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Short Communication

Silviculture

# Occurrence of *Tectona grandis* Stem Injury Caused by *Cornitermes cumulans* Termite

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## ABSTRACT

Termites of the species *Cornitermes cumulans* (Kollar, 1832) were observed causing injuries in the stem of *Tectona grandis* in commercial forest plantations in Cáceres, Mato Grosso state, Brazil. *C. cumulans* forms galleries below the bark, at the heartwood/sap-wood interface of 1.8 years-old trees. This is the first occurrence of this type of injury in stem caused by *C. cumulans* in *T. grandis* in Brazil.

**Keywords:** forest entomology, insect pest, teak, initial planting.

*Tectona grandis* L.f. (Lamiaceae), known as teak, is origin of Asian occurring naturally in India, Myanmar, Thailand and Laos, because of the characteristics and value of its wood, was introduced in countries of Asia, Africa and America (Hansen et al., 2014). The first seminal forests were planted in Brazil at the 1960s, in Cáceres city, Mato Grosso state (Cruz et al., 2008). There are 87,502 hectares of teak planted in Brazil (IBÁ, 2017) and this area is expanding due to the resistance, durability, and color of the wood, this species is highly demanded in the national market and abroad (Pelissari et al., 2014). The brazilian teak is destined mainly to the civil construction, noble furniture and export (Motta et al., 2013).

*T. grandis* production may suffer losses at different stages of its development in the field due to insect pests attack (Kulkarni et al., 2009), like any other exotic monoculture in a tropical region (Nascimento et al., 2016). Therefore, the objective of this work was to describe the first occurrence of termites causing injury to *T. grandis* stem in 1.8 years-old commercial planting.

The 200 hectares of teak planting is in Cáceres (16°04'14" S, 57°40'44" W and 118 m altitude), Mato Grosso state, Brazil. The teak stands were planted in December 2015, with 4×4 meters planting spacing, in a pasture predominant site (*Urochloa decumbens*). The soil preparation was done with the application of herbicide, plowing, and gradation in total area and subsoiling with fertilization in the planting line. Before planting the seedlings were treated with an insecticide solution based on 0.44% fipronil (phenyl-pyrazol). After planting, the teak stands were fertilized and kept free of invasive plants.

In May 2018, were observed injuries in the stem region and below the bark of teak trees, caused by termite infestation. The injuries were photographed and measuring, 20 termites of the soldiers caste were collected, kept in recipient containing alcohol 80% and sent to Laboratório de Fitossanidade (FitLab) of the Instituto Federal de Educação, Ciência e Tecnologia de Mato Grosso (IFMT) - Campus Cáceres.

The termites were observed in the laboratory using a stereoscopic microscope (40x), photographed and identified with the taxonomic keys (Emerson, 1952) and comparison with other specimens already identified. After identification the specimens were deposited in the Reference Collection on Forest Protection of the Laboratório de Fitossanidade of the IFMT - Campus Cáceres.

The termites were identified as *Cornitermes cumulans* (Kollar, 1832) (Blattodea: Termitidae) (Figure 1).

Infestation of *C. cumulans* was detected in several trees at different degrees of injury. Initial mounds were found close to the injured plants (Figure 2A), where the presence of clay galleries was observed, located below the bark and at the interface between bark and sap-wood, from the base up to 1.3 meters in tree height (Figure 2B).

The injuries were more pronounced close to the tree base in relation to the rest of the stem (Figure 3A). However, in 50% of the infested trees, it was observed that the sap-wood was partially consumed by *C. cumulans* activity (Figure 3B). This part corresponds to the most price value of the tree and the presence of insect

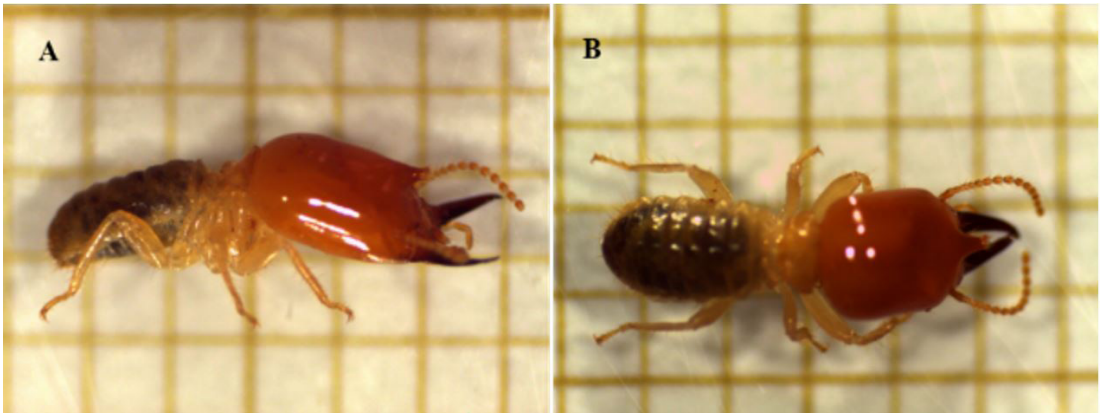


**Figure 1.** Soldier of *Cornitermes cumulans*. (A) Side view; (B) Dorsal view.


**Figure 2.** (A) *Cornitermes cumulans* initial mound near the tree base; (B) *C. cumulans* clay galleries in teak stem up to 1.3 m above ground.


**Figure 3.** (A) Tree base with presence of galleries in the bark/sap-wood interface; (B) Galleries and consumption of sap-wood by *C. cumulans* in teak stem.

galleries generate losses and harm the wood export (Abreu et al., 2002).

*C. cumulans* is a termite species that produces mound-shaped nests, where it has an underground and a superficial structure (larger and visible portion) (Redford, 1984). This species of termite normally causes direct losses in the young phase of the forest plantations, and can cause mortality of the seedlings, as it causes destruction of the root system of the plants and, indirectly, compromises the development of the trees, making them more susceptible to the attack of other pests (Junqueira et al., 2009; Leitão-Lima et al., 2013).

They are commonly found in pasture areas, because of the large amount of food available as dry matter (Czepak et al., 2003; Carrijo et al., 2009; Cunha & Morais, 2010), although they also feed on dead leaves and roots (Junqueira et al., 2008). Due to the ecological no balance generated by the anthropic action in the

preparation of areas for planting, this insect presents a potential risk of pest to forest plantations (Lima & Costa-Leonardo, 2007).

In the absence of preferable food, termites seek alternatives by selection pressure, since normally in forest species the food preference is by plant roots in the seedling phase (Junqueira et al., 2008; Leitão-Lima et al., 2014). Since teak has a considerable and expanding area in the country, high value and great demand in the foreign and domestic market, it is necessary to seek strategies of management and preventive control of this insect, in order that this species does not cause economic damages to the enterprises forests.

There is no product registered to control *C. cumulans* in teak plantations. However, to chemically control this termite species in other crops, the perforation of the mound with an steel bar of a maximum of 1 cm in diameter is carried out directly in the nests until it reaches the cellulose chamber and one liter of insecticidal syrup based on fipronil, with 0.1 g of the active ingredient per termite nest, by means of a hose coupled to a funnel or using the coastal pump without the nozzle. (Canesin et al., 2012). To combat *C. cumulans* termites, the process should be done 30 to 60 days before soil preparation, to eliminate them from the area to be planted and to avoid breeding by fragmentation of the nests (Canesin et al., 2012).

In the sugarcane industry, attractive cardboard traps impregnated with 0.1g of entomopathogenic fungi conidia *Beauveria bassiana* and/or *Metarhizium anisopliae* or their association with the insecticide fipronil 0.003% are used to control *C. cumulans* (Almeida et al., 2000; Chakraborti, 2017). This technique consists in maximizing the action of the entomopathogenic fungus on the termite population contaminated with an insecticide at the sub-lethal dose, while the workers feed on the cardboard trap (Almeida et al., 2000).

This paper reports for the first time a new stem injury caused by *C. cumulans* termite in teak plantations in Brazil.

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