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## Biology of *Spodoptera litura* (Fab.) in cassava, *Manihot esculenta* (L.)

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### Abstract

*Spodoptera litura* (Fab.) is a polyphagous pest which gained its importance by affecting different agricultural and horticultural crops, causing severe damage and economic losses. It has wide range of hosts including pulses, oil seeds, fiber crops, vegetable crops, fruit crops etc. Likewise this pest feeding on cassava was noticed in Madurai district, Tamilnadu and hence a study on biology of *S. litura* with cassava as its host was carried out in Agricultural college and Research Institute, Vazhavachanur. Observation on egg, larval, pre pupal and pupal periods along with adult longevity was done, by which total life cycle was calculated. *S. litura* has four stages in its life cycle viz., egg, larvae, pupa and adult stages, hence it undergo complete metamorphosis. The mean egg period was found to be  $2.0 \pm 0.71$  days, with  $20.6 \pm 2.07$  days of mean larval period (six instars),  $2.4 \pm 0.55$  days of mean pre pupal period,  $10.2 \pm 1.10$  days of pupal period and  $4.8 \pm 0.84$  days of mean adult longevity. Hence the total life cycle was found to be  $40 \pm 2.83$  days. Comparatively the larval and pupal period of *S. litura* feeding on cassava was high, but the adult longevity and fecundity rate was very low and so cassava was not found to be potential main host for *S. litura*.

**Keywords:** *Spodoptera litura*, polyphagous, cassava, biology, potentiality

### Introduction

The tobacco caterpillar *Spodoptera litura* (F.) (Lepidoptera: Noctuidae) is a polyphagous pest infesting 112 species of plants under 44 families, from which 40 species were found in India (Chari and Patel, 1983) [2]. This insect has been reported causing extensive damage to a wide range of crops such as oilseeds, pulses, vegetables (Gargav and Katiyar, 1971) [9]; fodders, fiber crops, fruit trees, weeds, medicinal and ornamental plants (Singh and Singh, 1993) [15]; tobacco, cole crops (Yadav *et al.*, 2014) [18]. Likewise Mathur (1962) [11] reported its several host plants like cotton, jute, sunhemp, castor, linseed, sesame, pigeonpea, black gram, horse gram, green gram, pea, cowpea, soybean, potato, sweet potato, maize, sorghum, groundnut, tobacco and also *Albezzia* sp., *Antemisia vulgaris* L, *Asparagus officinalis* L, *Cannabis sativa* L., *Chenopodium ambrosioides* L. and *Chrysanthemum* sp. (Nagia *et al.* 1991, Singh and Sehgal, 1992) [12, 16]. Growth, survival and fecundity of herbivorous insects are mainly determined by the host plant in which it feeds. Even though there are many host plants for *S. litura*, every host does not support the pest for its growth and development. And so number of studies on the biology of *S. litura* on different host particularly, in India (Patel *et al.* 1986) [13], China (Zhu *et al.* 2000) [19], Korea (Bae and Park, 1999) [8], Pakistan (Ahmad *et al.*, 2007) [7] and other Asian countries (Etman and Hooper, 1980) [3] was going on where *S. litura* has been an important pest on various crops. Here the study is to assess the potentiality of cassava as the host by observing the growth and development of *S. litura* on cassava. Also, information on biology of *S. litura* will help to make efficient control strategies to this economic pest (Greenberg *et al.* 2001) [10]. The number of larval instars and biology of *S. litura* helps in the development of crop pest models and pest management operations (Xue *et al.*, 2010; Etman and Hooper 1980) [17, 3].

### Materials and Methods

The experiment was conducted in the Entomology laboratory, Agricultural College and research Institute, TNAU, Madurai, Tamil Nadu, India. The egg mass found in the cassava field was collected and observed for the larval emergence. The emerged larvae were split into five replications with 15 larvae per replication for the study of biology of *S. litura* in cassava. The observations on egg period, larval instars, growth period of different instars, pre-pupal period, pupal period and adult longevity was done. From these, the total life cycle was calculated (Roopika *et al.*, 2021) [4].

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The whole setup was designed using Completely Randomized Design (CRD) and the obtained replication data of biological study were subjected to calculate the arithmetic mean and standard deviation among the replication were calculated. (Aravinthraju *et al.*, 2021)<sup>[4]</sup>.

## Results and Discussion

The study on biology of *S. litura* on cassava revealed that the insect in its life cycle has four life stages, egg stage, six instar larval stage, pupal stage and adult satge. The egg duration is  $2 \pm 0.71$  days. The one to six instars larval duration was  $3.2 \pm 0.45$ ,  $3.0 \pm 0.71$ ,  $2.6 \pm 0.55$ ,  $3.4 \pm 0.89$ ,  $3.0 \pm 0.71$ , and  $3.4 \pm 0.55$  days respectively and the total larval period was  $20.65 \pm 0.07$  days. The respective prepupal and pupal period was  $20.4 \pm 0.55$  and  $10.2 \pm 1.10$  days. Adult longevity was observed to be  $4.8 \pm 0.84$  days. From the above observations the total life cycle of *S. litura* by feeding on cassava was  $40.0 \pm 2.83$  days.

The present findings were in accordance with Narvekar *et al.*, (2018)<sup>[5]</sup> who reported that the total life cycle of *S. litura* on cassava was to be in the range of 37 days. Also they indicated that the life cycle of *S. litura* on castor, cowpea, mulberry, okra, sweet popato, taro and groundnut are to be 28.33, 32, 34.33, 32.67, 30.67, 31.67, 31.33 days respectively. Likewise the study on biology of *S. litura* on castor by Ashok and Pavithran (2021)<sup>[6]</sup> showed that the total life cycle was  $35.08 \pm 6.68$  days. The total developmental period of *S. litura* was 32.67 days on germinating seeds of soybean and 43.72 days on linseed (Sharma, 1994)<sup>[14]</sup>. Hence comparatively the larval and pupal period of *S. litura* was high while feeding in caasava than other hosts and the adult longetivity and fecundity rate was very low.

**Table 1:** Biology of *Spodoptera litura* (Fab.) in cassava

Life stages		Duration (Days)*
Egg period		$2.0 \pm 0.71$
Larval period	I instar	$3.2 \pm 0.45$
	II instar	$3.0 \pm 0.71$
	III instar	$2.6 \pm 0.55$
	IV instar	$3.4 \pm 0.89$
	V instar	$3.0 \pm 0.71$
	VI instar	$3.4 \pm 0.55$
	Total	$20.6 \pm 2.07$
Pre-pupal period		$2.4 \pm 0.55$
Pupal period		$10.2 \pm 1.10$
Adult longevity		$4.8 \pm 0.84$
Total life cycle		$40.0 \pm 2.83$

\*Each value is the mean of five replications Mean followed by standard deviation

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