# Isolation and Identification of Native Mikoriza Morphology on The Rhizosphere Gluta rengas L. in Jompie Botanical Garden

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**Abstract**

Alitta Forest, located in the city of Parepare, South Sulawesi, has an area of 84 ha, a portion of this forest area is functioned as part of a botanical garden. The jompie botanical garden has an area of 13.5 ha, with a collection of plants reaching 90 species originating from 81 plant clans and as many as 77 species that have been identified. In addition to a collection of high-level plants, jompie botanical gardens also have a diversity of microorganisms that have not been identified, especially microorganisms that symbiosis with plant roots known as mycorrhiza, so the purpose of this study is to identify and identify the abundance of mycorrhizal spores in the jompie botanical garden found in rhizosphere *Gluta renghas* L.. The research began with taking the rhizosphere under the stands of wet trees in the jompie botanical garden, which was then continued to identify and calculate the abundance of spores in the microbiology laboratory of Makassar's research and development environment and forestry. The identification results of mikoiza spores native to the jompie botanical garden show that they are found in two genera, namely; Acalauspora sp consisting of two morphotypes, and the genus Glomus sp consisting of one morphotype, with an average spore abundance of 45.3 per 100 grams rhizosphere

**Keywords**: fungus, indigenius, acalauspora, rizosphere

## A. Introduction

The Jompie Botanical Garden in Parepare, South Sulawesi, is part of Alitta forest. The area of Alitta forest that is part of the Jompie Botanical Garden is 13.5 ha, with 90 species of plants originating from 81 genera. 77 of these species have been fully identified, 10 new species are known to the genus level, and 3 other species have only been identified to the family level. The name Jompie itself is taken from the ancient bugis language which means water that comes out of the soil naturally or can be called a spring (Dinas Lingkungan Hidup dan Lembaga Ilmu Pengetahuan Indonesia Pusat Konservasi Tumbuhan Kebun Raya, 2017).

*Gluta renghas* L., one of the plants found in the jompie botanical garden, including the Anacardiaceae family. The trunk is about 40 to 50 cm high and emits toxic gums that can cause skin irritation. Rengas wood is included in durable class II wood which is quite durable and strong class II which is quite strong. Wood from Rengas (*Gluta renghas* L.) trees is commonly used by the community as raw material for making cages because it is easier to find and lasts longer when immersed in water (Martawijaya, Kartasujana, Kadir, & Prawiras, 2005).

**Figur 1. *Gluta renghas* L, in the Botanical Gardens Jompie**

Association of plants with fungi or known as mycorrhizae is a symbiotic interaction of mutualism that is very common in the plant world (Warouw, et al. 2010). Based on the depth of the tissue used by mycorrhiza can be classified into 2 types, namely ectomycorrhizae and endomicoriza. Ectomycorrhizae is a fungus that only lives on the surface area of the root ie the epidermis tissue, whereas endomikoriza is a fungus whose hypotension is able to penetrate plant roots to enter the cortical tissue (Indah, 2009). The results of research conducted in the nickel postmining area were obtained by three types of mycorrhiza, namely: Acaulospora sp, Gigaspora sp, and Glomus sp (Akib, Mustari, Kuswinanti, & Syaiful 2018[a]; Akib, *et al*. 2018[b]).

Five benefits of mycorrhizae for the development of host plants, namely: Increasing nutrient absorption from the soil, as a biological barrier against root pathogen infections, increasing host resistance to drought, increasing growth-promoting hormone and ensuring the implementation of the biogeochemical cycle. Whereas mycorrhiza get nutritional benefits (carbohydrates and other growing substances) for their living needs from plant roots.

## B. Methods

Soil Research was conducted in May-June 2019, in the Microbiology Laboratory of Research Center and Development of Environment and Forestry, Makassar. Rhizosphere sampling was carried out at the jompie botanical garden of Parepare. The selected rhizosphere sample was *Gluta renghas* L., which was taken diagonally.

The technique used in isolation is the pour-filter method, followed by the centrifugation method. The pour-filter technique is to filter the sample using a stratified filter, while the centrifugation technique is a technique used to separate heavy particles and light particles in the sample. The work step of the filter pouring technique is to weigh 100 grams of soil sample and then mix 100 grams of soil sample with 200 - 300 ml of water and stir evenly, then filtered in a set of filters with sizes of 325 µm, 50 µm, 40 µm in sequence from top to bottom. At the top of the filter is sprayed with tap water to facilitate the filter material to escape (Ansiga, Rifa, Rumambi, Kaligis, Mansur, & Kaunang, 2017).

Material that escapes in the bottom filter and the second from the bottom is then transferred into the centrifuge tube. The material is then centrifuged by sentifugation technique. The filter results are added with 60% glucose. The centrifuge tube is tightly closed and centrifuged at a speed of 3000 rpm for 5 minutes. Furthermore, the supernatant solution is poured into 0.5 mm filter paper, rinsed with flowing distilled water to remove glucose. The remaining sediment is put into a petri dish and then mycorrhizal spores are observed using a stero microscope to calculate the number of spore populations in the sample (Ansiga, *et al.* 2017).

Making spore preparations is intended to assist in the identification process. From these preparations, it is expected that morphological information on mycorrhizal spores can determine the genus of mycorrhizal spores contained in the *Gluta renghas* L. identification is carried out using an electron microscope. Spores obtained were collected based on morphological characters of mycorrhizal spores including: spore shape, spore size, spore color, hypha attachment and ornament spores (Ansiga, *et al.* 2017).

Relative abundance is calculated according to the formula:

$$IKR = \frac{(ni)}{(N)} \text{ X } 100\%$$

IKR : Relative abundance index
Ni : Number of mycorrhizal spores in a genus
N : Total number of spores

## C. Result and Discussion

The Jompie Botanical Garden of Parepare, is located at an altitude of 5 - 55 m above sea level at the coordinates of 3 ° 59'51,168 S, and 119 ° 38'24,366 E. has an area of about 13.5 ha, soil ph 6-7. With a collection of wallacea coastal plants.

The results of observations in the Laboratory indicate that the mycorrhizal spore types found in rhizosfer *Gluta renghas* L., are *Acalauspora* sp, and *Glomus* sp, and are divided into three morphotypes namely: Small Yellow Rounded (BKK), and Small Clear Rounded (BBK), as well as Small Black Rounded (BHK), which have different morphological characteristics. Morphological characteristics in showed to Tthe 1 and the number of mycorrhizal spores in rhizosfer *Gluta renghas* L. based on morphotype can be seen in Table 2.

**Table 1. Morphological Characteristics of Mycorrhizal Spores in the Rengas Rhizosphere**

| No. | Genus | Morfotipe | Morphology | | Diameter |
|---|---|---|---|---|---|
| | | | *PVLG* | *Meltzer* | |
| 1 | *Acalauspora* sp., | Small Yello Rounded. | Round, yellow, has a liquid inside, thick cell walls, smooth surface. | Round, yellow, has a liquid inside, rough surface, thin cell walls. Meltzer doesn't react | 262,5 |

| | | | | | |
|---|---|---|---|---|---|
| 2. | *Acalauspora* sp., | Small Clear Rounded | Round, clear in color, has fluid in it, thick cell walls, smooth surface. | Round, clear in color, has fluid in it, thick cell walls, rough surface. Meltzer doesn't react. | 185,6 |
| 3. | *Glomus* sp., | Small Black Rounded | Round, black, thin cell walls, smooth surface, have has liquid inside. | Round, black, thin cell walls, rough surface, have liquid inside. Meltzer doesn't react. | 242,2 |

**Table 2. Number of Mycorrhizal Spores in rhizosfer Rengas (Gluta renghas L.) Based on Morphotypes**

| No. | Genus | Morfotipe | Abundance (spora/100 g rhizosfer) |
|---|---|---|---|
| 1. | Acalauspora. Sp | Small Yello Rounded | 48 |
| 2. | Acalauspora. Sp | Small Clear Rounded | 38 |
| 3. | Glomus. Sp | Small Black Rounded | 50 |

Acalauspora sp., has a round, irregular and elliptical shape with two layers of spore walls. Spore color varies from yellow, brownish orange, dark red, to brownish red. Acalauspora sp., has a saccule that is round to irregular in color ranging from yellow, transparent, transparent pink, to white (Lily, 2018). Spora of Acalauspora sp., contained in the rhizosphere of *Gluta renghas* L. can be seen in Figure 1.

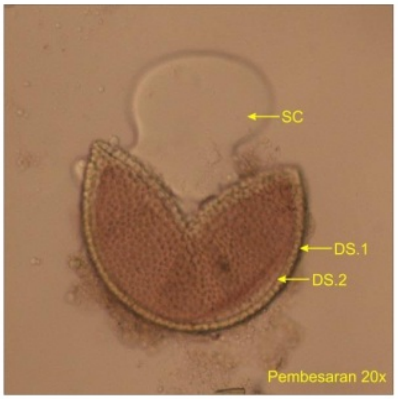


**Figure 1. Spora of Acalauspora sp., in the Rengas rhizosphere (*Gluta renghas L.*) (SC: Shacull, DS: Cell wall)**

Glomus Sp, characterized by round and oval shapes, the color of the genus Glomus. Sp varies from yellow, reddish yellow, brownish yellow, yellowish brown, light brown, dark brownish black, purple and black. In addition, spores can be produced singly or in groups forming aggregates (Lily, 2018). Spores of Glomus. Sp contained in the rhizosphere of *Gluta renghas* L. can be seen in Figure 2.

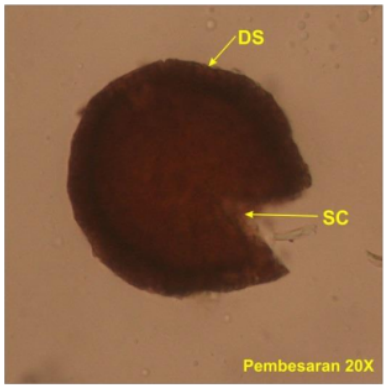


**Figure 2. Spores of Glomus sp., in the Rengas rhizosphere (Gluta renghas L.) (SC: Shacull, DS: Cell wall)**

## D. Conclusions

The spore type of native mycorrhizal found in rhizosphere of *Gluta Renghas* L. is *Acaluspora* sp., and *Glomus* sp., Type of *Acalauspora* sp., is more common than Glomus, sp. Based on morphotypes, there are three morphotypes namely; small yellow rounded, small clear Rounded, and small black rounded. With a small round black morphotype is more common than other types of morphotype. The abundance of mycorrhizal spores in the rhizosfer of *Gluta renghas* L. is an average of 45.3 spores per 100 g of rhizosphere.

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