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NEW RECORDS OF NATURAL ENEMIES ASSOCIATED WITH THE BROWN PLANTHOPPER, *NILPARVATA LUGENS* (STAL)

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NATURAL enemies of the brown planthopper *Nilparvata lugens* (Stal) pest of rice (*Oryza sativa*) have been reported from Karnataka[1], Andhra Pradesh[2] and other regions in India[3,4]. However not much work on the natural enemies of the brown planthopper has been done in Tamil Nadu.

In September 1987, an outbreak of the brown planthopper was reported from Tirupanandal Taluk, Tanjore District in Tamil Nadu. Severe damage was caused to the fully mature crop and subsequently the infestation spread to nurseries and the freshly transplanted crop. A thorough search for predators based on the actual feeding activity on the brown planthopper was carried out to confirm its predatory role.

The following predators were observed feeding on brown planthopper nymphs and adults:

Spiders

(a) Tetragnathidae, *Tetragnatha andamanensis* Tikader (b) Lycosidae, (i) *Lycosa poonaensis* Tikader, (ii) *Pardosa birmanica* Simon, (iii) *Pardosa sumatrana* (Thorell), (iv) *Pardosa shyamae* (Tikader).

Insects

(a) Miridae *Cyrtorhinus lividipennis* Reuter, (b) Nabidae *Stenonabis tagalica* Stal. *linnavuori* Kerzner, (c) Reduvidae, (i) *Polytoxus femoralis* Distant, (ii) *Polydidus armatissimus* Stal. (iii) *Staccia diluta* Stal., (d) Coccinellidae *Coccinella arcuata* Fabricius, (e) Carabidae, (i) *Casnoidea* indica (Thunberg), (ii) *Clivina tranquebarica* Bonelli (iii) *Colliuris fuscipennis* Chaudoir, (iv) *Elaphropus fumicatus* Motschulsky.

Except for *Crytorhinus lividipennis* and *Coccinella arcuata* all other species constitute new records of predators of the brown planthopper in India.

The population density of four species viz. *Tetragnatha andamanensis, Crytorhinus lividipennis, Stenonabis tagalica* and *Polydidus armatissimus* which were present in large numbers was studied. Within an area of 50 cents, 70 plants of the rice var TKM 9 were selected at random and the number of predators in each hill was counted at 10-day intervals beginning with 40 days after transplanting (DAT).

The first observation revealed that only the spider and nabid were present at the rate of 0.22 and 0.32/hill respectively. At 50 DAT, there was a sudden spurt in the activity of *C. lividipennis* to the extent of 18.65 nymphs/hill. However the population of the spider and nabids reduced to 0.17 and 0.07/hill respectively. At 60 DAT, the reduvid, *P. armatissimus* had increased to 1.67/hill displacing the nabid completely. Also, the population of *C. lividipennis* reduced slightly to 13.15/hill while the spider population increased to 0.54/hill. It was also observed that the activity of *C. lividipennis* was more pronounced in the early hours of the morning compared to afternoon hours. The observation for the incidence of BPH nymphs on the same plants revealed a mean population of 63.87, 125.86 and 84.83 nymphs/hill at 40, 50 and 60 DAT respectively. It appears therefore that even if a large and diverse fauna of predators were present, it may not be sufficient to contain the pest once an outbreak situation was attained.

The biocontrol potential of *C. lividipennis* was highlighted by Pophaly *et al*[5] and the role of spiders by Barion and Litsinger[6]. However there is no

record of the host range of *P. armatissimus* and *Stenonabis tagalica*. Adults and nymphs of *Nabis* spp. are predaceous on a variety of preys including aphids, leafhoppers, lygus bugs, spider mites and small caterpillars[7].

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AMYLASE AND ACID PHOSPHATASE ACTIVITIES IN LUMINAL FLUID OF RAT

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THE luminal fluid is a secretion of the uterus that promotes sperm capacitation, blastocyst metabolism and implantation. Its physical and biochemical nature undergoes cyclic changes during the reproductive cycle. Luminal amylase helps in sperm capacitation[1], while acid phosphatase activity is very high in semen[2]. Hence it was decided to study amylase and acid phosphatase in luminal fluid of rat during the estrous cycle to identify the cyclic changes and their role in sperm survival.

Female albino rats of Sprague-Dawley strain (150 to 175 g body weight) showing normal estrous cycle were selected and maintained under uniform animal husbandry conditions. Four groups of six rats each belonging to four stages of the estrous cycle were sacrificed by cervical dislocation. Each of the two uterine horns of each rat was flushed with 1 ml of normal saline and the flushings of both horns were pooled together to form one sample. Samples thus collected were processed for biochemical analysis of amylase[3] and acid phosphatase[4].

Table 1 *Amylase and acid phosphatase activities of rat luminal fluid during different stages of the estrous cycle*

Stages	Amylase (mg/h/100 ml)	Acid phosphatase (mg/h/100 ml)
Proestrus	25.00 ± 5.00* (6)	3.50 ± 1.23 (6)
Estrus	21.66 ± 9.08 (6)	5.50 ± 1.56 (6)
Metestrus	48.33 ± 25.09 (6)	1.80 ± 0.68 (6)
Diestrus	24.33 ± 7.26 (6)	3.20 ± 0.59 (6)

*Mean ± S.E. with number of samples in parentheses.

As amylase influences sperm capacitation[1], the lowest value at estrus is due to the increased utilization[5] of amylase at this stage, and also due to the dilution effect of luminal fluid which retains water to its maximum at estrus. This is further supported by the fact that amylase levels in human cervical fluid are inversely related to estrogen[5]. Hence the maximum amylase activity in luminal fluid of rat during metestrus is due to the decline in the endogenous estrogen.

The maximum acid phosphatase activity at estrus suggests that this might be due to the maximum level of endogenous estrogen[6]. Ultrastructural studies indicated that hyperestrogenism induced an increase in acid phosphate[7] activity in primary lysomes of endometrium. Significant decline in the activity at metestrus is due to the decline in endogenous estrogen.

It is interesting to note that the acid phosphatase activity is very high in semen[2]. It is possible that high acid phosphatase activity in luminal fluid at estrus (like that in semen) may make this fluid milieu conducive for sperm survival. Therefore, it is concluded that amylase and acid phosphatase activities at estrus and metestrus are negatively correlated.

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