

PHENOLOGICAL ASPECTS BETWEEN POPULATION ACTIVITY OF *PECTINOPHORA GOSSYPIELLA* (SAUNDERS) MALE MOTHS AND THE CORRESPONDING COTTON BLOOMS AND GREEN BOLLS INFESTATIONS

NASSEF M.A. AND W.M. WATSON

Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza

(Manuscript received October 2001)

Abstract

Phenological aspects were studied at Kafr El-Sheikh Governorate, Egypt, during 2000 and 2001 cotton growing seasons to estimate the relation between the early appearance of pink bollworm, *Pectinophora gossypiella* (Saund.), moths in sex pheromone traps caught 6 days prior to the first squaring and blooms and bolls larval infestations during early and late fruiting stages. Data show that the mean catches of male moths per trap per day were positively correlated with percentage larval infestations. Also, the larval population in blooms showed a positive correlation with that in bolls during early and late fruiting stages.

The data were useful in identifying cotton fields and areas that had a probability of developing economic infestations during the season.

INTRODUCTION

Reliable attention was given to protect cotton fields from serious damage caused by key insect pests from which the pink bollworm is considered as the most destructive.

The development of the diapausing larval generation of pink bollworm *Pectinophora gossypiella* (Saund.) is a vulnerable period in the seasonal population density of the insect. Management control strategies that exploit the early-season weak link can delay initiation of the pink bollworm infestations and accordingly delay development of the coming infestations.

Rice and Reynolds (1971), Henneberry and Clayton (1982), Bariola (1983), Beasley *et al.* (1985), Chu and Henneberry (1990), Gupta *et al.* (1990), Qureshi *et al.* (1993) and Korat and Lingappa (1996) studied the correlations between the moth catch in gossypure baited trap and incidence of pink bollworm larvae in cotton plants.

The present work was conducted to clarify the relationship between the early season catches of pink bollworm moths and larval infestations in cotton fields.

MATERIALS AND METHODS

Field trials were conducted for two successive seasons in nine isolated selected cotton fields at Kafr El-Sheikh Governorate for 2000 cotton growing season and eight fields for 2001, with three feddan each field. Seed of Giza 86 cotton variety were planted March 20th to April 4th, 2000 and March 17th to April 9th, 2001. Cotton plants were subjected to normal agricultural processes and were maintained far from any insecticidal treatments.

Pheromone Delta sticky traps baited 1 mg a.i. gossyplure were used. One month posterior cotton planting, one pheromone trap was positioned in the center of each feddan. The traps were placed within 0.3 m of the tops of early season buds and above the canopy later in the season. The captured male moths of pink bollworm was recorded at 3 day intervals during the season. Capsules and the sticky plates were replaced by new ones every 2-3 weeks. The average daily catches of the Delta sticky traps caught 6 days prior to the first squaring were considered and recorded.

The infestation levels of the pink bollworm expressed as larval content in blooms and green bolls were considered. Samples of 100 blooms or green bolls were randomly collected from both diagonals of the inner square area of each designated field and inspected for the presence of pink bollworm larvae. Sampling of blooms starts May 27th, 2000 and May 30th 2001 t 3 day intervals and continued for 20 successive inspections. Six day intervals, samples of green bolls started June 26th, 2000 and July 2nd, 2001 recording 7 inspections for larval infestation during early fruiting stage followed by 7 successive inspections to estimate the late and essential fruiting stage infestation.

Simple correlation coefficients between the daily catch of male moths/trap caught 6 days prior to the first squaring, percent of blooms infestation and bolls infestations by pink bollworm larvae during early and late fruiting stage were estimated.

RESULTS AND DISCUSSION

The relationship between the daily catch of pink bollworm male moths/trap caught 6 days prior to the first squaring and the corresponding blooms and green bolls infestations during early and late fruiting stage during 2000 and 2001 cotton growing seasons was studied. The results obtained are given in Tables, 1 and 2.

Data obtained in Table 1 show that the average number of captured daily male moths per 3 traps at the nine experimented fields during 2000 season ranged from 6.00 to 36.50 male with an average of 21.39 male, while it ranged from 12.00 to 44.00 with an average of 27.50 male/3 traps for 2001. The corresponding infestation figures for 2000 season were 0.35 to 0.75, 2.14 to 3.29 and 3.86 to 6.14, with an average of 0.54, 2.62 and 4.68% for blooms and green bolls infestation during early and late fruiting stage. For 2001 cotton growing season, were 0.30 to 0.85, 2.29 to 2.86 and 3.43 to 6.86% for the three infestation figures with an average of 0.54, 2.57 and 5.04, respectively.

Also, data in Table 1 show that the lowest number (6.00-16.00) of captured moths during the first season corresponded to 0.35-0.50 for blooms infestation, (2.14-2.43) for bolls infestation during early fruiting stage and (3.86-5.00%) for that during late fruiting stage. Meanwhile, the high numbers (23.50-36.50) of the average daily catch of male moths corresponded to (0.40-0.75), (2.57-3.29) and (3.86-6.14%) for the three infestation figures, respectively. In 2001 season, the low numbers (12.00-20.00) of the average daily catch of male moths caught 6 days prior to the first squaring faced (0.30-0.55), (2.29-2.57) and (3.43-6.14%) for the three larval infestation figures, respectively. Meanwhile, the high catch of male moths (26.50-44.00) corresponded to (0.40-0.85), (2.29-2.86) and (3.57-6.86%) for the three infestation figures.

The simple correlation coefficients between the four tested parameters during 2000 and 2001 cotton growing seasons are given in Table 2. It is clear that the correlation between all parameters were positive. The simple correlation coefficients between the average daily catch of male moths caught 6 days prior to the first squaring and percent of blooms infestation were significant in the first season (0.745) and insignificant for the second (0.552), but significant "r" values were obtained for the two

seasons when the daily catch of male moths and bolls infestation during early fruiting stage were considered (0.762 and 0.815). The simple correlation coefficients between the average daily catch of male moths and bolls infestations during late fruiting stage in 2000 and 2001 seasons (0.577 and 0.289) were insignificant. Also, it is worth to mention that for both seasons the simple correlation coefficients between blooms infestation and bolls infestation during early fruiting stage (0.833 and 0.572) and that for late fruiting stage (0.744 and 0.117) were significant in the first season and insignificant in the second. Meanwhile, the simple correlation coefficients between bolls infestation during early and late fruiting stage in the two seasons (0.652 and 0.398) were again insignificant.

In a general conclusion, the data presented in Tables 1 and 2 reveal that the numbers of male moths of pink bollworm caught 6 days prior to the first squaring of cotton are positively correlated to blooms and coming boll infestations. The numbers of larvae in bolls during the early fruiting stage are positively correlated to blooms and bolls infestations during the late fruiting stage. Therefore, careful trapping and early season blooms infestation monitoring can provide useful information for estimating the extent of the moth population that will subsequently oviposit and produce larvae in bolls that cause economic losses.

Hossain (1990) correlated the moth-catch data with the infestation percentages in green bolls two weeks later in an attempt to estimate the infestation level beforehand. The simple regression values infer that one moth captured in the sex pheromone trap during the period from early July to early September causes an average of 0.1-0.2% infestation in green bolls 10-15 days later.

Table 1. Average number of *P. gossypiella* male moths captured daily and the corresponding larval infestations during 2000 and 2001 cotton seasons.

Parameters	No. of male moths and larval infestation at 9 fields during 2000 season										
	1	2	3	4	5	6	7	8	9	Total	Mean
Average no. of male moths ⁽¹⁾	14	12	26	6	16	30.5	28	36.5	23.5	192.5	21.39
Blooms infestation ⁽²⁾	0.35	0.50	0.65	0.35	0.50	0.75	0.75	0.60	0.40	4.85	0.54
Bolls infestation (early fruiting stage) ⁽³⁾	2.14	2.43	2.71	2.43	2.14	3.29	3.00	2.86	2.57	23.57	2.62
Bolls infestation (late fruiting stage) ⁽³⁾	3.86	4.86	4.00	3.86	5.00	6.14	5.14	5.43	3.86	42.15	4.68
Parameters	No. of male moths and larval infestation at 8 fields during 2001 season										
	1	2	3	4	5	6	7	8	Total	Mean	
Average no. of male moths ⁽¹⁾	16	36	37.5	28	44	12	26.5	20	220	27.5	
Blooms infestation ⁽²⁾	0.30	0.85	0.55	0.70	0.60	0.55	0.40	0.35	4.30	0.54	
Bolls infestation (early fruiting stage) ⁽³⁾	2.29	2.71	2.86	2.57	2.86	2.43	2.29	2.57	20.58	2.57	
Bolls infestation (late fruiting stage) ⁽³⁾	5.00	4.57	4.86	6.86	5.86	3.43	3.57	6.14	40.29	5.04	

⁽¹⁾ Average daily catch of 3 Delta sticky traps caught 6 days prior to the first squaring.

⁽²⁾ Average percent infestation of 20 inspections

⁽³⁾ Average percent infestation of 7 inspections

Table 2. Correlation coefficients of relationships between male pink bollworm moth trap catches, 6 days prior to cotton squaring and subsequent blooms and bolls infestations during 2000 and 2001 seasons.

Parameters	Simple correlation coefficients (r)	
	2000 season (r_1)	2001 season (r_2)
$X_1 X_2$	0.745*	0.552
$X_1 X_3$	0.762*	0.815*
$X_1 X_4$	0.577	0.289
$X_2 X_3$	0.833**	0.572
$X_2 X_4$	0.744*	0.117
$X_3 X_4$	0.652	0.398

X_1 = No. of male moths/trap/day

X_2 = Blooms infestation %

X_3 = Bolls infestation % (early fruiting stage)

X_4 = Bolls infestation % (late fruiting stage)

r_1 ; N = 9; 0.666, 5%*, 0.798, 1%**

r_2 ; N = 8; 0.707, 5%*, 0.834, 1%**

REFERENCES

1. Bariola, L.A. 1983. Survival and emergence of overwintered pink bollworm moth (Lepidoptera: Gelechiidae). *Environmental Entomol.* 12: 1877-1881.
2. Beasley, C.A., T.J. Henneberry, C. Adams and L. Yates. 1985. Gossypure-baited traps as pink bollworm survey, detection, research and management tools in southwestern desert cotton growing areas. *California Agri. Exper. Station Bull.* 1915, 15 p.
3. Chu, C.C. and T.J. Henneberry. 1990. Gossypure-baited trap catch relationships to seasonal pink bollworm population increases. *Proc. Beltwide Cotton Prod. Res. Conf.*: 184-185.
4. Gupta, G.P., K.N. Katiyar and A.K. Vashisht. 1990. Behaviour of male pink bollworm. *Pectinophora gossypiella* toward gossypure and its relationship with larval population and weather condition. *Indian J. Agri. Sci.* 60(6): 411-416.
5. Henneberry, T.J. and T.E. Clayton. 1982. Pink bollworm of cotton, *Pectinophora gossypiella* (Saunders),: Male moth catches in gossypure-baited traps and relationships to oviposition, boll infestation, and moth emergence. *Crop Prot.* 1: 497-504.
6. Hossain, A.M. 1990. Ecological studies on bollworms in relation to the cropping system and host plants in Fayoum region. Ph.D. Thesis, Fac. Agric., Ain Shams Univ., Cairo.
7. Korat, D.M. and S. Lingappa. 1996. Monitoring of pink bollworm moths with sex pheromone traps and its relationship with larval population and field incidence. *Indian J. Agri. Sci.* 9(3): 432-437.
8. Qureshi, Z.A., N. Ahmad and T. Hussain. 1993. Pheromone trap catches as a mean of predicting damage by pink bollworm larvae in cotton. *Crop Prot.* 12(8): 597-600.
9. Rice, R.E. and H.T. Reynolds. 1971. Seasonal emergence and population development of the pink bollworm in southern California. *J. Econ. Entomol.* 64: 1429-1432.

العلاقة بين تعداد ذكور فراشات دودة اللوز القرنفلية والإصابة باليرقات فى أزهار ولوز نبات القطن

محمد عبدالفتاح ناصف - وطسن متى وطسن

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - الجيزه

أجريت مجموعة من التجارب الحقلية فى حقول القطن بمحافظة كفرالشيخ خلال موسمى ٢٠٠٠، ٢٠٠١م لدراسة العلاقة بين تعداد ذكور فراشات دودة اللوز القرنفلية فى مصائد الجاذبات الجنسية بداية الموسم خلال ستة أيام قبل ظهور أول برعم زهرى مباشرة وإصابة الأزهار واللوز باليرقات خلال فترات الإثمار المبكرة والمتأخرة.

أظهرت النتائج وجود علاقة إيجابية بين متوسط تعداد الذكور خلال هذه الفترة المبكرة من موسم القطن مع النسبة المئوية للإصابة باليرقات فى الأزهار واللوز. من ناحية أخرى كانت هناك علاقة إيجابية أيضا بين نسبة الإصابة فى الأزهار ونسبتها فى اللوز خلال فترتى الإثمار. بالتالى أوضحت النتائج إمكانية التعريف مبكرا بحقول ومناطق زراعة القطن المحتمل تعرضها للإصابة المؤثرة بدودة اللوز القرنفلية خلال الموسم.