

Isolation and identification of pathogen fungi in the varieties of local rice, Aceh-Indonesia

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Abstract. Aceh's local rice is one of the plasma nutfah's wealth in Indonesia. However, the availability and awareness of the people in Aceh to utilize the quality seed of Aceh's rice are still very low due to pathogenic fungi that infected the seeds. The objective of this study is to identify the type of pathogenic fungi that carried out by the seeds of Aceh's rice. A Completely Randomized Design (CRD) consisting of the four varieties local of Aceh was designed with the parameter including the present pathogens that attack the rice seed and germination. The four varieties Aceh's seed namely: Sigupai variety (v1), Cantek maneh variety (v2), Cantek kuning variety (v3) dan Room kuning varietiy (v4). Data were analysed using ANOVA at 5% significant level and continued with the DMRT. The Results summarized that the Sigupai variety (v1) is the best low percentage of germination, approximately 45%, followed by room kuning (48.3%), maneh (56.7%), and cantek kuning (58.7%). These were caused by the pathogenic attacks which carried out in the form of *Aspergillus sp* and *Fusarium sp*.

1. Introduction

Sustainable agriculture as one of the agricultural systems that has a role to increase food crop production to achieve food self-sufficiency, increase production of industrial crops and export crops, realize domestic agro-industries, create jobs, and increase farmers' income. In order to create sustainable agriculture, the use of superior rice seeds is the first link in the process of crop cultivation. In plant cultivation activities, seeds are one of the main factors that determine success, especially local rice seeds. If the rice seeds used do not have high quality, the plants will not produce high yields.

Aceh's local rice is part of the plasma nutfah's wealth in Indonesia. However, the level of availability and awareness of the people of Aceh to use quality local rice seeds is still very low [1]. This is because the community generally uses rice from the previous year's harvest as seeds so that the quality of seed quality is low which results in people being reluctant to use local rice seeds. If this is allowed continuously, the existence of local rice varieties in Aceh will become extinct (critical) and will be replaced with other superior seeds of rice species. [2] Reported that several types of local rice whose presence is almost extinct, namely sigupai rice, cantek maneh rice, sirendeh rice, and others. Existence in local Aceh whose existence is almost extinct is caused by many pathogenic fungi that infect rice seeds so that the quality of the seed is low. Therefore, this study aims to identify the type of pathogenic fungi carried by local rice seeds.

2. Material and Methods

2.1 Material

The main material was rice local varietie Aceh from Meulaboh, Aceh, Indonesia. All chemical used for study were analytical grade and obtained from C.V Multikreasi Medan.

2.2 Method

2.2.1 Preparation of pathogen Fungi

Pathogenic fungi were isolated from some rice varieties local of Aceh including sigupai rice, cantek maneh, cantek kuning and room kuning. Pathogen fungi isolation was out for 7 days by incubating local rice in sterilized petri dish. The seeds are planted in a petri dish containing PDA media that have previously been given Chloramphenicol to prevent bacterial growth. For each medium 4 local rice seedlings of Aceh are planted with the same spacing between seeds [3].

2.2.2. Pufication and identification of pathogen fungi

The purification od the spora fungus was carrued out by transferring the fungus which has grown by 0.5 cm into the medium PDA. An identification book room from Nakagiri [4] is used as a reference to identify morphology and pathogen fungi covering macroscopis ana microscopic observations. The same colonies were considered in same isolate, and each representative colony was separated into isolated.

2.2.3 Identification fungi pathogen from local rice varieties Aceh

Characterization of pathogenic fungi is carried out macroscopically and microscopically. Macroscopic observations, namely direct observation, see the characteristics of the colony in the form, color and edge of the colony. Microscopic observation is the observation of the characteristics of fungi in the form of: hyphae such as color, insulating or not and the pattern of branching. Conidia in the form, shape and color. Konidiophores are colored, insulated or not, branched or not and the size of conidiophores. Observation of pathogenic fungi according to [5] .

2.2.4 Research Design

This study uses a Completely Randomized Design (CRD) consisting of 4 rice varieties local of Aceh, namely: sigupai varieties (v1), cantek maneh varieties (v2), cantek kuning varieties (v3) dan room kuning varieties.

2.2.5 Data Analysis

The parameters observed pathogens that attack rice seed and germination. Data were analysed using ANOVA at 5% significant level and continued with the DMRT [6]

3. Result and Discutions

Germination is the ability of the seeds to germinate after handling so that the seeds can germinate optimally [7]. Based on the data from the observation of the percentage of the ability to germinate 4 varieties of Acehese local rice seeds are shown in Table 1 below:

Table 1. Percentage of germination rice varieties local Aceh

Rice Varieties	Repeated			Average
	I	2	3	
Padi Sigupai	36	42	57	45 ^d
Cantek Maneh	56	38	76	56.7 ^b
Cantek Kuning	65	63	48	58.7 ^a
Room Kuning	31	38	76	48.3 ^c

Based on Table 1 shows that four Aceh rice varieties have a low percentage of germination, namely sigupai (45%), cantek maneh (56.7%), cantek kuning (58.7%) and room kuning (48.3%). Whereas the requirement for seed quality certification is at least 80% of the percentage germinating. This is because the number of pathogens carried by seeds attack rice seeds during germination so that the quality of rice seed quality is low (Figure 2). One of the pathogens carried by rice seeds is: *Aspergillus* sp and *Fusarium* sp. The presence of pathogens is caused by the storage of seeds carried out traditionally without regard to storage location so as to cause seed decline. In this case Kartono (2004) reports that although the storage water content is low, storage carried out in open space can cause high seed damage, decrease the percentage of germination, and short seed storage.



Figure 1.Percentage of germination (a) padi sigupai, (b) cantek maeh, (c) cantek kuning, and (d) room kuning

Based the results of observations carried out macroscopically and microscopically, two types of pathogens that attack local Aceh rice seeds were found: *Aspergillus* sp and *Fusarium* sp .

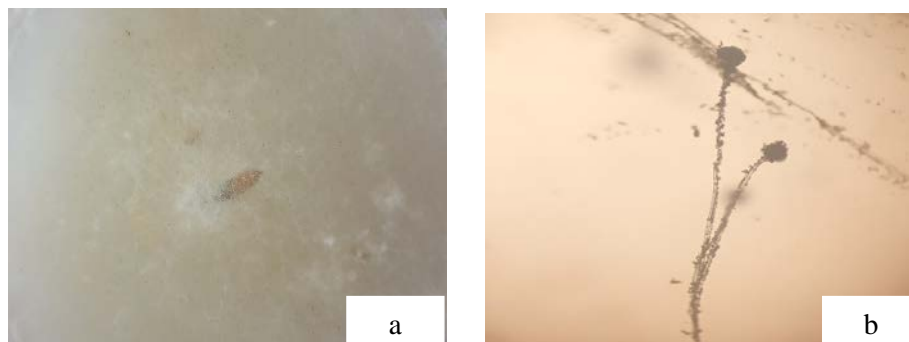


Figure 2. *Aspergillus* sp (a) macroscopic observation dan (b) microscopis observation

Aspergillus fungus is a group of facultative fungi or warehouses. This fungus infects the seeds with a moisture content of 13-18% and the temperature and humidity range between 20 ° -30 ° C and the condition of traditional seed storage. This can be a great opportunity for rice seed pathogenic fungi to infect rice seeds. *Aspergillus* sp fungus is white, dark brown. The head of the conidia is a structure located in the conidiophores and at the apex forms a globose structure. Non-branched conidiophores each produce a single conidial head [8]



Figure 3. *Fusarium* sp (a) macroscopic observation dan (b) microscopic observation

Fusarium fungus is a seed-borne pathogen. The characteristic of conidia is oval, consisting of 7 septa with hyaline color, the middle part is enlarged, the two ends of the conidia are tapered like a crescent moon. *Fusarium* fungus infection is caused due to supporting storage conditions for infecting seeds. While seeds stored in cans are not infected with fungi.

4. Conclusion

Based on the results of the study, it can be concluded that Aceh's rice local varieties have a low percentage of germination, namely sigupai (45%), cantek maneh (56.7%), cantek kuning (58.7%) and room kuning (48.3%) caused by pathogenic attacks the seeds carried in the form of *Aspergillus* sp and *Fusarium* sp.

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