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Evaluation of land suitability for corn (*Zea Mays*, L) in Kualuh Selatan District, North Labuhanbatu Regency

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ABSTRACT
The approach or method for evaluating land resource potential is a method of land evaluation. The expected production value that may be obtained, as well as the information and/or direction of land use required, will be provided by the results of the land evaluation. .Evaluation of the characteristics of the level of land suitability in the area is carried out to analyze improvement efforts aimed at increasing productivity and produce maps of actual land suitability and potential land suitability for superior commodities in the sub-district. Land use in South Kualuh District needs to be supported by land suitability information. Survey methods used. Land units are based on land maps, slope, elevation and land cover. The process of comparing (matching) is an analysis method.The results of the research show that the level of land suitability for corn plants. The condition of the actual land to become potentially suitable for cultivation in Kualuh Selatan District for corn plants is the limiting factor in nutrient availability (na), temperature regime (tc), rooting media (rc), nutrient retention (nr) and the danger of erosion (eh). Improvement efforts that can be made include making drainage, liming CaCO3, adding organic material, making terraces or planting parallel to the contour and fertilizing. The temperature regime cannot be repaired

Keywords: Land evaluation, land characteristics, South Kualuh District, Corn Crops.

INTRODUCTION

Efforts to assess a piece of land for a particular use are known as land evaluations. The degree of suitability of land for a particular use is known as land suitability. After improvement, land suitability can be evaluated based on current and future conditions. According to Hardjowigeno and Widiatmaka (2007), land evaluation is the process of determining the potential of a plot of land for a particular use. Land evaluation serves as a useful basis for the growth of agriculture, plantations, and forestry industries.

Soil properties that can be measured or estimated are called soil characteristics. We can predict the following soil properties for agricultural use: soil, climate, vegetation, topography and geological formations, and socioeconomic factors. The physical environment and soil are both detailed and described in detail for each soil map unit produced from land resource surveying and mapping. Land interpretation and evaluation uses this data. Land suitability classes can be created from complete surveys or field soil research data (Sastrohartono, 2011).

The physical condition of a plot of land greatly determines whether or not it is suitable for use as agricultural land. The harmony between land conditions and production capacity in the research area can be determined with the help of data on land suitability, production and agricultural productivity (Anggoro, 2006). This will make it possible to identify areas that make a positive contribution to the cultivation of agricultural crops as well as those that cause problems.

According to Saputri (2010), land surveys carried out can aim to increase land clearing, new plantings, rationalize land use, overcome land damage problems, and so on. It will also generate recommendations to achieve those goals.

In order for cultivated plants to grow well, land suitability must be considered. The degree to which a piece of land is suitable for a particular

purpose is known as land suitability. Although the plant seems to be able to grow in the field, each variety has unique characteristics. In order to harmonize existing land use and help make decisions regarding land use planning, land evaluation in an area can help overcome competition between various potential land uses so that land can be used more effectively (Mega et al., 2010).

The toughest limiting factors determining the assessment results are the land suitability class and the plant subclass being assessed. Depending on the characteristics of the land, one or more factors may be limiting factors (Ritung et al., 2007). Mukhlis (2007), Soil evaluation can precisely determine the level of fertility of a soil, which can be used to determine the amount of nutrients or lime that must be provided to the plant soil system. According to Hermon and Khairani (2009), the ideal level (S1) is suitable, (S2) is somewhat suitable, and (S3) is not suitable to measure the level of land suitability for coffee plants in the field.

In essence, every agrarian business today is centered on the high level of creation that it wants to achieve. If it is based on an understanding of land conditions and agricultural products that need to be developed, this can be done. Products to be developed to produce the best results, a land must be analyzed and evaluated. Corn is one of the fruit group horticultural products that is currently receiving a lot of attention. Because corn is a good source of vitamins, minerals and carbohydrates. The production of corn goods aims to meet the increasing demand for fruit, as well as increasing population awareness of the importance of nutrition (Ambarita et al., 2015). According to Komaryati and Adi (2012), corn is a crop with bright prospects because almost everyone likes to eat it, apart from its delicious taste, high nutritional value and relatively cheap price. that imported goods are also registered as exporters.



Figure 1. Condition of the Corn Plantation

Area at the Sampling Location

For example, Belgium, the United States, Germany and France are the leading countries that import corn but also export it (Rusdiansyah, 2013). In North Sumatra, corn is a natural crop with the highest production compared to other natural crops. (Central Statistics Agency, 2018).

Information on land suitability is expected to provide information and input to carry out appropriate management for the benefit of the community and whether the plant product is suitable for cultivation in the area. To determine the potential of the land, it is necessary to assess whether it is suitable for superior commodities in Labuhanbatu Regency, South Kualuh District.

Research purposes

Evaluate the characteristics of the level of actual land suitability and potential land suitability in South Kualuh District so that the land conditions are known which are suitable for agricultural commodities that will be developed on land to increase corn productivity (*Zea Mays*, L).

RESEARCH METHODS

South Kualuh District is administratively part of North Labuhanbatu Regency, which borders several sub-districts and regencies, namelyTo the north with Asahan Regency and the Strait of Malacca; To the south with Labuhanbatu Regency and North Padang Lawas Regency; West side with North Tapanuli Regency; and Toba Samosir Regency; To the east is Labuhanbatu Regency.PeThe research was carried out using a survey method which consists of 5 stages, namely preparation, pre-survey, main survey, soil analysis in the laboratory and data

processing.The research began with pre-research by taking soil samples.The method used in this research is a free grid survey method at semi-detailed survey level (observation density of 1 sample every 100 meters).

Carrying out soil samples from 5 sample points at a distance of 100 meters in the field using a random method spread over a predetermined area based on base map in the manner presented in Figure 1 (Rauf and Harahap. 2019). Samples were taken using a zig-zag sampling method at predetermined points in each block, sampling was carried out at two depths, namely 0-30 cm depth and 30-60 cm depth, 10 points each at the same two depths so thatto determine the chemical properties of the soil with certain predetermined criteria, based on the Technical Guidelines for Soil Fertility Evaluation. Directions for soil fertility management

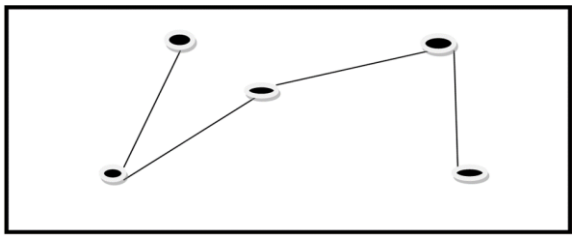


Figure 2. Taking soil sample points in the field

Determination of soil chemical properties was carried out by soil analysis at the Applied Science Laboratory, Faculty of Science and Technology, Labuhanbatu University. According to Sys et al., research data is interpreted into criteria for soil fertility levels in land suitability classes, 1993) and the Research Center's Technical Guidelines for land evaluation for agricultural commodities (Hardjowigeno, 2003;) determine the requirements for durian planting and the land evaluation process (Hardjowigeno, 2003; Ritung et al., 2011). Leibig's minimum law is used to determine the limiting factors that will influence land suitability classes and subclasses during the matching process. GIS has been used for land suitability mapping in several studies in North Sumatra (Rahmawaty et al., 2019). So if production factors such as the use of fertilizer, the use of superior varieties, and the availability of irrigation are needed in sufficient quantities and in balance, the goal will be achieved (Harahap *et al.,* 2019). GIS software is used to map actual and potential land suitability and display the results of land suitability studies for crop commodities in the form of tables showing actual and potential land suitability.

RESULTS AND DISCUSSION

Land characteristics

Land characteristics Subdistrict South Kualuh,which was previously an agricultural land area from the results of field surveys and analysis of soil samples in the laboratory are presented in Table 2.

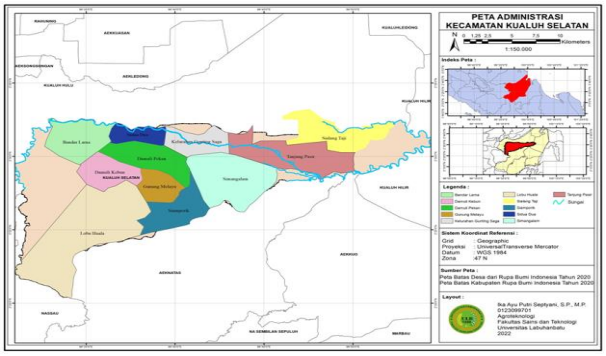


Figure 3. Administrative map of Kualuh Selatan District, Labuhanbatu Regency

Area Land characteristics for depths 0 to 30 are shown in Table 1 which makes it possible to group observation and soil sampling locations into land units included in the climate zone (D1), which according to Oldeman (1975) each has three to four wet months. and less than two dry months. The agroecosystem zone has a slope of 2-73% and is dominated by dry land agriculture and hilly forest land. Good soil drainage, texture of loamy sand, sandy loam, sandy clay loam, and an effective depth of > 100 cm are physical characteristics of soil that influence plant roots.

Table 1. Land characteristics for land units at a depth of 0-30 cm in Kualuh Selatan District, Labuhanbatu Regency to evaluate the suitability of agricultural land.

Land Use Requirements	Data Value	Case Class. Actual Land	Case Class. Potential Land
Temperature (tc)			
Average temperature (0C)	27.92	S2	S2
Height above sea level (m)	20	S1	S1
Water availability (wa)			
Rainfall (mm/year)	2030.4	N	S1
Length of Dry Period (months)	4	S1	S1
Humidity (%)	82.6	S2	S2
Rooting Media (rc)			
Drainage	Good	S1	S1
Texture	Smooth (Clay)	S1	S1
Coarse material (%)	< 3	S1	S1
Soil depth (cm)	> 75	S1	S1
Nutrient Retention (nr)			
Clay CEC (cmol)	13.42	S1	S1
Base saturation (%)	84.2	S1	S1
pH H2O	6.2	S1	S1
C-organic (%)	0.46	S1	S1
Toxicity (xc)			
Salinity (dS/m)	0.13	S1	S1
Sodicity (xn)			
Alkalinity/ESP (%)	10.13	S1	S1
Sulfidic Hazards (xs)			
Sulfide Depth (cm)	> 100	S1	S1
Erosion Danger (eh)			
Slope (%)	< 3	S1	S1
Danger of erosion	Very low	S1	S1
Flood Danger (fh)			
Puddle	F21	S3	S1
Land Preparation (lp)			
Rocks on the surface (%)	< 5	S1	S1
Rock outcrops (%)	< 5	S1	S1
Actual Land Suitability	Nwa, Rainfall (wa), Inundation (fh)		
Repair Efforts	Drainage repair, construction of drainage channels.		
Potential Land Suitability	S2tcwa, temperature (tc), humidity (wa)		

Source: Primary Data Analysis Results Applied Science Laboratory, Faculty of Science and Technology, Labuhanbatu University.(2022).

Soil samples in this Land Use Area have pH values ranging from 5.23 (slightly acidic) to 6.16 (neutral), total N values ranging from low to high, P2O5 values ranging from very low to low, and K2O values with very high average. Most land units must add organic material because the C-Organic levels in crop fields are very low. All the nutrients plants need, including humus, are found in soil organic matter.

The mineralization process, which is the final stage of the organic material breakdown process, cannot be separated from the role of organic material in the availability of nutrients in the soil. Chemically, organic materials provide N, P, and K for plants.

KTK has values ranging from medium to high. Soils with medium to high CEC values can absorb and provide more nutrients than those with lower CEC values. Apart from the pH of the extraction solution, the nature and quantity of the clay fraction and organic matter have an impact on the CEC value of the soil.
Base saturation levels in this region range from very low to moderate. Base saturation is a sign of soil chemical fertility. Due to the absence of significant soil leaching, fertile soils have high base saturation. Conversely, plant roots will be unable to absorb nutrients

from soil that has low base saturation (Indranada, 1986).

Suitability of land for corn crops (*Zea Mays*, L)

Water availability and nutrient retention, as well as base saturation, are limiting factors that make land suitable for coffee growing and must be improved for the land units in Table 2. There is no way to improve the limiting factor of temperature, namely humidity (S3). The permanent height of the location is a limiting factor for humidity, so it cannot be increased. Recapitulation data on land assessment results for Corn Crops (Zea Mays, L.) were obtained from the analysis results. the following are: Actual and potential land suitability for corn crops in other utilization areas of South Kualuh is based on GIS analysis findings (Table 2).

Table 2. Recapitulation of Land Suitability for Corn Crops **(*Zea Mays*, L)**

Land Units	KLA	Estimated Repair Effort	KLP
Land unit 1	**S3 tc, rc, nr, na, eh**	- Liming 3.14 tons CaCO3/ha - Providing BO 950 kg/ha or 4.43 tonnes/ha of Organic Fertilizer - Fertilize 7.10kg P2O5/ha or 19.72 kg SP36/ha - Making terraces or planting parallel to the contour	S3 tc, rc

Information: KLA = Actual Land Suitability KLP = Potential Land Suitability

CONCLUSION

Actual land conditions that are potentially suitable for cultivation in Kualuh Selatan District for corn are the limiting factors for nutrient availability (na), temperature regime (tc), rooting media (rc), nutrient retention (nr) and erosion hazard (eh).

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