

Evaluation of mycelial growth of *Lentinula edodes* and *Ganoderma lucidum* originated from South Korea and Brazil

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ABSTRACT: The choice of strain, substrate, and environmental conditions are fundamental factors that determine the ability of a fungus to develop and produce mushrooms with high quality. The objective of this study was to compare the strains of *Lentinula edodes* and *Ganoderma lucidum* originated from South Korea and Brazil in relation to their vegetative development in different culture media, to obtain isolates with high quality. The strains of the two mushroom species from Brazil and South Korea grew slowly, possibly because of abiotic factors or storage technique used. However, it may be concluded that temperature, humidity, light, pH, and nutrients from the substrate, if not regulated appropriately may affect the vegetative species.

KEYWORDS: *Ganoderma lucidum*, *Lentinula edodes*, mycelial growth

Ganoderma lucidum (W. Curtis.: Fries) Karsten is known as "Reishi" or "Mannentake" in Japan and as Ling Chih and Ling Zhi (Mushroom of Immortality) in China. This fungus is most famous in the medicinal mushroom, particularly China, Korea, Japan and the United States. This species has a reddish stipe and purple-brown pileus or hat, shiny as if varnished. Stipe is long of varying size, pileus large with 5-15 cm wide. Bottom of pileus is presenting pores circular and whitish (Fig. 1). They can reach up to 40 cm in size. It is not edible because of its leathery structure, however, is widely used for drug manufacturing. It has been used as a nutraceutical, being well known for its antitumor, antiviral, and antiinflammatory properties among others

(Britto, 2000; Willard, 1990; Urban *et al.*, 2004). *G. lucidum* is a saprophyte of wood, which requires nutrients for their vegetative and reproductive growth. The main nutrients are carbon, nitrogen and minerals. In the artificial cultivation, many culture media can be used for the growth of mycelium. For the production of fruiting bodies, various materials can be used for crops such as rice straw, wheat, corn and grasses, however, the use of sawdust cultivation is important, because this fungus is Lignolytic, developing naturally in shells trees (Milles and Chang, 1997; Urban *et al.*, 2001, 2004).

Lentinula edodes (Shiitake) (Fig. 2) mushroom is the most popular and famous in China. Ranks second among the most consumed mushroom in the world, second only to the Champignon de Paris (*Agaricus bisporus*). Its use is for thousands of years by Asian people, particularly the Chinese and Japanese. According to the literature, this mushroom is from China and its

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Fig. 1. *Ganoderma lucidum*

growing primitive artificial date 900 years ago, and was later perfected by the Japanese (Lajolo, 1970; Zhanxi and Zhanhua, 2001). The fruiting bodies are especially delicious flavor and aroma that are appreciated by consumers. It is known for its nutritional and medicinal value. In China it is regarded as the "elixir of life" by providing necessary nutrients to human health. Some dietary fibers found in the cell wall of this fungus, such as β -glucans, have antitumor activity. Dietary fiber has laxative action, reducing the risk of cancer of the colon and rectum (Zhanxi and Zhanhua, 2001; Urben and Oliveira, 1998). *L. edodes* is a saprophytic fungus, extracting nutrients from the substrate by the mycelium which has fine texture, thin walls and aspect Cottonou. Grow well in artificial culture media laboratory at a temperature ranging between 20~28°C. Substances essential for their development are carbon, nitrogen and vitamins. These nutrients can be found in cultivation substrates: logs, sawdust, Cao Jun-(maidenhair fern, the kingdom cane, sorghum, elephant grass, sudan grass, etc.)(Lin and Lin, 1988, 1997;. And agricultural products (cotton seed, corn, wheat, sorghum, etc.).

The objective of this study was to compare the strains of *L. edodes* and *G. lucidum* South Korea with Brazil in relation to their vegetative development in different culture media to obtain isolates with high quality under the morphological and physiological.

The research was carried out in the Mushroom Embrapa Genetic Resources and Biotechnology in the period from April to May 2011. The strains of *L. edodes* and *G. lucidum* were obtained from the Collection of the Laboratory of mushrooms Cenargen (Brazil) and South Korea were coming from the fungal collection of the Rural Development Administration - RDA / Kopia. The aim was to study the viability of the isolates in different culture media: Potato Dextrose Agar (PDA), Tomato Juice (ST) and Basic Medium (MB) and compare them to the Brazilian species in relation to



Fig. 2: *Lentinula edodes*

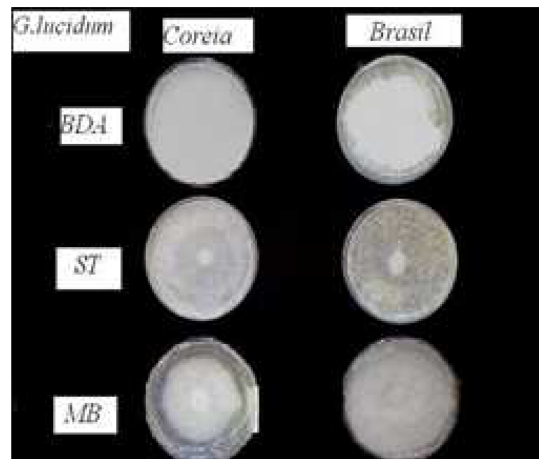


Fig. 3. Cultural aspects of *G. lucidum*, developed at 24°C in PDA, ST and MB, with twenty days of incubation.

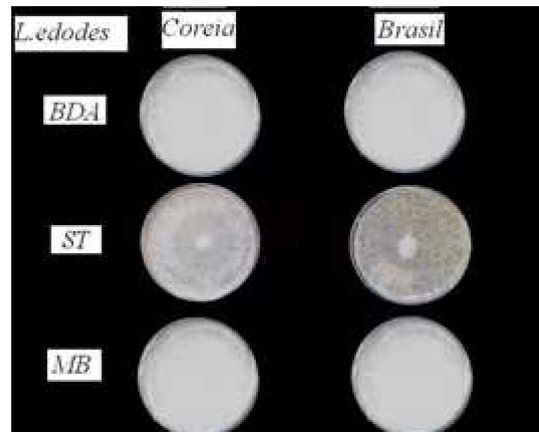


Fig. 4. Cultural aspects of *L. edodes*, developed at 24°C in PDA, ST and MB, with twelve days of incubation.

season. The species were transferred to culture media in petri dishes, each with ten replicates and incubated at a temperature of 22~27°C. The 4th day until the 20th day of incubation, we measured the diameter of the colonies, by observing the morphology of the species studied (Fig. 3, Fig. 4).

On PDA medium, the strains of *G. lucidum* in South Korea showed better vegetative growth at 16 days of incubation, while Brazil's only completed their growth at 24 days of incubation. In the middle of ST, was also the best result with the strains of South Korea The mycelial growth occurred with 17 days, while the Brazilian strains developed completely at 28 days of incubation. When used through the MB were identical for both countries. The mycelium has completed its development the plates with 20 days of incubation (Fig. 5, Fig. 6).

In relation to the cultivation of *L. edodes*, the results ?

***G.lucidum* - Brasil**

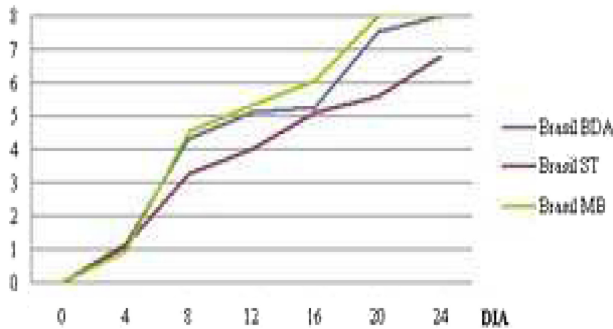


Fig. 5. Effect of culture medium BDA, ST and MB on vegetative growth of *G. lucidum* from Brazil, with 24 days of incubation

***L.edodes* - Brasil**

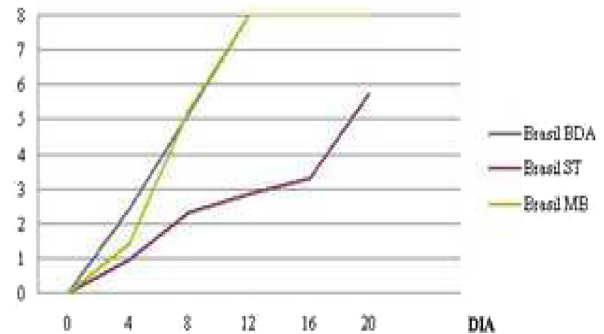


Fig. 7. Effect of culture medium BDA, ST and MB on vegetative growth of *L. edodes* from Brazil, with 20 days of incubation.

***G.lucidum* - Coreia**

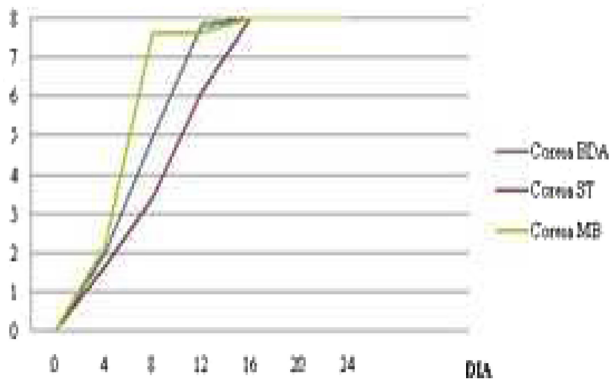


Fig. 6. Effect of culture medium BDA, ST and MB on vegetative growth of *G. lucidum* coming donates Korea, with 24 days of incubation.

***L.edodes* - Coreia**

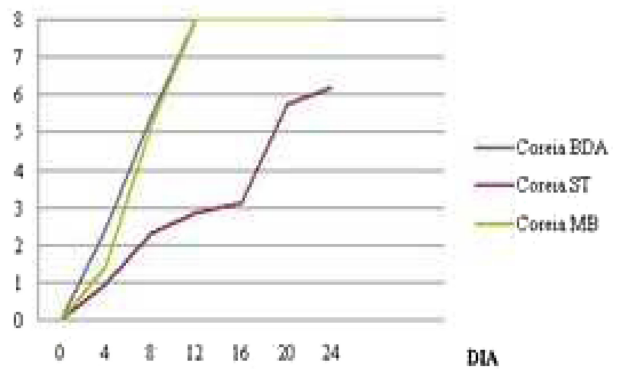


Fig. 8. Effect of culture medium BDA, ST and MB on vegetative growth of *L. edodes* coming from Korea, with 24 days of incubation.

were identical for both countries. In BDA, the mycelium has reached its maximum development at 12 days, in ST with 28 MB and 12 days of incubation (Fig. 7, Fig. 8).

In general, fungi (macro and micromycetes) grow well in artificial culture media lab, when incubated for 7~12 days at a temperature ranging from 25~28°C. Isolates of *G. lucidum* and *L. edodes*, in both countries were obtained from culture collection. The storage technique is very important for conservation and preservation of the species / fungal isolates and are relevant for both physiological and morphological comparison of species, and for future studies on genetic variability and studies on the nutritional and medicinal properties of mushrooms

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