International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 6, Issue 3
April, 2019
Pages; 608-613

Investigation of Utilizing Coffee Commodities toward Land Suitability, Case Study: Mane Village, Aceh Province

Muhammad Akbar; Abubakar Karim; Sugianto

Master of Land Resource Conservation, Faculty of Agriculture, Syiah Kuala University, Indonesia

http://dx.doi.org/10.18415/ijmmu.v6i3.857

Abstract

The characteristics of tropical forests in Indonesia produce various types of plants that can be used to improve the economic sector of the surrounding communities. The study is carried out on several suitable plants to be cultivated. Coffee plants such as Arabica Coffee (Coffea arabica) and Robusta coffee (Coffea Canephora) are one of them. It will be conducted to figure out whether coffee plants are sufficiently feasible to be cultivated especially in Mane Village, Aceh Province, which is the location of the research. Feasibility of coffee plants is reviewed from soil analysis based on the soil research center (1983), land suitability and slope class. The results show that coffee plants are feasible to be used as one of the potential cultivated commodities.

Keywords: Arabica and Robusta Coffee; Soil Characteristic; Land Suitability; Slope

Introduction

The investigation on forest characteristics are carried out to determine the reality of forest management activities towards economic growth, especially for people living around large and untapped land. Some activities that can be carried out to increase economic growth in some areas through planting coffee plants. Coffee is one of the potential export commodities for Indonesia where based on data from the International Coffee Organization (ICO) in 2012 Indonesia was some of the largest coffee producer in the world after Brazil and Vietnam with coffee export volume reaching 74.7% from 7.3 million bags in 2011/12 to 12.7 million of world coffee production. Indonesia also ranks the fourth among the world major coffee exporters after Brazil, Vietnam, and Colombia. Production of Indonesian Robusta coffee reached 74%, while the remaining was from Arabica coffee production (Rosiana, et al,. 2018; Direktorat Jenderal Perkebunan, 2015). During the period 1990–2015, Indonesia experienced a decrease in exports of 0.0061%. In contrast, coffee export in Brazil, Vietnam, and Colombia increased by 1.06%, 17.58%, and 0.0056%, respectively (Rosiana, et al,. 2018). Dias (2015) state that most coffee is currently the result of both types of coffee starting from the process of roasting and pounding which is then mixed. The seeds of both types of coffee are distinguished by color, shape, and size.

In addition, Robusta coffee production levels reached more than 601 thousand tons (80.4%) and Arabica coffee production reached more than 147 thousand tons (19.6%) (Immanuel., 2017; International

Coffe Organization). In the export sector, the level of consumption of the Indonesian people towards coffee is also high. (Rahmaddiansyah et al., 2015; AEKI 2012) state that the level of coffee consumption in Indonesia based on the results of the 1989 University of Indonesia LPEM survey was only 500 g / capita / year, but in 2012 it reached 800 g / capita / year.

In terms of land, an evaluation of the land suitability system is specifically related to the growth of coffee plants themselves which functions to regulate risk in the matter of the coffee crop system which usually requires a higher initial investment because these coffee plants are plants that grow in order to a long period. (Estrada et al, 2017; Bertrand et al., 2011; Haggar et al., 2011; Silva et al., 2013; Wang et al., 2015) Some of the risks commonly encountered by some coffee farmers are market failure, pests and climate changes, so this coffee plant also depends on the conditions around it. For instance, rainfall requirements depending on the retention properties of the soil, atmospheric humidity and cloud cover, as well as cultivation practices. The optimum annual rainfall range in particular for Arabica coffee about 1200-1800 mm (DaMatta et al,. 2008; Alègre, 1959). For robusta, it has a similar range seems to be required, eventhough it adapts better than arabica to intensive rainfall exceeding 2000 mm (DaMatta et al,. 2008; Coste, 1992). For both species (Arabica and Robusta), a short dry spell, lasting two to four months, corresponding to the quiescent growth phase, is important to stimulate flowering (DaMatta et al,. 2008; Haarer, 1958). Another conditions that must be fulfilled to plant coffee plants in terms of biophysics such as climate, temperature can be seen in table 1.

Table 1 Coffee Plant Requirements for Several Conditions

No	Plant Type	Growing conditions			
		Climate (rainfall, mm / th)	Altitude (masl)	Average Temperature (oC)	Soil (pH)
1	Robusta Coffee	1.500 – 3.000	300 – 600	19 - 32	5,5 – 6,5
2	Arabica Coffee	2.000 – 4.000	700 – 1.400	16 – 24	5,5 – 6,0

From this coffee plant cultivation process, Aceh province is one of the regions in Indonesia that has the potential to produce coffee plants from both the Arabica and Robusta species.

Coffee is one of the biggest commodities produced in the Aceh Province. Aceh Province and also North Sumatra Province accounted for more than 50% of Afabika's type of coffee production in Indonesia. The coffee market which has a specialty taste is growing rapidly, especially in the main consumer countries (Wahyuni et al., 2013). Based on (Wahyuni et al., 2013; NCA. 2008) reported that coffee consumption in the United States increased from around 14% to 17% in 2008. Two types of coffee that can be produced and increase the economic sector in Aceh namely Arabica coffee and coffee Robusta. The area which is one of the strategic areas which will be carried out further research on the potential of coffee plants is in Mane Village, Pidie District, Aceh Province.

In this paper, the research conducted is primary by conducting direct testing on the site in the form of analysis of the soil in terms of physical-chemical properties, feasibility of existing land and how slope is needed especially for coffee plants of Arabica and Robusta species.

The reminder 0f this paper is organized as follow : in the next section will be discussed about Arabica and Robusta coffee plants based on several previous studies. In the third part, we will explain the

method of research that will be conducted. The results obtained start from the nature of the soil at the research location and whether coffee plants are suitable in order to cultivation will be given at the end.

Methodology

In the content of utilizing Arabica coffee and Robusta Coffee, the research method are used survey method with descriptive analysis. For data used, it includes primary data and secondary data. Primary data is obtained through direct surveys in the field, while secondary data is obtained from relevant agencies and literature studies, respectively.

In collecting primary data, several observation sites were prepared in terms of taking soil samples at the research sites, namely Mane Village, Pidie District. Identification of soil morphology involves slope data using Abney Level measuring instruments, characteristik of rock, Cation Exchange Capacity (KTK) and the basic of saturation (KB).

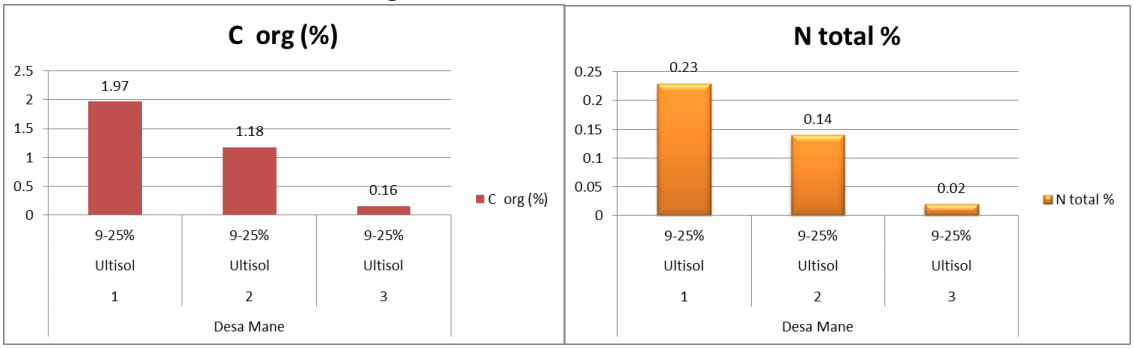
The additional data, identifying the physical-chemistry properties that involve the contain of P (phospor) is using the Bray II method and also checking the contains of Organic C with the Walkkley and Black methods. These values will then be used as a reference in determining the use of arabica and robusta coffee plants based on a land suitability classification system for certain uses (FAO, 1996) in the Mane Village area, Pidie District.

Result and Discussion

Soil characteristic analysis

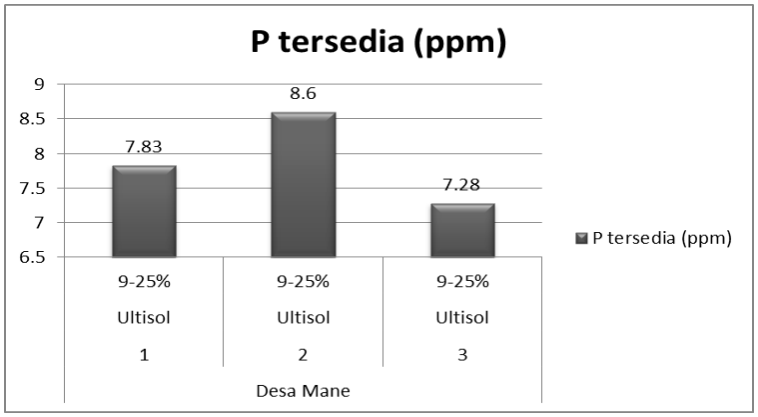
Several parameters in determining the analysis of soil characteristics in Mane Village, Pidie District showed several differences in each observation site. There are three observation sites that have been identified as having conformity to coffee plants of Arabica and Robusta species. In this case, the level of the slope that corresponds to the coffee plant is in the range of 9-25% with the type of soil obtained is Ultisol. Ultisol is a result obtained based on information from PPT (1983), in terms of the level of soil fertility, it was found that the soil fertility rate was at a low criterion. This is based on the value of the limiting factor for Organic C content, total N, available phosphorus content (P-av), Cation Exchange Capacity (CEC) and base saturation (KB) which are very low to moderate.

Figure 1 Content of C and N on Soil



In Figure 1, there are comparisons on the three observation sites that are suitable for coffee plants. The value of C and the value of N indicates that it is in the low to moderate range. The value of C is in the range 0.16-2.00% and the value of N is at 0.02 - 0.23%.

Figure 2 Content of Phosfor (P)



For Phosphorus (P) values, can be seen in Figure 2 where the available values are in the range of 7.00-8.6 ppm. This value indicates that the phosphorus content is in the medium range. For CEC values in the range of 16-24 me / 100 g which are in the medium range and the Basis Saturation value (KB) is in the range of 33-68% which included in the high class.

Figure 3 Content of Cation Exchange Capacity (KTK)

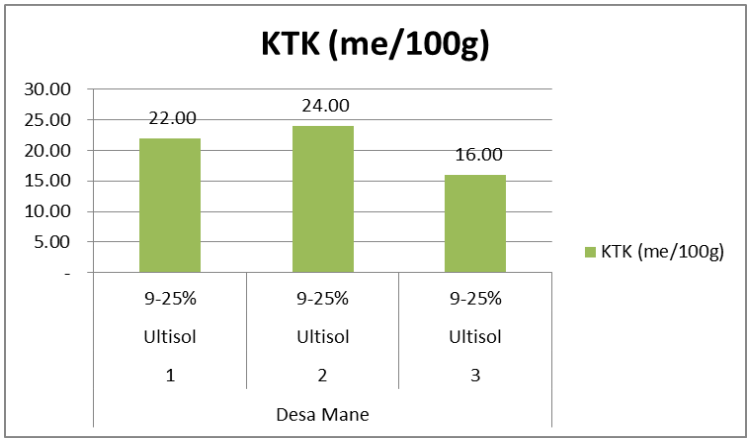
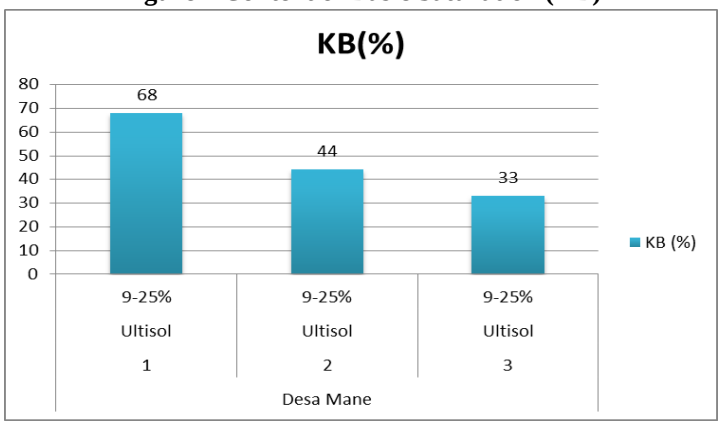


Figure 4 Content of Basic Saturation (KB)



Identification of Utilizating for Arabica Coffee and Robusta Coffee

From the Laboratory analysis, it is showed the results of soil analysis at the study site, through two parameters were used, based on land suitability and plant feasibility. Based on land suitability analysis based on arabica coffee and robusta coffee, it can be seen in table 2 where the classes of Arabica and Robusta coffee based on FAO (1976) are in the appropriate class (S2) and have the potential to be very suitable (S1). The solution to reach it could be done through optimization of nutrient availability around plants, fertilizing and giving other organic ingredients.

Table 3 shows that the slope for Arabica coffee and robusta coffee in the range of 0-15%, it is included in the proper class. For slopes about 15-40% are in the class allowed. Some things that can be done to increase productivity on permitted lands are by making a terrace which serves to reduce the speed of water flow and to increase water infiltration.

Table 2 Feasibility Conditions of Coffee Plants Based on Plant Types

No	Plant Type	Land Suitability by Plant Type					
		Actual			Restraint Factor	Input/ Input Level	Potential
		S1	S2	S3			
Mane Village							
1	Robusta Coffee				$n_{-1,2,3,4}$	M & O/Li	S1
2	Arabica Coffee				$n_{-1,2,3,4}$	M & O/Li	S1

Table 3 Conditions for Feasibility of Coffee Plants Based on Slope.

No	Plant Type	Land Suitability Based on Slope Classes				
		0-8%	8-15%	15-25%	25-40%	>40%
Mane Village						
1	Robusta Coffee	Feasible	Feasible	Permitted	Permitted	Unpermitted
2	Arabica Coffee	Feasible	Feasible	Permitted	Permitted	Unpermitted

Conclusion

In the study of the development of Mane Village toward coffee plants by Arabica Coffee and Robusta Coffee, in terms of two parameters, namely the suitability of land and the slope class that is feasible especially for coffee plants of the type arabica and robusta. Soil analysis provides the results that

the soil type is ultisol with a level of land suitability that is suitable (S2) and slope rate of around 9-25%. With the result, planting the coffee plants can be used as one of the good commodities in increasing economic growth, especially for people who are in Mane Village.

Recommendation

It is neccessary to conduct among stakeholders which involves on regional economic growth. Coffee plant, as the core of this research, is expected enabled to increase regional income in particular for Mane Village, Pidie District, Aceh Province.

References

DaMatta, Fabio M., et al. (2008). Ecophysiology of coffee growth and production. Braz. J. Plant Physiol., 19(4):485-510, 2007.

Dias, Rafael C.E., et al. (2015). Discrimination between Arabica and Robusta Coffees Using Hydrosoluble Compounds: Is the Efficiency of the Parameters Dependent on the Roast Degree?. Beverages, 1, 127-139; doi:10.3390 / beverages 1030127.

Estrada, Leonel Lara., et al. (2017). Modeling land suitability for Coffea arabica L. in Central America. Environmental Modelling & Software 95: 196-209.

FAO, 1976. A Framework for Land Evaluation. Soils bulletin. Food and Agriculture Organization of the United Nations, Rome, Italy.

ICO. (2012). ICO Annual Review 2012/13 Page 8. 2012.

Pusat Penelitian Tanah. 1983. Lampiran Tor of Reference Klasifikasi Kesesuaian Lahan. No.59 b/1983. P3MT Balitbang Deptan. Bogor. 23p.

Rahmaddiansyah, et al. (2015). Analisis Loyalitas Konsumen Terhadap Minuman Kopi Robusta Di Kota Banda Aceh. Agrisep Vol (16): No. 2 , 2015.

Wahyuni, Eka., et al. (2013). Analysis of Taste Quality of Organic Arabica Coffee in SeveralAltitudes and Processing Techniques in Gayo Highlands. Jurnal Manajemen Sumberdaya Lahan. Volume 2, Nomor 3, Juni 2013: hal. 261-269.

Rosiana, Nia., et al. (2018). Dyanmic of Indonesia Robusta Coffee Competition Among Major Competitor Countries. Journal of Industrial and Beverage Crops : Volume 5 (1), page: 1-10. Maret (2018).