

## ***Dryobalanoxylon* sp. : a fossil wood preserved in the Genteng Formation from Lebak Regency, Banten Province, Indonesia**

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### **Abstract**

The fossilized wood unearthed in Sindangsari Village, Sajira District, Lebak Regency, Banten Province, Indonesia. The depositional environment of this Early Pliocene fossilized wood that has been found in tuff sediment of Genteng Formation corresponds littoral to terrestrial deposition. To identify a fossil wood type, preparation made from three sides; transverse, radial and tangential. The preparation of thin section following to the one method in the rock petrography. Anatomical features of the fossil wood are as follows : wood porous diffuse, vessel almost exclusively solitary with 7 – 14 / mm<sup>2</sup>, ray width 1 to 3 cells, larger rays commonly 4 to 10 seriate, body ray cells procumbent with one row of upright and/or square marginal cells, axial canals in long tangential lines, prismatic crystals in parenchyma cells. These features show affinities of the fossil wood to *Dryobalanoxylon* member of family Dipterocarpaceae.

**Keywords:** Dipterocarpaceae, *Dryobalanoxylon*, Early Pliocene, fossil wood Banten, Genteng Formation

### **Introduction**

The discovery of fossilize wood in Indonesia is one of common geological phenomenon but is little-known about further observation on its palaeoecological context. Some critical informations on fossil wood are essential to reveal ecological evolution (Wilis & Mc Elwan, 2002) palaeogeography and paleoclimate (Mehrota, 1999; Tiwari et al, 2012; Bande & Prakash, 1986; Linch et al, 2015; Shukla et al, 2013; Yang et al, 2013; Wiemann et al, 1998). Fossil wood becomes a high valued commodity for trade in the western part of Java Island. Banten is one of area in the island which posses abundant discovery of fossil wood. Fossil wood which found in this area dominated by Family Dipterocarpace such as *Anisopteroxylon*, *Dipterocarpoxyton*, *Dryobalanoxylon*, *Hopeoxylon*, *Shoreoxylon*, *Parashoreoxylon*, *Cotylelobioxyton*, *Vaticoxylon* (Mandang & Martono, 1996; Andianto et al, 2015). Research on the specimens is commonly limited to anatomical characteristics without considering the provenance and its position in the sediment layer. In Lebak regency, fossil wood reported found in the Genteng Formation (Ansori, 2010;

Suharsono et al, 1982 in Winantris, 1994).

This research aims to reveal the identification on type and stratigraphical context of fossil wood which preserved in Sindangsari Village, Sajira Sub-regency, Lebak Regency, Banten Province, Indonesia.

### **Research**

The finding point is situated in coordinate S 6° 31' 26.6" E 106° 19' 47.0" (Picture 1) with depth ranging from 50 to 150 cm from surface. Specimens are found fragmented into several segments with length 20 - 120 cm and diameter 50 - 80 cm (Picture 2.). The wood is entirely silicified as it appears with darker color gradually towards the center perpendicularly.

A specimen fragment sized 6 cm long and 22 - 23.5 cm in diameter is secured to be observed into several thin sections. The fragments are housed in the storage room of Geological Museum Bandung, Geological Agency, Ministry of Energy and Mineral Resources Republic of Indonesia with Collection number MGB00033171.

The fossil site is located in the Geological Map of Leuwidamar (Sujatmika & Santosa, 1992). According

to the geological map, the Genteng Formation was deposited in littoral to terrestrial environment (Picture 3). Lithology in this area are : tuffaceous claystone with thickness  $\pm 1$  m,

tuffaceous sandstone with thickness  $\pm 4$  m, and tuff with thickness  $\pm 4$  m. Fossil wood found in tuff layer, which has been weathered as paleosoil (Picture 4).

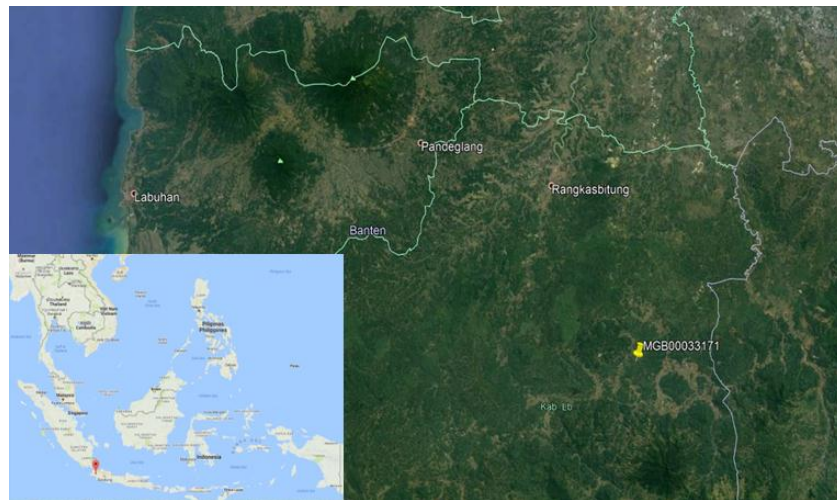


Figure 1. Map of the fossil site



Figure 2. Research Area

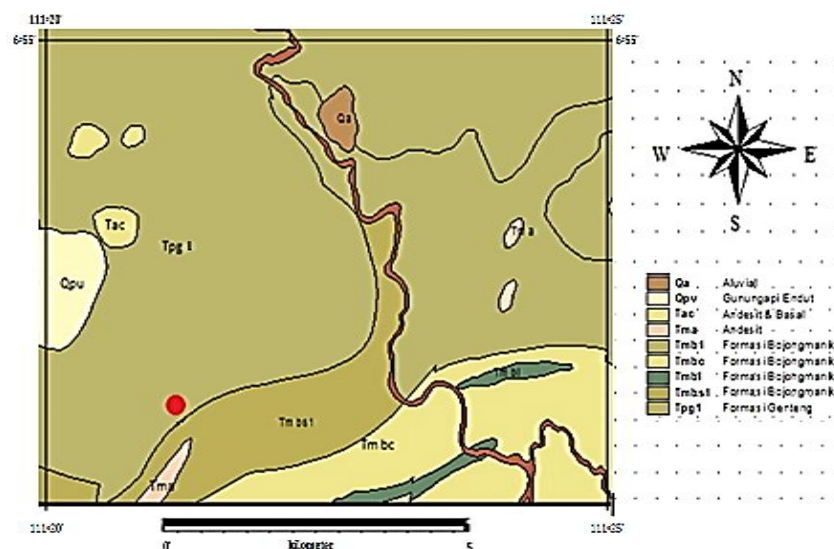


Figure 3. The fossil site in geological map (modified from Sujatmika and Santosa, 1992)

## Methods

The observation of wood type is conducted based on the identification method on living wood established by IAWA (1989). Three sides of thin section are made from the specimens following transversal, radial and tangential side. Preparation method of the thin section is conducted like the one used in petrography (Andianto et al, 2014), and it is made in Petrography Laboratorium, Geological Museum, Geological Agency, Ministry of Energy and Mineral Resources, Jl. Diponegoro No 57 Bandung, Indonesia.

Nomenclature of fossil: adding suffix - *xylon* in every identified genus with the exception in certain e.g *Xanthopyllum* (Gregory, 2009).

## Result and discussion

Diagnostic feature from the sample : wood porous diffuse, vessel exclusively solitary, simple perforation plate, diameter tangential of vessel lumina 122.22 – 229.96  $\mu\text{m}$ ; mean 182.86 standar deviation  $\pm$  28.88; vessel per square mm are 7 – 14, mean 9.60 with standard deviation  $\pm$  1.75; Tyloses sclerotic. Rays multiseriate, ray width 1 to 3 cells, larger rays commonly 4 to 10 seriate, ray height 0.56 – 2.27 mm; mean 0.95 with standar deviation  $\pm$  0.34; body rays cells procumbent with one row of square marginal cells. Sheath cells, intercellular canal : axial canals in long tangential lines, which size smaller than vessels. Prismatic crystals in non chamberes axial parenchyma cells. This feature has similarity with *Dryobalanops*, family Dipterocarpacea (Ogata et al, 2008; Wheeler, 2011).

The discovery of *Dryobalanoxylon* (MGB00033171) has been frequently reported by several authors (Schweitzer, 1958; Mandang & Martono, 1996; Srivastava & Kagemori, 2001; Mandang & Kagemori, 2004; Andianto et al, 2015). The specimen found in Sindangsari shows the 7-14 per  $\text{mm}^2$  frequency of vessels which resembles to *D. javanense* from Bolang (Java), *D. spectabile* from Banten (Java), *D. tobleri* from Palembang (Sumatera), *D. negletum* from Jambi (Sumatera) and *D. bangkoense* from Jambi (Sumatera). Tangential diameter of vessel of

*Dryobalanoxylon* (MGB00033171) displays 122,22 – 229,96  $\mu\text{m}$  which is in diameter range of *D. negletum* from Jambi (Sumatera) and *D. bogorensis* from Leuwiliang (Java). The rays width has similarity to *D. negletum* from Leuwiliang (Java) and *D. borneense* from East Kalimantan ranging from 1-3 seriate. *Dryobalanoxylon* (MGB00033171) has other similarities with *D. negletum* such as crystal in parenchyma and crystal in rays. The difference between the two is that *Dryobalanoxylon* (MGB00033171) has sheath cells, silica in rays, which not found in *D. negletum*. *Dryobalanoxylon* (MGB00033171) has shorter length vessel than *D. negletum* (Schweitzer, 1958 in Mandang dan Kagemori, 2004).

Fossil wood was found 50 – 150 cm from the surface. Based on the lithology of the research area, the fossil wood is deposited in paleosol which is the weathered tuff layer of Genteng Formation. Tuff is a volcanic material with rich silica content. Oktariani et al (2017) reported the finding of *Dryobalanoxylon* sp. in Genteng Formation (MGB00033170) located in Lebak Regency.

The location of the *Dryobalanoxylon* findings is 400 m to the southwest from this research area. Based on palinology research, Winantris et al (1994) mentioned that *Dryobalanoxylon* found in Genteng formation.

This area is divided into five vegetation, there are : Mangrove vegetation, beach vegetation, swamp forest vegetation, fresh water vegetation and Pteridophyta. Here, we predicted that environment in research area at early Pliocene is terrestrial or fresh water vegetation. On the other research, Martawijaya et al (2005) reported that *Dryobalanops* usually grow as a group in lowland tropical rain forest at 60 – 400 m above sea level.

## Conclusion

The fossil wood that is preserved in Genteng formation at Sindangsari Village, Sajira Sub-regency, Lebak Regency, Banten Province, Indonesia is *Dryobalanoxylon* sp. with age interpretation of Early Pliocene. Research area is predicted as terrestrial

or fresh water vegetation with elevation about 60 - 400 m above sea level.

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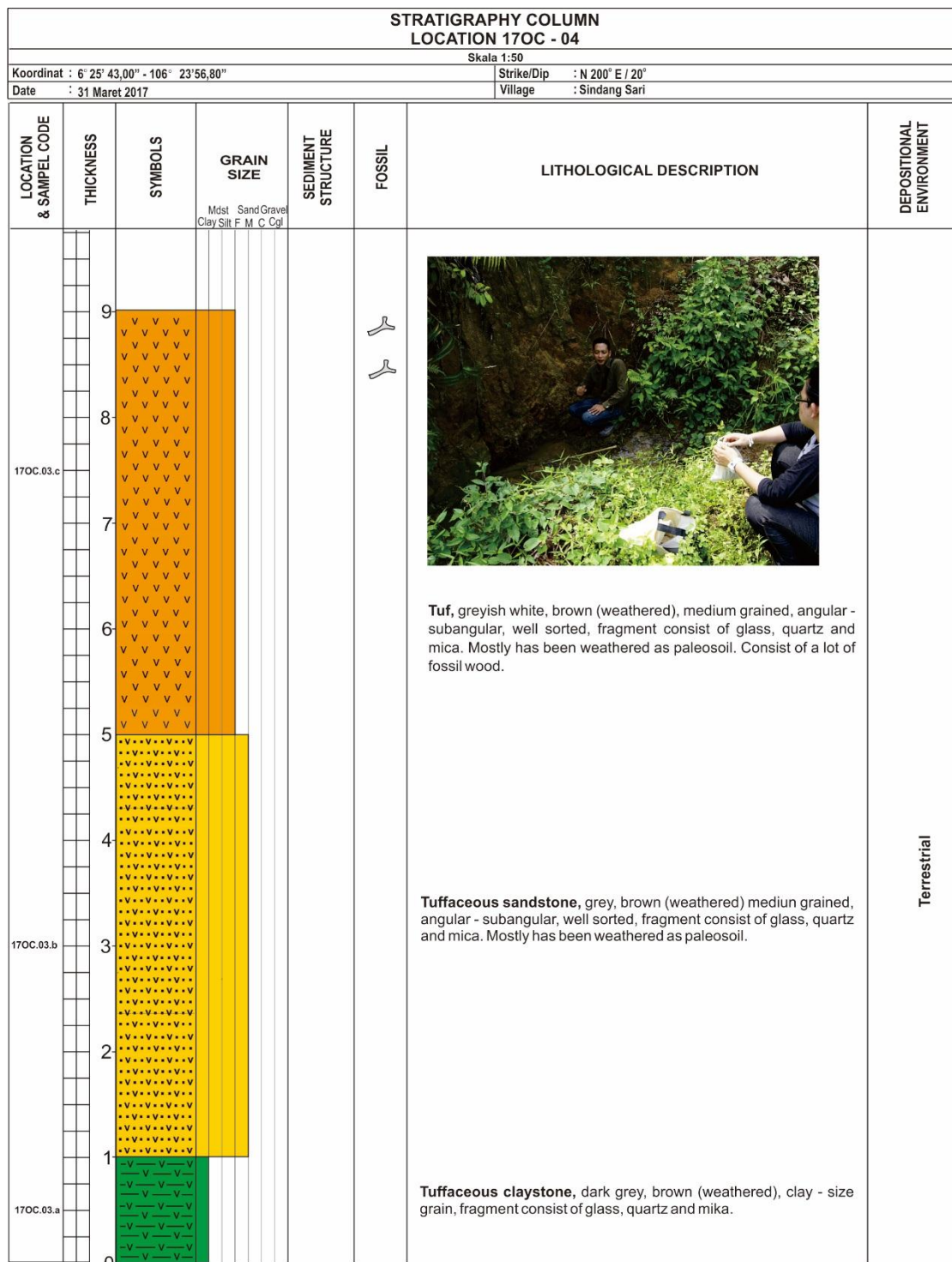


Figure 4. Lithology of research area



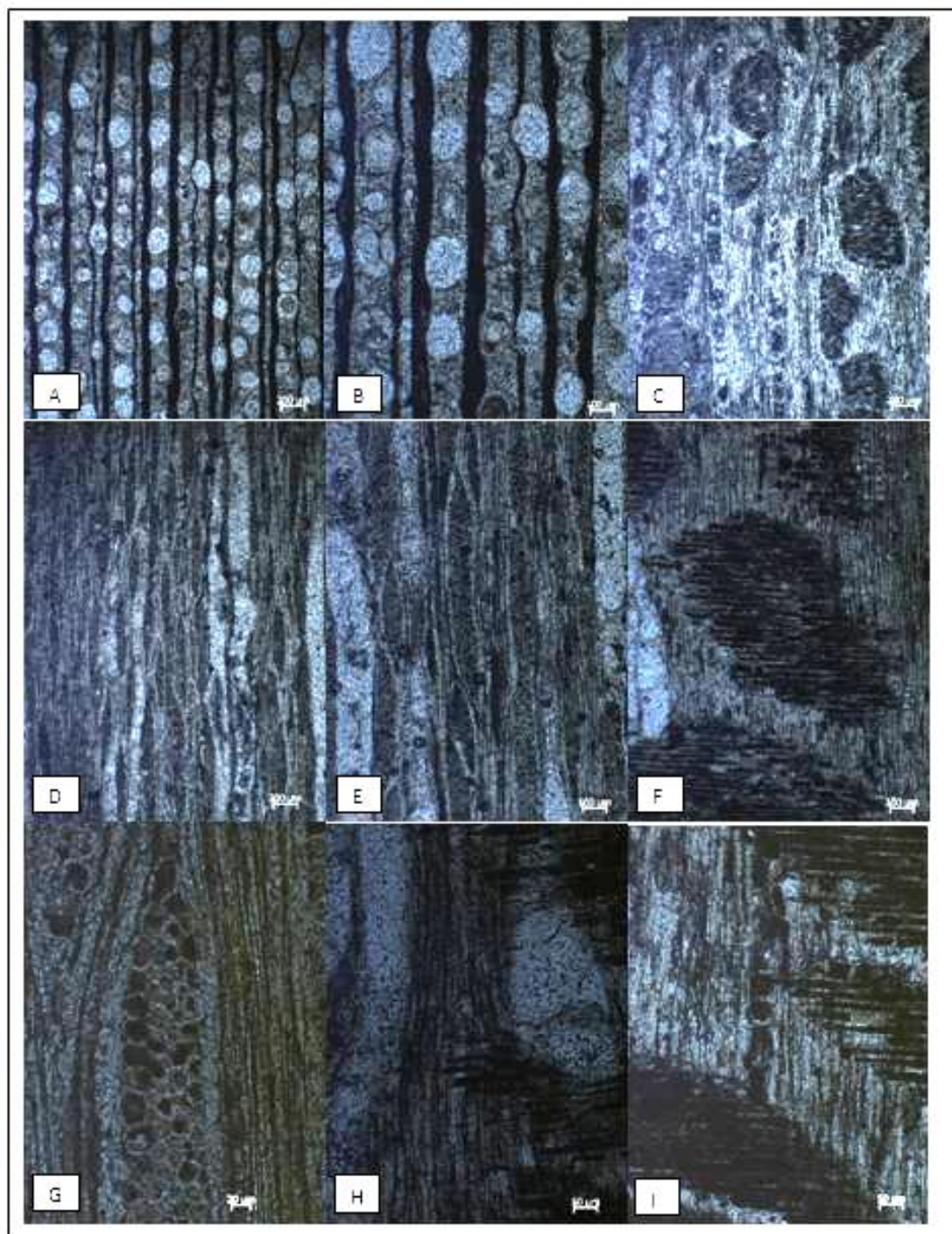


Figure 5. Anatomical feature A : wood porous diffuse, solitary, B : intercellular axial canals, C : Tyloses sclerotic, D. : Storied structure in rays, E. : larger rays commonly 4 – 10 seriate, F. : Body cells procumbent with one row square marginal cells, G. : Sheath cells and silica in rays, H. : crystals in rays, I. : crystal in parenchyma cells.

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