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CHARACTERIZATION OF LAND EXISTING IN EFFORTS TO IMPROVE PLANT PRODUCTIVITY

Sri Rahayu*, Luluk Sulistiyo Budi, Ma'ruf Pambudi Nurwantara, Dian Ardifah Iswari
* Agriculture Faculty, Merdeka Madiun University, Indonesia

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ABSTRACT

Demand for food needs increases with increasing population, but increasing food production always lags far behind. The specific objective of this research is to produce a cropping system model of dryland cultivation related to existing land through soil characteristics. The purposive sampling research method was used to determine four areas. The research was carried out in the districts of Madiun, Ngawi, Ponorogo, and Magetan. Each of the two subdistricts taken with a height of <200 m, 200-400 m, and more than 400-600 m. Research parameters include developing commodities, commodities with the best growth and other commodity development opportunities. The results showed that the development of different regions with the same height did not show any real difference, while the development of commodities at an altitude of more than 400m leads to durian and clove plantations both for the Madiun, Ngawi and Ponorogo Regencies, while Magetan is more dominant for the development of vegetable crops.

INTRODUCTION

The increase in national food stock and food production has so far become a severe concern of the government and all parties, including universities. Although in East Java, there has been a rice surplus of 4.94 Million Tons, it only provides six provinces (BPS, 2017). The national scale surplus is also in the commodity of corn. While soybeans and other food commodities, we still visit, and the alternative is importing (Lantarsih, Widodo, Darwanto, Lestari, & Paramita, 2011). It was explained that an increase in population growth of around 1.28% per year would require the addition of food production of at least 1.3% per year (Agriculture, 2010). Therefore it is necessary to increase food production with a variety of strategies. Availability of land is indeed not an obstacle, because it is still open to the potential of a property that can be used but competes with the use of non-agricultural land. The effort that can be taken is to innovate dryland management technology to increase the Planting Index (IP) and correct post-harvest handling. This certainly can be done intensification and extensification for self-sufficiency in rice, and previously corn must be achieved (Mulyani & Hidayat, 2010).

The results of research on the implementation of the Special Efforts Program (UPSUS) in Lampung have shown success in increasing productivity in dryland both due to area expansion and increased production per hectare (Hafif, 2016). Related to this in East Java has the potential for a large area of dry land, which is possible to be optimized for the development of food crops. However, it is still vital that the characteristics of existing area and commodities are suitable for development. The purpose of this study is to identify the primary fertilizer content in the soil as a reference to cropping system models for food crop cultivation on dry land

MATERIALS AND METHODS

Time and place

The study was conducted in the area of Madiun Regency, Magetan Regency, Ponorogo Regency and Ngawi Regency, East Java as areas that have topographic variations that can represent the Madiun Residency, where the height is between 63-600 masl. Radius Research 60 Km. The area to be reflected is the Kendal District, Dagangan District, Babatan District, Dolopo District and Parang Subdistrict because this area has a large percentage of dry land because it is connected to forest land. Conducting research between April-August 2018.

Method

The collection of primary data on the existing land, land, and existing plants is carried out through a survey with a purposive sampling method. To determine the existing area taken with a depth of 20 cm, the existing land is

seen from the height of the place that is ≤ 200 masl, 200 masl - 400 masl, and ≥ 400 masl, and existing plants, as well as land and crop productivity, is done through interviews with farmers and random field visits. Agro-climate secondary data, especially rainfall, were collected from the Madiun Public Works Irrigation Service.

RESULTS AND DISCUSSION

The results of the analysis of several soil parameters in several areas are as follows:

A. Ingredients C-Organic

Table 1. Average C-Organic values

TREATMENT	Average C-Organic values		
	< 200 M	200-400	>400
Madiun regency	1.31	1.21	1.14
Magetan regency	1.42	1.39	1.23
Ngawi regency	1.26	1.24	1.18
Ponorogo regency	1.35	1.31	1.28

Source : Primary data (2019)

It can be seen in Table 1 that the C-Organic content shows that in all regions, the trend indicates that the higher the place shows a decrease in C-Organic, this is thought to be the process of drifting/erosion of surface runoff because the existing sloping land is increasingly sloping. This is due to the high surface runoff that drifts the topsoil layer due to upper slope (Young, 1989).

B. Ingredients N- TOTAL

Table 2. Average N-Total values

Treatment	Average N-Total values		
	< 200 M	200-400	>400
Madiun regency	1.33	1.21	1.22
Magetan regency	1.44	1.33	1.38
Ngawi regency	1.37	1.34	0.99
Ponorogo regency	1.32	1.3	1.32

Source : Source : Primary data (2019)

The data above shows Madiun regency has the highest N-total value of 1.33, Magetan regency 1.44, Ngawi regency of 1.37, and Ponorogo regency 1.32. The high value of N-total in Magetan regency because the community has been aware of the use of compost and chicken manure for their plants, so it accumulatively affects the existing N-total content. (Damanik et al., 2010) suggested that nitrogen influences the process of plant photosynthesis in producing carbohydrates, proteins, nucleic acids, amino acids, chlorophyll, and so on to build new cells such as plant height.

C. PHOSPOR / FOSFOR

Table 3. Average Phospor / Fosfor values

TREATMENT	Phospor Content Available		
	< 200 M	200-400	>400
Madiun regency	96.23	112.41	111.21
Magetan regency	123	132.1	163
Ngawi regency	79.2	82.5	87.38
Ponorogo regency	45.3	67.3	56.62

Source : Source : Primary data (2019)

The results showed that the highest phosphorus content in Madiun regency amounted to 112.41, Magetan regency for 163, Ngawi regency of 87.38, Ponorogo regency of 67.3. Magetan regency has the highest value of phosphorus content, and this is because of the farmer's Magetan regency has been fertilizing using organic fertilizer sourced from chicken manure. Phosphorus is needed to stimulate nutrient absorption by increasing the number of nodules in the roots so that it can increase plant growth (Faizin et al. 2015).

Complete data from the study as follows:

1. Ponorogo regency
   Soil composition is in the range 42-68, with dust 19-22, and clay 13 - 35. The PH content depends on 5.9 - 6.6, which shows the pH of the soil is somewhat acidic. The content of organic matter is classified as low, with a value of 0 - 1.82. Factors affecting the composition of soil organic matter consist of temperature which affects the speed of decomposition of organic matter, the texture of the soil where the organic material increases with increasing clay content, the reaction of the soil where acidic or alkaline soils will affect biomass production and microbial activity in the soil, input material organic matter which contains organic matter, organic material and organic material, organic material, and organic material (Supiyadi, 2008). The soil C / N ratio in Ponorogo Regency has a value of 11-14, which is considered suitable for plant development. P_2O_5 content 29 - 44 mg classified as moderate, K_2O 38 – 47mg, CEC value 5.02 -8.75 , KB 83 - 95%, $AL^{3+} = 0$, $H^+ = 0,14$. The results of the soil analysis in the Ponorogo Regency show that the soil in Ponogoro Regency is not good, so it needs to improve the quality of land management.

2. Magetan regency
   The composition of sand soil in Magetan Regency is 5 - 47, with dust composition 24 - 36, and clay 2.9 - 69. Soil pH is classified as acidic to slightly acidic, ranging from 4.8 - 5.8. The content of soil organic matter is low, with a value of 0.95 - 1.82. Medium category for the C / N ratio of land with values between 11 - 13. CEC value is 11.50 -12.66, KB 53 - 86%, AL^{3+} = 0,13, H =0,14. The conclusion from the analysis above is the need for better soil handling to improve crop productivity in Magetan Regency.

3. Madiun regency
   Madiun Regency sand soil composition is 40 - 64, with dust composition 11 - 30, and clay 21 – 30. Soil pH is around 3,8 – 5,7 so that it tends to be sour. Soil organic matter ranges 0,95 - 1,82 relatively low. C / N ratio between11 - 13 so that the soil is quite suitable for plant development. Content P_2O_5 21 - 95 classified as low to high, K_2O 20 – 49 classified as low to moderate, the Content of CEC 7.51 - 11.01 is classified as low, KB 56% - 98%, AL^{3+} = 0,13, H =0,19. From the results of the analysis, it can be concluded that it needs serious handling in soil management in Madiun Regency to restore soil organic matter.

4. Magetan Regency
   Komposisi tanah pasir Magetan regency pada 7 - 33, dengan debu 26 - 39, dan liat sebesar 28 – 64. Soil pH is around 5 – 6,4 so that it tends to be slightly sour to sour. The content of soil organic matter ranging from 0.53 to 1.53 is quite low. The C / N ratio between 11 - 14 is classified as moderate, so it is still good enough for plant development. Content P_2O_5 52 - 98 relatively high, K_2O 26 - 73, CEC content 10,24 - 14.52 , KB 54 - 91%, AL^{3+} = 0,93, H =0,12. The results of the Magetan Regency soil analysis concluded that it needed severe soil management to save soil organic matter.

CONCLUSION

The results of the analysis can be concluded that the existing land with the best nutrient content is determined by the level of management carried out, while the level of nutrient degradation naturally is generally not able to offset the needs of plant growth. The best land to increase crop productivity is the Magetan district area with the highest amount of N-C, Organic, and Phosphorus. Tilling the soil and applying organic material to the soil will help reduce erosion, maintain soil moisture, control soil pH, improve drainage, prevent hardening and cracking, increase ion

exchange capacity, and increase soil biological activity.

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