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Population of Spotted Bollworm *Earias* sp. and its Predators (Natural Enemies) on Cotton

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Abstract: Preliminary studies on the population of spotted bollworms *Earias* sp. and its natural enemies on cotton crop were carried out to assess the population dynamics of the spotted bollworm and its predators on cotton at the experimental field of Integrated Pest management Section, Agriculture Research Institute, Tandojam during 2000. Five cultivars i.e. MNH-454, RH-400, MNH-552, BH-95 and CIM-435 were observed for 12 weeks at major growth period of cotton. The results thus suggested that the population of spotted bollworm on cotton varieties MNH-454 and RH-400 was at peak (12.25/plant) in the 1st week of September, while MNH-552 suffered with its severe infestation during August and September with highest population of 16.50 in the 4th week of August. On cultivar BH-95, the population of spotted bollworm was at peak in the 4th week of August (9.50) and similar was the condition on cotton cultivar CIM-435, it was in the 3rd week of August (7.50/plant). The population of *Geocoris* sp. predator on cotton variety MNH-454 and RH-400 was at highest level (0.52 and 0.50 per plant) in the 4th week of August and 1st week of September, respectively. The population of *Orius* sp. predator on cotton variety MNH-454 was at the highest level (8.25/plant) at the end of August. The population of *Brumus* sp. and *Formicomus* sp. on all the cotton varieties (MNH-454, RH-400, MNH-552, BH-95 and CIM-435) have also examined.

Key words: Spotted bollworm, predators, cotton cultivars

INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is main fibre crop of Pakistan, it occupies the largest area after wheat and earns highest export revenue. Besides, several million men and woman depend upon its good production and utilization in the country. During the last one and half decades although the yield per hectare as well as total production of cotton has almost been doubled in Pakistan but it is still low as compared to major cotton growing countries of the world. The major factor responsible for low yields is a quantum of damage caused by insect pests and diseases^[1,2].

Major pests of cotton may be grouped under sucking and chewing complexes. The sucking complex comprises Thrips (*Thrips tabaci* L.), Jassid (*Amrasca devastans* Dist.) and Whitefly (*Bemisia tabaci* Genn.) etc. The chewing complex includes mostly the bollworms i.e. Spotted bollworm (*Earias vitella* F.), spiny boll worm, (*Earias insulana* Boisd), American bollworm, (*Helicoverpa armigera* Hub.) and Pink bollworm (*Pectinophora gossypiella* Saund.)^[3].

The use of pesticides has been remained a popular tool to control the insect pests of cotton because they result in immediate knock down of these pests. But the

continuous and indiscriminate use of insecticides have created several problems which jeopardize their efficacy by creating environmental pollution a threat to human and animal lives and enemies of many cotton pests^[4,5]. Moreover, the use of biological control of pest population is currently being considered as an important tool in cotton pest management and it is gaining importance day by day^[6]. Biological control consists mass rearing careful identification and preservation of predatory and parasitic insects and their multiplication as well as timely release in affected crop^[4,7,8].

Keeping in view the above facts, present investigation was conducted at Tandojam to study the population of spotted bollworm *Earias* sp. and its natural enemies on cotton.

MATERIALS AND METHODS

Present investigation was conducted at the experimental field of IPM Section, ARI Tandojam, during the year 2000. Five cultivars of cotton i.e. MNH-454, RH-400, MNH-552, BH-95 and CIM-435 were sown on 16-5-2000 in a Randomized Block Design and replicated four times. Dibbling method of seed sowing was used in 20 sub plots, each measuring 30x100 feet having all

cultural practices.; For observation, stick method introduced by Mario^[9] was adopted. In this method 4 sticks were thrown at random in each sub plot and number of plants which were in the range of each stick were examined thoroughly. For recording data total bolls in each plant under observation were examined and the number of spotted bollworms larvae were counted. In addition total number of natural enemies present in each stick area were also recorded at weekly intervals.

RESULTS AND DISCUSSION

The results (Table 1) indicated that spotted bollworms *Earias* sp. appeared in the 1st week of July on all cultivars of cotton. The mean peak population of pest on CIM-435 was (7.50 larvae/plant) during 3rd week of August, on MNH-552 (16.50) and BH-95 (10.25) during last week of August and on MNH-454 (12.25) and RH-400 (12.25) in the 1st week of September. Thereafter, the pest population decreased gradually. The overall mean population observed on cultivar MNH-552 (6.23) was followed by MNH-454 (5.10), RH-400 (4.79), BH-95 (4.58) and CIM-435. Similarly Arain and Munshi^[10] reported that

the infestation of spotted bollworms on cotton flowers started in the 2nd week of July and continued upto 3rd week of September. They observed highest attack of the pest in 2nd week of August^[11].

The predators, *Geocoris* sp. had more mean population on MNH-454 (0.52), followed by RH-400 (0.50), CIM-435 (0.35), BH-95 (0.29) and MNH-552 (0.19). *Orius* sp. was more on MNH-552 (2.85), followed by BH-95 (2.81), MNH-454 and RH-400 (2.29) and *Brumus* sp. was highest in number on RH-400 (0.50), CIM-435 (1.94), followed by MNH-552 (0.27), MNH-454 (0.23), CIM-435 (0.13) and BH-95 (0.08). Similarly, *Formicomus* sp. was collected more on RH-400 (1.04), MNH-454 (0.90) MNH-552 (0.73), BH-95 (0.56) and CIM-435 (0.52). Among predators, *Orius* sp. had greater overall mean population (2.43), followed by *Formicomus* sp. (0.75), *Geocoris* sp. (0.37) and *Brumus* sp. (0.24). The overall maximum population (mean) of all predators was recorded on cultivars, RH-400 (1.08) and MNH-552 (1.01), followed by MNH-454 (0.98), BH-95 (0.93) and CIM-435 (0.73) (Table 2).

Previous authors has also reported the importance of predators on cotton. Whitecomb^[12] and Tawfik and Atta^[13]

Table 1: Weekly (mean) population of spotted bollworms *Earias* sp. on different cultivars of cotton during Kharif-2001

| Observation Month/ Week | Mean population of spotted bollworms on cotton cultivars | | | | |
|-------------------------|--|--------|---------|--------|---------|
| | MNH-454 | RH-400 | MNH-552 | BH-95 | CIM-435 |
| July | | | | | |
| W ₁ | 0.25± | 0.00 | 0.50 | 0.00 | 0.00 |
| W ₂ | 0.75± | 0.75 | 0.50 | 0.25 | 1.00 |
| W ₃ | 0.25 | 1.50 | 1.25 | 0.50 | 0.75 |
| W ₄ | 3.50 | 1.75 | 2.75 | 4.25 | 7.50 |
| August | | | | | |
| W ₁ | 4.25 | 2.00 | 5.75 | 6.00 | 4.75 |
| W ₂ | 6.00 | 8.50 | 12.00 | 6.00 | 3.50 |
| W ₃ | 7.25 | 7.50 | 10.75 | 10.00 | 7.50 |
| W ₄ | 10.25 | 9.25 | 16.50 | 10.25 | 7.25 |
| September | | | | | |
| W ₁ | 12.25 | 12.25 | 13.50 | 9.50 | 7.25 |
| W ₂ | 8.50 | 10.50 | 10.25 | 5.25 | 5.00 |
| W ₃ | 5.50 | 0.75 | 1.00 | 1.75 | 0.75 |
| W ₄ | 2.50 | 2.75 | 0.00 | 1.25 | 0.00 |
| Mean | 5.10 | 4.79 | 6.23 | 4.58 | 3.77 |
| ±S E | 0.779 | 0.943 | 1.045 | 0.637 | 0.9025 |
| LSD 0.05 | 1.170 | 4.647 | 5.145 | 3.140 | 4.445 |
| LSD 0.01 | 1.561 | 6.199 | 6.864 | 4j.140 | 5.929 |
| CV % | 52.87 | 67.62 | 58.10 | 48.19 | 81.91 |

Table 2: Overall mean±SE for population of spotted bollworms *Earias* sp. and different predators on various cotton cultivars

| Cultivars | Mean No. <i>Earias</i> sp. | Mean number of predators | | | | Predators mean (%) |
|--------------|----------------------------|--------------------------|------------------|-------------------|----------------------|--------------------|
| | | <i>Geocoris</i> sp. | <i>Orius</i> sp. | <i>Brumus</i> sp. | <i>Formicomu</i> sp. | |
| MNH-454 | 5.10±0.77 | 0.52±0.17 | 2.29±0.17 | 0.23±0.18 | 0.90±0.51 | 0.98±0.08 |
| RH-400 | 4.83±0.94 | 0.50±0.23 | 2.29±1.39 | 0.50±0.24 | 1.04±0.38 | 1.08±0.09 |
| MNH-552 | 6.23±1.04 | 0.19±0.12 | 2.85±0.93 | 0.27±0.17 | 0.73±0.44 | 1.01±0.07 |
| BH-95 | 4.580±0.64 | 0.29±0.18 | 2.81±0.71 | 0.08±0.01 | 0.56±0.22 | 0.93±0.06 |
| CIM-435 | 3.77±0.90 | 0.35±0.16 | 1.94±0.77 | 0.13±0.01 | 0.52±0.26 | 0.73±0.05 |
| Overall mean | 4.91±0.85 | 0.37±0.17 | 2.43±0.89 | 0.24±0.12 | 0.80±0.36 | |

reported *Orius* sp. as predator of *Earias* sp. Lingren *et al.*^[14] and Nayar *et al.*^[15] reported that *Geocoris* sp. was predating on cotton bollworms. Similarly, Orphanides *et al.*^[16] indicated that *B. suturalis* is predaceous on cotton bollworms.

CONCLUSIONS

The population of *Geocoris* sp. predator on cotton variety MNH-454 and RH-400 was at highest level in the 4th week of August and 1st week of September. The population of *Orius* sp. predator on cotton variety MNH-454 was at the highest level at the end of August. The population of *Brumus* sp. and *Formicomus* sp. on all the cotton varieties (MNH-454, RH-400, MNH-552, BH-95 and CIM-435) have also been examined.

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