DISCUSSION

### 1- Population density of *A. gossypii*:

Date presented in Table (1a) indicated that, in 2003 season , aphids population on early sown cotton (march 21) showed small peak on July 18 and nearly two equal peaks on Aug. 8 and Aug. 29 represented by 192, 328 and 340 aphids / 100 leaves , respectively. Two peaks on Aug. 22 and Sep. 12 coincided with 1140 and 888 aphids / 100 leaves respectively of April 10 sown cotton. Also , two peaks occurred on Aug. 8 and Sep. 12 consisted of 1420 and 1100 aphids / 100 leaves respectively of April 30 sown cotton .

In 2004 season, Table (1b) , three beaks were noticed on July 16 , Aug. 20 and Sept. 10 recording 89 , 332 and 250 aphids / 100 leaves respectively of March 19 sown cotton .

On cotton of April 8 sowing date, three peaks were observed on July 16, Aug. 13 and Aug. 27 represented by 115, 510 and 412 aphids / 100 leaves, respectively . In April 28 sowing date , four beaks occurred on July 9, July 23, Aug. 13 and Aug. 27 coincided with 120, 215, 621, and 892 aphids / 100 leaves, respectively.

Statistical analysis showed significant differences between means of aphids populations for the three tested sowing dates. The lowest means amounted 124.4 and 116.7 aphids / 100 leaves were recorded on cotton sowed early during March and the highest means accounted for 494.3 and 270.7 aphids / 100 leaves were recorded on cotton sown late, April 30 and April 28, respectively in both of the two seasons respectively .

Slosser et al. (1989) reported that the average number of aphids / cotton leaf during 6 weeks sampling period were 1.1, 2.1 and 31.7 on cotton of April 28, may 23 and June 22 sowing dates, respectively. Deguine et al. (1994) stated that early sowing of cotton is the most effective way to control aphids infestation .

El- Refai and Emam (1994) found that early sowing of cotton (Mar.31) resulted in the lowest average of aphids infestation (27.02 insects / leaf) while, late sowing on Apr. resulted in the highest average (50.51 aphids / leaf)

### 2- Population density of *B. tabaci* immature stages:

In 2003 season, data in Table (2a) showed that in the first sowing date (Mar.21) two beaks were observed and the highest of them was on Aug. 22 with 1120 insects / 100 leaves . One beak on Aug. 22 consisted of 1428 insects / 100 leaves was noticed in

plots of Apr. 10 sowing date . Two peaks were formed in plots of Apr. 30 sowing date and the highest was on Aug. 8 with 2000 insects / 100 leaves .

In 2004 season , data presented in Table (2b) cleared that the population density of whitefly was less than that in 2003 season. In plots of Mar. 19 sowing date two small peaks were formed and highest was on Sept. 3 with 361 insects / 100 leaves . Only one peak was formed in plants of Apr. 8 sowing date coincided with 845 insects / 100 leaves on Sept. 3 . On plants sown in Apr. 28 two peaks were observed and the biggest was on Sept. 10 with 1218 insects / 100 leaves .

It is obvious that , when sowing date had been retarded , the means of infestation during the scouting period increased significantly . The lowest means accounted for 467.3 and 126.4 insects / 100 leaves were noticed on cotton of early-sowing dates on (Mar. 21 and Mar. 19) in the first and the second seasons respectively. Whereas, the highest means amounted 768.2 and 455.1 insects / 100 leaves were observed on cotton of late-sowing date (Apr. 30 and Apr. 28) in 2003 and 2004 , resp.

Isler and Ozgur (1992) reported that early sown cotton affect by slight build up of whitefly population, but as sowing time was delayed the plants became more sensitive to infestation and more damaged .

Slosser et al. (1992) stated that the highest density whitefly found on leaves of cotton that sown in late Apr. and late May. Nassef (1995) told that the lowest means of *B. tabaci* was recorded on cotton sown early in mid-Mar. and the mean increased as the date of sowing was retarded .

### **3-Population density of larvae of some associated predators (*C. carnea* , *Coccinella spp.* and *Scymnus Spp.*).**

The population density of studied predators did not significantly affect by change in the first two sowing dates. Data in Table 3a and b revealed that, the means in case of late-sowing date significantly differed comparing to the other two dates of sowing in both seasons. The means population densities of studied predators / 50 plants in early , middle and late sowing dates were 30.9 , 27.9 and 17.8 in 2003 and were 47.7 , 47.7 and 41.3 in 2004, respectively. Sewify et al. (1996) found that on early-sown cotton plants the highest population of *C. carnea*, *Scymnus spp.* and *Coccinella undecimpunctata* was occurred .

#### **4-Effect on cotton fruiting components and seed-cotton yield**

##### **a- Number of squares :**

Data in Table (4 a and b) showed that the squares of the early sowing plants significantly differed comparing to the other two dates in both seasons. Where, the accumulative total of average squares / plant were 170.5 , 137.2 and 135.5 in 2003 and 210.1, 175.9 and 165.6 in 2004 seasons for plots of early, middle and late sowing dates, respectively.

##### **b-Number of green bolls:**

Statistical analysis of data in Table (5a and b) cleared that the highest accumulative total of average green bolls / plant amounted 159.1 and 191.4 was in plants of earliest sowing and the lowest one was 118.5 and 184.9 in that of latest sowing with significant differences , in both seasons , respectively.

As showed in Table (5 a and b) the earlier sown cotton harboured the highest average number of total bolls (green + opening) / plant amounted 26.9 and 27.3 bolls , whereas the late sown cotton bore the lowest average total bolls / plant accounted for 21.7 and 22.2 bolls in 2003 and 2004, respectively. with significant differences between the two sowing dates in both seasons . With the last scouting, the late sown cotton had the highest percentage of remaining green bolls / plant (17.1 and 27.5 %) in both seasons . These med bolls were mostly infested with bollworms and consequently gave yield of seed-cotton less in quality and quantity .

##### **c-Seed-cotton yield :**

From data presented in Table (6) , it is obvious that seed-cotton yield was significantly affected by changing in sowing dates . The highest yield (8.53 and 9.65 Kentars / feddan) was obtained when cotton was sown early (Mar. 21 and Mar. 19) , while the lowest one (5.97 and 6.73 Kentars / feddan) was obtained from late-sown cotton (Apr. 30 and Apr. 28) in 2003 and 2004 , respectively. Also , data indicated that delaying sowing of cotton for 20 days from the earlier date resulted in about 14 % decrease in seed-cotton yield . Whereas , delaying sowing for 40 days from the earliest date resulted in about 30 % reduction in seed-cotton yield . Dhawan *et al.* (1987) reported that seed-cotton yield was significantly lower in plants sown on 9 May.

El-Refai and Emam (1994) showed that early sowing of cotton on Mar. 31 resulted in the highest mean number of green bolls / plant (43.71) comparing with 24.16 green bolls / plant sown on Apr. 21. Nassef (1995) found that cotton sown early on Mar. 17

gave the highest seed-cotton yield (5.75 Kentars / feddan) , while that sown late on May 1 gave the lowest (3.66 Kentars / feddan).

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Table 1a . Population density of *A. gossypii* / 100 cotton leaves as influenced by cotton sowing dates during 2003 season at Kafr El-Sheikh Governorate .

Number of aphids / 100 cotton leaves at indicated dates of scouting	Sowing Date		Mar-21	Apr-10	Apr-30
	May	15		92	
22			26		
29			15	17	
June	6		0	0	0
	13		0	0	0
	20		0	0	0
	27		0	8	0
July	4		28	34	52
	11		63	56	100
	18		192	82	108
	25		150	180	348
August	1		268	372	519
	8		328	458	1420
	15		250	748	820
	22		232	1140	640
	29		340	680	820
September	5		170	600	800
	12		85	888	1100
	19		-	620	924
	26		-	-	672
Total			2239	5973	8403
Mean			124.4 <sup>c</sup>	351.4 <sup>b</sup>	494.3 <sup>a</sup>

LSD (5%) = 28.90

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 1b . Population density of *A. gossypii* / 100 cotton leaves as influenced by cotton sowing dates during 2004 season at Kafr El-Sheikh Governorate .

Number of aphids / 100 cotton leaves at indicated dates of scouting	Sowing Date		Mar-19	Apr-08	Apr-28
	May	7		110	
14			65		
21			23	51	
28			11	32	25
June	4		0	13	12
	11		0	0	0
	18		0	0	0
	25		0	0	0
July	2		9	30	54
	9		35	72	120
	16		89	115	90
	23		61	98	215
	30		136	192	172
August	6		199	207	343
	13		318	510	621
	20		332	320	516
	27		288	412	892
September	3		210	315	680
	10		250	290	592
	17		198	270	315
	24			198	225
Total			2334	3125	4872
Mean			116.7c	164.5b	270.7a

LSD (5%) = 23.85

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.



Table 2a . Population density of immature stages of whitefly / 100 cotton leaves as influenced by cotton sowing dates during 2004 season at Kafr El-Sheikh Governorate

	Sowing date		Mar-21	Apr-10	Apr-30
Number of immature stage of whitefly / 100 cotton leaves at indicated dates of scouting	June	6	0	0	0
		13	0	0	0
		20	0	0	0
		27	15	0	0
	July	4	53	0	60
		11	178	156	272
		18	360	404	664
		25	442	452	780
		1	517	702	1596
	August	8	748	1174	2000
		15	943	1380	1436
		22	1120	1428	1308
		29	870	988	968
	September	5	950	776	872
		12	813	600	1320
		19		488	912
		26			872
	Total		7009	8548	13060
	Mean		647.3 <sup>c</sup>	534.3 <sup>b</sup>	768.2 <sup>a</sup>

LSD (5%) = 34.73. In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 2b. Population density of immature stages of whitefly / 100 cotton leaves as influenced by cotton sowing dates during 2004 season at Kafr El-Sheikh Governorate .

Number of immature stage of whitefly / 100 cotton leaves at indicated dates of scouting	Sowing date		Mar-19	Apr-08	Apr-28
	June	4	4	0	0
11		11	0	5	0
18		18	3	16	9
25		25	12	28	41
July	2	2	16	39	68
	9	9	32	56	82
	16	16	49	82	151
	23	23	76	173	192
	30	30	89	232	210
August	6	6	184	350	389
	13	13	231	442	686
	20	20	278	531	847
	27	27	253	669	1125
September	3	3	361	845	989
	10	10	312	713	1218
	17	17		625	976
	24	24		432	753
Total			1896	5238	7736
Mean			126.4 <sup>c</sup>	308.1 <sup>b</sup>	455.1 <sup>a</sup>

LSD (5%) = 29.83

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 3a. population density of (*C. carnea*, *coccinella spp.* and *scymnus spp.*) larvae / 50 cotton plants as influenced by cotton sowing dates during 2003 season at Kafr El-Sheikh Governorate.

Sowing Date		Mar-21	Apr-10	Apr-30
		May	15	12
	22	16		
	29	32	25	
June	6	42	32	10
	13	38	28	24
	20	35	21	14
	27	20	16	15
July	4	29	14	10
	11	35	26	10
	18	43	38	15
	25	52	42	16
August	1	40	66	32
	8	38	42	40
	15	28	31	20
	22	22	23	25
	29	25	19	15
September	5	29	20	10
	12	21	14	11
	19		18	16
	26			19
Total		557	475	302
Mean		30.9 <sup>a</sup>	27.9 <sup>a</sup>	17.8 <sup>b</sup>

LSD (5%) = 3.72

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 3b. Population density of (*C. carnea*, *coccinella spp.* and *scymnus spp.*) larvae / 50 cotton plants as influenced by cotton sowing dates during 2003 season at Kafr El-Sheikh Governorate.

Sowing Date	Number of ( <i>C. carnea</i> , <i>coccinella spp.</i> and <i>scymnus spp.</i> ) larvae / 50 cotton plants at indicated dates of scouting			
		Mar-19	Apr-08	Apr-28
May	7	8		
	14	15		
	21	29	18	
	28	35	28	21
June	4	49	41	39
	11	66	48	40
	18	59	62	46
	25	32	41	30
July	2	40	32	22
	9	62	45	29
	16	60	59	48
	23	54	50	51
	30	70	61	59
August	6	76	69	62
	13	64	78	74
	20	55	82	62
	27	42	51	50
September	3	31	42	31
	10	59	35	28
	17	48	40	32
	24		25	19
Total		954	907	743
Mean		47.7 <sup>a</sup>	47.7 <sup>a</sup>	41.3 <sup>b</sup>

LSD (5%) = 4.13

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 4a. Average number of squares / cotton plant as influenced by cotton sowing dates during 2003 season at Kafr El-Sheikh Governorate .

Average number of squares / cotton plant at indicated date of scouting	Sowing date		Mar-21	Apr-10	Apr-30
	June	6		2.8	0
13			8.6	3.1	1
20			13.9	7.8	2.2
27			17.8	11.2	8.5
July	4		22.5	16.7	13.9
	11		20.1	20.9	18.2
	18		18.9	18.1	20.1
	25		15.2	16.2	17
August	1		12.3	13.5	14.7
	8		10.9	8.3	10.2
	15		7.3	5.6	6.1
	22		5.8	4.2	5.2
	29		4.5	3.1	4.4
September	5		3.8	2.5	3.2
	12		3.2	2.9	4.1
	19		1.8	2.2	4.2
	26		1.1	0.9	2.3
Accumulative total			170.5 <sup>a</sup>	137.2 <sup>b</sup>	135.3 <sup>b</sup>

LSD (5%) = 12.10

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 4b. Average number of squares / cotton plant as influenced by cotton sowing dates during 2004 season at Kafr El-Sheikh Governorate.

Average number of squares / cotton plant at indicated date of scouting	Sowing date		Mar-19	Apr-08	Apr-28
	June	4	4	5.1	2.3
11		11	9.8	5.6	2.7
18		18	14.4	11.3	6.1
25		25	18.9	15.4	10.5
July	2	2	23.5	19.6	15.7
	9	9	25.3	21.7	18.5
	16	16	21.5	23.5	20.3
	23	23	19.2	18.3	22.7
	30	30	16.1	14.4	19.2
August	6	6	12.5	10.9	13.1
	13	13	10.9	8	10.4
	20	20	8.6	7.5	7.1
	27	27	6.1	4.2	5.8
September	3	3	5.9	4	4.9
	10	10	4.8	3.2	3.1
	17	17	4	3.1	2.8
	24	24	3.5	2.9	2.5
Accumulative total			210.0 <sup>a</sup>	175.9 <sup>a</sup>	165.6 <sup>b</sup>

LSD (5%) = 20.11

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 5a. Average number of green bolls / cotton plant as influenced by cotton sowing dates during 2003 season at Kafr El-Sheikh Governorate .

Average number of green bolls / cotton plant at indicated date of scouting	Sowing date		Mar-21	Apr-10	April 30	LSD (5%)
	June	20	0.3			
	27	2				
July	4	3.2	0.2			
	11	7.9	1.3	0.1		
	18	11.1	2.6	0.9		
	25	12.4	6.8	3		
August	1	15	10.8	7.7		
	8	17	12.7	11.1		
	15	17.5	15.2	13.7		
	22	20.4	17.3	16.6		
	29	15.3	18.3	17.6		
September	5	12.1	12.4	14.2		
	12	9.8	8.7	10.4		
	19	7.6	6.3	7.5		
	26	5.4	5.2	6.8		
October	3	1.1	3.4	5.2		
	10	1	2.8	3.7		
Accumulative total			159.1 <sup>a</sup>	124.0 <sup>b</sup>	118.5 <sup>b</sup>	9.23
Average number of bolls / plant at late season			26.9 <sup>a</sup>	22.4 <sup>ab</sup>	21.7 <sup>b</sup>	2.31
% green bolls/plant			7.8 <sup>c</sup>	12.5 <sup>b</sup>	17.1 <sup>a</sup>	3.75

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

Table 5b. Average number of green bolls / cotton plant as influenced by cotton sowing dates during 2004 season at Kafr El-Sheikh Governorate.

Average number of green bolls / cotton plant at indicated date of scouting	Sowing date		Mar-21	Apr-10	Apr-28	LSD (5%)
	June	18	0.2			
25		2.5				
July	2	4.1	0.4	0.2		
	9	7.5	0.9	1.3		
	16	10.4	3.1	2.5		
	23	14.7	6.8	5.7		
August	30	17.9	9.7	8.2		
	6	21.1	13.4	11.4		
	13	22.9	19.8	18.1		
	20	20.3	18.7	20.4		
	27	17.1	15.4	17.2		
September	3	12.4	13.1	14.3		
	10	8.7	11.8	11.5		
	17	8.7	11.8	11.5		
	24	5.6	7.4	9.4		
October	1	2.3	5.3	7.3		
	8	0.9	4	6.1		
Accumulative total			191.4 <sup>a</sup>	146.7 <sup>b</sup>	148.9 <sup>b</sup>	32.16
Average number of bolls / plant at late season			27.3 <sup>a</sup>	21.5 <sup>b</sup>	22.2 <sup>b</sup>	2.16
% green bolls/plant			11.7 <sup>c</sup>	18.6 <sup>b</sup>	27.5 <sup>a</sup>	5.6

In each column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test.

\* Average number of green + opening bolls / plant at late season.



Table 6. Seed-cotton yield in kentars / feddan as influenced by sowing dates in 2003 and 2004 season at Kafr El-Sheikh Governorate.

2003 season			2004 season		
Sowing dates	Yield (Kentars / feddan)	% reduction from the highest yield	Sowing dates	Yield (Kentars / feddan)	% reduction from the highest yield
Mar-21	8.53 <sup>a</sup>	0	Mar-19	9.56 <sup>a</sup>	0
Apr-10	7.37 <sup>b</sup>	13.66	Apr-08	8.23 <sup>b</sup>	14.77
May-01	5.97 <sup>c</sup>	30.07	Apr-28	6.73 <sup>c</sup>	30.29
LSD at 5%	0.72		LSD at 5%	0.89	

In the same column, means followed by common letter are significantly different at 5% level by Duncan (1955).

## تأثير ميعاد زراعة القطن علي ديناميكية تعداد المن و الذبابة البيضاء و بعض المفترسات علي محصول القطن الناتج

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أجريت هذه الدراسة في حقول القطن بمركز بيلا بمحافظة كفر الشيخ لدراسة تأثير ميعاد زراعة القطن حيزة ٨٦ علي تذبذب تعداد المن و الذبابة البيضاء و بعض المفترسات المصاحبة و كذلك علي محصول القطن الزهر الناتج في موسمي ٢٠٠٣،٢٠٠٤ م . أوضحت النتائج أن نباتات القطن التي زرعت مبكرا خلال شهر مارس أصيبت بأقل متوسط من كل من المن (١٢٤،٣٩ ، ١١٦،٧٠ حشرة / ١٠٠ ورقة قطن) و الأطوار غير الكاملة للذبابة البيضاء (٤٦٧،٣٠ ، ١٢٦،٤٠ حشرة / ١٠٠ ورقة) و أثمرت أعلي تعداد من اللوز الأخضر كمجموع تراكمي علي مدار ٢٠ أسبوع فحص (١٥٩،١ ، ١٩١،٤ لوزة / نبات) و كذلك أنتجت أعلي محصول من القطن الزهر (٨،٥٣ ، ٩،٦٥ قنطار / فدان) في موسمي ٢٠٠٣ ، ٢٠٠٤ علي الترتيب . علي العكس من ذلك فإن النباتات التي زرعت متأخرة في نهاية أبريل أصيبت بأعلى متوسط من كل من المن (٤٩٤،٢٩ ، ٢٧٠،٦٧ حشرة / ١٠٠ ورقة قطن) و الأطوار غير الكاملة للذبابة البيضاء (٧٦٨،٢٠ ، ٤٥٥،١ حشرة / ١٠٠ ورقة) و أثمرت أقل مجموع تراكمي من اللون الأخضر (١١٨،٥ ، ١٤٨،٩ لوزة / نبات) خلال ٢٠ أسبوع فحص و كذلك أنتجت أقل محصول من القطن الزهر (٥،٩٦ ، ٦،٧٣ قنطار / فدان) في موسمي الدراسة علي الترتيب .

النباتات التي زرعت في ميعاد متوسط (بداية أبريل) أعطت نتائج متوسطة بين الميعادين السابقين . كثافة تعداد المفترسات لم تتأثر معنويا في الميعادين الأولين لكن كان هناك فرق معنوي بينهما و بين الميعاد الأخير.