



Life History and Diet Breadth of *Apoderus tranquebaricus* Fab. (Coleoptera: Attelabidae)

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ABSTRACT : The life history of *Apoderus tranquebaricus* Fab. was studied in the laboratory as well as in the field conditions. The female prepares leaf cradles and lays the egg within. Preparation of leaf cradles is for the shelter and food for the young ones. It is a typical behavior of parental care. The incubation period was 3.5 ± 0.26 days. The total larval period lasted for 25.5 ± 0.53 days. Pupal period lasted for 9.0 ± 0.29 days. The adult longevity averaged for 5 ± 0.33 days. Attelabids feed on the wide range of plants. The host range study of *A. tranquebaricus* revealed that it develops on 8 plants in Amba forest. The host plants viz. *Terminalia tomentosa*, *T. arjuna*, *Syzygium cumini*, *Aporosa lindliana*, *Dimocarpus longan*, *Lagertsromia* sp., *Grewia* sp. and *Mamia suriga*. But *Syzygium cumini*, *Dimocarpus longan*, *Terminalia tomentosa* and *Mammea suriga* were the most preferred in the study region.

Keywords : Attelabidae, Leaf roller, Forest, Nidus, Host range.

INTRODUCTION

Leaf-rolling weevils (Rhynchitidae and Attelabidae) are strictly phytophagous species. The World fauna comprises about 1110 species of Rhynchitidae and about 1000 species of Attelabidae (Legalov, 2007). Leaf-rolling weevils are a widespread family of weevils. Attelabids are mainly distributed in the tropical region and Manchuria subregion and scattered over the Palearctic region (Park et al, 2007). *Homoeolabus analis* (Illiger) is one of a large number of New World and Old World leaf-rolling weevils in the family Attelabidae.

The leaf-rolling weevils present interesting examples of complex, genetically determined behaviors. The leaf roll of an attelabid is referred to as a nidus. It is commonly found in the Florida. Another leaf-rolling attelabid, *Attelabus bipustulatus* Fabricius is sympatric with *H. analis* all the way through much of its sharing but has a somewhat more northerly distribution and is not found in Florida (Vogt 1992). There are four tribes which are known world wide. Of them three tribes comprising 18 species were reported from the Korea. (Bae, 1986). Louw (1990) studied the life history and immature stages of *Brachycerus ornatus* Drury. Attelabids show the typical parental behavior. After mating the females construct typical attelabid brood rolls from the leaves of their host plant. (Zuppa et al., 1994). During the preparation of the nidus female roll the leaf and lay the egg within and seals it. Entire development takes place within the nidus until the formation of adult. Park and Lee (2004a,b) described the immature stages of *Paracynotrachelus longiceps* Motschulskey and *Tomapoderus ruficollis* Fab. from Korea. *Apoderus notatus* has very wide range of host plants. It has been reported that it develops on the 16 plant species. (FAO, 2007).

Lee (1992, 1996) added information to the comparative morphology of the weevil larvae of Curculionidae in Korea.

Overall data reveals that most of the work on the attelabidae was carried on the taxonomy, ecology and distribution of weevils. No comprehensive material is available on the life history and host range of Asian attelabids. Our study presents the observations on the life history and host plants *Apoderus tranquebaricus* in Amba reserved forest.

MATERIALS AND METHODS

Extensive surveys were made to collect the leaf cradles and to study its host range from Amba Reserve Forest during the year 2007 and 2008. Leaf cradles were collected from the *S. cumini* and brought to the laboratory. They were kept in the cages for further study. Each nidus was examined to get the details of developing stages. Field observations were made in the months March to August at fortnight interval. After the emergence of adults, they are provided with fresh twigs of *S. cumini*, the duration of different stages and morphometric measurements of *A. tranquebaricus* were recorded.

Study Area

Amba Reserved Forest

Amba Reserved Forest (15°43' to 17°10' north and longitude 73°40' to 74°42' east and 691.3 meters above Mean Sea Level) is situated between North-West directions of Kolhapur District. It is tropical semi evergreen forest of Western Ghats. The geographical area is 318.16 ha. The average annual rainfall is 6000 mm. Temperature of this region during summer, winter and Rainy Season ranges from 25-38°C, 10-30°C and 15-30°C respectively. Red brown soil is observed in the study region.

RESULTS AND DISCUSSION

Life cycle and host range of *Apoderus tranquebaricus* Fab. was studied in the laboratory as well as in the field. The detailed account of life cycle stages i.e. egg, larva,

pupa and adult are given in table 1 and 2 and depicted in plate I from Fig. 1 to 4. The leaf cradles prepared on the leaves of *Dimocarpus longan*, *Aporosa lindliana*, *Syzygium cumini* and *Mammea suriga* shown in Plate I Fig. 5 to 8. The host range is given in table 3.



A. tranquebaricus in South India rolls the leaves of Country almond, *Terminalia catappa* & habits have been observed on the number of species in the subtropical zone of India. Over 30 species are known from India in the genera *Apoderus*, *Attelabus* and *Rhynchites*. (Lefroy, 1909). After the mating, the female prepares the cases of green leaves. The cut reaching from each margin only the leaf then folded longitudinally and the tip rolled and forms a compact cylindrical mass, tightly rolled and folded leaf blade with the egg in the centre.

Eggs

The eggs are pale yellow and oval in shape. The average length of the egg was 1.16 ± 0.04 and breadth was measured 0.53 ± 0.03 mm. The incubation period ranged for 3 to 4 days with an average of 3.7 ± 0.26 days.

Larva

After hatching the larva starts to feed on the leaf cradles. Body with sparse to abundant setae; thorax slender than abdomen. Head is yellow. The larva moults twice. The length of the full grown larva was 8.3 ± 0.30 mm and the breadth ranged from 2.4 to 2.7 mm with an average 2.53 ± 0.04 mm. During larval development, only first instar shows

light colour. Next two instars are yellow in colour and no specific change in the morphology except in the length and breadth. The average larval period was 25.2 ± 0.53 days. The full grown larva of *Apoderus jekelli* Roelofs was measured about 10 to 10.5 mm in length and 2.5 to 2.8 mm in width. (Park *et al.*, 2007).

Pupa

The newly formed pupa is dull white in colour. After 3 to 4 hours it turned from dull white to yellow in colour. The length of the pupa was 8 ± 0.25 mm. The breadth was 3.14 ± 0.03 mm. The pupal period lasted 9.0 ± 0.29 days. The pupa of *A. jekelli* measured 7 to 8 mm in length and 3 to 3.2 mm in width. (Park *et al.*, 2007).

Adult

Immediately after the adult formation in the nidus, the weevil does not show any distinct coloration. After 18 to 20 hours pigmentation was observed. The adult is red brown in colour having elongated snout, clavate antennae. The length of the adult ranged from 9 to 11 mm with an average 10.3 ± 0.30 mm. The width was 3.9 ± 0.31 mm. The adult longevity in the laboratory averaged for 5 ± 0.33 days.

Madapoderus pacificus, after the eclosion it shows transparent pale yellow colour and remain on the leaves until it hardens and take on its proper colouration earlier than beginning to feed and start a new generation. (Biondi, 2005). The information on the subject of biology and host plants of attelabids is still meager from this region. Many of them are serves as a pests of agricultural and forest plants. Gyawali (2005) studied the yield loss of Soyabean caused by *Apoderus cyaneus* Hope. *A. tranquebaricus* feed on the *Mangifera indica*, *Ancardium occidentale* and treated as sporadic pest. (Prem Chand, 1995; Ayyar, 1940).

In addition to this it also damages the *Terminalia tomentosa* and *Terminalia arjuna*. It damages the tender leaves by feeding on them or by nidus formation in the plantations or in the nurseries. Finally it reduces the leaf quality and quantity also. (Jha & Sen - Sarma, 1994). Uchara and Suzuki (1998) studied on the host plants Apoderinae and Attelabinae. *Madapoderus pacificus* develops on the plant *Grewia* sp. (Malvaceae). No biological information is available for the African and Madagascan species; a little information is reported from Asian species, mainly Japanese (Biondi, 2005). It is a known fact that attelabids exhibits a parental care by forming a compact leaf cradles. The leaf cutting pattern often varies from species to species. The leaf cutting types are as follows both cutting type, curved-cutting type, L - shaped cutting type, non - cutting type, quasi- cutting type, straight- cutting type, (Park *et al.*, 2007). Hirano (1953) studied the forms of nidus prepared by *Apoderus jekelli*.

The host range of *A. tranquebaricus* was studied in the Amba forest. It was found on *Syzygium cumini*,

Dimocarpus longan, *Aporosa lindliana*, *Terminalia tomentosa*, *Terminalia arjuna*, *Mammea suriga*, *Lagerstromia* sp and *Grewia* sp. The identification of two more plants is under process. However it is commonly found on the *S. cumini*, *D. longan*, *T. tomentosa*, and on the *M. suriga*. Previously it has been reported on *Mangifera indica* and *Anacardium occidentale* (Ayyar, 1940 and Prem chand, 1995). During the study period we never found nidus of *A. tranquebaricus* on *Mangifera indica*. The study is still continued to get more comprehensive picture of host range and life cycle on these different host plants.

Table 1: Duration of different stages of *A. tranquebaricus* Fab. in days.

S. No.	Stages	Duration
1	Egg- Incubation	3.7 ± 0.26
2	Total Larval period	25.2 ± 0.53
3	Pupa	9.0 ± 0.29
4	Adult	5 ± 0.33

Table 2: Morphometric data of *A. tranquebaricus* Fab.

S. No.	Stages	Measurements (mm)	
		Length	Breadth
1	Egg	1.16 ± 0.04	0.53 ± 0.03
2	Larva (Full grown)	8.3 ± 0.30	2.53 ± 0.04
3	Pupa	8 ± 0.25	3.14 ± 0.03
4	Adult	10.3 ± 0.30	3.9 ± 0.31

Table 3: Host plants of *A. tranquebaricus* Fab.

Sr. No.	Host plants	Reference
1	<i>Syzygium cumini</i>	Butani, 1979
2	<i>Dimocarpus longan</i>	First report in Kolhapur District
3	<i>Aporosa lindliana</i>	First report in Kolhapur District
4	<i>Mammea suriga</i>	First report in Kolhapur District
5	<i>Terminalia tomentosa</i>	Jha & Sen-Sarma 1994
6	<i>Terminalia arjuna</i>	Jha & Sen-Sarma 1994
7	<i>Terminalia catappa</i>	Lefroy 1909
8	<i>Mangifera indica</i>	Ayyar 1940
9	<i>Lagerstromia</i> sp.	First report in Kolhapur District
10	<i>Grewia</i> sp.	First report in Kolhapur District

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