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COMPARATIVE BIOLOGY OF RICE SWARMING CATERPILLAR *SPODOPTERA MAURITIA* BOISDUVAL

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ABSTRACT

Comparative biology of rice swarming caterpillar *Spodoptera mauritia* Boisduval has been analysed in this study. It was observed that rearing it on the artificial diets (chickpea flour based diets) was the most favourable with shortest larval period of 20.00± 0.51 days, whereas, those fed with rice leaves were 23.00± 0.52 days. The number of eggs laid was 1887.50 and 1013.50 when reared on artificial diet and rice leaves, respectively.

Key words: *Oryza sativa*, swarming caterpillar, *Spodoptera mauritia*, Noctuidae, biology, artificial diet, natural diet, mass rearing, larval period, fecundity

The rice swarming caterpillar, *Spodoptera mauritia* (Biosduval) (Lepidoptera: Noctuidae) is a serious pest of rice in Telangana, Odisha and Assam in the nursery stages (Pradhan and Jotwani, 1992; Sain and Prakash, 2008; Tanwar et al., 2010; Ramaiah et al., 2018; Banu et al., 2022). This pest has a tendency to migrate in large swarms, and grazes a field like cattle and hence it is referred to as army worm (Pradhan and Jotwani, 1992). The caterpillar is essentially a polyphagous and during the last few years, it has emerged as a major pest in eastern India (Tanwar et al., 2010). In Odisha, this pest has occurred over thousands of hectares in 2009, especially in Sambalpur and Sundergarh districts (Tanwar et al., 2010). The continuous maintenance of laboratory colony of insect species is needed for any biochemical and physiological studies. With the development of artificial diets, the mass rearing of insects has been facilitated. Large scale rearing of larvae is difficult in natural medium because there is need to change the diet frequently. Artificial diet for *S. mauritia* has not been standardized, and in the present study rearing of *S. maurita* on chickpea based artificial diet has been attempted and the comparative biology analysed.

MATERIALS AND METHODS

The study was done at the Department of Entomology, College of Agriculture, PJTSAU, Rajendranagar, Hyderabad during August, 2017-18. Initial culture of *S. mauritia* was made from larvae collected from rice nurseries of RARS, Warangal, Telangana, India and reared in laboratory (28± 5°C; 65± 5% RH). The egg masses were maintained in 15x 10 cm plastic jars and provided with rice seedlings intact with primary roots as a feed. It was ensured that the seedlings touch the walls of jar by placing them in a test tube so that first instar larvae crawl onto the plant immediately after hatching. Later, these test tubes along with the first instar larvae were transferred to pre-sterilized transparent plastic containers and covered with a muslin cloth. Fresh rice leaves were provided as and when required till the larvae entered the third instar; from this instar onwards, the larvae were released onto the rice seedlings raised in plastic trays containing water, so that the larvae will not escape from the tray. Until the larvae reached the sixth instar, fresh rice seedlings were fed as and when needed. Sixth instar larvae or prepupae were later transferred to soil kept in plastic container for pupation. With the larvae reared in the artificial diet (Hamed and Nadeem, 2007), immediately after hatching the larvae were transferred to petriplates with freshly prepared artificial diet. Pupae obtained were kept in small plastic jars covered with muslin cloth for adult emergence, with the male and female pupae separated by taking into account external characters, until adult emergence. A pair of newly emerged male and female moths were then transferred to new oviposition jar along with blotting paper and fresh leaf for egg laying. The jars were covered with muslin cloth to prevent the escape of the adults. 10% honey solution was provided as food for adults, soaked on a piece of cotton with honey solution. These jars were observed every morning for egg laying. Data on parameters such as preoviposition

and oviposition period, fecundity, incubation, larval and pupal periods, and adult longevity of male and females were recorded. These were analyzed for mean and standard deviation (using one way ANOVA).

RESULTS AND DISCUSSION

The details of survival and developmental stages of *S. mauritia* investigated with artificial diet and rice leaves revealed statistically significant differences (Table. 1); maximum larval period was observed in rice leaves (23.00± 0.52) and using artificial diet (20.00± 0.51). This varied from 21-32 days (Anantanarayanan and Ayyar, 1937) and 38.6 days (Tanada and Beardsley, 1958). The adults reared on artificial diet revealed a longer life span than those reared on rice leaves; egg to adult life span when reared on rice leaves and artificial diet were 38.37± 1.00 and 36.38± 1.00 days, respectively. Eggs were laid in masses of 9-150 eggs covered with greyish anal tuft of hairs of female; eggs laid/ female reared on artificial diet and rice leaves amounted to 1887.50± 21.92 and 1013.50± 21.92, respectively. Female adult longevity was more on both diets compared to that of males; females reared from artificial diet lived for 9.00± 1.00 days and males for 7.00± 1.00 days; with when reared with rice leaves it was 8.00± 1.00 and 6.00± 1.00 days, respectively. No cannibalism was observed among the larvae. Crowding caused cannibalism (Smith, 1933). Thus, the artificial diet was more favourable compared to natural diet of rice leaves. The lifecycle was shortened when larvae were reared on artificial diet; also, number of eggs laid/ female was more. Under the changing climatic conditions, outbreaks of *S. mauritia* may occur at any point of time. The continuous maintenance of laboratory colony is needed for any biochemical and physiological studies, and artificial diets could help in this.

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Table 1. Comparative biology of *Spodoptera mauritia*

S. No.	Stage of the insect	Natural diet Mean (Days)± SD	Range (mm)	Artificial diet Mean (Days)± SD	Range (mm)
1.	Incubation period	3.00± 0.00	3.00-3.00	3.00± 0.00	3.00-3.00
2.	Larval period				
a.	I instar	2.50± 0.52	2.00-3.00	2.00± 0.51	2.00-2.00
b.	II instar	2.50± 0.52	2.00-3.00	2.00± 0.51	2.00-2.00
c.	III instar	3.50± 0.52	3.00-4.00	3.00± 0.51	3.00-3.00
d.	IV instar	3.50± 0.52	3.00-4.00	3.00± 0.51	2.00-4.00
e.	V instar	2.50± 0.52	2.00-3.00	3.00± 0.51	2.00-4.00
f.	VI instar	5.50± 0.52	5.00-6.00	4.00± 0.51	2.50-5.50
	Total larval period	23.00± 0.52	20.0-26.0	20.00± 0.51	18.0-22.0
3.	Pre pupal period	0.88± 0.12	0.75-1.00	0.88± 0.12	0.75-1.00
4.	Pupal period	7.50± 0.52	7.00-8.00	7.50± 0.51	7.00-8.00
5.	Adult longevity				
	Male	6.00± 1.00	5.00-7.00	7.00± 1.00	6.00-8.00
	Female	8.00± 1.00	7.00-9.00	9.00± 1.00	8.00-10.00
	Average	7.00± 1.00	6.00-8.00	8.00± 1.00	7.00-9.00
6.	Total lifecycle	38.37± 1.00	33.75-43.00	36.38± 1.00	31.25-41.50
7.	Preoviposition period	1.75± 0.35	1.50-2.00	1.50± 0.35	1.00-2.00
8.	Oviposition period	3.00± 1.41	2.00-4.00	4.00± 1.41	3.00-5.00
9.	Fecundity (no.)	1013.50± 21.92	998.0-1029.00	1887.50± 21.92	1777.75-1997.25
10.	% hatching	81.50± 8.49	75.50-87.50	87.00± 7.49	82.00-92.00

*Mean of 10 individuals; SD: Standard deviation

AUTHOR CONTRIBUTION STATEMENT

MR conducted survey, identification, rearing, recorded data on biology and manuscript preparation; TUM did planning, guiding, and manuscript preparation.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

REFERENCES

Anantanarayanan K P, Ayyar T V R. 1937. Bionomics of the swarming caterpillar of paddy in south india. Agriculture Livestock India 7: 725-734.

Anonymous. 2017. Food and Agriculture Organization of the United Nations. http;//www.FAOstat.fao.org.com.

Banu C A, Praseeja C, Manogem E M. 2022. Evaluation of the histopathological and biochemical effects of fenoxycarb in the ovaries of *Spodoptera mauritia* (Lepidoptera: Noctuidae). International Journal of Tropical Insect Science 1-12: 2143.

Hamed M, Nadeem S. 2007. Rearing of *Helicoverpa armigera* (Hub.) on artificial diets in laboratory. Pakistan Journal of Zoology 40(6): 447-450.

Pradhan S, Jotwani M G. 1992. Insect pests of crops. Edn 3, Director, National Book Trust, India, New Delhi. pp. 28-31.

Ramaiah M, Uma Maheswari T, Malathi S, Omprakash S. 2018. Seasonal incidence of rice swarming caterpillar, *Spodoptera mauritia* Boisd infesting paddy (*Oryza sativa* L.) nursery. Journal of Pharmacognosy and Phytochemistry 7(5): 2967-2969.

Sain M, Prakash A. Major insect pests of rice and their changing scenario. Rice pest management, AZRA, India, 2008, 7-17.

Samanta A, Chakraborti K, Alam S K F, Das B C, Patra S. 2014. Pest surveillance in LCC and non-LCC rice plots by participatory rural folk appraisal. The Ecoscan 8(3&4): 211-213.

Smith J H. 1933. Caterpillar plagues in grasslands and cultivation padlocks. Queensland Agricultural Journal 39(4): 155-l60.

Tanada Y, Beardsley J W. 1958. A biological study of the lawn armyworm, Spodoptera mauritia (Boisduval), in Hawaii (Lepidoptera, Phalaenidae). Proceedings of the Hawaiian Entomological Society 16: 411-436.

Tanwar R K, Anand Prakash S K, Panda N C, Swain D K, Garg S P, Singh S, Sathyakumar, Bambawale O M. 2010. Rice swarming caterpillar (*Spodoptera mauritia*) and its management strategies. Technical Bulletin 24. National Centre for Integrated Pest Management, New Delhi. pp. 26.

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