

## COTTON FRUITING COMPONENTS IN RELATION TO PINK BOLLWORM INFESTATION

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### ABSTRACT

The relation between the number of squares, blooms and green bolls on cotton plants and pink bollworm infestation during the cotton seasons of 2001 and 2002 at Kafr El-Sheikh Governorate was studied.

The infested squares and blooms on cotton plants reached the maximum value before 1-2 weeks from recording the maximum squaring or blooming value. The percentages of infested squares and blooms decreased as the numbers of bolls increased and consequently an evident increase in the percentage of boll infestation followed the increase in the number of green bolls. The increase in infested bolls indicated the fact that the pink bollworm prefer to infest bolls rather than squares or flowers.

### INTRODUCTION

The pink bollworm *Pectinophora gossypiella* (Saund.) has become one of the most injurious insect pest of cotton in Egypt and many cotton-growing regions of the world.

The seasonal distribution patterns of pink bollworm moths in Egyptian cotton and other crops were determined by Romeilah (2000) using light traps. Abdel-Hamid *et al.* (1999) reported that the reliable appearance of *P. gossypiella* moths took place during March, April and May, thus forming the suicidal emergence. This is mainly due to the fact that this insect is oligophagous in addition to the emergence of moths at that time took place in the absence of favorable plant stage of cotton. The results of Rofail *et al.* (2000) indicated that the best time to control *P. gossypiella* using natural oils is determined by the beginning of new generation represented in eggs and newly hatched larvae. Al-Beltagy (1999) investigated three plant growth levels ( $\leq 3$ , 4-7 and  $\geq 8$  nodes/plant) and three pink bollworm population densities ( $\leq 3$ , 4-7 and  $\geq 8$  males/trap/night) as suggested times for chemical control against the insect.

The current study aimed to clarify the interactions between the pink bollworm infestations and different fruiting stages of cotton plant.

### MATERIALS AND METHODS

Field experiments were conducted at Kafr El-Sheikh region during the two cotton growing seasons of 2001 and 2002 to find out the relation between blooming and fruiting of cotton plants and the pink bollworm infestation.

Four cotton field plots with two feddan each were planted on March 25<sup>th</sup>-27<sup>th</sup>, 2001 and April 2<sup>nd</sup>-5<sup>th</sup>, 2002. The normal agricultural practices were followed and no insecticidal treatments were applied during the whole

experimental period. Hand picking of cotton leafworm egg-masses were sufficient.

Weekly samples of 25 plants from each plot were inspected for counting the numbers of squares, blooms and green bolls. Counting of the flowering and fruiting components was initiated on June and continued till the end of cotton seasons. The average number of squares, blooms and green bolls per plant were calculated during different fruiting stages of the plant.

For assessing the squares and blooms infestation by the pink bollworm larvae, 100 squares and 100 developed blooms about to shed were collected weekly at random from both diagonals of the inner square area of each plot according to Shaaban and Radwan (1974), starting from June and continued up to the end of the season. Also, 100 full-sized, middle-aged bolls were picked up weekly from each plot for estimating the boll infestation. Boll sampling started on July and continued up to the end of the season.

The squares and blooms samples were taken to the laboratory and examined for the actual presence of pink bollworm larvae, whereas the bolls were examined for the presence of the larvae and counts also included bolls from which the larvae had departed but left characteristic traces. Percent infestations were calculated during both two seasons.

## **RESULTS AND DISCUSSION**

The numbers of squares, blooms and bolls per plant and the percent infestations by the pink bollworm larvae during 2001 and 2002 cotton seasons are tabulated in Tables (1 to 3) and graphically illustrated in Figures (1 to 3).

### **1. Number of squares and pink bollworm infestation:**

Data in Table (1) and Fig. (1) show that cotton plants in 2001 and 2002 harboured squares at first with low numbers which increased gradually by time till reached the highest number during July in both seasons (13.65 squares per plant in July 16<sup>th</sup>, 2001 and 11.82 in July 18<sup>th</sup>, 2002) and then decreased toward the end of the season. Also, the results revealed that pink bollworm infestation of cotton squares was low recording 0.0 to 2.25% in 2001 and 0.0 to 1.75% in 2002. The highest infestation percentage was recorded on July 2<sup>nd</sup>, 2001 and July 11<sup>th</sup>, 2002. Data in Table (1) and Fig. (1) showed that the infested squares on cotton plants reached the maximum value before 1-2 weeks from recording the maximum squaring value.

### **2. Number of blooms and pink bollworm infestation:**

Data presented in Table (2) and Fig. (2) show the average number of blooms appeared on cotton plants during a period extended from June till September, 2001 and 2002 seasons. Blooming started in low numbers and increased till reached its peak on July 16<sup>th</sup>, 2001 and August 1<sup>st</sup>, 2002, recording 1.19 and 1.07 blooms per plant, respectively, then decreased toward the end of the season. Also, the results in Table (2) and Fig. (2) show the percent of infested blooms by pink bollworm larvae during 2001 and 2002

**Table (1): Number of squares per plant and percent of squares infestation by *P. gossypiella* larvae during 2001 and 2002 cotton seasons.**

	Numbers of squares and percent of infestation at indicated dates of inspection																										
	June						July						August						September								
	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	23	30	6	13	20	27	3	10	17	24
2001																											
Cotton season	2.41	4.67	6.45	8.32	10.66	13.29	13.65	12.01	10.31	7.23	5.62	5.02	3.84	2.73	2.65	2.15	1.59	12.01	10.31	7.23	5.62	5.02	3.84	2.73	2.65	2.15	1.59
Numbers of squares/plant	0.25	0.5	0.5	1.5	2.25	1.25	1.00	0.75	0.75	0.25	0	0	0	0	0	0	0	0.75	0.75	0.25	0	0	0	0	0	0	0
Percent of infestation																											
2002																											
Cotton season	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	1	8	15	22	29	5	12	19	26	3
Numbers of squares/plant	1.82	3.55	7.18	8.63	11.65	11.82	10.30	7.00	4.68	4.22	3.61	3.69	2.90	2.69	2.21	1.91	1.23	7.00	4.68	4.22	3.61	3.69	2.90	2.69	2.21	1.91	1.23
Percent of infestation	0	0.25	0.75	1.25	1.75	1.50	1.00	0.5	0.25	0	0	0	0	0	0	0	0	0.5	0.25	0	0	0	0	0	0	0	0

**Table (2): Number of blooms per plant and percent of blooms infestation by *P. gossypiella* larvae during 2001 and 2002 cotton seasons.**

	Numbers of blooms and percent of infestation at indicated dates of inspection																										
	June						July						August						September								
	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	23	30	6	13	20	27	3	10	17	24
2001																											
cotton season	0.08	0.18	0.43	0.66	0.82	0.93	1.19	1.08	1.02	0.87	0.77	0.59	0.39	0.30	0.26	0	0	1.19	1.08	1.02	0.87	0.77	0.59	0.39	0.30	0.26	0
Numbers of blooms/plant	0	0	0.25	0.75	1.75	2.75	2.5	1.25	0.75	0.25	0.25	0.25	0	0	0	0	0	2.5	1.25	0.75	0.25	0.25	0.25	0	0	0	0
Percent of infestation																											
2002																											
cotton season	13	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	1	8	15	22	29	5	12	19	26	3
Numbers of blooms/plant	0.05	0.13	0.37	0.59	0.75	0.92	1.04	1.07	1.00	0.95	0.75	0.52	0.41	0.34	0.31	0	0	1.04	1.07	1.00	0.95	0.75	0.52	0.41	0.34	0.31	0
Percent of infestation	0	0	0.25	0.5	1.75	2.25	1.5	0.75	0.5	0.5	0.25	0	0	0	0	0	0	1.5	0.75	0.5	0.5	0.25	0	0	0	0	0

cotton seasons. In both two seasons, the infestation of blooms started to appear during late June and continued till the end of August, recording its maximum value (2.75%) on July 9<sup>th</sup>, 2001 and 2.25% on July 18<sup>th</sup>, 2002. Also, the maximum infested blooms value was recorded before 1-2 weeks from reaching the maximum blooming value.

**3. Number of green bolls and pink bollworm infestation:**

The results obtained in Table (3) and Fig. (3) show that the formed green bolls started with low numbers during mid June in both seasons and increased gradually till reached its peak (16.27 and 15.03 bolls/plant) during second half of August, 2001 and first half of September, 2002 then decreased toward the end of the season. Concerning the green boll infestation by pink bollworm larvae, the results in Table (3) and Fig. (3) show that the infestation started during the first half of July and increased progressively till the end of the season recording 34.5% on October 8<sup>th</sup>, 2001 and 30.25% on October 17<sup>th</sup>, 2002. As for the number of green bolls in relation to the percentage of boll infestation by pink bollworm larvae, the results showed an evident increase in the percentage of boll infestation following the increase in the number of green bolls.

Generally, it could be concluded from the previous results that pink bollworm larvae infested squares and blooms early in the season during June and July until enough green bolls had formed which were attacked heavily with such pest during August, September and October.

Noble (1969) reported that any measures used to control the spring population developing in squares are necessary only to reduce the potential population that would attack bolls later in the season.

Kostandy (1992) proved the great effectiveness of removal the infested flowers by the 1<sup>st</sup> generation of *P. gossypiella* at the beginning of the season on reducing the green boll infestation later in the season.

The results of Liu *et al.* (1993) showed that the peak occurrence of pink bollworm adults did not always coincide with the susceptible period when the bolls were green. They reported that in early August to middle September, the peak-late 2<sup>nd</sup> generation to early-peak 3<sup>rd</sup> generation of the pest coincided with peak occurrence of susceptible green bolls, the best time for pest control measures. After this period, the proportion of susceptible green bolls in most of the cotton fields was reduced to 5%.

So, it is important to have detailed data of plant stages and insect population dynamics before the chemical application against pink bollworm in cotton fields.

**Table (3): Numbers of green bolls per plant and percent of boll infestation by *P. gossypiella* larvae during 2001 and 2002 cotton seasons.**

		Numbers of bolls and percent of infestation at indicated dates of inspection																							
		June				July				August				September				October							
2001	cotton season	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	1	8						
	Numbers of bolls/plant	0.20	0.37	0.55	1.60	2.41	3.59	6.91	12.21	13.91	15.53	16.27	16.03	13.68	11.25	10.14	8.69	7.02	6.93						
	Percent of infestation	-	-	-	-	0.25	0.5	1.75	3.0	5.25	8.5	12.0	13.75	14.25	16.5	20.0	26.75	30.25	34.5						
2002	cotton season	20	27	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17						
	Numbers of bolls/plant	0.32	0.51	0.95	1.73	3.09	5.57	7.43	9.08	10.52	13.43	14.71	15.03	14.88	14.02	12.61	11.33	8.53	7.61						
	Percent of infestation	-	-	-	0.5	1.0	2.25	3.75	5.25	6.75	8.25	11.5	14.0	14.75	16.25	18.75	23.25	28.0	30.25						

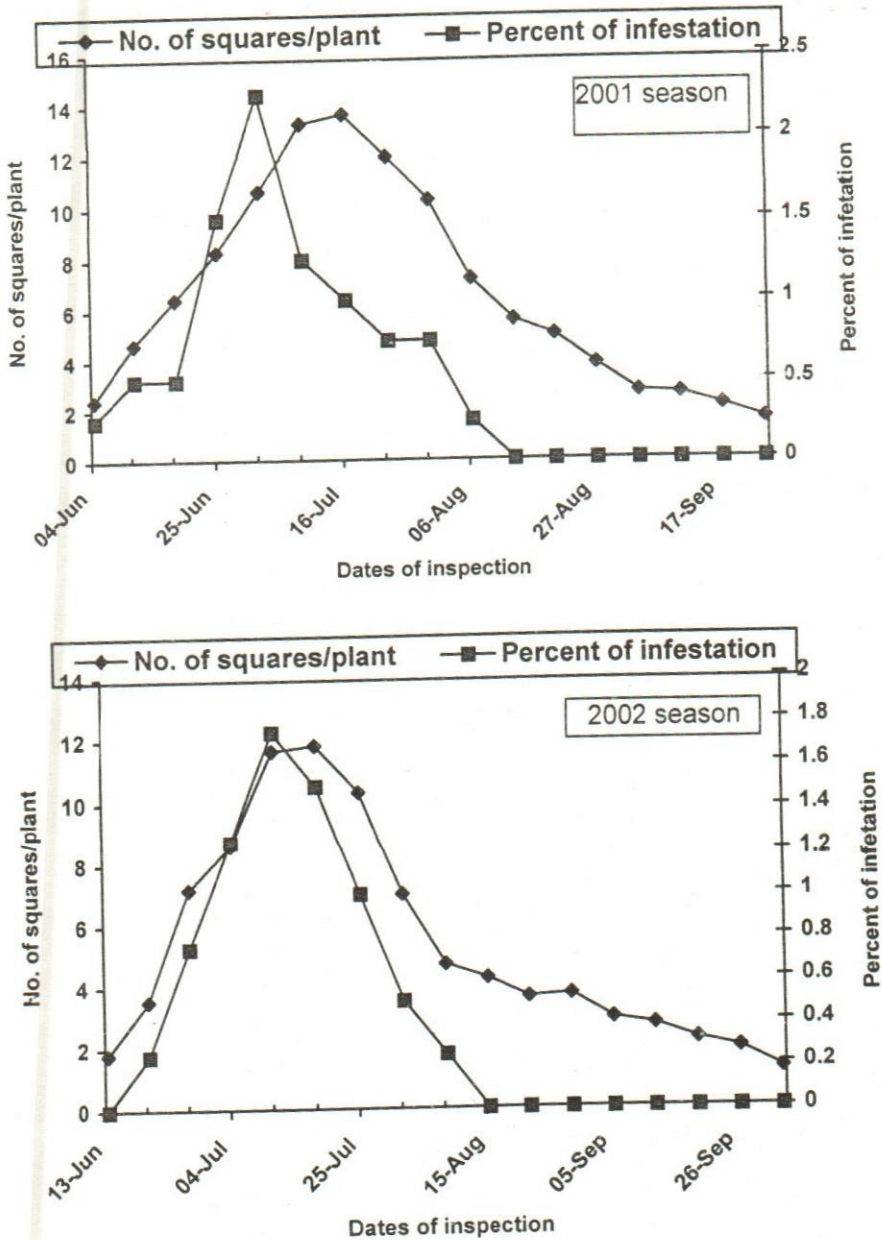


Fig. (1): Numbers of squares and squares infestation by *P. gossypiella* larvae during 2001 and 2002 cotton growing seasons.

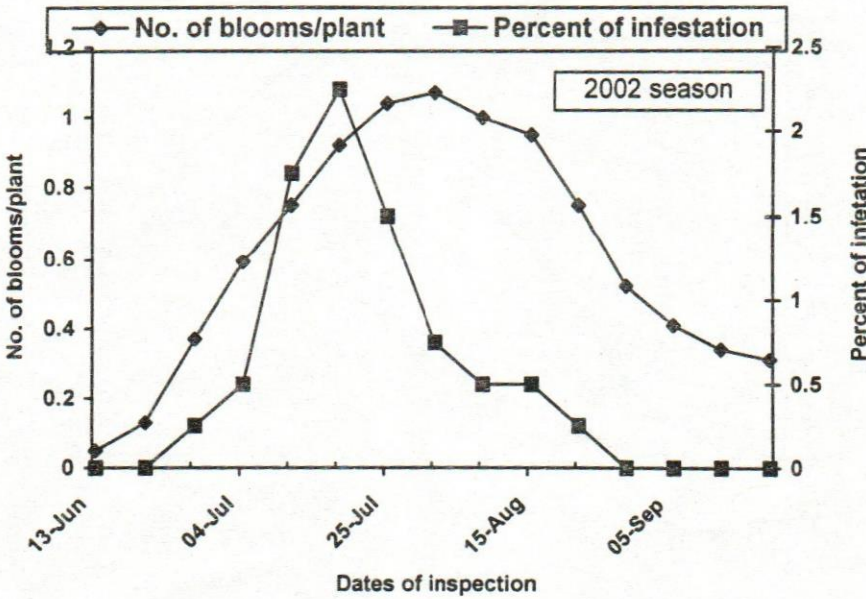
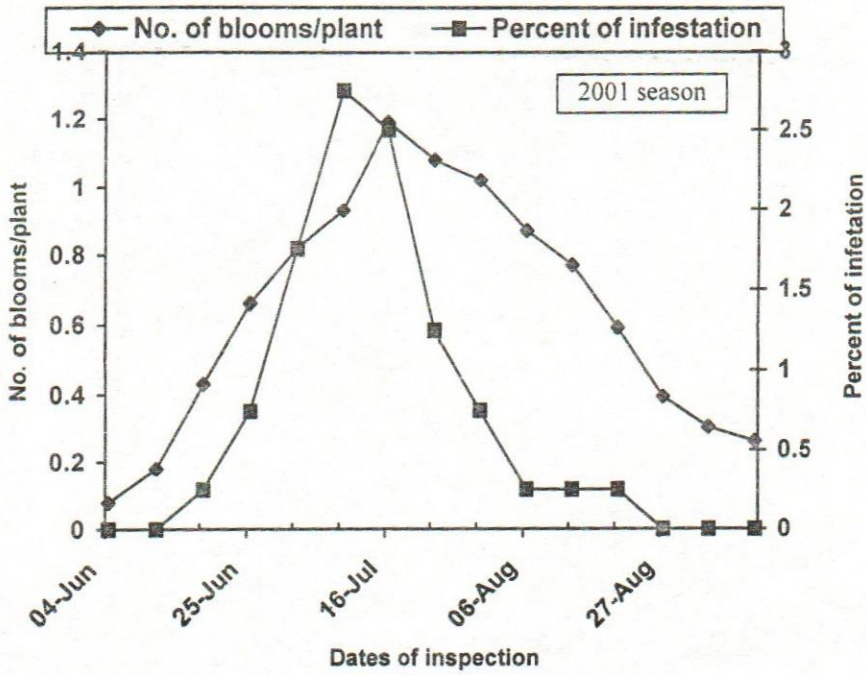


Fig. (2): Numbers of blooms and blooms infestation by *P. gossypiella* larvae during 2001 and 2002 cotton growing seasons.

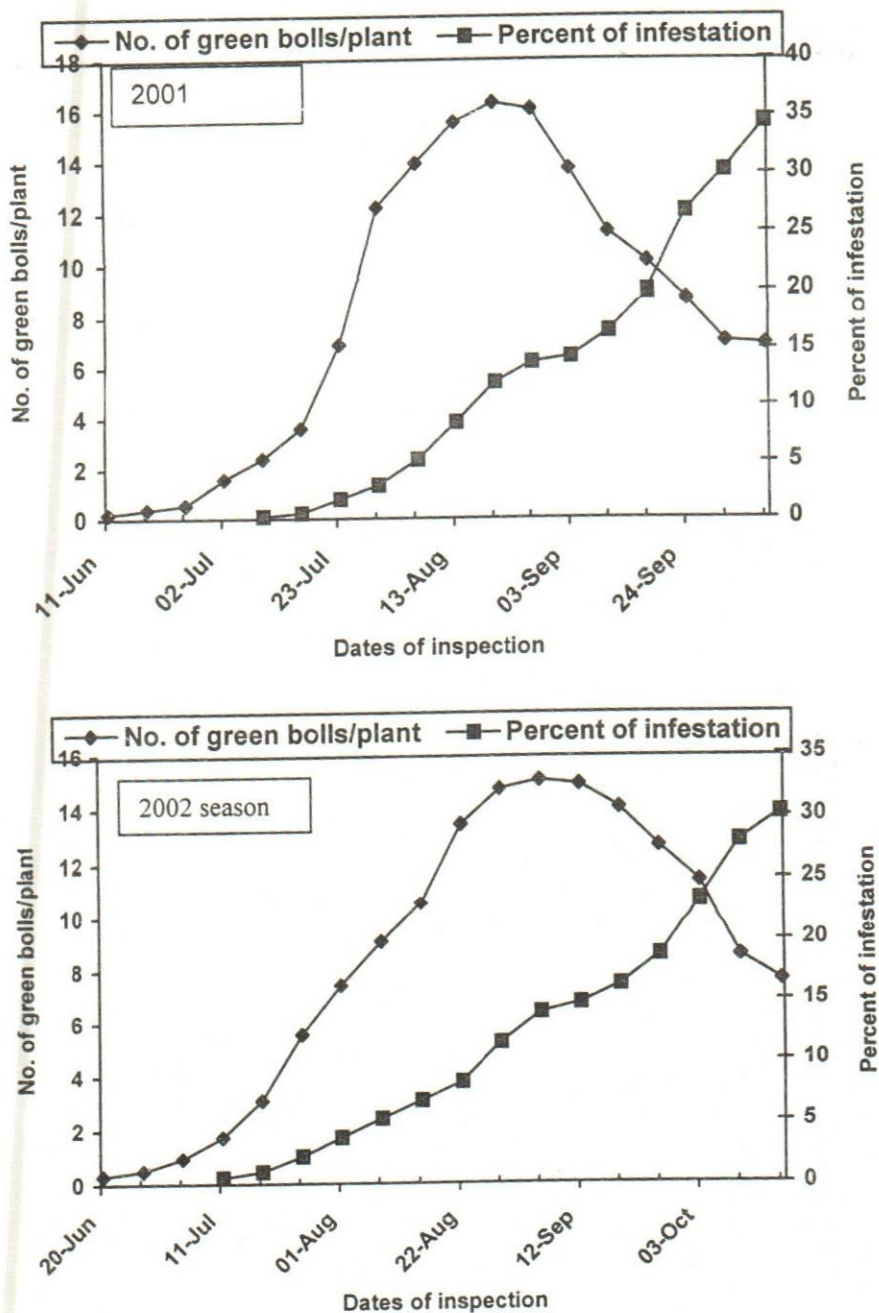


Fig. (3): Numbers of green bolls and green bolls infestation by *P. gossypiella* larvae during 2001 and 2002 cotton growing seasons.



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العلاقة بين مكونات نبات القطن الثمرية والاصابة بدودة اللوز القرنفلية  
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في تجربة أجريت عامى ٢٠٠١ ، ٢٠٠٢ بمحافظة كفرالشيخ ، درست العلاقة بين أعداد البراعم الزهرية والأزهار واللوز الأخضر على نباتات القطن وإصابة كلا منها بيرقات دودة اللوز القرنفلية.

أظهرت النتائج تسجيل أعلى إصابة فى البراعم الزهرية والأزهار قبل أسبوع الى اسبوعين من وصول أعداد البراعم الزهرية والأزهار التى يحملها نبات القطن الى أعلى قيمة لها. بعد ذلك تناقصت الإصابة فى البراعم الزهرية والأزهار بصورة واضحة عندما ازداد عدد اللوز الأخضر على النبات وبالتالي استتبع هذه الزيادة فى عدد اللوز الاخضر على النبات زيادة مطردة فى إصابة اللوز بيرقات دودة اللوز القرنفلية. هذه الزيادة الواضحة فى نسبة اللوز المصاب تؤكد حقيقة تفضيل الحشرة لإصابة اللوز أكثر من البراعم الزهرية والأزهار.