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Incidence of *Batocera rufomaculata* De Geer (Coleoptera: Cerambycidae) on cashew

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Abstract

The incidence of *Batocera rufomaculata* was recorded in cashew plantations of Directorate of cashew Research, Puttur, India during 2010-2013. The infestation of cashew by cashew stem and root borers was usually associated with secondary borers. *B. rufomaculata* was a commonly noticed secondary borer on previously infested cashew trees and it was feared to be a potential major borer of cashew trees.

Keywords: cashew stem and root borer, *Batocera rufomaculata*, egg, larva, pupa, adult

1. Introduction

The mango stem borer, *Batocera rufomaculata* De Geer was reported to be a serious pest of forest trees and mango (*Mangifera indica* L.) in many parts of India^[11]. It was reported to infest cashew as a secondary borer (*Anacardium occidentale* L.). Reports are available on the wide occurrence of mango stem borer, *B. rufomaculata* as a primary pest of mango from all over India^[3, 5, 8], while^[10], reported the pest on fig and apple trees in north India.^[7] has reported that, *B. rufomaculata* could breed on cut cashew logs; however the population of this species on cashew was low. The incidence of *B. rufomaculata* on *Eucalyptus tereticornis* was reported^[6].

It was also recorded to be the most prevalent pest on durian trees in Thailand. After hatching, the neonate larvae initially fed on the phloem tissue and later migrated into the heartwood for pupation.^[12] On an average, 30.08 percent of mulberry plants were reported to be infested by *B. rufomaculata* in Palakkad district (Kerala)^[13]. The reported host range of this pest species included; *M. indica*, *Bombax malabaricum* L., *Ficus infectoria* Wild. *Sterculia villosa* Roxb. ex Smith, *Hevea braziliensis* L. and *Morus australis* Poir. The highest (7.33%) damage of jack fruit due to *B. rufomaculata* was in July from Bangladesh^[2]. The report on the incidence of this pest on cashew is scanty. The objective of this study is to record the incidence of *B. rufomaculata* on cashew plantations of Dakshina Kannada district of Karnataka (India) and to validate it as a potential major cashew stem and root borer (CSRB).

2. Materials and methods**2.1 Collection of the pest species**

Regular roving survey was conducted from 2010 to 2013 in the cashew plantations of Directorate of Cashew Research and Karnataka Cashew Development Corporation farms in Puttur taluk to monitor the pest incidence and to collect the different developmental stages of *B. rufomaculata*, one among the documented cashew stem and root borer (CSRB) species. The developmental stages of *B. rufomaculata* were collected in individual polythene bags with a small piece of cashew bark as temporary feed and were brought to laboratory. Based on the field observations, population dynamics of *B. rufomaculata* on cashew were recorded.

2.2 Laboratory rearing

The stages were further reared on cashew bark. The larvae were weighed and later transferred to individual glass rearing bottles (12 cm height × 6 cm width; 500 ml cap.). Fresh cashew bark was procured from already infested cashew trees and cut into small pieces of 5 × 5 × 3 cm size. The larvae were supplied with three to four such bark pieces as feed, which was replaced once in 10 days interval to sustain the growth of the larvae.

Observations were carried out on the development of the pest stages by weighing and measuring the morphometrics of the larvae at the time of feed change.

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The larvae which showed development of pupal structures were labeled and screw capped and kept aside and checked once in two days for the adult emergence. The date of emergence was recorded and adult beetles were transferred to acrylic rearing cages (30 x 30 x 30 cm) with 20% honey as adult feed and allowed to mate.

3. Results and Discussion

In the present study, the field collected stages of *B. rufomaculata* were reared on cashew bark, under laboratory conditions till adult emergence. Biology and population dynamics of *B. rufomaculata* on cashew were recorded based on observations on field collection of different developmental stages of the pest.

Adult beetles started emerging in late June and extended up to February. Adult emergence and sex ratio exhibited seasonal variation, which was female biased in July, October and November. In case of other reported major CSRB species viz. *Plocaederus ferrugineus* L. and *P. obesus* Gahan, adult emergence was peak during January to April [15]. This did not coincide with the emergence of the present pest species which is a secondary borer. Earlier observations on the emergence of other cerambycid borer species *Aeolesthes holosericea* on *Hardwickia binata* and *Terminalia belerica* in Madhya Pradesh was reported during February- March [6].

The adult beetles of *B. rufomaculata* (3.0 – 4.0 cm long) are dull ash coloured beetles with two red / orange crescent shaped markings and a few lateral spots on the elytra, the antenna is longer than the body in males and slightly equal to body length in females (Fig 1). The adult longevity of is 25.73 ± 7.99 days

for male and 30.53 ± 19.89 days for female under laboratory conditions when provided with 20 percent aqueous honey as adult feed (Table 1).

Table 1: Biological details of *B. rufomaculata* on cashew (based on field collected larvae)

Parameter	Female	Male
Mean pupal period (in days)	19.5 ± 2.3	26.36 ± 3.4
Mean adult longevity(days) provided with 20% honey as feed	30.5 ± 9.9	25.7 ± 8.0
Sex ratio (F:M)	1 : 1.2	

The adults though mated frequently, were aggressive and oviposition was inadequate under laboratory rearing cages, though provided with oviposition sticks. The laboratory culture of *B. rufomaculata* could not be established as the emergence of beetles was staggered and hence, availability of male and female beetles did not coincide.

However, observations on the field collected eggs revealed morphometrics of egg. The eggs were oval, dirty white in colour, 0.3 - 0.4 cm in length and 0.1cm in breadth. Incubation period was 8-11 days. The body length of the larva was earlier recorded as 0.5 - 0.6 cm and the incubation period 7-13 days [4].

The larvae of *B. rufomaculata* were generally encountered in cashew trees which were previously infested by *Plocaederus* spp. The young larvae were collected during July to September while, later instars were encountered during late September to December in the period of study (Table 2).

Table 2: Details of field collection and adult emergence of *B. rufomaculata*

Month (2010-13)	Mean number of larvae collected	Mean percent of adults emerged		Sex Ratio
		Male	Female	F : M
January	2.23	69.23	30.76	1:2.25
February	0	60.2	39.8	1:1.51
March	0	0	0	0
April	0	0	0	0
May	8.33	0	0	0
June	14.67 (2*)	78.17	22.13	1:3.53
July	34.33	49.05	51.05	1:0.96
August	74.67	46.23	43.87	1:1.05
September	22.67	66.67	33.33	1:2.00
October	29.67	42.86	57.15	1:0.74
November	31.67 (2**)	40.91	59.09	1:0.69
December	13.33	66.67	33.33	1:2.00

*= Pupa;

**= Adults

The nature of bark feeding by the larvae was dissimilar in different species of CSRB. The chewed out bark fibres were more coarse and scraped in the present species unlike the frass produced by other CSRB species larvae namely, *Plocaederus ferrugineus* L. and *P. obesus* Gahan, which produced fine fibers in the form of frass (Fig2) .

In the present observations five larval instars were distinguished. However exact length of larval period and instar length was not recorded in the study. The number of larval instars of *B. rufomaculata* on cashew was not reported by earlier workers. The average larval duration of *Aeolesthes*

holosericea (Coleoptera: Cerambycidae) was 27.0 – 32.0 days on teak and *Hardwickia binata* [6]

The morphometric details of different field collected larvae showed considerable disparity in their body dimensions. The length of the newly hatched larvae was 0.50 - 0.60 cm. The second, third, fourth, fifth instar larvae measure about 1.52, 2.43, 4.24 and 5.97 cm respectively (Fig1). The above observations were recorded earlier on mango [4].

The final instar larva moulted to an exarate pupa (4.0 - 5.0 cm long) in a cavity without formation of cocoon. The pupal duration was 19.5 days in females and 26.36 days in males under laboratory conditions.

Pillai *et al.* [9] reported this pest from live cashew tree. It was generally found as a secondary borer. The population of this species was confined only to the severely damaged cashew trees [7], the present observations agree with the report. The

present study also revealed that, the pest species, if not monitored and checked, could be a potential major stem borer of other plantation crops.

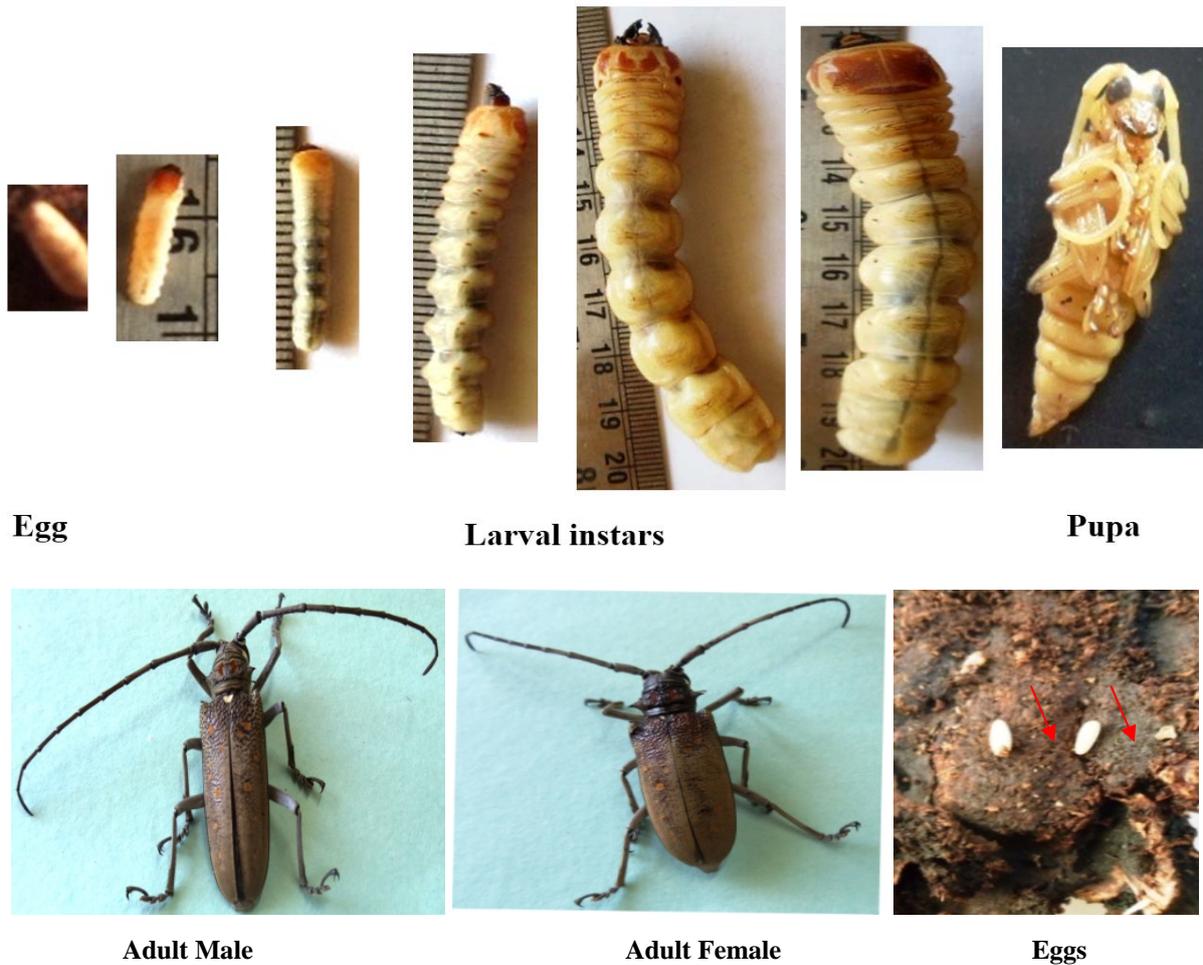


Fig 1: Morph metric details of different field collected stages of *B. rufomaculata*



Fig 2: Frass produced by (a) *Batocera rufomaculata* larvae and (b) *Plocaederus* spp. Larvae

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