

A new host plant for the shoot-hole borer, *Euwallacea fornicatus* (Eichhoff) (Coleoptera: Scolytidae) from India

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Abstract: In India, the shoot-hole borer, *Euwallacea fornicatus* (Eichhoff, 1868), feeds inside the galleries of tea plant twigs in natural condition and also known as tea borer and a key pest of tea. The natural presence of this beetle on som plantations, *Persea bombycina* Kost. (Lauraceae) at Farm No. 3 Central Muga Eri Research and Training Institute, Lahdoigarh (Jorhat-Assam) has been documented with appreciable damage during May to August, 2010. The host range, distribution, biology and bionomics of *E. fornicatus* (Eichhoff) have been discussed in this manuscript along with the new record on *P. bombycina* Kost for the first time.

Key words: Tea borer; *Euwallacea fornicatus*; som (*Persea bombycina*); biology; bionomics

1 INTRODUCTION

The shoot-hole borer, *Euwallacea fornicatus* (Eichhoff, 1868) is a small, wood boring beetle belongs to the family Scolytidae (Coleoptera). The shoot-hole borer is considered as a major and key pest of the tea (*Camellia sinensis*) and causes damage constructing galleries in the branches. The difficulty in controlling due to its well concealed habit, the economic damage it causes as well as the wide distribution (Walgama and Pallemulla, 2005), contributed it to be a key pest of tea. Shoot-hole borer has now been found to be a pest throughout the farm in Jorhat district of Assam state. A new host plant, *Persea bombycina* Kost. (Synonyms – *Machilus bombycina* King, *M. odoratissima*, *M. gamblei*, *M. kurzi*, *Persea gamblei* Kost., *P. kurzi*, *P. odoratissima* Kost.; Vernacular names – Som, Artuchekan, Mojili, Onthat) (Lauraceae), is recorded, which is extremely susceptible to attack by this beetle. The golden color muga silk obtained from *Antheraea assamensis* Helfer is endemic and found exclusively in North Eastern India, which is reared on primary host plant *P. bombycina* Kost. Muga culture is of considerable economic importance and closely associated with the life, tradition, and culture of the tribal people. The purpose of this paper is to highlight important observations and conclusions made by previous host plants and new host plant record along with bionomics of this beetle.

2 MATERIAL AND METHODS

Ten plants of *P. bombycina* Kost. were

observed from April, 2010 to January, 2011 at Farm No. 3 (Latitude 26°47'04"N, Longitude 94°20'01" E, Elevation 63 m asl), Central Muga Eri Research and Training Institute, Central Silk Board, Ministry of Textiles, Govt. of India, Lahdoigarh, Assam. The ten plants were observed randomly for detecting galleries and larvae of the ambrosia beetle and the data were graphed. The eggs of beetle were observed inside the galleries of stem. The larvae, pupae and adults were collected from these holes and galleries.

For field observations, specimens and damage symptoms were photographed by Sony DSC R1 10.3 mega pixel. The larvae, pupae and adults were collected and photographed by using software Leica Application Suit ver. 2.8.2 and Leica DFC-290 camera attached with Leica MZ16A microscope.

3 RESULTS

Euwallacea fornicatus (Eichhoff, 1868)

Xyleborus fornicatus Eichhoff, 1868, *Beri. ent. Z.*, 12: 151.

Xyleborus schultzei Schedl, 1951, *Tijdschr. Ent.*, 93: 68.

Euwallacea fornicatus (Eichhoff, 1868) Beaver, 1991, *Ann. Naturhist. Mus. Wien*, 92B: 90.

Common names: Shoot-hole borer, tea shoot-hole borer, Asian ambrosia beetle.

Distribution: Africa, America, Australia, Bangladesh, Cambodia, Caroline Islands, China, Fiji, India, Indonesia, Japan, Laos, Madagascar, Malaysia, Myanmar, New Guinea, Pacific Islands, Philippines, Solomon Islands, Sri Lanka, Taiwan, Vanuatu and Vietnam (CABI, 1973).

Hosts Range: This beetle was reported on 18 plants all over the world, *viz.*, *Persea americana*;

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Theobroma cacao; *Durio zibethinus*; *Gmelina arborea*; *Falcataria moluccana*; *Bauhinia variegata*; *Camellia sinensis*; *Senna siamea*; *Casuarina equisetifolia*; *Chlorophora excelsa*; *Citrus* spp.; *Erythrina subumbrans*; *Gliricidia sepium*; *Grevillea robusta*; *Hevea brasiliensis*; *Populus* spp.; *Tectona grandis*; *Terminalia catappa* (FAO, 2007), *Litchi sinensis* (Wang and Yuan, 2003), and *Persea bombycina* Kost. (new host plant).

BIOLOGY AND BIONOMICS

During April, 2010 to January, 2011, Muga silkworm host plants *Persea bombycina* Kost. were planted at Farm No. 3, Lahdoigarh, Jorhat, Assam. The holes on twigs and branches had been observed. The beetles were observed feeding inside the stem forming galleries. The adults were identified as *E. fornicatus* and also known as ambrosia beetle. The beetle is polyphagous in nature and causes extensive damage to plantation crops. The incidence of this beetle population was found low at the time of observations. The prevailing temperatures at the time of observations were 26°C–35°C and the relative humidity was also high at 75%–95%. Due to these conditions, beetles were very active whilst feeding.

Nature and symptom of damage: Adults and larvae feed inside the galleries of branches of som plant. The damage by beetles leads to weakening of branches and breakage and providing entry points for secondary invasive (Fig. 2). The details of galleries per branch, number of larvae and number of holes per branch were observed. In the field observation, maximum number of holes 19, larvae 10 and galleries 9 per branch of som plantation crop were found (Fig. 1).

Biology: The photographs of eggs, larvae, pupae and adults were taken in field condition. All the field observation and bionomics of all stages are given in Table 1.

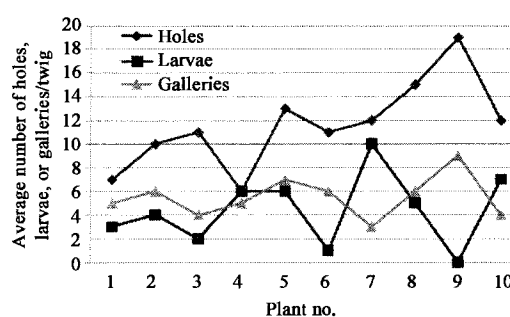


Fig. 1 Graph representing the damage data in respect to number of larvae and galleries in ten plants

Eggs: Laid in groups inside the galleries of branches, the mean number being 14.52 ± 2.92 per gallery (number of galleries observed = 23) (Fig. 2: D). The egg is white oval shape, 0.23 ± 0.04 mm long and 0.01 ± 0.00 mm with a hatch rate of 84.90%, with an incubation period of 7.86 ± 0.63 d (Fig. 2: D).

Larvae: 1st instar newly hatched larvae white in color and feed inside the galleries and width & breadth measured 0.92 ± 0.07 mm \times 0.37 ± 0.05 mm, the developmental period 5.37 ± 0.49 d (Fig. 3: A).

2nd instar larvae white in color, feed inside the galleries and width & breadth measured 1.30 ± 0.06 mm \times 0.44 ± 0.06 mm, developmental period 6.77 ± 0.42 d (Fig. 3: B). 3rd instar larvae much transparent and slightly yellowish in color with their head shield becoming more prominent measured 1.80 ± 0.05 mm \times 0.60 ± 0.07 mm, developmental period 5.81 ± 0.39 d (Fig. 3: C).

Pupa: Pupation takes place on or inside the galleries of twigs, brown and yellowish in color (Fig. 3: D–F). Pupae were measured in terms of width and breadth 1.97 ± 0.10 mm \times 0.97 ± 0.10 mm with pupal period 9.78 ± 0.79 d.

Adults: Adults emerged in the last week of August, synchronized with the new growth of leaves (Fig. 3: G–M). Female with body length 1.83 ± 0.07

Table 1 Measurements and developmental period of *Euwallacea fornicatus* (Eichhoff, 1868)

Life stages	Measurements (mm)		Developmental period	
	Length	Breadth		
Eggs (n=36)	0.23 ± 0.04	0.01 ± 0.00	Incubation period (n=36)	7.86 ± 0.63
I instar (n=37)	0.92 ± 0.07	0.37 ± 0.05	I instar period	5.37 ± 0.49
II instar (n=34)	1.30 ± 0.06	0.44 ± 0.06	II instar period	6.77 ± 0.42
III instar (n=34)	1.80 ± 0.05	0.60 ± 0.07	III instar period	5.81 ± 0.39
Pupae (n=30)	1.97 ± 0.10	0.97 ± 0.10	Pupal period	9.78 ± 0.79
Adults			Adult longevity	
Male (n=23)	1.45 ± 0.10	0.59 ± 0.11	Male	5.84 ± 0.36
Female (n=30)	1.83 ± 0.07	0.80 ± 0.60	Female	7.90 ± 0.45

Data in the table are mean \pm SE.



Fig. 2 Muga silkworm host plant *Persea bombycina* Kost

A: Damage symptoms of *Euwallacea fornicatus* (Eichhoff) in branches; B: Holes in broken branches; C, D: Adults of *E. fornicatus* (Eichhoff) in galleries.

mm \times 0.80 \pm 0.60 mm with longevity 7.90 \pm 0.45 d; male body length 1.45 \pm 0.10 mm \times 0.59 \pm 0.11 mm with longevity 5.84 \pm 0.36 d.

Life cycle: Male and female complete their life cycle in 41.43 \pm 0.51 d and 43.49 \pm 0.52 d, respectively. The total length of the life cycle including

longevity was about 42 days (Table 1).

4 DISCUSSION

Som, *Persea bombycina* Kost (Lauraceae) is the primary host plant of muga silkworm, *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae). India

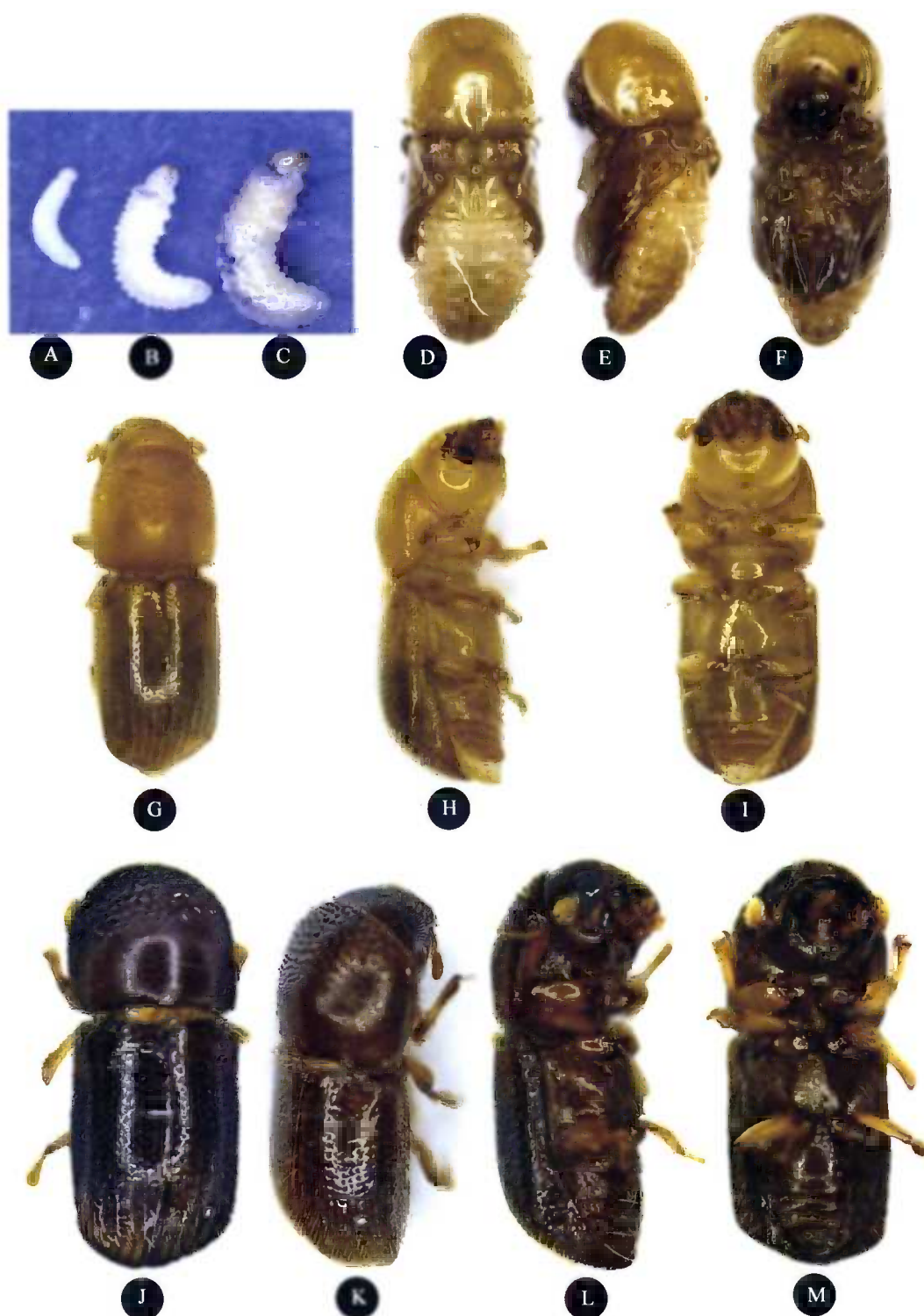


Fig. 3 *Euwallacea fornicatus* (Eichhoff, 1868)

A - C, Larva. A; 1st instar; B; 2nd instar; C; 3rd instar. D - F, Pupa. D; Dorsal view; E; Lateral view; F; Ventral view. G - I, Fresh adult. G; Dorsal view; H; Lateral view; I; Ventral view. J - M, Adult. J; Dorsal view; K; Lateral view; L; Latero-ventral view; M; Ventral view.

is homeland for many sericigenous insects and their host plants. This plant is grown widely in North Eastern Region of India for muga silkworm as food plant. *E. fornicatus* has a very wide range of hosts and commonly known as tea shoot-hole borer. FAO (2007) recorded 18 host plants. Wang and Yuan (2003)

reported *E. fornicates* as pest on Litchi (*Litchi sinensis*) and studied the control measures. However, this pest migrated from tea plantation to muga silkworm host plant, because in the Assam state of India the tea plantation crop is in abundance. Wherever, muga host plants are available, the tea crop is also available in

surrounding area. It is envisaged that this beetle has been migrated from tea crop and field observations revealed that *E. fornicatus* is found on economically important host plant of muga silkworm causing appreciable damage.

Hence, many pests have been recorded on *P. bombycina* Kost. viz., *Ceroplastes ceriferus* (Indian wax scale), *Ceroplastes floridensis* (soft scale), *Ceroplastes rubens* (red wax scale), *Coccus hesperidum* (brown soft scale), *Daphnephila machilicola*, *Diaspidiotus perniciosus* (San José scale), *Maconellicoccus hirsutus* (pink hibiscus mealybug), *Parabemisia myricae* (bayberry whitefly), *Pseudococcus jackbeardsleyi* (Jack Beardsley mealybug), *Pulvinaria psidii* (green shield scale), and *Saissetia coffeae* (hemispherical scale) (CABI, 2007). It is concluded that *E. fornicatus* has been reported for the first time causing appreciable damage to muga silkworm's host plant, *P. bombycina* Kost.

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印度小圆胸小蠹的一种新寄主植物

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摘要: 自然条件下印度小圆胸小蠹 *Euwallacea fornicatus* (Eichhoff, 1868) 在茶树枝条虫瘿内取食, 是茶的重要害虫之一, 以茶蛀虫著称。2010年5–8月, 在印度 Muga Eri 研究中心 3 号农场 (Lahdoigarh, Jorhat-Assam) 的黄心树 *Persea bombycina* Kost. (樟科) 种植园中发现该虫有自然分布, 且已对黄心树造成了明显的危害。黄心树为小圆胸小蠹一种新纪录的寄主植物。本文对小圆胸小蠹的寄主范围、分布、生物学和生活史等进行了讨论。

关键词: 茶蛀虫; 小圆胸小蠹; 黄心树; 生物学; 生活史

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