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# Morphology and Growth Test of *Beauveria* sp. of Rhizosphere in Sweet Guava

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## ABSTRACT
*Beauveria sp. is one of the fungi obtained from the exploration of the Rhizosphere in the Gondang Manis Guava plantation, which is located in the northern region of the Brantas River. This study aims to determine the morphology and growth of Beauveria sp. obtained from the exploration of endophytic fungi in the Rhizosphere of the Gondang Manis Guava plant. This research was conducted at the Agroecotechnology Laboratory, Faculty of Agriculture, KH University. A. Wahab Hasbullah, in vitro in April-July 2024, with qualitative and quantitative approaches, each with 5 replications. The results of the observation showed that the Beauveria sp. isolate had a yellowish white upper part, a bone white lower part, a zigzag colony shape spread out and a white powder hypha texture. The conidia of the fungus were hyaline in a round shape. The diameter after H-7 and H-14 was around 8 and 14 cm, respectively.*

***Keywords**: Beauveria sp; Gondang Manis Guava; Morfology*

## INTRODUCTION
Based on the biodiversity of microorganisms that live in the rhizosphere, there are many fungi that can be used as biological control agents. In the exploration of microbes in the Bol Gondang Manis guava plantation area in Jombang Regency, one of them was Beauveria sp (Afifah, et al., 2022). Beauveria sp fungi have been reported to be effective in controlling insect pests. Several types of ladybugs and warehouse pests, such as Blissus leucopterus ladybugs, Leptinotarsa decemlineata which attack potato plants, Myzus persicae, Bemisia tabaci. Scirpophaga nivella, Nilaparvata lugens, Sciropophaga innotata (Hasyim, 2005). The fungus also controls larval stage pests, such as Plutella xylostella (Utami et al., 2014). To identify the fungi found, it is necessary to carry out tests related to the morphological, molecular characteristics, and testing the role of the fungi in the field. Fungal morphology tests are useful for facilitating the identification of fungi types, by knowing their macroscopic and microscopic characteristics. While growth is the process of developing the size or mass of a substance from the number of cells which is generally interpreted as the growth of colonies in fungi. This growth is known based on the size of the colony which is getting bigger and more numerous. Therefore, a study was conducted on the morphology and growth rate of Beauveria sp. which was explored from the same place. The purpose of this study was to determine the morphology and growth of Beauveria sp. fungal colonies from the results of Rhizosphere exploration in the Gondang Manis Guava plantation, which is located in the northern region of the Brantas River..

## METHOD
This research was conducted at the Agroecotechnology Laboratory, Faculty of Agriculture, KH. A. Abdul Wahab Hasbullah University, Jombang Regency, which was carried out in April-July 2024

**Making Potato Dextrose Agar Media**

The media components are weighed according to the following composition: Potato/potato 3g, Dextrose 5g, Agar 15g, Aquades up to 1000 ml (before weighing, the potatoes should be peeled and cut into small pieces). Then the potatoes are boiled in some aquades for 1-3 hours until soft to extract by

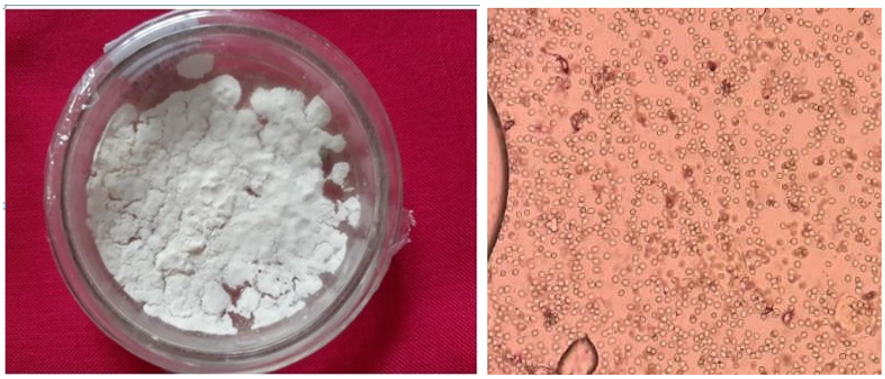
filtering and squeezing them using filter paper and then collected in a beaker. The Agar material is dissolved with a Hot Plate Stirrer in 500 ml of aquades, after dissolving, dextrose is added and homogenized again. The pH of the media is adjusted to 5-6 by dripping HCl/NaOH. The media is poured into an Erlenmeyer flask or into a test tube and is then ready to be sterilized.

**Pure Fungal Cultivation on PDA Media**

The media that has been sterilized in Erlenmeyer, is poured into a sterile petri dish ± 1ml. After that, it is left until the agar in the petri dish cools and hardens. The fungi tested came from the collection of the Faculty of Agriculture, KH University. A. Wahab Hasbullah (Afifah, et al, 2022), which is stored in a slant test tube culture medium. Then using an ose needle, the fungi are planted into the petri dish agar media, and incubated for 7 days. After incubation, the fungi that grow on the petri dish media are printed using a cork borer, and then taken and placed in the middle of the PDA media in the petri dish. The media is stored at room temperature 27oC - 32oC. Observations begin from the first day of incubation until 14 days. These observations include; 1) the color of the upper and lower colonies, 2) the texture of the colonies, 3) the distribution of hyphae, and 5) the average diameter of the growth of the fungi tested. The data collection method is based on observations carried out macroscopically and microscopically (visually with the senses) and documentation. The data obtained is then compared with the literature in books and supporting literature to identify the data. The Data Analysis Method is descriptive by describing or depicting the data that has been collected so that the results of the analysis of the average diameter of the fungus 7 days after inoculation (hs1) and 14 his (Susanti, et al., 2021)

## RESULT AND DISCUSSION

The results of observations after 7 days of inoculation against Beauveria sp. showed differences in morphology macroscopically and microscopically as in Figure 1 and Table 1.



(A) (B)

**Figure 1.** Macroscopic cross-section of the tested fungi (A) Beauveria sp 14 hsi (Document Susanti, 2021), and microscopic conidia of Beauveria sp (Afifah, et al., 2022)

**Table 1.** Results of macroscopic observations of Beauveria sp. at 7 and 14 days after inoculation at room temperature (270-320 C)

| **Chaacteristic** | **Description** |
|---|---|
| Top cross-section | Yellowish white |
| Bottom cross-section | White |
| Colony texture | White powder |
| Hyphae distribution | Zig-zag spread |
| Diameter 7day after inoculate(dai) | 12 mm |
| Diameter 14dai | 13,5 mm |

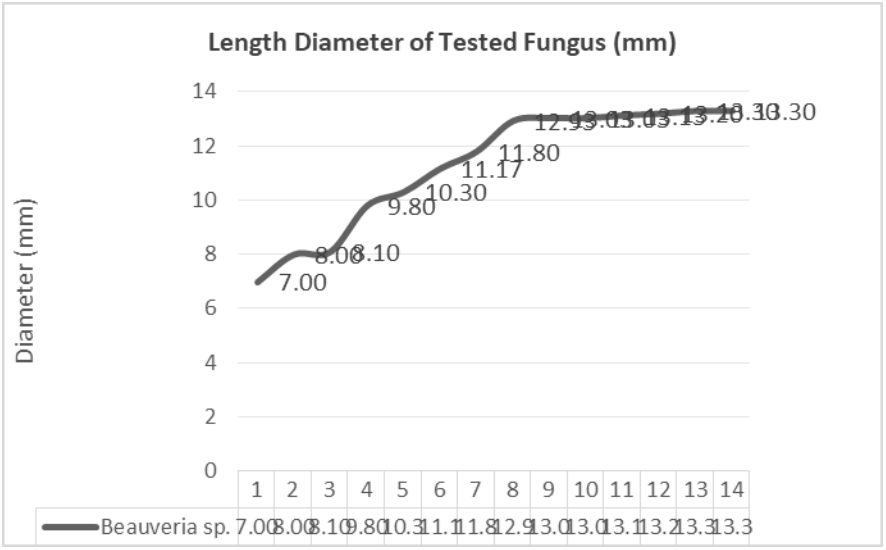



**Figure 3**. Graph of *Beauveria* sp. growth diameter at room temperature (27$^{o}$C -32$^{o}$C)

Based on Figure 1 and Table 1, it is known that the upper cross-section of Beauveria sp is yellowish white, while the lower cross-section is bone white. The shape of the colony is zigzag and spread, powdery white and septate (Figure 1A). The average diameter at 7 days is 12 mm while at 14 days the average is 13.5 mm. Widyasari et. al (2020) reported that the color of the Beauveria fungus colony is yellowish white. Beauveria fungi have conidiophores that branch with a zigzag pattern and at the ends are formed conidia that spread. Figure 1B shows microscopic observations of the shape of Beauveria sp spores which are generally round. Research shows that the conidia of the fungus are hyaline in a round shape, with a smaller size than the Trichoderma sp type. with a clustered location (Afifah, et al., 2022). Beauveria sp is active in producing spores or conidia that function as a means of asexual reproduction, distribution and a form of defense against an unsupportive environment. The above is related to the growth of fungal colonies that play an important role in their life processes. Therefore, it is necessary to observe the diameter of the colony to determine the growth of the tested fungi.
Based on Figure 3, it shows that the growth of the Beauveria colony diameter is growing rapidly. The growth character is relatively fast on day 1 day, already showing an average of 7 mm, then Beauveria sp has experienced a development of 2 mm on day 2. At 14 days, Beauveria sp experienced a development of around 13.5 mm. However, Beauveria sp experienced stagnation in its development until 14 days. The existence of stagnation conditions is suspected of several factors, including media, incubation room conditions, and the environment. Colony growth and fungal characteristics are greatly influenced by the media used for growth (Suprihatin, 2010). Beauveria sp requires more carbon and nitrogen for its hyphae growth (Wiradiputra, 1994). Conidia stored in a dark place for 365 days were still able to germinate 90%, while in bright conditions the germination power decreased by only about 30%. (Wiradiputra, 1994). The next factor is low humidity. Based on the humidity conditions at the research site, it ranges from 70-80%. According to Wiryadiputra (1994), the optimum relative humidity for the development of B. bassiana is 92% RH supporting the development of its spores. On the other hand, high humidity helps spores germinate which is followed by the formation of germination tubes. Room temperatures ranging from 27oC - 32oC support its growth and development. Beauveria bassiana is able to grow optimally in the temperature range of 15-30 oC (Bayu, et al., 2021), while Oliveira, et. al (2018) reported that it is more

tolerant to temperatures above 32 oC with the addition of oil carrier media. In addition to temperature, pH also affects the condition of Beauveria sp. conidia. Rizkie, et al. (2017) reported that the lower the pH of the in vitro media, the lower the viability and density of B. bassiana isolate conidia. Triasih, et al. (2019) reported that the growth of B. bassiana conidia is also influenced by the length of storage period.

## CONCLUSIONS

Based on the results of the study and observations, it was concluded that: The morphology of the upper cross-section of Beauveria sp is yellowish white, the lower cross-section of the isolate is bone white, the colony shape is zigzag and spread, the hyphae are white, powdery and septate. While the conidia of the fungus are hyaline and round. The diameter after H-7 and H-14 is around 8 and 14 cm respectively.

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