*Indian Journal of Applied Entomology* **24**(1) : 47-49 (2010)

# SEASONAL INCIDENCE OF PADDY BUG (*LEPTOCORISA ACUTA TH.*) POPULATION AND ITS MANAGEMENT THROUGH CULTURAL PRACTICES

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## ABSTRACT

Assessment on the field dynamics of the paddy bug (*Leptocorisa acuta* Th.) in relation to paddy crop phenology and climatic parameters was regarded as a prime requisite for the implementation of the adopted crop protection approach in view of modern IPM practices. Field experiments conducted with the widely cultivated high yielding variety *Swarna mashuri* (MTU 7029) during four consecutive *kharif* seasons (2004-2007) at Raiganj, Uttar Dinajpur, West Bengal showed paddy bug population was significantly related with maximum temperature, temperature gradient, average temperature, minimum relative humidity and sunshine hour at positive level and with maximum relative humidity and rainfall at negative level. Effect of minimum temperature and rainy days were insignificant. The role of average relative humidity was both positive and negative. Paddy bug rendered maximum and minimum destruction to the *kharif* crop when transplantation was done at about 27 and 29 standard meteorological week respectively, suggesting the adoption of the latter.

**Key words :** *Leptocorisa*, paddy bug, incidence, management

## INTRODUCTION

Paddy bug (PB) infestation results in the discoloration of the panicles and the formation of partially or fully empty grain (Israel and Rao 1961). PB induced loss may range up to 25-35 per cent (Banerjee and Chatterjee 1982) though it may extend up to 40 per cent depending on agro ecological situations ( Rao and Kulshreshta 1985). Srivastava and Saxena (1964) suggested time fitted cultivation as best suitable method to minimize PB menace. Farmers due to poor scientific knowledge commonly follow irregular transplantation dates, which often results in high grain deterioration due to PB attack. After obtaining substantial knowledge on the relative interactive role of climatic factors, appropriate cultivation protocol advocating proper time of transplantation as suggestive recommendation to the farmers can be evolved.

## MATERIALS AND METHODS

Field experiment was conducted with transplanted 35-day old seedlings of widely cultivated variety *Swarna mashuri* (MTU 7029) during four consecutive *kharif* seasons (2004-2007) at Raiganj [26°35´15´´(N) – 87°48´37´´(W)], Uttar Dinajpur, West Bengal. The soil of the experimental field was sandy loam with PH value 6.6 and EC value 0.27mmhs/cm. Available N, $P_2O_5$ and $K_2O$ was 307,55 and 348 kg/ha respectively. Experiment was conducted in split plot design with the transplanted seedlings at 15x15 cm spacing. Transplantation was done in a succession of 15-day intervals in three separate plots (50×50 mt), during the 27$^{th}$, 29$^{th}$ and 31$^{st}$ standard meteorological week (SMW) respectively designated as KP1, KP2 and KP3.

**Assessment on pest incidence:** Pest estimation quadrate was square (1 × 1m). The dynamics of paddy bug in each plots at 1 sq. m (1×1m) three different time intervals (KP1,KP2 and KP3) was recorded weekly in terms of their availability within a particular quadrat form the seedling age till the yellow maturing stage of paddy leaves.

**Assessment on extent of damage:** Damage by paddy bug was recorded by counting the percentage of unfilled grains (%) at maturation stage. 20 panicles were diagonally collected from each of the 3 plots (50 × 50 m.), panicles were threshed and percentage of unfilled grains was calculated

Periodically collected paddy bug catch number were correlated with the prevailing climatic factors such as maximum temperature (Tmax), minimum temperature (Tmin), temperature gradient (Tgr), Maximum humidity (RHmax), minimum humidity (RHmin), humidity gradient (RHgr), sunshine hour (Shr), rainfall (Rfall) and rainy days (Rdays). The interrelationship between the population number and the meteorological data was serially tabulated. Correlation values of cumulative years were worked out.

## RESULTS AND DISCUSSION

**Population dynamics:** Dynamics of paddy bug population differed considerably in three plots, transplanted at three different times. The population was persistently present throughout the cultivation season. In KP1, initial high population decreased gradually attaining the minimum at about 41 SMW. In KP2, though the population at the beginning was low, increased abruptly up to 33 SMW, then decreased gradually attaining the minimum at about 42 SMW. KP3 comparatively supported high level of PB population from the beginning up to 38 SMW then decreased gradually. Maximum percentage of unfilled grains with minimum yield was noted in KP1. KP3 registered 31.47 q/ha grain yield with 11.56 per cent unfilled grains. Maximum yield( 34.89 q/ha) was noted in KP2 with 9.34 unfilled grains (Table 1).

**Correlation analysis of PB population with climatic factors :** Significant positive relation was noted between paddy bug and Tmax except in 2005. Minimum temperature had no significant influence on the occurrence of paddy bug, though in all the years relations were positive. Temperature gradient positively influenced paddy bug population at good significant levels except in 2005 when the relation was non significant and negative. In all the years the field population exhibited highly significant positive relation with average temperature. Except in 2004, maximum RH had highly significant negative effect on the pest incidence in most of the years. Minimum RH and the field pest level had highly significant positive relation in all the years. Both negative and positive effect on the field population was exhibited by the humidity gradient, high negative significant relation was observed in 2004 and 2007, but in 2005 and 2006 the relations though positive were non significant. Average RH influenced paddy bug population in both positive and negative manner. Sunshine (hrs) exerted significantly positive influence on paddy bug incidence in all the years. Rainfall exercised significant negative effects on the pest numbers. However, the number of rainy days showed significant positive relation to the pest occurrence only during 2007 (Table 2).

With regard to the relative fluctuation of PB infestation during entire *kharif* crop growing season, the pest infestation was initiated on 25-26 SMW, *i.e.*, early in July

**Table 1. Dynamics of PB population in the three fields transplanted at succession of 15-day intervals (individuals/ quadrate)**

| SMW | Time of transplantation | | |
|---|---|---|---|
| | KP1 | KP2 | KP3 |
| 27 | 2.25 (1.66) | | |
| 28 | 2.57 (1.75) | | |
| 29 | 2.80 (1.82) | 1.85 (1.54) | |
| 30 | 2.62 (1.77) | 1.97 (1.50) | |
| 31 | 2.57 (1.75) | 2.00 (1.59) | 2.02 (1.59) |
| 32 | 2.42 (1.72) | 2.15 (1.55) | 2.25 (1.68) |
| 33 | 2.25 (1.65) | 2.10 (1.62) | 2.55 (1.75) |
| 34 | 2.10 (1.61) | 1.95 (1.57) | 2.82 (1.82) |
| 35 | 1.92 (1.56) | 1.90 (1.56) | 2.87 (1.84) |
| 36 | 1.85 (1.54) | 1.47 (1.41) | 2.47 (1.73) |
| 37 | 1.65 (1.47) | 1.25 (1.34) | 2.50 (1.74) |
| 38 | 1.45 (1.40) | 1.15 (1.30) | 2.20 (1.68) |
| 39 | 1.32 (1.36) | 1.58 (1.26) | 2.00 (1.60) |
| 40 | 1.58 (1.26) | 1.00 (1.22) | 1.82 (1.54) |
| 41 | 1.00 (1.22) | 0.94 (1.20) | 1.75 (1.50) |
| 42 | | 0.85 (1.66) | 1.55 (1.44) |
| 43 | | | 0.85 (1.66) |
| 44 | | | 0.64 (1.06) |
| Unfilled grains (%) | 14.65 | 9.34 | 11.56 |
| Yield (q/ha) | 30.18 | 34.89 | 31.47 |

Figure in the parenthesis indicate square root transformed value

**Table 2. Correlation coefficient of incidence of the leaf folder population with the climatic factors indicating the level of significance**

| Climatic parameters | Years of observation | | | |
|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 |
| Maximum temperature (Tmax) | 0.626* | 0.425 | 0.567* | 0.611* |
| Minimum temperature (Tmin) | 0.451 | 0.118 | 0.356 | 0.439 |
| Temperature gradient (Tgr) | 0.587* | -0.213 | 0.648* | 0.712* |
| Average temperature (Tavg) | 0.592* | 0.723 | 0.711* | 0.812* |
| Maximum humidity(RHmax) | -0.378 | -0.775* | -0.790 | -0.675* |
| Minimum humidity (RHmin) | 0.831* | 0.765* | 0.712* | -0.690* |
| Humidity gradient (RHgr) | -0.603* | 0.450 | 0.329 | -0.678* |
| Average humidity (RHavg) | -0.363 | -0.290 | 0.810* | 0.723* |
| Sunshine hours / day(Shr) | 0.557* | 0.654* | 0.534* | 0.654* |
| Rainfall (Rfall) | -0.207 | -0.645* | -0.716* | 0.341 |
| Rainy days (Rdays) | 0.404 | -0.311 | 0.453 | 0.543* |

Significant at 5% level

and maximized at 30-34 SMW maintained a steady level up to 34-38 SMW and subsumed afterwards. In consideration of three alternative plantation schedules, least damage to the grains was noted in KP2. Late plantation in KP3 rendered higher damage. But when early plantation was followed in KP3, though pest infestation was low, yield was comparatively low with maximum percentage of unfilled grains due to adverse climatic parameters. So, KP2 is the best suitable cultivation schedule amongst the three in consideration.

Present findings matched with the observation of Israel and Rao (1968) who also reported a severe infestation of rice bug in Orissa condition when the temperature and relative humidity was lying between 27°C and 28.2°c and RHavg 80.60% or above respectively. Garg and Sethi (1980) have found that weekly average temperature 28.59°C, relative humidity 69.55%, sunshine hours 8.18 hrs and rainfall 00.0-71.7 mm are conducive for population build up. Rao and Kulshreshtha (1985) have mentioned that high relative humidity, rainfall and insignificant fluctuation in diurnal temperatures during the milky stage of paddy encourage higher damage by the paddy bug during the wet season in Orissa condition. Present observation partly resembles with the findings of Bhatnagar and Saxena (1999) who have found that sunshine hours (r = 0.662) had a significantly positive relation on the population build up of paddy bug while minimum temperature (r = -0.868), evening RH (r = -0.794) and rainfall (r = 0.635) exhibited negative effect.

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