Diversity Tree Varieties Mango (*Mangifera indica* L.) in Critical Areas

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ABSTRACT
Critical land is often a problem in various regions in Indonesia, especially in the Jombang district. Various efforts have been made by the community in tackling the critical land they face. One of them is by cultivating mango trees. In the Jombang district, there are quite a lot of mango trees with various varieties. This study aims to determine the diversity and dominance of mango varieties growing on critical land in Plandaan District, Jombang Regency. This research was conducted by purposive sampling in 3 villages with a total sample of 30 yards/gardens, based on the availability of data and information in the field. This research was conducted using a quadratic transect method by determining the research location by purposive sampling with a plot size (20x20 m^2). Data analysis was carried out qualitatively and quantitatively. Quantitative data analysis using vegetation analysis, namely: density (Kr), Frequency (Fr) Important Value Index (INP), Dominance (C), and Diversity Index (Ĥ). From the results of the study, it was found that 7 varieties of mango were planted by the community on critical land in the Plandaan District, the mango that was most widely cultivated by the community was the Gadung mango. The existence of other varieties of mango is only found in very small quantities and has begun to be abandoned by the community.

Keywords: Critical Land; Diversity; Mango Varieties.

INTRODUCTION

In Indonesia, the area of critical land is always increasing every year. This condition occurs because of the impact of the implementation of development that does not heed the principle of environmental balance and lack of soil and water conservation efforts. Developments related to land development that has been ongoing so far are planned and implemented without being based on adequate information about the capability and suitability of land resources. As a result, optimization of land use is not achieved, in fact, there are many transfers of land use that are against the principle of land use (Nugroho, 2000); (Nurhadi et al, 2020).

Various ways are carried out by the community in overcoming critical land, including by cultivating mango plants. Mango is one of the superior tropical fruit favored by people in the world. The Best Loved-Tropical, accompanying durian's popularity as the King of Fruit. Indonesia, including East Java, is the center and source of various tropical fruit varieties and their biodiversity (Oktavianto et al., 2015); (Roosenani et al, 2020). Mango (*Mangifera indica* L.) is a fruit plant that has the potential to be developed because it has a high level of genetic diversity. The high variation in the shape, size, and color of mango leaves indicates a fairly wide genetic diversity (Nilasari et al., 2013).

Vegetation analysis is a way to study the composition and composition of vegetation in the form (community) of plant vegetation. The calculated vegetation analysis is relative density, absolute density, relative frequency, absolute frequency, relative dominance, absolute dominance, and important value index. Vegetation analysis serves to obtain quantitative data about the structure and composition of a plant community (Sari et al., 2018); (Hakim et al, 2020).

Based on the description above, it is encouraging to conduct research on the diversity and dominance of mango tree vegetation, which is useful for developing the potential of critical land. The purpose of this study was to determine the index of diversity and dominance of tree vegetation on critical

land in Plandaan District, Jombang Regency, East Java.

METHOD

This research was conducted purposively based on the availability of data and information in the field as many as 30 samples. The parameters observed were manga plants in the Plandaan sub-district, which consisted of 3 villages, namely Pojokklitih Village, Tondowulan Village, and Darurejo Village. From each village 10, gardens or community yards were taken. The tools used in this research are stationery, camera, meter. The materials used were notebooks, observation sheets, 20 x 20 m2 plots, and yard tree vegetation in the research location. The vegetation of a plant was analyzed quantitatively to explain the diversity and structure of the vegetation. Plant vegetation is done by looking for Density, Frequency, Dominance, Important Value Index (IVI), and Diversity Index.

Important Value Index (IVI):

$$\text{Density} = \frac{\text{number of individuals}}{\text{total plot area}}$$

$$\text{Relative density} = \frac{\text{density of species}}{\text{total density of all species}} \text{ x } 100\%$$

$$\text{Frequency} = \frac{\text{number of plots in individual}}{\text{total of number plots}}$$

$$\text{Relative frequency} = \frac{\text{frequency of a type}}{\text{total frequency of all type}} \text{ x } 100\%$$

IVI = Relative density + Relative Frequency

Species diversity index (H')

$$H' = -\sum_{i=1}^{S} P_i \ln P_i$$

Where :
H'   : Species diversity index
P_i : Opportunity of interest for each species = ni/N
ni   : Number of individuals per species
N   : Total Number of Individuals

According to Magurran (1988), the Shannon-Wiener diversity index is categorized as follows:
H' < 1   : Low diversity
1 < H' < 3 : Medium diversity
H' > 3   : High diversity

Domination Index (C):

$$C = \sum \left(\frac{n_i}{N} \right)^2$$

Annotation:
C   : Dominantion Index
ni   : Value of importance for each species
N   : Total of importance

Dominance index results criteria:
0 < C < 0.5 : No dominant type
0.5 < C < 1 : There is a dominant type (Odum, 1998)

RESULT AND DISCUSSION
Result

The results of research that have been carried out in Pojokklitih Village, Tondowulan Village, Darurejo Village as an area identified as critical land in the Plandaan sub-district, Jombang Regency, East Java, obtained 7 varieties of mango. The mango varieties found consisted of Gadung, Manalagi, Podang, Bajul, Apel, Bapang, Kweni varieties.

Table 1. Mango Varieties On Critical Land in Pojokklitih Village, Plandaan District, Jombang Regency, East Java

NO	Name of Mango Variety	Σ	IVI(%)	C	H'
1	Gadung	75	180,72	2,18	-0,09
2	Manalagi	2	4,82	0,06	-0,09
3	Podang	1	2,41	0,03	-0,05
4	Bapang	2	4,82	0,06	-0,09
5	Bajul	1	2,41	0,03	-0,05
6	Kweni	1	2,41	0,03	-0,05
7	Apel	1	2,41	0,03	-0,05
	Total	83	200,00	2,41	-0,48

Table 1 shows that in Pojokklitih Village there are 7 varieties of mango with a total of 83 individuals. The most common variety found was the Gadung variety, which was 75 varieties or 90.36% of the total mango varieties. Pojokklitih Village has more varieties than Tondowulan Village and Darurejo Village.
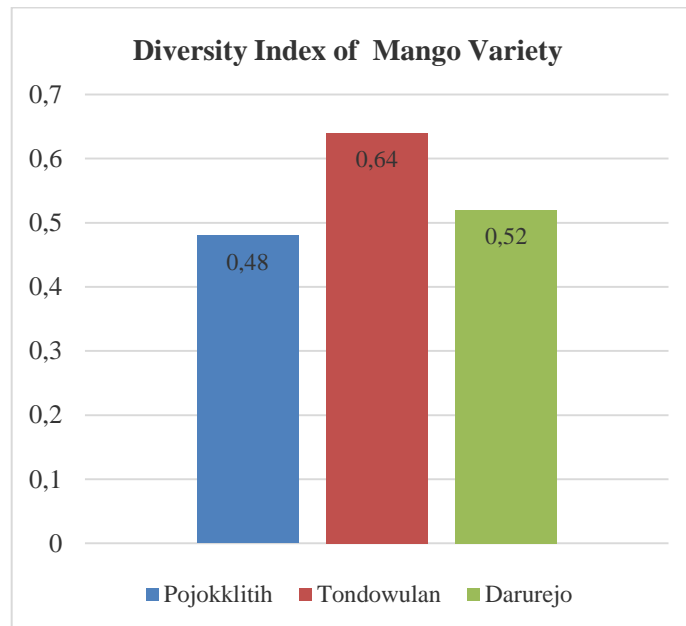
Table 2. Mango Varieties On Critical Land in Tondowulan Village, Plandaan District, Jombang Regency, East Java

NO	Name of Mango Variety	Σ	IVI (%)	C	H'
1	Gadung	105	164.06	1.28	-0.16
2	Manalagi	16	25.00	0.20	-0.26
3	Podang	3	4.63	0.04	-0.09
4	Bajul	1	1.56	0.01	-0.04
5	Apel	3	4.69	0.04	-0.09
	Total	128	200,00	1.56	-0.64

Based on table 2, it can be seen that Tondowulan Village has at least 5 varieties, but the number of individuals reaches 128. In table 3 it is noted that Mango Gadung remains the most widely cultivated variety by the local community, which is 105 trees or 82.03% of the total population. total mango trees studied. The abundance of Gadung mango trees shows that this mango variety is in great demand for planting by the community, besides the tree has the ability to grow quite well on critical land.

Table 3. Mango Varieties On Critical Land in Darurejo Village, Plandaan District, Jombang Regency, East Java

NO	Name of Mango Variety	Σ	IVI (%)	C	H'
1	Gadung	61	176.81	2.56	-0.11
2	Manalagi	4	11.59	0.17	-0.17
3	Podang	1	2.90	0.04	-0.06
4	Bapang	1	2.90	0.04	-0.06
5	Bajul	1	2.90	0.04	-0.06
6	Kweni	1	2.90	0.04	-0.06
	Total	69	200.00	2.90	-0.52

Figure 1. Mango Variety Diversity Index On Critical Land in Plandaan District

The diversity index (H') of Mango varieties on critical land in Plandaan District showed different results as shown in Figure 1. Pojokklitih Village with a diversity index of 0.48%, Tondowulan Village with a diversity index of 0.64%, Darurejo Village with a diversity index of 0.52%. Of the 3 villages that have been studied, the highest level of diversity is found in Tondowulan Village. The number of trees found was 5 varieties of mango with a total of 128 trees and a total diversity index of 0.64% associated with the diversity index category <1.00 of low diversity.

Discussion

Compared to two other villages that have been studied, it shows that Tondowulan village has the highest diversity of mango varieties, both in the number of species and the number of trees cultivated. This is because in Tondowulan village the majority of the population still has a large yard and the community still makes efforts to use their yard to plant mango trees even though the area is classified as a village with critical land. The diversity index can be used as an indicator that describes its support for the stability of an ecosystem. The size of the index value of plant diversity in the yard can give an indication of how much support the ecosystem supports for settlements (Yulianti et al., 2018).

The gadung variety mango has a higher INP (Important Value Index) than the others because the variety dominates in several villages which causes the dominance value to be high. Gadung mango can grow in lowlands and warm temperatures (25-320C), the taste of the fruit is sweet, so it is favored by various levels of society, especially the people of Pojokklitih Village, Tondowulan Village, and Darurejo Village. The high and low Importance Value Index of plant species shows that these plants have roles and benefits for people's lives (Hasnah et al., 2016).

The results of the study of mango varieties on critical land in Plandaan District, the Gadung variety, dominates, while other varieties have started to be abandoned. According to the local community, the mangoes that are being abandoned include varieties of Podang, Kweni, Bajul, Bapang, Apple, etc. because people don't like these varieties because they don't taste good and the selling price is cheap. Local varieties of mango are starting to be abandoned by the community and are experiencing genetic erosion so that it needs to be preserved (Utami et al., 2019).

CONCLUSIONS

Based on the results of research conducted on critical land in Plandaan District, Jombang Regency, East Java, it can be concluded that there are 7 varieties of mango trees. Diversity index in Pojokklitih Village with a diversity index of 0.48%, Tondowulan Village 0.64%, Darurejo Village 0.52%. With an average diversity index of 0.55%, it can be categorized as low. From the results of the research, the variety most commonly found or planted by the community is the gadung variety mango.

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