



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(6): 79-82

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Received: 19-09-2019

Accepted: 23-10-2019

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## Identification of termite species infesting live trees

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### Abstract

Termite species collected from the infested live trees of Forest College and Research Institute, Mettupalayam, Tamil Nadu, India, were identified to be *Coptotermes frenchi* (*Azadirachta indica*), *Coptotermes formosanus* (*Swietenia macrophylla*), *Coptotermes curvignathus* (*Tamarindus indica*), *Coptotermes dreghorni* (*Simarouba glauca*), and *Reticulitermes flavipes* (*Pongamia pinnata*) under the family, Rhinotermitidae, and, *Odontotermes globicola* (*Chukrasia tabularis*), *Odontotermes feae* (*Melia dubia*), *Odontotermes gurdaspurensis* (*Dalbergia sissoo*), *Odontotermes yadevi* (*Acrocarpus fraxinifolius*) and *Microcerotermes laxmi* (*Eucalyptus globulus*), under the family, Termitidae, respectively.

**Keywords:** Termites, *Coptotermes frenchi*, *Odontotermes globicola*, *Reticulitermes flavipes*, live trees

### 1. Introduction

Termites are tiny, social insects which cause considerable damage to wooden structures and living plants, mainly in tropical region. They live in a highly-organized social group inside a nest which can be either above or below the soil surface. Subterranean termites are one of the most economically important pests in the world (Su and Scheffrahn, 1998) <sup>[13]</sup> and are responsible for 80% of all termite damage and 95% total wood damage (Rawat, 2004) <sup>[8]</sup>. There are about 281 genera and 2,800 species of termites (Engel and Krishna, 2004) <sup>[3]</sup>.

Some species of termites feed on dead or fallen timber by covering the timber with a thin layer of mud and few species feed on living plants. Some species build mounds or nests on or at the base of tree trunks or stumps, while others are free standing and remote from their feeding sites. Termites are recognized as important agricultural and domestic pests (Logan *et al.*, 1990) <sup>[7]</sup>. They are one of the major agroforestry pests in the tropics (Wardell, 1987) <sup>[17]</sup>. The trees including acacia, silver oak, eucalyptus and terminalia are mostly attacked by termites. Most of the introduced trees are susceptible to termite infestation. The most commonly infested trees are mango, cashew, citrus, gmelina, African mahogany and many elm species (Thistleton *et al.*, 2017) <sup>[15]</sup>.

Very little information is known about the damage by subterranean termites in live trees. Hence, an attempt has been made to identify the termite species infesting various live trees of Forest College and Research Institute, Mettupalayam, Tamil Nadu, India, based on the morphological characteristics.

### 2. Materials and Methods

#### Collection and preservation

Soldier termites were collected from infested live tree species, namely, *Azadirachta indica*, *Melia dubia*, *Dalbergia sissoo*, *Eucalyptus tereticornis*, *Acrocarpus fraxinifolius*, *Chukrasia tabularis*, *Simarouba glauca*, *Swietenia macrophylla*, *Tamarindus indica* and *Pongamia pinnata*, by gentle scrapping of the shelter tubes / mud tubes constructed over the stem by the termites. The termites were collected in a plastic tray covered with dark black cloth and brought to the laboratory. Soldier termites are usually larger and dark in colour and were transferred to a glass vial containing 70 per cent ethyl alcohol for preservation.

#### Identification

The preserved soldier termites collected from various tree species were examined under a stereo-zoom trinocular microscope fitted with image analyzer. Based on the differences in morphological characteristics, *viz.*, head capsule and mandible shape, the termite species were

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identified and the families were categorized.

### 3. Results and Discussion

Traditionally, head size and shape, mandible shape, are useful

diagnostic characters for soldier caste (Scheffrahn and Su, 1994) [12]. The identified termite species infesting various live trees are presented in Table 1 and Figure 1.

**Table 1:** Termite species infesting various live trees of Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

S. No.	Tree Species	Termite Species	Family of termite
1	Malabar Neem <i>Melia dubia</i>	<i>Odontotermes feae</i>	Termitidae
2	Rosewood <i>Dalbergia sissoo</i>	<i>Odontotermes gurdaspurensis</i>	Termitidae
3	Tamarind <i>Tamarindus indica</i>	<i>Coptotermes curvignathus</i>	Rhinotermitidae
4	Blue gum <i>Eucalyptus tereticornis</i>	<i>Microcerotermes laxmi</i>	Termitidae
5	Neem <i>Azadirachta indica</i>	<i>Coptotermes frenchi</i>	Rhinotermitidae
6	Indian Mahogany <i>Chukrasia tabularis</i>	<i>Odontotermes globicola</i>	Termitidae
7	Indian beech <i>Pongamia pinnata</i>	<i>Reticulitermes flavipes</i>	Rhinotermitidae
8	Paradise tree <i>Simarouba glauca</i>	<i>Coptotermes dreghorni</i>	Rhinotermitidae
9	Big leaf mahogany <i>Swietenia macrophylla</i>	<i>Coptotermes formosanus</i>	Rhinotermitidae
10	Pink cedar <i>Acrocarpus fraxinifolius</i>	<i>Odontotermes yadevi</i>	Termitidae

#### ***Melia dubia* (Malabar Neem)**

Termite species which were found to infest live trees of *Melia dubia* was identified to be the South Asian wood-destroying termite, *Odontotermes feae* (Wasmann). It is also known as fungus-growing termite and belongs to the family Termitidae. Head-capsule yellowish-brown in colour; antennae and legs paler; mandibles blackish, basally reddish brown; thorax and abdomen creamy yellow in colour. Head capsule sub-rectangular, longer than wide; widest in posterior region; sides gradually narrowed in front. Mandibles stout, strong, sabre-shaped; Both mandibles have a minute tooth near middle region (Figure 1) (Roonwal and Verma, 1991) [11].

#### ***Dalbergia sissoo* (Rosewood)**

Termite species infesting live trees of *Dalbergia sissoo* was identified to be *Odontotermes gurdaspurensis* (Holmgren and Holmgren). It belongs to the family Termitidae. Head-capsule golden yellow to dark brown; antennae yellowish brown in colour. Head-capsule sub-rectangularly oval and weakly converging in front of antennae. Antennae 16 segmented. Mandibles long, slender, weakly incurved; longer than half of head length. Right mandible with a prominent, sharp tooth (Figure 1) (Verma, 1989) [16].

#### ***Tamarindus indica* (Tamarind)**

Termite species which were found to infest live trees of *Tamarindus indica* was identified to be *Coptotermes curvignathus* (Holmgren). It is commonly known as rubber termite and belongs to the family Rhinotermitidae. Head chestnut brown in colour; antennae and legs paler than head. Head broadly oval, lateral margins strongly bulging out. Mandibles sabre shaped, anterior margin convex with a deep median emargination, posterior margin with a weak median emargination (Figure 1) (Kirton *et al.*, 1999) [6].

#### ***Eucalyptus tereticornis* (Blue gum)**

Termite species infesting live trees of *Eucalyptus globulus* was identified to be *Microcerotermes laxmi* (Roonwal and Bose). It belongs to the family Termitidae. Head-capsule pale yellow, a little darker posterior; antennae pale yellow; mandible reddish brown in colour. Head capsule sub-rectangular, slightly converging anterior. Antennae with 13 segments and mandibles are long slender, sabre-like, strongly incurved (Figure 1) (Roonwal and Bose, 1978) [10].

#### ***Azadirachta indica* (Neem)**

Australian Subterranean Termite, *Coptotermes frenchi* (Hill) was found to be infesting live trees of *Azadirachta indica*. It belongs to the family Rhinotermitidae. Head yellowish brown, other parts paler. Head with few erect hairs; pronotum and abdomen more hairy. Head elongately oval with much narrowed anterior end. Mandibles somewhat straight with feeble incurved apices (Figure 1) (Hill, 1932) [5].

#### ***Chukrasia tabularis* (Indian Mahogany)**

Termite species which were found to infest live trees of *Chukrasia tabularis* was identified to be *Odontotermes globicola* (Wasmann) and belongs to the family Termitidae. Head-capsule dark golden brown in colour; antennae brownish, paler than head; mandibles dark brown in colour. Head-capsule roundly oval, converging anteriorly; widest behind middle. Mandibles long and slender; straight and weakly incurved near distal end. Right mandible with a prominent tooth near tip (Figure 1) (Chhotani and Bose, 1987) [2].

#### ***Pongamia pinnata* (Indian beech)**

Termite species infesting live trees of *Pongamia pinnata* was identified to be the Eastern Subterranean termite, *Reticulitermes flavipes* (Kollar). It belongs to the family Rhinotermitidae. Head is light yellowish brown in colour. Head capsule is rectangular in shape, typically longer than wide. Mandibles elongate and curved and dark brown in colour (Figure 1) (Banks and Snyder, 1920) [1].

#### ***Simarouba glauca* (Paradise tree)**

Termite species which were found to infest live trees of *Simarouba glauca* was identified to be *Coptotermes dreghorni* (Hill) and belongs to the family Rhinotermitidae. Head deep brown in colour and sub-rectangular in shape with lateral and posterior margin weakly convex. Mandible thin, long and slightly curved at the apex (Figure 1) (Gay, 1969) [4].

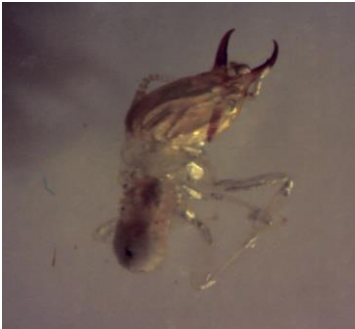
#### ***Swietenia macrophylla* (Big leaf mahogany)**

Termite species infesting live trees of *Swietenia macrophylla* was identified to be *Coptotermes formosanus* (Shiraki), commonly known as Formosan subterranean termite, and belongs to the family Rhinotermitidae. Head yellow and sparsely hairy; oval in shape. Mandibles uniformly hooked at apices (Figure 1) (Roonwal, 1970) [9].

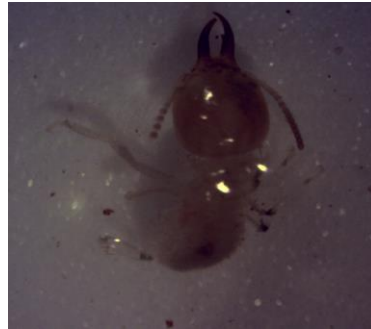
***Acrocarpus fraxinifolius* (Pink cedar)**

Termite species infesting live trees of *Acrocarpus fraxinifolius* was identified to be *Odontotermes yadevi* (Thakur). It belongs to the family Termitidae. Head-capsule

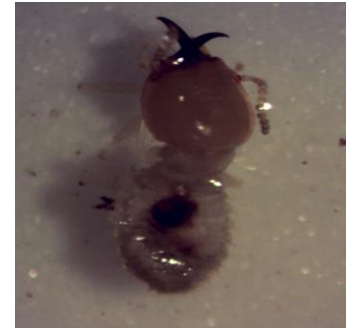
yellowish brown to brown; antennae uniformly coloured and yellowish brown in colour. Mandibles blackish brown, short, thick, sabre-shaped. Head-capsule broadly oval, longer than wide and widest posteriorly (Figure 1) (Thakur, 1981) [14].



*Odontotermes feae* Termitidae  
(*Melia dubia*)



*Odontotermes gurdaspurensis* Termitidae  
(*Dalbergia sissoo*)



*Coptotermes curvignathus*  
Rhinotermitidae  
(*Tamarindus indica*)



*Microcerotermes laxmi*  
Termitidae  
(*Eucalyptus tereticornis*)



*Coptotermes frenchi*  
Rhinotermitidae  
(*Azadirachta indica*)



*Odontotermes globicola*  
Termitidae  
(*Chukrasia tabularis*)



*Reticulitermes flavipes*  
Rhinotermitidae  
(*Pongamia pinnata*)



*Coptotermes dreghorni*  
Rhinotermitidae  
(*Simarouba glauca*)



*Coptotermes formosanus*  
Rhinotermitidae  
(*Swietenia macrophylla*)



*Odontotermes yadevi*  
Termitidae  
(*Acrocarpus fraxinifolius*)

**Fig 1:** Termite Species infesting live trees

**4. Conclusion**

From the above studies, *Coptotermes frenchi* (*Azadirachta indica*), *Coptotermes formosanus* (*Swietenia macrophylla*), *Coptotermes curvignathus* (*Tamarindus indica*), *Coptotermes dreghorni* (*Simarouba glauca*) and *Reticulitermes flavipes* (*Pongamia pinnata*) under the family, Rhinotermitidae and *Odontotermes globicola* (*Chukrasia tabularis*), *Odontotermes feae* (*Melia dubia*), *Odontotermes gurdaspurensis* (*Dalbergia sissoo*), *Odontotermes yadevi* (*Acrocarpus fraxinifolius*) and *Microcerotermes laxmi* (*Eucalyptus globulus*) under the family Termitidae, respectively were identified as important termite species infesting live trees at Forest College and Research Institute, Mettupalayam, Tamil Nadu.

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