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NEW RECORD OF THE AMBROSIA BEETLE, *Treptoplatypus micrurus* Schedl. ATTACK ON SONOKEMBANG (*Pterocarpus indicus* Willd.) IN BATU, INDONESIA

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ABSTRACT

Sonokembang (*Pterocarpus indicus* Willd.) is commonly planted as an ornamental tree in Batu city, East Java. In 2012 and 2013, there were some dying trees of sonokembang along the road of Batu city, and there were some indications that the signs and symptoms might be related to the ambrosia beetle samples from Batu. To clarify the precise condition, identification of beetle samples was needed in this research. Based on survey and sample collections conducted in Batu from the early July 2013 to the end of March 2014, characteristic of damage on trees was observed together with the presence of beetle collected. Identification was based on morphological characters such as posterior elytral declivities and body size of male, and mycangia on female`s pronotum. Based on the morphological characters, there were some special characters which described such as 1) the body size of female adult was bigger than male adult, 2) elytral declivities on male adult was unique, and 3) there was mycangia on pronotum of female adults. Morphological characters showed that the ambrosia beetle attacked on sonokembang belonged to *Treptoplatypus micrurus* Schedl. This ambrosia beetle species seems to be the responsible agent that caused dying trees of sonokembang.

Keywords**:** Morphological characters; Platypodinae; *Pterocarpus indicus*; *Treptoplatypus micrurus*

INTRODUCTION

Sonokembang (*Pterocarpus indicus* Willd.) is commonly planted as ornamental trees in Batu city, East Java. Sonokembang is preferred because of its quick growth, beauty and easy propagation by seed or cutting (Furtado, 1935). This species grows in lowland up to highland (up to 1300 m after sea level) and prefers seasonal climate (Carandang, 2000). There are several reports related to plant diseases on Sonokembang in South East Asia including Singapore, Malaysia, Thailand and Indonesia. Furtado (1935) reported that in 1923, there was incidence of wilt disease on Sonokembang in Malaysia, while wilt disease on Sonokembang caused by *Fusarium oxysporum,* a symbiont of the ambrosia beetle, was also reported in the 1990s in Singapore, (Sanderson *et al*., 1996; Sanderson *et al*., 1997a; Sanderson *et al*., 1997b). Moreover, an exotic ambrosia beetle, *Euplatypus parallelus* infested Sonokembang trees in southern Thailand (Bumrungsari *et al*., 2008) and in Malang, Indonesia (Tarno *et al*., 2014). In addition, other species of ambrosia beetles in the South Asia were reported for Cashew in Goa, India (Marutadurai *et al*., 2013), while oak ambrosia beetles (*Platypus quercivorus* and *P. Koryoensis*) infested Oak tress in Japan and South Korea (Ueda and Kobayashi, 2004; Moon *et al*., 2008a).

Ambrosia beetles produce frass as result of their digging activities in their host trees. There are two types of frass: fibrous and powdery frass (Tarno *et al*., 2011). In detail, Tarno *et al*., (2011) reported that fibrous frass is produced by adult beetles, in the early stage of attack. Powdery frass is produced by larva in the next stage of attack (Tarno *et al*., 2011). Fibrous and powdery frass were also produced by *E. parallelus* which attacked sonokembang in Malang (Tarno *et al*., 2014).

Based on our survey from 2012 to 2013, there were some dying trees of sonokembang along the road of Batu city, and there were some indications that the signs and symptoms might be related to ambrosia beetle. Therefore, it is important to identify collected specimens of beetle from Batu to bring clarifications about the species concerned.

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Table 1. Locations of samples based on GPS points by Garmin Etrex 10 for collection of beetle samples in Batu City

No.	X	Y	Longitude	Latitude
1.	669109	9128398	112°32'2.262"E	7°52'56.460"S
2.	669102	9128396	112°32'2.033"E	7°52'56.526"S
3.	669097	9128397	112°32'1.870"E	7°52'56.494"S
4.	669091	9128402	112°32'1.673"E	7°52'56.332"S
5.	669088	9128404	112°32'1.575"E	7°52'56.267"S
6.	669397	9128471	112°32'1.655"E	7°52'54.049"S
7.	669397	9128471	112°32'1.655"E	7°52'54.049"S
8.	669339	9128455	112°32'9.764"E	7°52'54.577"S
9.	669294	9128445	112°32'8.296"E	7°52'54.908"S
10.	669265	9128436	112°32'7.350"E	7°52'55.204"S

MATERIALS AND METHODS

Survey and collection of samples were conducted in Batu from early July 2013 to the end of March 2014. All trees on the main roads were observed and ten locations where selected to collect beetle samples for identification. Location of samples were described in Table 1. Collection of beetle samples was conducted by attaching plastic traps on each hole created by beetles. The trapped beetle adults in each plastic trap were collected and fixed by 70 % alchohol in the small tubes. Identification was based on morphological characters such as posterior elytral declivities and body size of male, and mycangia on female`s pronotum. Identification was conducted in the Laboratory of Entomology, Faculty of Agriculture, University of Brawijaya, Malang. Some beetle samples were taken for photographs by a Binocular and Scanning Electron Microscopes in the Laboratory of Plant Breeding and Genetic Bioresources in Grassland, Faculty of Agriculture, University of Miyazaki, Japan.

RESULTS AND DISCUSSION

The identification of beetle species were based on some morphological characters which featured the following: 1) the body size of female adult was bigger than male adult, 2) elytral declivities on male adult was unique, and 3) there was mycangia on pronotum of female adults All of three characters provided useful information in the identification of beetle samples which were collected in Batu City. The beetle samples were identified as *Treptoplatypus micrurus* Schedl. In detail, morphological characters were described in Figure 1, 2, 3 and 4. Wood (1992) reported that in 1951, *T. micrurus* was found in Tangkuban Perahu Mountain, West Java. Previously, *T. micrurus* was known as *Platypus longecaudatus* (Wood, 1992; Wood and Bright, 1992; Wood, 1993; Setliff, 2007).

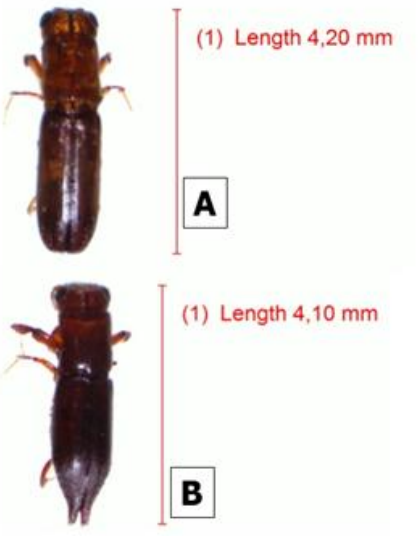

Figure 1. Morphological description of both adults of *T. micrurus*; A. male, and B. female

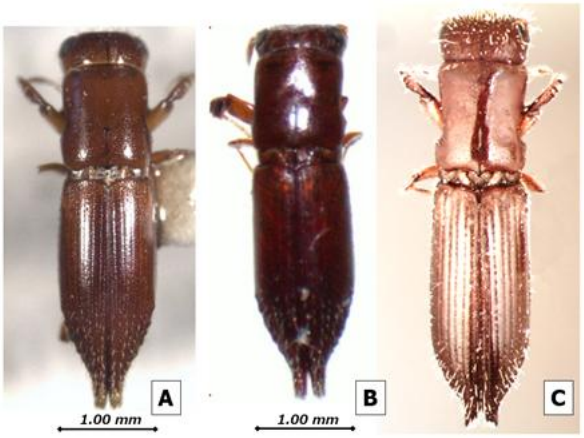

Figure 2. Morphological Comparation of three ambrosia beetles species; A. *T. micrurus* from Malaysia (CNC, 2012), B. *T. micrurus* which collected from Batu city, East Java, and C. *T. abietis* (Buss, 2008)

The body size of female adult has ca. 4.20 mm, which was commonly bigger than male adults (ca. 4.10 mm)(Figure 1). Wood (1993) reported that species which belonged to *Treptoplatypus* genus has 2.4-6.0 mm. *Treptoplatypus* is widely distributed from India and Australia to Japan and NW North America (Wood, 1993). In case of *T. micrurus*, this species was reported in 1951 from a collection in Tangkuban Perahu Mountain, West Java, Indonesia (Wood and Bright, 1992). *Treptolatypus micrurus* has previously synonimies as *P. longecaudatus* Nunberg or *P. Micru-rus* Schedl (Schedl, 1961; Wood, 1993; Setliff, 2007).

When male beetle samples from Batu city were compared to two male beetle specimens from Malaysia and the U.S., the male beetle samples from Batu city showed similar elytral declivities and body size to those beetle specimens from Malaysia. In addition, the male beetles from US showed little difference those from Batu city and Malaysia. *Treptoplatypus micrurus* (Figure 2A and 2B) had smaller body length than *T. abietis* (Figure 2C).

In general, *Treptoplatypus* is characterized by their male elytral declivity that are rather abruptly, obliquely truncate and dehiscent at the sutural apex (Wood, 1993). The elytral apex of male is usually strongly attenuate, and the male declivity is concave. Based on elytral declivity of male adults, *T. micrurus* elytral declivity was different to that of *T. abietis*. It was shown by the end of elytra, where elytra of *T. abietis* has the sharp tip and sharply concave than *T. micrurus* (Figure 3).

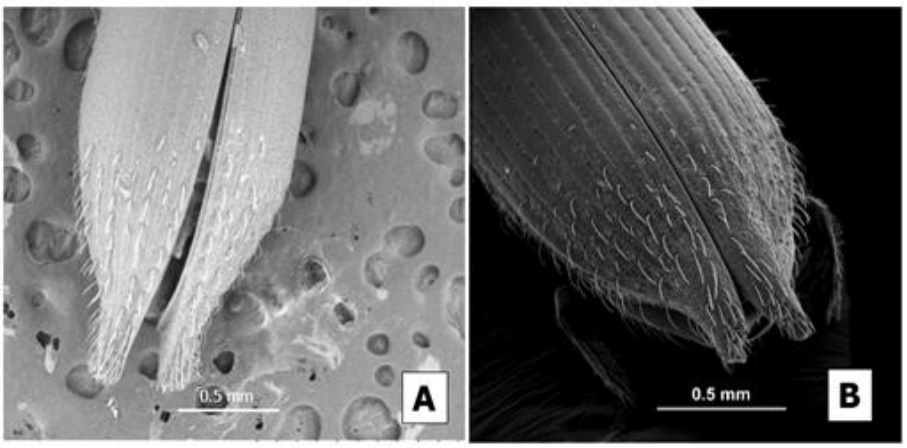

Figure 3. Elytra characteristic of two ambrosia beetles species; A. *T. micrurus* which collected from Batu, East Java, and B. *T. abietis* (Buss, 2008).

Figure 4. Morphological characteristic of the ambrosia beetle, *T. micrurus*; A. adult female, and B. location of mycangia on pronotum of adult female.

In Platypodines, mycangia are usually more developed in females than males (Kent, 2010) and there are numerous mycangia on the female pronotum such as in *P. quercivorus* and *P. koryoensis* (Wood, 1993; Atkinson, 2000; Moon *et al*., 2008a). On pronotum, mycangia pores can be easily distingushed in *T. micrurus* females. Mycangia has various sizes, such as bigger and smaller diameters. In the group of mycangia pores, there is suture with direction to the scutellum (Figure 4).

Based on the observation, dying sonokembang trees were an effect of ambrosia beetle, *T. micrurus* attack. There were no leaves on trees, and trees became brown and dying from upper to lower parts. The pattern of attack was clusterred, shown by more than one or two trees dying. Moreover, we found many holes with frass arround holes on the main stem of the trees (Figure 5). Sone *et al.,* (1998) also described that defoliation of leaves and dying of trees was a typical result of an attack by herbivorous insects such as *P. quercivorus*. In addition, holes on surface of stem produced galleries inside of stem with complicated pattern (Sone *et al*., 1998). In Japan, ambrosia beetle *P. quercivorus* is known to be associated with ambrosia fungi, *Raffaelea quercivora* (Esaki *et al*., 2004; Kinuura and Kobayashi, 2006).

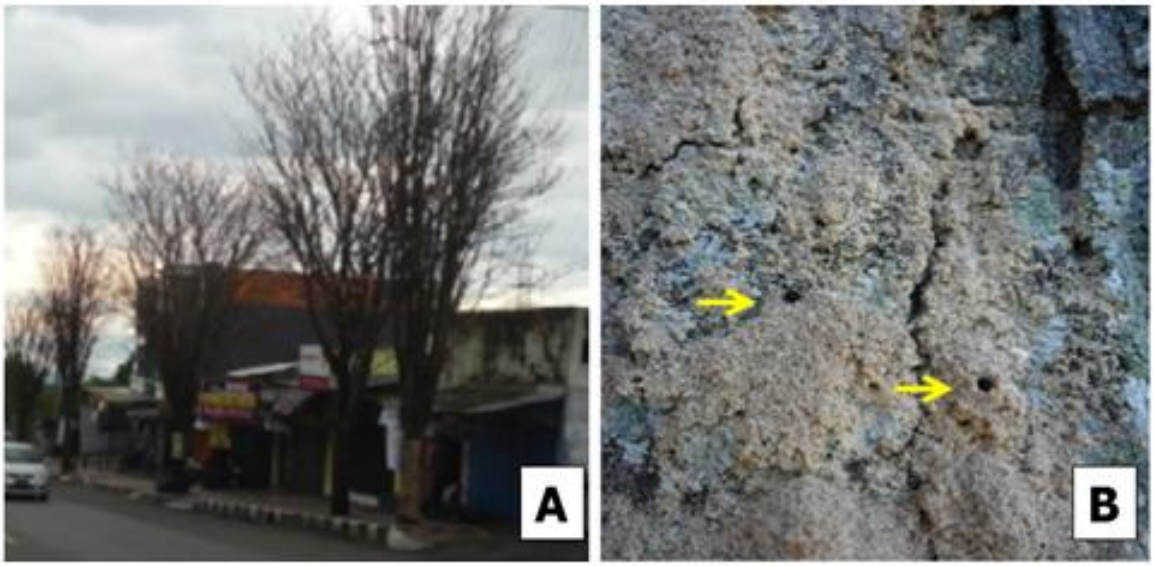

Figure 5. Damage characteristic of Sonokembang; A. symptom of attacked tree, and B. holes and frass were produced by the ambrosia beetle, *T. Micrurus*

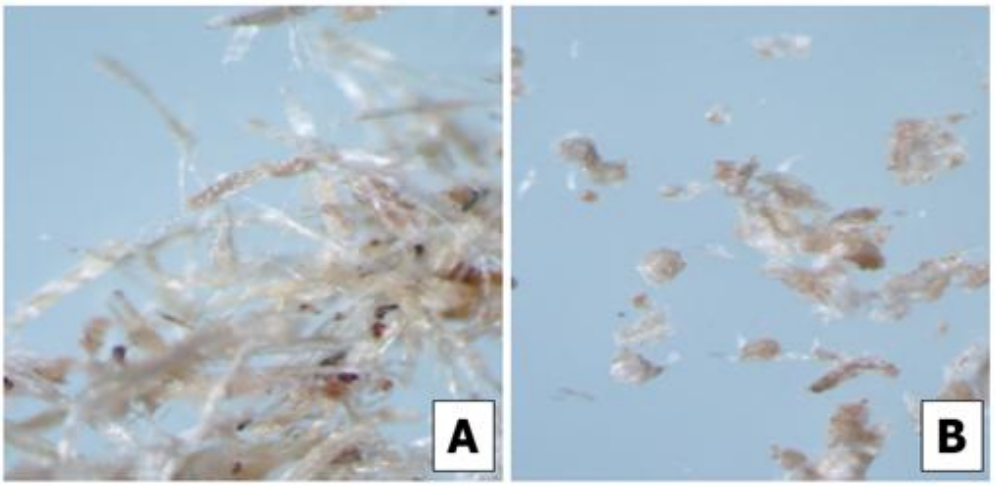

Figure 6. Frass was produced by the ambrosia beetle, *T. micrurus*; A. fibrous frass, and B. powdery frass

Ambrosia beetles including *Euplatypus parallelus*, *P. quercivorus*, and *P. koryoensis* commonly produce frass (Moon *et al*., 2008b; Tarno *et al*., 2011; Tarno *et al*., 2014). Ambrosia beetle makes galleries directly into the sap and heartwood of the tree using its functional mouthpart (Moon *et al*., 2008b; Tarno *et al*., 2011). The frass is made by adult has its typical fibrous shape and called fibrous frass (Moon *et al*., 2008b; Tarno *et al*., 2011). Larva of the ambrosia beetle produce frass with smaller size called powdery frass (Tarno *et al*., 2011). *Treptoplatypus micrurus* also produces frass with both typical characters such as fibrous and powdery frass (Figure 6).

CONCLUSIONS

Based on Morphological character such as elytral declivities on male adult and mycangia on pronotum of female adults, ambrosia beetle attacked on sonokembang in Batu, belonged to *Treptoplatypus micrurus* Schedl. This species seems to be the responsible agent that caused dying trees of sonokembang.

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