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STUDIES ON THE ECOLOGY AND MONITORING OF PINK BOLLWORM, *Pectinophora gossypiella* (Saunders) ON COTTON

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ABSTRACT

The activity of pink bollworm, **Pectinophora gossypiella** (Saunders) was studies by time of sowing experiments and monitoring through pheromone traps for two years. In both the years, the crops sown on August 21st had less infestation than other sowings. Male moth catches through pheromone traps indicated peak occurrence during October and November. Among weather factors, rainfall, sunshine hours and morning relative humidity influenced the trap catches.

KEY WORDS: Cotton, Pink Bollworm, Ecology, Population dymanics.

The pink bollowrm, *Pectinophora gossypiella* (Saunders) is one of the most serious pests of cotton. Agarwal and Katiyar (1979) estimated the loss due to this insect to be 6,525 metric tonnes of lint worth Rs. 1216 million annually in India. The pest is usually active in Tamil Nadu from November. It is also carried through the seeds enabling the spread of the insect. The present studies were taken up during 1985-87 to find out the activity of the insect under Coimbatore conditions.

MATERIALS AND METHODS

The ecology and population dynamics were studied with experiments on time of sowing, monitoring of male moths through pheromone traps and on the effect of weather factors on moth activity.

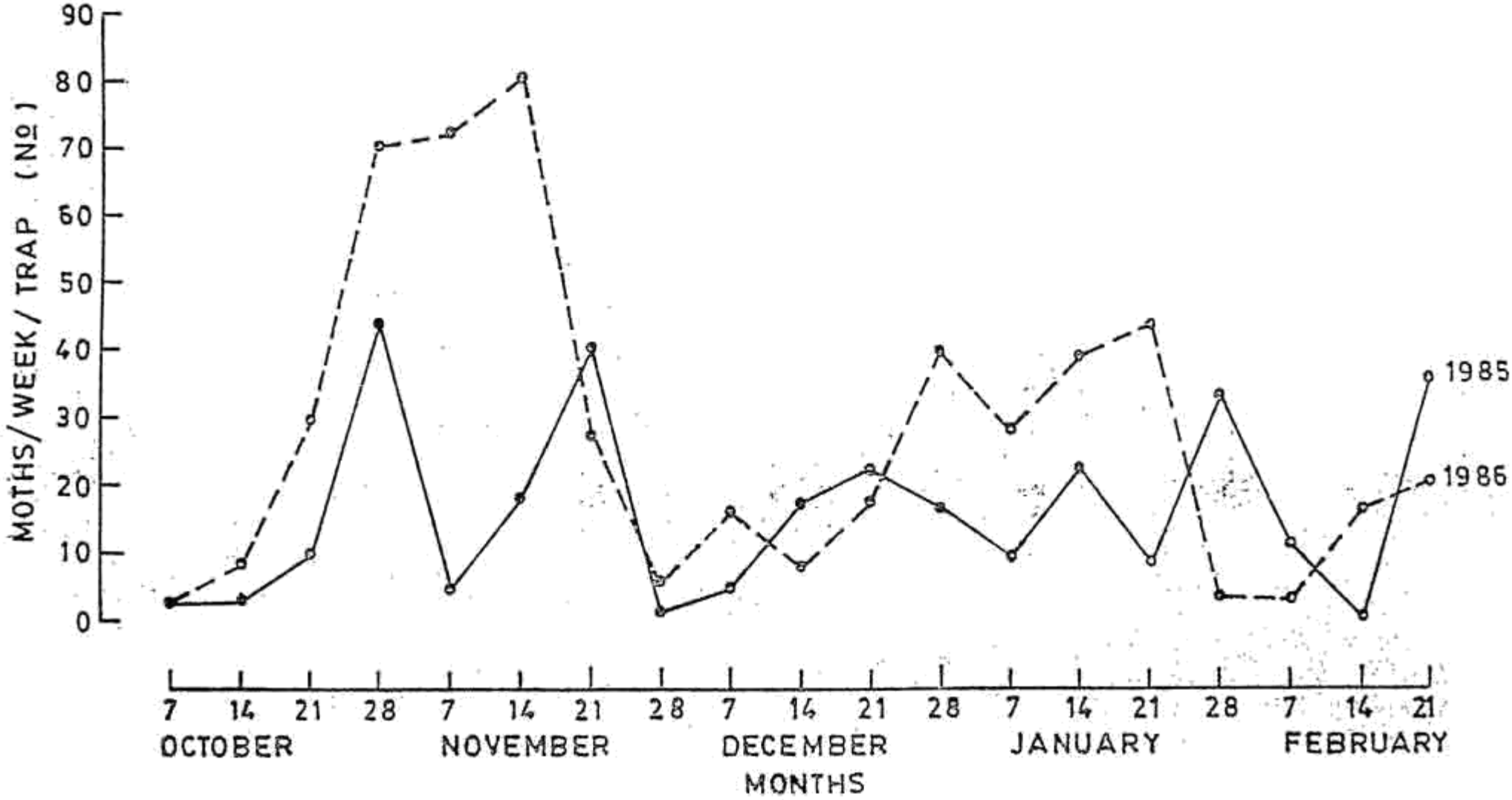
Six sowings at an interval of ten days commencing from August 1, 1985 were taken up in a randomised block design. The plot size was 20 m^2 and there were four replications. MCU 9 was used as test variety and the crop was left unprotected against bollworm. Observations were recorded on the damage to the loculi in bolls commencing from 100 days after sowing. A similar experiment was conducted during 1986-87. The data on the incidence were analysed statistically.

For monitoring the moth activity, five omnidirectional pheromone traps were placed above the canopy level 20 meters apart in an area of 0.5 ha; the traps were equidistributed in the field and the activity of male moths was monitored daily from October to February in both the years. The septa in the traps were replaced at triweekly intervals.

The data on the catches of male moths in the traps were related with the weather factors viz., maximum temperatuer (X_1), minimum temperature (X_2), morning relative humidity (X_3), evening relative humidity (X_4), rainfall (X_5),rainy days (X_6), sunshine hours (X_7) and wind velocity (X_8). Simple correlations and multiple regression analyses were carried out to find out the influence of above factors

FIG. 1

PHEROMONE TRAP CATCHES OF MALE MOTHS OF PINK BOLLWORM DURING 1985 AND 1986



dividually and collectively on trap catches.

RESULTS AND DISCUSSION

The data on the incidence of pink bollworm during 1985-86 and 1986-87 are furnished in the Table 1. The damage was more during 1985-86 as compared to 1986-87. During 1985-86, the crop sown even in August recorded as high as 55.0% incidence. This may probably be due to carryover of the insect population from the crop raised during summer season which did not exist in 1986-87. The increase in the incidence of pink bollworm in the September sown crops as compared to August sown crops may be due to the multiplication of initial infestation. In both the years, the minimum damages were 25.20 and 9.98% respectively on the crop sown on August 21. The results are in agreement with the heavy damage in September sowings as reported by Khalifa (1972) in Sudan Gezeira.

On monitoring the moth activity, the peak incidence of pink bollworm moths was observed during last week of October (42) and third week of November (41) (Fig.1). Thereafter, there was a decline in the trap catches. From fourth week of January, an increasing trend was noticed in the first year. In the second year, the capture of male moths was at its peak during last week of October (71), first and second weeks of November (73 and 80) and then declined. Gupta and Khurana (1971), Taneja Lal and Jayaswal (1986) and Dhawan and Sidhu (1987) reported that the maximum moth emergence was during October and November in North India. The present observation shows that a similar phenomenon exists in Coimbatore also.

Correlation studies between the male moth catches and weather elements indicated a significant negative relationship with maximum temperature ($r = -0.887$), morning relative humidity ($r = 0.164$) and sunshine hours ($r = -0.031$), and a positive relationship with minimum temperature ($r = 0.451$), evening relative humidity ($r = 0.029$), rainfall ($r = 0.432$), rainy days ($r = 0.148$) and wind velocity ($r = 0.306$).

The multiple regression equation fitted with weather elements to predict the male moths population was $Y = -89.11 - 0.1446 X_1 + 2.8478 X_2 - 0.6622 X_3 - 0.039 X_4 + 1.1854 X_5 - 0.6886 X_6 - 0.046 X_7 + 1.7553 X_8$ with R^2 value of 0.5456. The regression equation explained 54.56 per cent variation in moth population due to weather elements. The results revealed that an increase in rainfall by 1 mm per week will increase the male moth population by 1.1854 per week and an increase in the mean sunshine by one hour per week would increase the male moth by 1.755 per week. Similarly, the increase of morning relative humidity by 1 percent per week would reduce the male moth catch by 0.662 per week. Similar effects of weather parameters viz., rainfall and humidity were reported to influence the capture of male moths of pink bollworm (Taneja Lal and Jayaswal, 1986).

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EFFICIENCY OF NITROPHOSPHATES IN RICE-WHEAT SEQUENCE

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ABSTRACT

Field experiments were conducted on mollisols at Pantnagar to study the efficacy of two nitrophosphate grades differing in P solubility vis-a-vis urea + triple superphosphate (TSP) in rice-wheat sequence. Grain yield response of rice to both the nitrophosphate grades was similar but its magnitude was less than the reponse to urea + TSP. The relative agronomic effectiveness of nitrophosphate decreased with increasing level of application. Total N and P uptake by rice was also less in the plots fertilized with either grade of nitrophosphate as compared to urea + TSP plots. The residual effects of nitrophosphates on wheat were however more or less similar to urea + TSP when additional N was adequately supplied.

KEY WORDS: Nitrophosphates, Rice-wheat sequence, Grain yield.

Production of nitrophosphate fertilizers is of special interest because it does not require the use of sulphur which has to be imported due to absence of its deposits in the country. Nitrophosphates are however complex materials containing N and P in more than one chemical form which may influence the nutrient availability to plants and thereby the effectiveness of the fertilizers. There are conflicting reports about the suitability of nitrophosphates for rice (Prasad *et al.* 1971; Singh *et al.* 1976; Lal and Mahapatra, 1977). Several factors such as the degree of water solubility of its P, soil pH and mode of application may influence the efficacy of nitrophosphates (Sekhon, 1979; Atanasiu and Westphal, 1980). In view of these, the present study was undertaken to ascertain the efficacy of two nitrophosphate fertilizers differing in their P solubility *vis- a-vis* urea and triple superphosphate for rice and the residual effects were evaluated on a succeeding wheat crop.

MATERIALS AND METHODS

Field experiments were conducted in 1982-83 and 1983-84 at the Crop Research Centre of the University at Pantnagar on P deficient sites (Olsen P 8.6 and 9.1 kg/ha). The soils of the experimental plots were clay loam with alkaline reaction (pH 8.1, 8.0), 0.98 and 0.86 per cent organic carbon and 0.11 and 0.09 per cent total N in 1982-83 and 1983-84 respectively.

The experiment was laid out in randomized block design with three replications. Two grades of nitrophos-