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Population of pink borer, *Sesamia inferens* (Walker) (Noctuidae : Lepidoptera) in rice stubbles and its parasitoids

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ABSTRACT: The pink borer, *Sesamia inferens* (Walker) (Noctuidae :Lepidoptera) is a polyphagous borer and attacks many crops. The mean number of larvae varied from 0.3- 121.1 per clump. The more number of larvae was observed from last week of November 2020 to January 2021 (81.0-121.1) than Febraury and March. The pupal population was more than in the month of January (last week) to March (second week). Four parasitoids were recorded on pink borer.i.e., S*turmiopsis inferens*, *Temelucha* sp., *Isotima* sp and *Tetrastichus* sp. The activity of these parasitoids started from January and maximum in February to March.The per cent field parasitisation by *Temelucha* sp., *Sturmiopsis inferens*,*Isotima* sp and *Tetrastichus* sp range from 22.5-30.0;20-40:4-12.3 and 40-70,respectively. These potential parasitoids will helpful for developing efficient pest management against this borer. Further studies need to be carried out to develope protocols for its mass rearing in the laboratory on an alternate host, release technique, taxonomical study and survival in the field.

Key words: *Sesamia inferens,* parasitoids, *Sturmiopsis inferen*s, *Tetrastichus* sp., *Isotima* sp., *Temelucha* sp., rice eco-sysytem

Introduction

Rice is a very important food crop in India and is grown from almost sea-level to elevations of about 6,000 feet though the cultivation is concentrated in the river valleys, deltas and in the low-lying coastal

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areas of North-East and South India (Rao *et al*.,1968). Among the wide variety of insects that cause heavy damage to paddy, the stem-borers are the most important. Over 20 species of borers are known to attack paddy, but only 10 occur in India (Rao, 1964).The pink borer, *Sesamia inferens* (Walker) (Noctuidae :Lepidoptera) is a polyphagous borer and attacks many crops viz., rice, wheat, maize, sorghum, sugarcane, finger millet etc (Majumder, 2020).Itoccurs in India, Pakistan, Bangladesh, Burma, China, Srilanka, Malaysia, Taiwan, Japan, Indonesia and Philppines (Nayak *et al*.,1976 and Teetes *et al*.,1983). Due to the availabilty of one or the other host crops round the year, the pink borer is found throughout the year. It is dominant and largest stem borer becomes more abundant in a deep water rice at the seedling stage and maturing rice crop (Uichanco,1911 and Alam *et al*., 1992).

Despite the fact that pink borer larvae are internal feeders and thus are protected from most natural enemies, still some parasitoids play a major role in suppressing stem borer populations. A large number of parasitoids were recorded on *S.inferens* i.e., *Trichospilus diatraeae*, *Cotesia* (*Apanteles*) *pallipes*, *Tropobracon scoenobii, Coccygomimus (Piimpla) laothoe*; *Devorgilla* sp., *Temelucha* sp., *Stenobracon nicevillae* (Rao *et al*., 1968 and Shepard *et al*., 1987). Till date, very little work is available on the natural enemies of *Sesmia inferens* in rice stubbles, keeping in view the present study is planned to study population of pink borer and its parasitoid for its effective management in rice ecosystem.

The stubble clumps were collected from rice field (November 2020 to March 2021) at ICAR- IISR, Lucknow. After collection, splitted rice stubbles and obtained larvae (different instars), pupae as well as parasitised larvae, pupae of pink borer. The parasitised larvae and pupae were kept singly in glass tubes (15 x 2.5 cm) for its emergence in the laboratory. After emergence, parasitoids were identified as larval parasitoids:*Sturmiopsis inferens* Townsend (Tachinidae:Diptera) and *Temelucha* sp. (Hymenoptera:Ichneumonidae) and prepupal and pupal parasitod,*Isotima* sp (Braconidae:Hymenoptera) and *Tetrastichus* sp.(Eulophidae:Hymenoptera), respectively.The observations were taken on number of larvae, pupae per clump and parasitisation of both larvae and pupae. The data were analysis statistically.

The number of larvae was more as compared to pupae/clump up to 8th January and no parasitisation recorded up to December 2020. The pupae were gradually increses and it was maximum in last week of January. The mean number of larvae varied from 0.3 to 121.1 per clump (Table 1).The more number of larvae was observed from last week of November 2020 to January 2021 (81.0-121.1) than Febraury and March. The pupal population was more than in the month of January (last week) to March (second week).

Pink borer larvae remain inside or behind the leaf sheath in groups and feed gregariously on the epidermal layer of the leaf sheath and in the tillers of stubles during winter months (Calora and Reyes,1971). During the peak winter (December to February) its activity is greatly reduced in sugarcane ecosystem but in a situation when paddy is grown near sugarcane field and shifted from sugarcane crop to rice ecosystem, it gets ready access to the adjoining paddy stubbles (after harvesting).The larvae remain over winterning in rice stubble (Garg,1988).Overwintered larvae entered slowly slowly into the pupal stage from last week of November and peak in last week January to second week of March. The transplanted irrigated rice was the most susceptible to pink borer and it is dominant species and more abundant in deep water rice at the seedling stage and maturing rice crop (Uichanco,1911 and Alam *et al*.,1992).

Table.1 Population of pink borer in rice stubbles and its parasitoids

Date of collection	Mean no.of larvae and pupae /clump		Natural parasitisation (%)			
	Larvae	Pupae	*Temelucha* sp.	*Sturmiopsis inferens*	*Isotima* sp.	*Tetrastichus* sp.
28-11-2020	81.0 ^{c}	2.5 ^{a}	0.0	0.0	0.0	0.0
18-12-2020	87.0 ^{c}	4.0 ^{a}	0.0	0.0	0.0	0.0
08-01-2021	121.1 ^{e}	9.3 ^{c}	0.0	20.0 ^{a}	0.0^{a}	0.0
29-01-2021	99.4 ^{d}	15.0 ^{e}	0.0	40.0 ^{a}	0.0	40.0 ^{b}
19-02-2021	29.9 ^{b}	12.0 ^{d}	24.0 ^{b}	24.0 ^{a}	4.0 ^{a}	48.0 ^{b}
12-03-2021	10.2 ^{a}	12.1 ^{d}	22.5 ^{b}	22.5 ^{a}	12.3 ^{b}	42.6 ^{b}
23-03-2021	0.3 ^{a}	6.6 ^{b}	30.0 ^{b}	0.0	0.0	70.0 ^{c}

Means followed by different letters in the same column are significantly different (P<0.05)

The activity of four parasitoids viz., *Tetrastichus* sp*., S. inferens, Isotima* sp. and *Temelucha* sp. were started from January and maximum in February to March. The larval parasitoid, *Temelucha* sp found to parasitise larvae of pink borer (22.5-30.0 %).During the day, they hunt stem borer or leaf folder larval hosts when stem borer larvae move from one tiller to another, they are parasitised before they can rebore in to the rice stem (Shepard *et al*.,1987).Upon maturity, the parasite larvae leaves its host and spins a light brown cocoon in the stem borer tunnel or folded leaf. It was also parasitise *T. nivella*, *T.incertulas* and *S.inferens* (Rao *et al*.,1968).

The maximum parasitisatuion by *Sturmiopsis inferens* was observed during last week of January (40.0%) and it ranged from 20-40 per cent. When larval population was very low in third week of March, the parasitoid unable to search the host i.e.pink borer larvae. It attacks a wide range of pyralid and noctuid stemborers of which *Sesamia inferens* is a key host.It is also an important internal solitary larval parasite of sugarcane moth borers (Kalra and Dutta, 1971; David *et al*., 1980 & 1988;Singh and Yadav, 1979; Chaudhary*et al*., 1980; Krishnamurti and Usman, 1952).

The pre pupal parasitoid, *Isotima* sp. was found to parasitise pink borer larvae and its parasitisation varied from 4 to 12.3% during mid February to mid March. Its emergence coincide with exit hole formation of top borer. It is a major parasitiod of sugarcane top borer in Subtropical India. It was reared from larvae of *T. incertulas* at Gobichettypalayam (Madras State) in January 1962 (with parasitism 6.4%), and subsequently at other localities in the same State, Kamalpur, Mandya and around Chandannagar (Rao *et al*.,1968).It is a pre pupal parasite, and many times more effective than that of an egg parasitoid (Baitha *et al*., 2022).

The pupal parasisation by *Tetrastchus* sp. was found to 40-70 per cent with maximum in month of March.Most of the larvae converted pupa,so maximum parasitisation occurred in this month.Its field parasitisation on *Chilo partellus* (Swinhoe) varied from 0.1-3 % (Jalali and Singh, 2002), 2.5% on *Cnaphalocrosis medinalis* Guenee (Bharti and Kushwaha, 1988) and 0 to 7.6% on *Chilo suppresalis* (Chen *et al*., 1984).*Tetrastichus ayyari* (= *howardi***)** was recorded on pupae of *T. incertulas* at Bhubaneshwar (Rao *et al*.,1968).It also parasitises many other species of pyralid borers of sugarcane in India (Cherian and Subramaniam, 1940). Subba Rao and Chawla (1964) have listed it as a parasite of *Chilo suppressalis* (Walker) in India. *Tetrastichus israeli* (M&K.) (Hymenoptera:Eulophidae) also recorded as a pupal parasitoid in Indonesia (Kalshoven,1981).

These four potential parasitoids found parasitise of pink borer (larvae and pupae) in different months will helpful for developing efficient pest management against this borer.Further studies need to be carried out to develope protocols for its mass rearing in the laboratory on an alternate host, release technique, taxonomical study and survival in the field.

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