

CHARACTERIZATION OF LOCAL DURIAN GERMPLASM BASED ON THE MORPHOLOGY OF FRUIT

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Abstract. One of the efforts to improve the quality and the conservation of local fruits like durian requires characteristic certainty of durian fruits according to the needs of plant breeders and tastes of consumers. Some durian germplasm at Hortimart Agro Center in Central Java have been successfully characterized. There are 43 accessions with 18 characters covering 64 character states of fruit. The dendrogram showed that those 43 accessions split into 2 groups. Durian Kartomarmo separated from the other 42 accessions. Durian Kartosumarmo has a unique characteristic on its fruit, which has an apex with irregular shape (mammiform). Some durians which have good taste, such as durian Bismo, Cokro, Janoko, and Petruk were grouped together with durian Monthong. The coefficient similarity in 43 accessions of the durian fruit is between 0.44-0.86. The diversity of accessions based on the fruit morphology showed that these 43 accessions were different and not a duplicate of different accessions. It shows that each of accession should be categorized as a different cultivar since there are many other characteristics that have not been observed.

Keywords: morphology of fruit, durian, local cultivars

INTRODUCTION

Southeast Asia is the center of durian diversity, including Indonesia with the greatest durian diversity in Borneo. Around the world, 30 species of durian (genus of *Durio*) have been identified, 14 species of which were endemic in Borneo and generally grow wild in the forest (Kimman 2002). Durian cultivars and clones which are were developed and cultivated in Indonesia, especially *Durio zibethinus*, 28 cultivars of which have been known as superior durian (Reza 2002).

In general, farmers cultivate local durian cultivars. Characteristics of local cultivars are usually not clear. It can lead the farmers to the mistake in choosing local cultivar for commercial purposes. The certainty of durian identity is also required for breeding programs. An important characteristics that always generated is the reproductive form such as fruits. The fruit characteristic

is most commonly used as a marker of durian cultivar. Based on morphological characteristics, durian cultivar could be determined precisely using the fruit that will develop after the plant reach minimum 8 years of age (Irian Jaya Agricultural Information Center 1993), especially for plants that are propagated through seeds.

Durian production in Indonesia an average of 500-700 thousand tons per year of the total land area of about 60 thousand hectares (Anonymous 2012). It is far below the production of Thailand and Malaysia with a total area respectively

153 and 107 thousand hectares. The production of local durian can not fulfill the demand of domestic market. Low supply of local durian made the demand pushed to be very high. It made the imports increased and the market was dominated by durian Monthong from Bangkok. Local durian with high diversity open up opportunities to improve the quality of local durian so that it becomes the main choice of consumers, both domestically and for export.

Hortimart Agro Center in Central Java has a collection of local durian germplasm, that consist of 110 accessions, with an erratic fruit quality and productivity. Related information about superior characteristics of durian is still very low. Characterization using morphological markers have not been done, so the information related to the identity of the phenotype, especially the fruit from the collection still does not exist. The purpose of this study was to characterize the durian accession on Hortimart Agro Center's collection based on the morphology of fruit as one of the important agronomic traits as well as identifying duplicate accessions collection of durian..

to increase the efficiency and effectiveness of the use of germplasm, germplasm information exchange between places of collection, and to detect any durian accession duplicates.

METHODS

Morphological characterization was conducted on durian fruit collection of Hortimart Agro Center in Central Java. Fruit characters were observed according to the Descriptors for Durio (*Durio zibethinus* Murr) (Bioversity International, 2007). Characterization is based on the presence of the character and character states of the fruit that can be observed during the period from February to April 2015, as long fruit stalk; the density of spines; and the intensity of the color. Jaccard coefficient using similarity of qualitative data (SYMQUAL) procedure was used to estimate of similarity between the accessions. Analysis of clustering was performed using sequential, agglomerative, hierarchical and nested (SHAN) procedure by NTSYSpc version 2.02 (Rohlf 1998).

RESULTS AND DISCUSSION

The characters and character states of the fruit morphology was observed in 43 of 110 accessions durian (Table 1).

Table 3. Collection of durian accessions which has been characterized

No	Accession Name	No	Accession Name	No	Accession Name
1.	Janoko	16.	Mustiko	31.	Rambutgeni
2.	Jangkar Bumi	17.	Tirtonoto	32.	Noroyono
3.	Arjuna	18.	Bismo	33.	Ajimah
4.	Ontoseno	19.	Yomodipati	34.	Semar
5.	Bimo	20.	Pancatnyono	35.	Gondomono
6.	Romowijo	21.	Ontorejo	36.	Monthong
7.	Botorokolo	22.	Dewi Sinto	37.	Suryo 2
8.	Suryo 1	23.	Jagal Bilowo	38.	Kolosrenggi
9.	Sugriwo	24.	Trijoto	39.	Duryudono
10.	Abiyoso	25.	Pendowo	40.	Ngastino
11.	Ponconoko	26.	Ngalengko	41.	Banowati
12.	Pasopati	27.	Surtikanti	42.	Kartomarno
13.	Gareng	28.	Cokro	43.	Rahwono
14.	Pancasona	29.	Mahesosuro		
15.	Petruk	30.	Lembusuro		

All characters of the fruit that was observed covering 18 characters with 64 character states (Table 2).

Table 2. The characters and character states of 43 durian accessions

No	Character	Character states	No	Character	Character states
1.	Fruit dehiscense	a. No b. Yes	10.	Fruit spine shape	a. Hooked b. Convex c. Pointed-convex d. Concave e. Pointed-concave f. Conical g. Pyramidal
2.	Fruit shape	a. Oblate b. Globose c. Oval d. Oblong e. Elliptic f. Obovoid g. Ovoid	11.	Surface of spine	a. Glabrous b. Not glabrous
3.	Shape of fruit apex	a. Pointed b. Convex c. Mammiform d. Truncate e. Depressed	12.	Fruit spine density	a. Sparse b. Intermediet c. Dense
4.	Shape of fruit base	a. Depressed b. Necked c. Convex d. Truncate e. Concave f. Acute	13.	Fruit spine length (cm)	a. Short (< 1.0 cm) b. Intermediate (1,1-1,5 cm) c. Long (>20 cm)
5.	Blossom end	a. Small b. Large	14.	Fruit length	a. Short (<20 cm) b. Intermediate (21- 30 cm) c. Long (>30 cm)
6.	Fruit stalk length	a. Short b. Medium c. Long	15.	Fruit diameter	a. Narrow (<15 cm) b. Intermediate (16-30 cm) c. Width (>31 cm)
7.	Fruit stalk attachment	a. Weak b. Strong	16.	Fruit weight	a. Very light (< 0,8 kg) b. Light (0,9-1,5 kg) c. Medium (1,6-2,5 kg) d. Heavy (2,6-4,0 kg) e. Very heavy (>4,0 kg)
8.	Fruit stalk colour	a. Green b. Greenish brown c. Brown	17.	Fruit skin colour	a. Green b. Brownish green c. Yellowish green d. Greenish yellow e. Yellow
9.	Fruit spininess	a. Spiny	18.	Fruit skin colour intensity	a. Light b. Dark

The genetic diversity of local durian accessions in the collection were exhibited by dendrogram in Figure 1. At the coefficient similarity of 0.44, the dendrogram showed 2 main clusters. Only Kartomarmo accession in the first cluster was separated from another accessions in the second cluster.

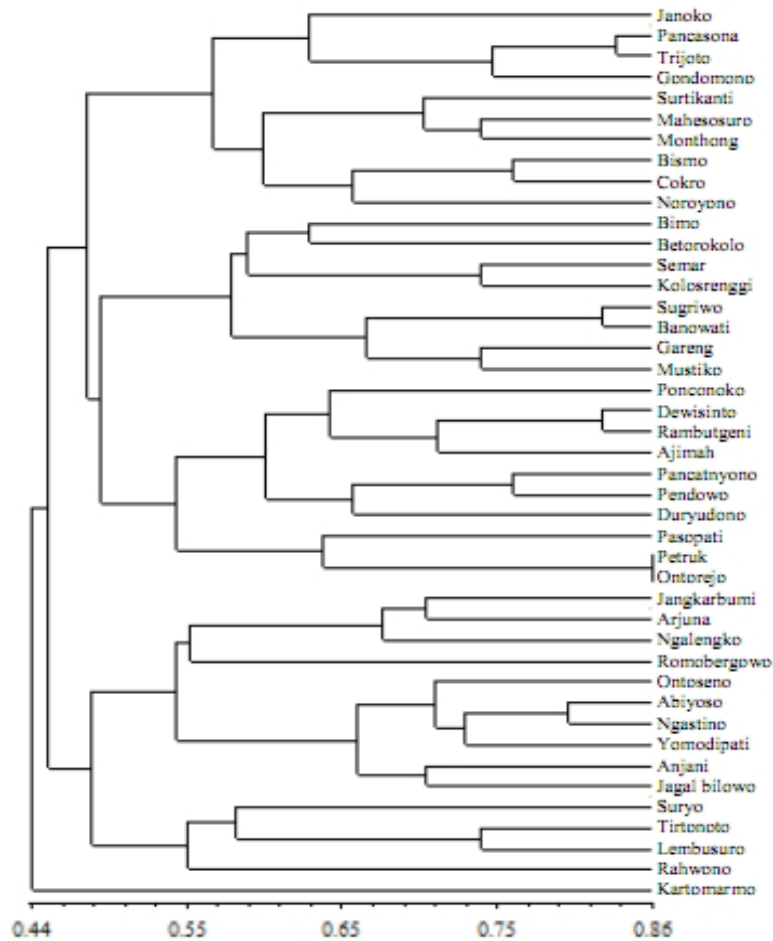


Figure 1. The dendrogram of 43 accession durian based on morphological characters of the fruit

Clustering analysis based on 18 characters with 64 character states of morphological fruit showed that 43 accessions are no duplicate. The similarity between accessions based on the fruit morphology that had been observed is between 0.44-0.86. Kartomarmo accession is the only accession which have different form of the fruit apex which called mammiform. Most of the fruit that had been observed have convex shape on its apex. Some durians which have good taste, such as durian Bismo, Cokro, Janoko, and Petruk were in the same group with durian Monthong. Petruk similarity to Monthong also detected in clustering analysis using RAPD markers (Ruwaida et al 2009). Monthong is a marketable thailand durian cultivars in Indonesia. It means that Petruk, and even Bismo and Cokro which have a greater similarity to Monthong than Petruk, are expected to have a potential to be developed into a durian that meets consumers demand. Monthong dominance on the domestic durian market is expected to be taken over by a qualified local durian.

The diversity of accessions based on durian fruit morphology showed that 43 accessions of durian is not a duplicate of different accessions. These accessions can be categorized as different cultivars, since there are many other features that have not been observed. Observation about other characters and character states, including physiology and biochemical, is important to complement the characters and character states that can be used to improve crop quality, especially the quality of the fruit. For example, when Monthong durian fruit is ripening, sulfur-containing volatiles production appears to be abolished in all fruits kept in low temperature storage. Keeping these fruits for three more days in ambient condition recovered their capacity to produce the sulfur-containing compounds (Maninang et al, 2011). This information is important for the distribution management of fruit marketing.

Durian germplasm of Hortimart Agro Center's collection were a varied germplasm and some of accession has some similarity to Monthong. There are 67 of 110 accession from the durian collection that have not been characterized. In the next growth cycle, we expect that the characterization on all important characters and character states of all durian accession is complete, so the durian collection database can be arranged.

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