Study of Biology of Pink Bollworm *(Pectinophora gossypiella)* Lepidoptera: Gelechiidaeon Alternate Host (Okra)

Muhammad Umer
Department of Entomology, University of Agriculture Faisalabad, Pakistan

M.Atif
Department of Entomology, University of Agriculture Faisalabad, Pakistan

M.Ahmad
Department of Entomology, University of Agriculture Faisalabad, Pakistan

OPEN ACCESS

Volume: 6

Issue: 3

Month: Januray

Year: 2019

ISSN: 2321-788X

Received: 02.11.2018

Accepted: 24.12.2018

Published: 30.01.2019

Citation:
Muhammad Umer, Atif, M & Ahmad, M. "Study of Biology of Pink Bollworm (Pectinophora Gossypiella) Lepidoptera: Gelechiidaeon Alternate Host (Okra)." *Shanlas International Journals of Arts, Science and Humanities*, vol. 6, no. 3, 2019, pp. 18–21.

DOI:
https://doi.org/10.5281/zenodo.2550003

Abstract
Cotton is cash crop and attacked by many pests especially bollworms. The pink bollwormis one of the major pests of cotton, and its larva damages the boll by eating internal contents. Biology of the pink bollworm was studied by rearing on alternate host okra in the controlled conditions (28 ± 1°Ctemperature and 55-60% relative humidity). Both adults of male and female moth were released into a rearing cage and given a protein mixture for feeding. Female moth laid eggs from which larvae emerged. Freshly emerged larvae were reared on fresh okra pieces up to pupation. Larvae became pink in third and fourth instar, and it took 35-40 days to complete the life cycle.
Keywords:Pink bollworm, Cotton, Rearing cage, Okra

Introduction

The cotton is a cash crop and it is important to increase its yield,but attack of many insect pests (bollworms) is reducing yield of cotton. The cotton is much sensitive crop to the pestattack and chemically intensive among all fields. The pink bollworm belongs to family Gelechiidae of order Lepidoptera.Chamberlain et al. (1993), reported the cotton bollworm (Lepidoptera: Gelechiidae) as the major cause of yield losses in Pakistan whereas Wilson et al. (1979).Gilick et al. (1967), reported that PBW first time observed in North America (Mexico) in 1911, later on Nobel et al. (1969), observed the damage of first instar larva in cotton bolls in India in 1843. Ahmed (1980) said that 20-30% reduction in cotton crop yield is caused by the attack of bollworms. Ghouri (1980) reported that it is of the major pests of cotton and causesup to 20% yield loss. It is a native pest of Asia, but now it has spread to all over the world. Attique (2004) described the preferred site of PBW for egg laying.It is challenging to control this pest as its larva remains inside the bolls and insecticide cannot reach there. Its attack results in overall poor quality of the cotton crop due to staining of the lint(Ingram, 1995). It also causes severe damage to flowers and squares (Hari Prasad, 1999).

Eggs are laid singly or in group form of 4-6. Freshly laid eggs are 0.4-0.6 mm long and whitish but later turn into orange color. Larval stage consists of four instars. Larvae are 1-2 mm long when hatched and become 12-15 mm long when fully matured. First two instars are white, and it starts to change its color to pink in the third instar and become fully pinkish the in fourth instar. The Larval stage is the most damaging stage. Larvae enter in the pupal stage which continues up to 8-10 days. Pupae are reddish brown and measures 8-10 mm in length. It pupates inside soil or in litter on the ground. The Adult emerges after the pupal stage. Adults are small, dark-brown moths measuring about 12-20 mm across the wings. The head is reddish brown with pale, iridescent scales. Forewings are elongated-oval, pointed at the tips and bearing a fringe of hairs while hindwings are broader than the forewings and darker at apex. The male genitalia is broader at the base, tapering to a point and the aedeagus has a hooked tip.

Materials and Methods

First of all, cotton shootbearing fresh leaves from the upper portion of the main branch were cut. The shoots were washed with distilled water to make them free from contamination. After that shoots were fitted into plastic vials filled with water to keep shoots fresh. A piece of wool was also wrapped around the base of shoots. An oviposition cage of glass (60 x 60 x 60 cm diameter) was prepared, and a polystyrene sheet placed in it, and vials containing cotton shoots were fixed into sheet(Figure 1).Adults of pink bollworm were collected from cotton of different regions of country kept in glass cagesAdults of pink bollworm were released into oviposition cage(Fig.2).Adults were fed on a mixture of protein and honey solution. A cotton ball dipped in distilled water was also placed in each cage.Cotton shoots served as a substratum for adults to rest and oviposit. Oviposition cage was covered with black cloth to avoid from light(Fig.3). Cotton Shoots and diet was changed after every two days. Oviposition cage was kept in controlled conditions (28 ± 1°C Temperature and 55-60% Relative Humidity). Female moths laid eggs in leaf axils, and on the ventral surface of the leaves.After two days, these shoots were replaced with new shoots. Old shoots containing eggs were placed into a glass jar (Fig.4). Glass jars were examined on a daily basis under the microscope (Fig.5), and newly hatched larvaewere transferred onto piecesof fresh okra fruit with the help of camel hair brush and reared up to pupation. Okra pieces were changed every three days using a camel hair brush.

Figure 1

Figure 2

Figure 3

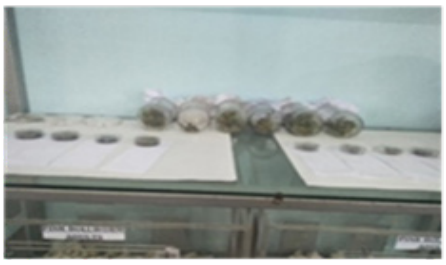
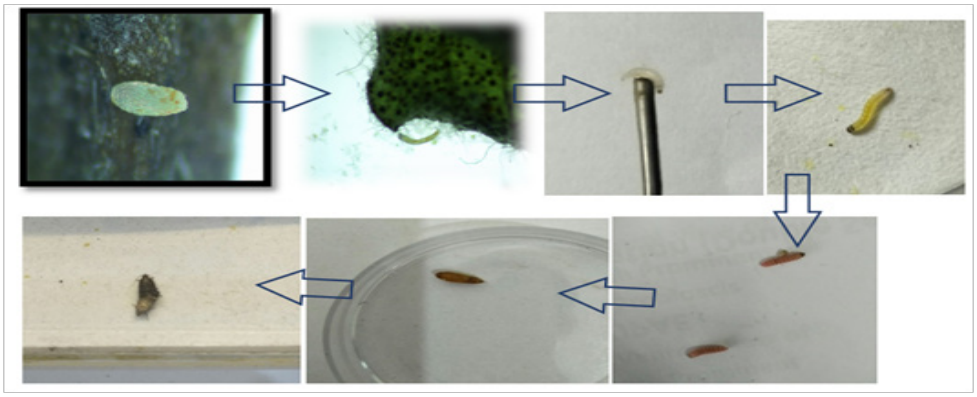


Figure 4

Figure 5

Results and Discussion

The life cycle of the pink bollworm was studied. Each life stage of pink bollworm was examined carefully on a daily basis. Female moths lay eggs singly or more commonly, in small groups. Eggs hatches within 2-4 days. Larval period completes in 15-18 days. Pupa does not feed or move during the pupal period. The pupal period is of 7-8 days. The adult moths of pink bollwormare small, dark-brown in color.After emergence male and female mates within 3-4 days and female lay eggs within 8-10 days. The female produces a sex pheromone that attracts the male for mating. The adult stage continues up to 13-16 days. It takes 35-40 days to complete the life cycle (Table). Adult mates 3-4 days after emergence.



Stage	Avg. ± SE(days)	Range (days)	
		Min.	Max.
Egg	3 ± 0.28	2	4
1st Instar	3.33 ± 0.36	3	5
2nd Instar	3.83 ± 0.34	3	5
3rd Instar	3.83 ± 0.18	3	4
4th Instar	3.66 ± 0.23	3	4
Pupa	8.83 ± 0.44	8	10
Adult	14.33 ± 0.54	13	16

Conclusion

Pink Bollworm spends its life cycle inside the bolls. Its life cycle consists of four stages (Egg, Larva, Pupa, Adult). The larval stage consists of four instars, while third and fourth instars are pink, that's why called pink bollworm. Its completes the life cycle in 35-40 days.

References

Ahmed, Z. (1980). Incidence of major cotton pests and diseases in Pakistan with special reference to pest management. Proceeding of First International Consultation on Cotton Production Research with focus on the Asian Region. Manila, Philippines. 17-21 November, 156-179.

Attique, M. R., Z. Ahmad., A. I. Mohyuddin and M. M. Ahmad, (2004). Oviposition site preference of pink bollworm, Pectinophora gossypiella (Lepidoptera: Gelechiidae) on cotton and its effects on bolls development. Crop Prot. 23, 287-292.

Chamberlain, D. J., Z. Ahmed., M. R. Attique and M. A. Choudhry, (1993). The influence of slow release PVC resin pheromones formulation on the mating behavior and control of cotton bollworm complex (Lepidoptera: Gelechiidae and Noctuidae) in Pakistan. Bull. Ent. Res. 83, 335-343.

Ghouri, A. S.K., (1980). Roll of DDT in pest control. Pak. Times Suppl. 9, 4-9.

Gilick, P. A., (1967). Aerial dispersal of the pink bollworm in the United States and Mexico. U.S. Department of Agric. Prod. Res. 96, 1-50.

Nobel, L.W. (1969). Fifty years research on the pink bollworm in united states. USDA Agri. Res. Service Handbook. 357-366.

Hari, P. K. V. (1999). Ecology and behavioral aspects of the pink bollworm, Pectinophora gossypiella (Lepidoptera: Gelechiidae) infesting cotton. J. Ent. Res. 23, 149–155.

Ingram, W. R. (1995).Pectinophoragossypiella (Lepidoptera: Gelechiidae), pp. 107–149. In: Insect Pests of Cotton (edited by G. A. Matthews and I. P. Tugstell). CAB Int., Wallingford, Oxon.

Wilson, F. D., R. D. Wilson and B. W. George, (1979). Pink bollworm reduced growth and survival of larvae placed on bolls of cotton race stocks. J. Eco. Ent. 72, 860-864.