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Isolation And Identification Of Pathogen Mushroom Types On Umbi Talas (*Colocasia Esculenta (L.)* Schoot) Post Harvest

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Abstract. The taro tuber (*Colocasia esculenta*) is an important source of carbohydrates for an important energy producer whose portion has a fairly bright and profitable development prospect. Taro is not only used as a food source, it can be used for industrial purposes, for example raw materials of cosmetics and plastic. Taro is very easy to recognize and varied with other preparations because it has a distinctive flavor. Increased production is the only major consideration in taro cultivation. Efforts to increase production are influenced by limiting factors that are often experienced in the community. Such barrier is a pathogen attack both on the ground and post harvest. The purpose of this study is to isolate and identify the types of pathogenic fungi found in taro tubers. The method used is microscopic and macroscopic identifications. The results of identification with the macroscopic and microscopic observations obtained by the genus Aspergillus, Candida, Sclerotium, Fusarium, Mucor, and Rhizopus..

Keywords: Taro, Identification, Pathogenic Fungi

I. INTRODUCTION

The taro tuber (Colocasia esculenta (L) Scott) is part of a brighter and profitable development prospect, an important source of carbohydrates as an energy producer in the tropics and sub tropics (Liu et al., 2006). Taro parts of tubers potentially as a source of high enough carbohydrates. Taro tuber as a food has good nutritional value because in addition there are carbohydrates also contain fat and protein (Adyuta, et al 2014).

Utilization of taro (C. esculenta (L) Scott) as a food ingredient has been widely known. In Indonesia, especially the city of Bogor is one of the largest taro producing cities. Production of taro tubers in Bogor reached 57,311 tons in 2008, and taro production centers spread in several areas in Bogor. Viewed from the average harvested area and the production of taro per area in 2006, there are five regions that are the largest taro producer in Bogor namely Residences of Tamansari, Cijeruk, Sukaraja, Kemang and Ciomas. Ciomas region has harvested area for taro plants about 49 hectares and production amount about 6970 quintals (Bappeda Bogor, 2008).

As a mainstay agricultural commodity in Bogor regency of West Java Province with high economic value, then increasing production is the only major consideration in taro farming business. Efforts should be made to enhance the diversification of taro-based products for various domestic uses and exports should be encouraged. Efforts to increase taro production is influenced by important limiting factors in the field, among others, the attack of plant diseases (Rukmana, 2002). One factor of production decrease is caused by fungal pathogen attack both on the land and on post-harvest (Semangun, 1996). Mushrooms that often attack the type of taro plants one of them is Phytophtora colocasiae. The fungus can decrease taro production by up to 50% in Hawaii (Uchida, 2002).

In Indonesia, the pathogenic fungus causing tuberculosis in tuberculum has not received attention, either on the tuber of taro that is still in the soil and tuber of taro post-harvest. This may be due to the fact that the attack rate is still low, so the loss of the results has not been considered economically meaningful, but this needs to be cautioned because the pathogen causing the disease continues to grow and spread widely and in turn will become an important pathogen in taro plants (Yunasfi, 2002).

II. RESEARCH METHODS

Sterilization Tool (Davet and Rouxel, 2000)

Glassware used (Erlenmeyer 250 ml, measuring pipette, test tube, petri dish) was sterilized using oven at 80oC for 3 hours. Ose and knife needles are sterilized by 75% alcohol and then burned directly on the spiral flame when used.

Making Isolation medium

The medium used for the isolation of pathogenic fungi from some taro tubers is a PDA medium. The

Volume 01, Number 01, February 2018
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medium for identification of pathogenic fungi is MEA medium. All media prior to use were first sterilized using autoclave at 1210C, 1 atm pressure for 20 min. After the media temperature reaches 400C, the media is poured in petri dishes and test tubes for use when isolating pathogenic fungi.

Isolation of pathogenic fungi (Ratnaningtyas. *et.al*, 2011)

Isolation of pathogenic fungi from several types of tuber taro is done by direct planting method. Several types of taro tubers are cut in 1x1 cm in aseptic size and then inoculated on a medium plate for PDA and incubated at room temperature for 3-5 days to develop mold mycelia. Identify the types of pathogenic fungi in each taro tuber.

Identification of pathogenic fungi is done by using macroscopic observation, ie looking at the morphology of the colony and mycelium. Colony observations include color, elevation and shape whereas mycelium includes color. Microscopic observations were performed using a microscope including spores and mycelium molds Data analysis Data obtained from isolation and identification of pathogenic fungal species were analyzed descriptively using Pitt and Hocking analysis (1995).

III. RESULTS AND DISCUSSION

The study of pathogenic fungi on taro tuber in Bogor area was done in 2 different sub-districts namely Ciapus and Tanah Baru subdistricts. Ciapus sub-district is planted with many types of jasmine taro while Tanah Baru sub-district is planted with lampung and bentul taro (Figure 1).

Figure 1. Taro morphology used. (A) .The Bentul Ground, (B) .The Japanese Red Wheel, (C) .Talas Lampung.

Isolation of pathogenic fungi carried out on tubers affected by disease / rot. Characteristic taro tubers are sick / rotten is a hole with a blackish brown, slimy but not smelly The sick / rotten bulbs then we cut by 1 cm and done planted directly on the medium MEA. Before the planting of sterile bulbs sterilized by using alcohol 30% then rinsed with aquades. Based on isolation results, there are 7 different isolates based on macroscopic morphology, mainly from the isolate color.

Figure 2. Morphology of Taro Tubers Infected with Pathogens. (A). Holes caused by fungi, (B) .Hole in the tubers with mucus.

Table 1. Identification Macroscopic fungal pathogens in taro tubers in the Bogor area

No	Name of isolate	Taro Types	Origin of Isolate	Colony Color	Colony Surface	Genus
1	LTB	Lampung Taro g	Tanah baru	Black	Cotton	*Aspergillus*
2	JC 1	Japanese Taro g	Ciapus	White Yellowish	Fibers	*Rhizopus*
3	JC 2	Japanese Taro	Ciapus	White	Cotton	*Rhizopus*
4	BTB	Bentul Taro	Tanah baru	White	Cotton	*Sclerotium*
5	JC3	Japanese Taro	Ciapus	White	Cotton	*Mucor*
6	JC4	Japanese Taro	Ciapus	White	Cotton	*Aspergillus*
7	JC5	Japanese Taro	Ciapus	White Yellowish	Cotton	*Candida*

Isolate Lampung Tanah Baru (LTB)

Figure 3. Macroscopic observations of LTB isolates in 7-day-old MEA medium (A) Macroscopic (B) microscopic

The New Lampung Soil Isolate (LTB) produced a clear color on initial growth, and the isolate changed color to black at day 7 in malt extract agar medium (MEA). Mycelium has a height of 0.5 cm on the 5th day growth, wavy edges, and textures such as cotton. Microscopic observations of LTB isolates have hyphae and hyphae have fragmentation or thickening. Based on the macroscopic and microscopic features as shown in Fig. 4. and referring to John I. Pitt and Ailsa D. Hocking (1995), it is known that LTB isolates belong to the genus Asperghillus.

1. Japanese Isolate Ciapus 1 (JC1)

The Japanese Isolate Ciapus (JC1) grows on the MEA medium by producing clear color of the isolate at the beginning of growth, and yellowish white on the 7th, flat edge, and thin text growth. Microscopic observations appear hyphae secured, and produce sporangium with a spherical shape at the tip of the hyphae. Based on the macroscopic and microscopic features as shown in FIG. 5 and referring to John I. Pitt

Volume 01, Number 01, February 2018
p-ISSN: 2615-3769 ; e-ISSN: 2615-3750

and Ailsa D. Hocking (1995), it is well known that the JPC isolates belong to the genus Rhizopus.

Macroscopic features Rhizopus surfaces propagate because it has a rhizoid and a hairy surface texture, the opposite of a white colony. Colony margin can not be determined because Rhizopus is growing very fast on the third day has filled petri dish. While the microscopic characteristics obtained are rhizoid, sporangia round to semi-round (Pitt and Hocking, 1995).

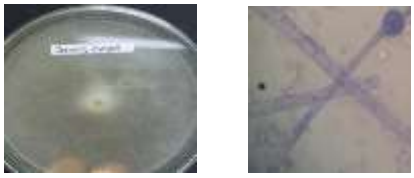

Figure 4. Observation of isolate JC1 in MEA medium (A) Macroscopic (B) Microscopic

2. Japan Ciapus (JC2)

It grows on the MEA medium by producing white isolate color, flat edges, and textures such as cotton. Microscopic observations appear hyphae, and produce sporangium with a spherical shape at the tip of the hyphae. Based on the macroscopic and microscopic features as shown in FIG. 6 and referring to John I. Pitt and Ailsa D. Hocking ((2009)), it is well known that the JPC isolate belongs to the genus Rhizopus.

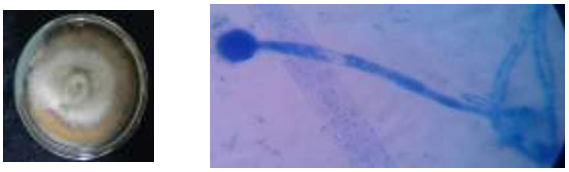

Figure 5. Observation of isolate JC 2 in MEA medium (A) Macroscopic (B) Microscopic

Growth of isolate JC 2 on MEA medium by yielding clear color of isolate at the beginning of growth, and yellowish white color at 7th day growth, flat edge, and thin texture. Microscopic observation appears hyphae is not insulated, and produces sporangium with a spherical shape at the tip of the hyphae. Based on the characteristics of macroscopic and microscopic it can be seen that the isolates of the type of taro japan red included in the genus Rhizopus John I. Pitt and Ailsa D. Hocking (1995).

Bentul Tanah Baru (BTB)

It grows on the MEA medium by producing white isolate color, flat edges, and textures such as cotton. While from the observation of the microscopic looks hyphae not insulated. Based on the macroscopic and microscopic features as shown in Fig. 7 and referring to John I. Pitt and Ailsa D. Hocking (1995), it is known that the isolate PTB belongs to the genus Sclerotium.

The growth of colonies on the MEA medium results in the color of white isolates, flat edges, and textures such as cotton. While from microscopic observation, the hyphae are not insulated, and form an angle <90º. Based on macroscopic and microscopic characteristics referring to John I. Pitt and Ailsa D. Hocking (1995), it can be seen that isolates derived from taro type of bentul belong to the genus Sclerotium. Sclerotium attacks the Japanese taro plants at various plant ages and generally attacks through young roots or stems. This is similar to the Sclerotium attack on cotton seedlings (Yulianti 1998), and against soybean seeds that cause wilt

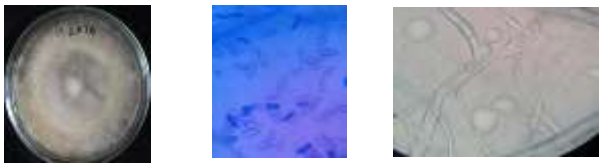

Figure 6. Observation of BTB isolate on microscopic (A) macroscopic MEA (A) medium

1. Japan Ciapus (JC3)

It grows on the MEA medium by producing white isolate color, flat edges, and thick textures such as cotton. While from microscopic observation, hyphae is not insulated, and produce sporangium with round shape at hypha tip. Based on the macroscopic and microscopic features as shown in FIG. 8 and referring to John I. Pitt and Ailsa D. Hocking (1995), it can be seen that the JPC isolates belong to the genus Mucor.

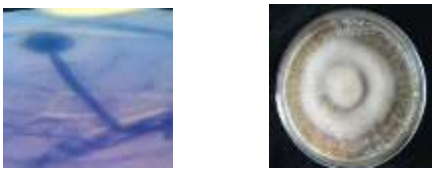

Figure 7. Observation of isolate JC 3 on MEA medium (A) Macroscopic (B) Microscopic

Mucor is included in the Zygomycetes class (sexual breeding with zygospora ie the fusion of two gametangium and asexuals with spores produced by sporangium). Macroscopically this fungus has a mycelium-like form of cotton, and microscopically this fungus has a stolon but has no rhizoid and its sporangiofor is shorter than Rhizopus (Pitt and Hocking, 1995). This type of fungus is cosmopolitan in soil and is often found in nuts, seeds, wheat, rice, and tomatoes (Gandjar et al, 1999).

2. Japanese Ciapus (JC4)

It grows on the MEA medium by producing a corrugated edge of the wound, and textur such as cotton. While the observation of the microscopic visible hyphen sealed, and spore-shaped round.

Volume 01, Number 01, February 2018
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Figure 8. Observation of Isolates JC 4 in MEA (A) Macroscopic (B) Microscopic medium

Based on the macroscopic and microscopic features as shown in FIG. 9 and referring to John I. Pitt and Ailsa D. Hocking (1995), it is known that JC 4 isolates belong to the genus Aspergillus. Aspergillus is one of the fungi derived from the phylum of Ascomycota, recognizable by the existence of oval, semibulate, or round conidial structures (Samson et al., 2004). In general, this fungus is saprophytic, can damage the agricultural produce in the savings (Semangun, 1996).

3. Japanese Ciapus (JC5)

Grows on the MEA medium by producing a clear color of the isolate, and turns yellowish white at 7th, flat edge, and cotton-like text. While from the observation of microscopic looks hyphae not insulated, and produce spores with a round shape. Based on the macroscopic and microscopic features as shown in Fig. 10 and referring to John I. Pitt and Ailsa D. Hocking (1995), it can be seen that the JPC isolates belong to the Candida genus.

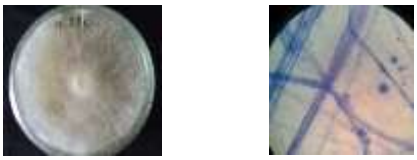

Figure 9. Observation of Isolate JC 5 in MEA (A) Macroscopic (B) Microscopic medium.

The Candida genus has a varied cell shape from round, oval, cylindrical to elongated, rarely apiculate, ogival, triangular or bottle shape with or without pseudohifa. Asexual reproduction with multilateral repayment. The Candida genus does not form ascospores, arthrospores, teliospores, or ballistospores, but chlamydospores may form in some species. Does not have carotenoid pigments so white to cream. Some Candida species can ferment, and some others do

IV. CONCLUSION

In a study of isolation, and identification of pathogenic fungi on taro tubers (Colocasia esculenta (L) Schoot), 7 isolates were obtained from 6 genera. The results of identification with the macroscopic and microscopic observations obtained by the genera Aspergillus, Candida, Sclerotium, Fusarium, Mucor, and Rhizopus.

Recommendation

1. Molecular identification is required, using the ITS (Internal Trancribed Spacer) area of ribosomal DNA (rDNA) to identify the scientific name up to pathogenic fungal species.
2. Need to do further test on the utilization of pathogenic fungi that have been found on taro tuber.

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