Agri. Res. J. Kerala, 1970, 8 (1) : 17—21

HOST-BIOLOGY RELATIONS OF *ARAECERUS FASCICULATUS* DE GEER *

P. RAGHUNATH and M. R. G. K. NAIR

Agricultural College and Research Institute, Vellayani, Kerala.

The information available on the nutrition ecology of insect pests in general is very meagre. This is especially so in the case of polyphagous pests. In the case of storage pests eventhough much information exists on the effects of synthetic diets on their biology not much is known about the effect of various natural foods on which they depend in nature. The present studies were hence undertaken to understand the influence of various naturally occurring foods of *Araecerus fasciculatus* (Anthribidae ; Coleoptera) on its biological features.

Material and Methods

To study the duration of development of the insect on different host materials adults were put on them in polythene bags and closed by tying with rubber rings. The beetles were separated from the host materials after 24 hours of exposure. The eggs laid on the materials were allowed to emerge on the respective host materials and the grubs allowed to grow for 20 days. Subsequently, the grubs were separated from the food and single grubs transferred to specimen tubes (8×2 cm) with the host material and the tubes closed with muslin cloth. The days of pupation and adult emergence were then observed of these single grubs.

To observe the egg laying capacity of the adults known number of adults were put on tapioca chips in polythene bags. The chips were removed after a day of exposure to the beetles and fresh chips supplied to them. The chips removed daily from the bags were kept in specimen tubes for 10 days, broken open and the number of grubs counted. This process was continued till all the beetles died. The counts of the grubs were taken as the counts of eggs laid.

To study the preference of the beetle for different hosts the different food materials were placed in separate heaps within a circular glass trough, 22 cm in diameter and 30 beetles confined on them for 48 hours. The materials were then removed to separate polythene bags and emergence of adult beetles noted. The total number of beetles emerging from each of the host material was taken as an index of the host preference of the beetle.

---

* From M. Sc. (Agri.) thesis submitted to the University of Kerala in 1969.

generalisations because in this host material the development period is short (shortest among the different hosts) which is the characteristic of a favoured host, while the longevity and fecundity also are relatively of the low order which are characteristic of the unfavoured host.

Though maize gives the beetle to produce the largest number of eggs and though it has other characters of a favoured host, such as short developmental period and long adult life, the preference shown by the beetles to it for oviposition is considerably less than that shown to tapioca. This may be due to the unsuitability of the surface of maize grains for oviposition.

Summary

Studies were made to ascertain the variations in the biological features of A. *fasciculatus* when reared on different food materials. Two strains of the beetle, one collected from stored arecanut and another collected from stored tapioca were used for the studies.

Development period of the egg and grub of A. *fasciculatus* of the arecanut strain was longest on blackgram followed in the descending order by ginger tapioca, maize and arecanut. These periods for the tapioca strains were the longest on arecanut, followed in the descending order by blackgram, maize and tapioca.

The longevity of A. *fasciculatus* of the arecanut strain was longest when reared on tapioca, followed in the descending order by maize, arecanut, blackgram and ginger, while for the tapioca strain this order was tapioca, maize, blackgram and arecanut.

The females of arecanut strain reared on maize laid the maximum number of eggs followed in the descending order by those reared on tapioca, ginger, arecanut and blackgram. They exhibited the highest preference to tapioca for oviposition followed by maize, arecanut, blackgram and ginger.

In general the developmental period and adult life of arecanut strain were longer than those of tapioca strain on all the host materials except maize.

On the whole tapioca and maize appeared to be far more favourable hosts of A. *fasciculatus* than blackgram, ginger and arecanut.

The tapioca strain of A. *fasciculatus* did not at all develop on ginger.

Acknowledgements

The authors are thankful to Prof. P. Kumara Pillai, Principal (Retd.), Agricultural College, Vellayani, for providing the facilities required for carrying out the investigations and to Mr. E. J. Thomas, Professor of Statistics, for the help rendered in the analysis of the data.

(Accepted: 21-8-70)

In Table 4 is given the summary of statistical analysis ('t' test) to compare the variations in the biological characteristics of the two strains of A. *fasciculatus* when reared on different host materials. It may be seen that in general, the egg cum larval durations and the longevity of the adults when reared on different materials were more for the arecanut strain than for the tapioca strain, the only exception being maize, where the position was reversed, with respect to both the characters.

Table 4

Comparative effect of different hosts on the biology of two strains of A. *fasciculatus*

Egg-cum-larval period			
on tapioca	AS	> TS	Significant
on maize	TS	> AS	,,
on blackgram	AS	> TS	,,
on arecanut	AS	< TS	,,
Longevity of female			
on tapioca	AS	> TS	Not significant
on maize	TS	> AS	Significant
on blackgram	AS	> TS	Not significant
on arecanut	AS	> TS	Significant

(Note : AS=arecanut strain. TS=tapioca strain.)

Discussion

The results presented above indicate the existence of different strains of A. *fasciculatus* with preference to a particular host or sets of hosts and with different biological responses to food materials.

In the case of arecanut strain, if higher female longevity and fecundity are taken as characters related to a favoured host *it* will be observed that maize and tapioca are the two most favoured host materials and under this criterion blackgram, ginger and arecanut appear to be the least favoured hosts. It is also observed that the development period of the egg and the grub is the lowest on the preferred hosts as compared to unfavourable hosts. The favoured hosts as based on the above mentioned criteria are the favoured hosts for oviposition by the beetle also.

Thus the biological features of A. *fasciculatus* manifested in association with a suitable host appear to be short development period, long adult life and high fecundity. Arecanut alone seems to be an exception to these

than the other materials for oviposition and development. The beetles did not lay any egg on coffee beans, turmeric, cotton seeds and tephrosia seeds, all of which have been recorded earlier as the hosts of *A. fasciculatus.*

Table 2

Number of eggs laid by A. *fasciculatus* on different host materials.

Hosts	Replication 1	Replication *2*	Replication 3	Total
Tapioca	47	37	52	136
Maize	8	7	13	28
Blackgram	*2*	6	9	17
Ginger	*7*	8	–	15
Arecanut	4	13	7	24

Table 3 gives the effect of various food materials on the biological features of A. *fasciculatus* - tapioca strain. The duration of the egg and the larva was longest on arecanut followed in the decreasing order by blackgram, maize and tapioca.

Table 3

Effect of hosts on the biological features of A. *fasciculatus*–tapioca strain

Biological features	Tapioca	Maize	Blackgram	Ginger	Arecanut
Egg cum larval period (Average, days)	26·9	30·7	44	–	52·6
Pupal period (Average, days)	5·2	5·1	4·8	–	4·8
Longevity of females (Average, days)	55	52·4	23·75	–	20·4
Sex ratio (Female to male)	2:3	1:1	2:3	–	1:1

The larva of this strain did not survive on ginger. The longevity of the female beetle was significantly longer when reared on tapioca and maize than when reared on blackgram and arecanut.

The insects required for the studies were collected from two sources viz. dried tapioca chips and dried arecanut. Bulk cultures of these were maintained on respective hosts and these two sets were considered as two different strains and the effect of different hosts on the two lots studied separately.

Results

Table 1 gives the effect of different host materials on the biological features of A. *fasciculatus* arecanut strain.

Table I

Effect of different hosts on the biological features of *A. fasciculatus* arecanut strain.

Biological features	Tapioca	Maize	Black gram	Ginger	Arecanut
Egg cum larval period (Average, days)	34	29·5	50·7	49·2	28·4
Pupal period (Average, days)	5·1	5	5	5	5
Longevity of female (Average, days)	56·75	47·25	25·6	15·8	33·5
Sex ratio: Female to male	2:3	2:3	1:1	1:1	3:2
Average number of eggs laid per female beetle reared on different host materials	23·5	36	10·75	17·67	17·25

Statistical analysis of the data showed that the developmental period of the egg and larva was significantly longer when reared on blackgram and ginger than when reared on other materials. The longevity of the female beetle varied significantly when reared on different materials. Thus the longevity was maximum when reared on tapioca while it was the least when reared on ginger; the other commodities showed intermediate longevities. The beetles reared on maize laid the maximum number of eggs followed in the descending order by those reared on tapioca, ginger, arecanut and blackgram. It may be seen from Table 2 that the beetles preferred tapioca chips more