

RESEARCH ARTICLE

# Inventorying Various Termite Species Attacking Agricultural Crops in Tamil Nadu, India

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## ABSTRACT

Termite attack causes severe damage in agricultural crops viz., wheat, sugarcane, maize, sorghum, groundnut and fruit trees. An explicit survey was done in various districts of Tamil Nadu, India, for inventorying different termite species inflicting damage in major crops viz., groundnut, sugarcane and maize. The termite species attacking important agricultural crops of Tamil Nadu were morphologically identified as *Odontotermesobesus*, *O. wallonensis*, *O. redemanni*, *O. hornii* and *O. brunneus* pertaining to subfamily Macrotermitinae and *Nasutitermesbrunneus* of subfamily Nasutitermitinae, both falling under the family Termitidae and *Neotermesbosei* belonging to subfamily Kalotermitinae under family Kalotermitidae.

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## INTRODUCTION

About 3,105 species of termites in 330 genera (Kumar *et al.*, 2013) distributed over 12 families (Engel *et al.*, 2009) and 14 subfamilies (Varshney, 2007) are presently recognized from all over the world with about 185 considered to be pests (Verma *et al.*, 2009). Around 300 species under 37 genera under seven families have been reported from the Indian region (Murthy *et al.*, 2015) of which about 12% of species (35 species) are known to damage agricultural crops. Termites that belong to the families Hodotermitidae (*Anacanthotermes* and *Hodotermes*), Kalotermitidae (*Neotermes*), Rhinotermitidae (*Coptotermes*, *Heterotermes* and *Psammotermes*), and Termitidae (*Amitermes*, *Ancistrotermes*, *Cornitermes*, *Macrotermes*, *Microcerotermes*, *Micromeres*, *Odontotermes*, *Procornitermes*, and *Syntermes*) cause great loss to agricultural crops (Anonymous, 2000). Two species, *O. obesus* and *M. obesi* account for almost 80% of total losses in South Asia. In India, termites are widely distributed in red, sandy loam, lateritic, and red loam soils (Varshney, 2007). Termite fauna of the world is estimated to be around 2,864 species under 195 genera (including 60 fossil species) distributed over 9 families. In India there are 271 under 52 genera belonging to 7 families, of which 172 species are endemic to India. ([www.zsi.gov.in](http://www.zsi.gov.in))

The termite fauna of the Assam region of Eastern India was assessed by Roonwal and Chottani (1962) and they described 34 termite species belonging to three families viz., Rhinotermitidae, Kalotermitidae and Termitidae.

A survey was conducted by Anantharajuet *al.* (2014) for detailed taxonomic identification of termite species available in the Pudukkottai coastal area and ten species belonging to seven genera and three families viz., Termitidae, Rhinotermitidae and Kalotermitidae were identified. They are *Hypotermes obscuriceps* Wasmann, *Macrotermes convulsionarius* (Konig), *Odontotermes anamallensis* (Holmgren), *Odontotermes brunneus* (Hagen), *Odontotermes soglobicola* Wasmann, *Microcerotermes fletcheri* Holm and Holm, *M. obesi*, *T. biformis*, *C. heimi*, and *Neotermes assamuthi* (Holmgren).

## MATERIAL AND METHODS

A detailed field survey was conducted during the year 2016 for the collection and taxonomical identification of various termite species attacking groundnut, sugarcane and maize in ten districts of Tamil Nadu viz., Coimbatore, Erode, Dharmapuri, Krishnagiri, Theni, Madurai, Dindugal, Ramanathapuram, Tirunelveli and Tuticorin (Fig.1). Crop fields with incidence of termite attack were

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identified and termite samples were collected from each field. Termites in the soil and plants were collected using a fine brush, shovel and the samples collected were placed over a plain white sheet wherein the moving termites were easily transferred to 15 mL glass vials containing hundred per cent absolute alcohol by means of wetted painting brush No.1. Taxonomical identification of termite samples based on the mandibles of soldier caste was done by Dr. D.S. Rajavel, Professor, Department of Agricultural Entomology, Agricultural College and Research Institute, Killikulam with the help of standard taxonomical keys provided by Maiti (1983), Chotani (1997) and Nivedita *et al.*, (2016).



Fig 1. Surveyed districts of Tamil Nadu for collection of termite samples

## RESULTS AND DISCUSSION

Termites are social insects with a caste system, and much of termite taxonomy is based on the soldier caste or, in the case of soldier less termite groups, the worker caste. This is because these castes are the most readily encountered in the field, as they often forage away from the nest and are, therefore, the forms associated with damage to agricultural crops and wood. Field surveys were conducted in ten districts of Tamil Nadu, and the investigations unfolded that majority of the termite species (soldier caste) collected belonged to the family Termitidae and subfamily Termitinae. *Odontotermes* genus of various species viz., *O.obesus*, *Odontotermes wallonensis* Wasmann, *Odontotermes hornii* Wasmann, *Odontotermes redemanni* Wasmann and *Odontotermes brunneus* Hagen pertained to Termitinae, whereas *Nasutitermes brunneus* Snyder belonged to subfamily Nasutitermitinae.

*Neotermesbosei* Snyder belonging to subfamily Kalotermitinae under family Kalotermitidae was also identified (Table 2) and the various termite species identified, their location and their host crops were listed in Table 1.

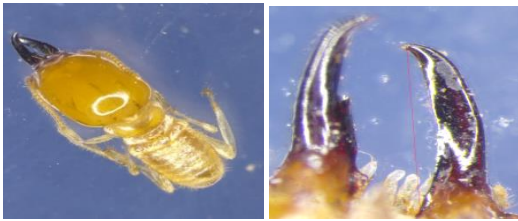

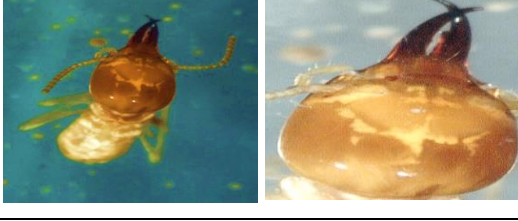
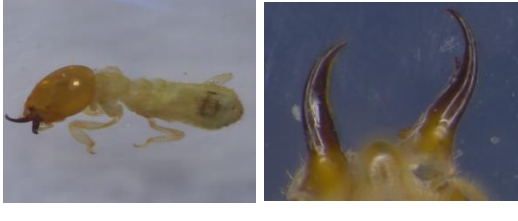



Table 1. Termite species recorded from various districts of Tamil Nadu

\*Identification carried out with taxonomic key

S. No	Termite species*	District	Host
1	<i>Odontotermes wallonensis</i> Wasmann	Coimbatore, Madurai, Krishnaagiri, Tirunelveli, Ramanathapuram	Groundnut Sugarcane
2	<i>Nasutitermes brunneus</i> Snyder	Dharmapuri	Groundnut
3	<i>Odontotermes obesus</i> Rambur	Coimbatore	Sugarcane
4	<i>Odontotermes brunneus</i> Hagen	Erode	Sugarcane
5	<i>Neotermesbosei</i> Snyder	Dindugal	Groundnut
6	<i>Odontotermes redemanni</i> Wasmann	Madurai, Tuticorin	Sugarcane
7	<i>Odontotermes hornii</i> Wasmann	Theni, Erode	Sugarcane Groundnut

This documentation of termite species is in line with the findings of Gadhiya *et al.* (2012), in which *O. obesus* and *O. redemanni* were reported attacking wheat crop in Gujarat, India. Similar observations on *O. obesus* had also been reported as serious pest in guar, chilies, pulses, and sugarcane (Parihar, 1981; Singh and Singh, 2002) and *O. obesus* is the most commonly documented species in groundnut in India and African countries causing a yield loss of 10 to 30% (Paul *et al.*, 2018). Likewise, *O. redemanni* had been recorded as pest of tea, coffee, sugarcane, fruit trees and a wide range of field crops in India and Sri Lanka which supports the current findings. Rathore and Bhattacharyya (2004) identified *O. wallonensis*, *O. brunneus* and *O. hornii* in Gujarat and Rajasthan regions of India which were also reported from Karnataka and Andhra Pradesh (Chhotani, 1997) which, supports the present findings. The current findings of *O. wallonensis* a serious pest of sugarcane in Tamil Nadu was also reported by Nisha (2011), whereas *O. brunneus* and *O. hornii* were recorded as a pest of economically important tree

Table 2. Taxonomical identification of termites affecting various crops in Tamil Nadu

S. No	Name of the species	Figure depicting soldier and its mandible	Key for identification
1.	<i>Odontotermes wallonensis</i> Wasmann		Mandibles comparatively less so incurved from distal third (Smaller species)
2.	<i>Nasutitermes brunneus</i>		Mandible vestigial, each with a short spinose process
3.	<i>Odontotermes obesus</i>		Mandibles thin, saber shaped, left mandible with a prominent tooth at the base of distal 3 <sup>rd</sup> .
4.	<i>Odontotermes brunneus</i> Snyder		Mandibles strongly incurved in front from middle (Larger species)
5.	<i>Neotermes bosei</i> Snyder		Left mandible with a deep notch in-between first and second marginal teeth
6.	<i>Odontotermes redemanni</i> Wasmann		Left mandibular teeth forwardly placed
7.	<i>Odontotermes horni</i> Wasmann		Left mandible with a large tooth near the base of middle third

crops viz., *Santalum album* L., *Tectona grandis* L., *Dalbergia sissoo* Roxb., *Eucalyptus* sp. and *Hevea brasiliensis* Mull. Arg. (Chhotani, 1997). Further, 12 species of termites are known to attack sugarcane in India and among them *O. obesus*, *M. obesi* and *O. wallonensis* are comparatively more damaging (Mahapatro and Bhatnagar, 2015). The current identification of *N. bosei* and *N. brunneus* from sugarcane fields in Tamil Nadu, India was in closer proximity to the findings of Krishna et al. (2013), who reported *N. bosei* and *N. brunneus* attacking fruit and forest trees in India.

Regular surveys for termites impacting damage in crops have to be done, which helps to associate the major termite species occurring, their damage potential and management strategies to contain them.

## CONCLUSION

Termites are very serious pests in dry land agricultural crops, wheat, sugarcane and maize, a detailed survey covering all the districts of Tamil Nadu is much necessary to identify the termite species infesting various crops. This will help in documenting new species as well as most devastating termite species. Further studies on the nature of damage, their impact on the crop yield will help in devising an integrated termite management strategy.

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