Bull. zool. Surv. India, 4 (3) : 247-250, 1981

ON THE HOST-SELECTION, OVIPOSITION AND FECUNDITY OF THE LONG-HORNED BEETLE BORER, ACALOLEPTA RUSTICATOR (FABRICIUS) (COLEOPTERA : CERAMBYCIDAE)

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ABSTRACT

The host-selection and oviposition behaviour of the cerambycid borer, *Acalolepta rusticator* (Fabricius) is discussed. Host-selection in this beetle depends primarily upon the condition of the host material and secondarily upon the host identity. The mean potential fecundity was 94 (S. D. = 20.35), while the realised fecundity was 61 (S. D. = 23.29). The oviposition period varied between 4 and 29 days with a maximum of 34 days in one female. The number of eggs laid by one female range from 2 to 8 per day.

INTRODUCTION

Various aspects of the behaviour of cerambycid adults have been dealt with by several authors. Craighead (1921), Knull (1946) and Duffy (1953) have described the host-selection principle of cerambycid females, while Tragardh (1930) and Butovitsch (1939) recognized several different methods of oviposition. However, no published account of the host-selection, oviposition and fecundity of *Acalolepta* (= *Dihammus*) *rusticator* (Fabricius) is available, although Beeson and Bhatia (1939) have furnished a brief description of the behaviour of an allied species, *A. cervina* (Hope), from Indian mainland. The present communication summarises different aspects of the host-selection and oviposition behaviour, including the fecundity estimates of this timber borer.

MATERIAL AND METHODS

During the course of last two years, while studying the ecological interaction and economic status of some of the Xylophagous insects of the islands of Andaman and Nicobar, a large number of logs infested with the immature stages of *A. rusticator* was collected from several field sites. The total number of logs of different host-tree species, infested with *A. rusticator* was recorded. Some of the sample logs were taken to the laboratory and were held in galvanized iron cages for adult emergence. Upon emergence, the adult beetles were sexed and paired in breeding-jars, made of glass (36 cm. × 22 cm. × 22 cm.), containing a layer of sandy soil at the bottom. They were provided with fresh leaves and twigs of *Ficus religiosa* L. for food and logs of different host-trees for oviposition

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sites. Both the food and host material were renewed at definite intervals. The number of eggs laid by the females on subsequent days was recorded until they died. After they died, all the females were dissected and the number of mature unlaid eggs were determined.

All the breeding studies were conducted at Port Blair, under the laboratory conditions. During the course of these studies maximum and minimum temperature recorded in the laboratory was 29.5°C and 26.0°C respectively, while the relative humidity ranged between 69.0% and 91. 5%.

Result and Discussion

Host-selection and Oviposition : Richardson's (1925) statement that, in many insects contact with an appropriate surface seems to be a necessary prerequisite for oviposition, was confirmed for *A. rusticator*. Prior to oviposition, the female crawls slowly along the host surface with extruded ovipositor. This searching procedure was observed to take place upto 30 minutes or even more in several females. Oviposition occurs immediately after the selection of the oviposition site. The female chews a transverse slit through the bark, inserts her ovipositor and deposits one egg in the outer bark. The egg-pit is subsequently sealed with a resinous substance after oviposition.

In the islands of Andaman, *A. rusticator* was found to oviposit on a number of timber yielding tree species. Among them *Artocarpus chaplasha* Roxb., *Canarium euphyllum* Kurz, *Pterocymbium tinctorium* Merrill, *Salmalia insignis* Schott and Endl., and *Semecarpus kurzii* Engler are most important. Percentage estimates of logs of different species (Table 1) infested by *A. rusticator*, under field conditions, suggest that logs of *A. chaplasha* were the most preferred host material ; no clear cut preference was found between *P. tinctorium* and *S. insignis*. Laboratory studies on 50 newly emerged females, placed in sets of 5, in breeding-jars, along with 5 males, containing logs of different host-tree species (5 logs/jar), suggested a similar mode of host preference (Table 2).

Both Craighead (1921) and Duffy (1953), in applying Hopkin's host-selection principle to cerambycid beetles, agreed that the condition of the host material was the most important factor in oviposition, and that a species would select a new host in the favourable condition, rather than the old host in which the conditions were unfavourable. Duffy concluded that the host condition, rather than host variety was an important factor. On the contrary, Knull (1946) described the cerambycid females as to be selective primarily to the host and secondarily to the condition of the host material.

Duffy's view appeared to be more applicable to *A. rusticator* in Andamans, although

TABLE 1. Percentage of logs of different host-tree species infested by *A. rusticator*, under field conditions.

	Artocarpus chaplasha	*Canarium euphyllum*	*Pterocymbium tinctirium*	*Salmalia insignis*	*Semecarpus kurzii*
No. of logs examined	3897	3201	4239	3670	2907
Percentage infection	72.66	21.71	52.32	48.59	20.03

TABLE 2. Host-selection in 50 *A. rusticator* females

No. of eggs in different host-logs after 7 days of emergence of the females

Test No.	No. of females	*Artocarpus chaplasha*	*Canarium euphyllum*	*Pterocymbium tinctorium*	*Salmalia insignis*	*Semecarpus kurzii*	Total
1	5	32	6	19	21	8	86
2	5	37	8	24	25	5	99
3	5	24	5	15	17	3	64
4	5	26	8	17	17	4	72
5	5	29	4	16	13	7	69
6	5	20	6	13	11	5	55
7	5	33	5	22	20	7	92
8	5	13	3	6	7	1	30
9	5	35	3	11	13	2	64
10	5	28	5	16	14	0	63
Total	50	282	53	159	158	42	694

TABLE 3. Oviposition by *A. rusticator* females in freshly cut, dry older and decaying logs of *A. chaplasha*.

Condition of logs	No. of females	No. of eggs in the subsequent days after the emergence of females											
		5	6	7	8	9	10	11	12	13	14	15	Total
Freshly cut	10	17	29	42	49	38	15	18	29	17	13	5	272
Dry older	10	—	12	13	24	11	—	13	19	7	7	1	107
Decaying	10	—	—	12	7	5	4	3	7	11	2	—	51

there was an indication of preference for host identity (Table 2). To test the condition preference in the preferred hosts, a pair of adults were placed in each of 30 breeding-jars, 10 containing freshly cut logs, 10 containing dry older and other 10 containing decaying ones. Eggs were removed and logs were replaced daily. Oviposition was heaviest on the freshly cut logs (Table 3). It appears, therefore, that host-selection in *A. rusticator* depends primarily upon the condition of the host material and secondarily upon the host identity.

Fecundity : The number of eggs laid by one female ranged between 2 and 8 (mean 5) per day, and oviposition continued throughout the life of adult females with occasional intervals of 1-3 days. The mean potential fecundity of 50 females was found to be 94 (S. D.= 20.35), while the realised fecundity of the same beetles was 61 (S. D.=23.29).

The difference between the potential and realised fecundity appeared primarily to be due to the length of adult life ; short lived females generally laid fewer eggs than long lived ones. Under the laboratory conditions, the oviposition period generally ranged between 4 and 29 days (mean 11 days). The maximum oviposition period was recorded to be 34 days in one female. Under field

conditions, however, the presence of suitable host material with adundant oviposition sites and climatic factors were appeared to be the additional factors influencing the number of eggs laid.

ACKNOWLEDGEMENTS

Grateful acknowledge is made to the Director, Zoological Survey of India, for his able guidance and constant inspiration, and to Dr. A. K. Das, Officer-inCharge, Andaman and Nicobar Regional Station, Z. S. I., for his keen interest and for providing facilities to carry out this work. Appreciations are expressed to all the members of the staff of Andaman and Nicobar Regional Station, Z. S. I., for their active co-operations.

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