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Characteristics of Chemical Properties of Oil Palm Soil at Plant Age in Different Areas of Land

Karakteristik Sifat Kimia Tanah Kelapa Sawit pada Umur Tanaman Menghasilkan di Areal Lahan yang Berbeda

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ABSTRACT

This study aims to identify the variables fertility constraints in the District Pangkatan, Kabupaten Labuhanbatu by evaluating the fertility status of the soil and assess alternative management in accordance with the status of soil fertility contained in the Center of Palm oil Plantation in the Village of Sidorukun, Kecamatan Pangkatan, Kabupaten labuhan batu with a height of ± 70 meters above sea level. This research is a descriptive qualitative phenomenological with the survey of land and supported the laboratory analysis qualitatively. Soil sampling conducted in the area of the survey in a sequence based on the place of estimated properties of soil vary with the method of purposive random sampling, then the results of the analysis of the land acquired is expected can reflect the true value. Retrieval of soil samples taken in the upper layer at the depth of the top soil of 0 -20 cm, 30-60 cm As for the Parameters chemical Properties of soil were analyzed for C-organic matter, CEC, Base Saturation and Soil pH. The results of the analysis of the parameters of the fertility of the soil constraints in the soil fertility status of oil Palm in the Village Sidorukun, Kecamatan Pangkatan, Kabupaten Labuhanbatu. Is the content of soil Organic matter is low and Kejunah Wet soil is very low. The direction of the management of soil fertility for the unit sloping land in the area of oil palm the bottom, living on the slope, the peak of the form of action the addition of organic matter with compost and fertilizer and inorganic in accordance with the recommendations to improve the fertility status of the soil.

Keywords: *Nutrient Status, Area Of Land, Palm Oil*

ABSTRAK

Penelitian ini bertujuan mengidentifikasi variabel kesuburan yang menjadi kendala di Kecamatan Pangkatan, Kabupaten Labuhanbatu dengan melakukan evaluasi status kesuburan tanah dan mengkaji alternatif pengelolaan yang sesuai dengan status kesuburan tanah yang terdapat di Sentra Perkebunan Kelapa Sawit di Desa Sidorukun, Kecamatan Pangkatan, Kabupaten Labuhanbatu dengan ketinggian ± 70 meter diatas permukaan laut. Penelitian ini merupakan penelitian deskriptif kualitatif fenomenologis dengan survai lahan dan didukung analisis laboratorium secara kualitatif. Pengambilan sampel tanah dilakukan pada areal survei secara sekuen berdasarkan tempat diperkirakan sifat tanahnya berbeda dengan metode purposive random sampling, maka hasil analisis tanah yang diperoleh diharapkan dapat mencerminkan nilai sebenarnya. Pengambilan sampel tanah diambil pada lapisan atas pada kedalaman top soil 0 -20 cm, 30-60 cm Adapun Parameter Sifat kimia tanah yang dianalisis C-organik, KTK, Kejenuhan Basa dan pH Tanah. Hasil analisa dari parameter kesuburan tanah yang menjadi kendala dalam status kesuburan tanah Kelapa Sawit di Desa Sidorukun, Kecamatan Pangkatan, Kabupaten Labuhanbatu. Adalah kandungan Bahan Organik tanah rendah dan

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Kejunah Basah tanah yang sangat rendah. Arahan pengelolaan kesuburan tanah untuk unit lahan miring di areal kelapa sawit bagian bawah, lerang, puncak berupa tindakan penambahan bahan organik dengan kompos dan pupuk dan anorganik sesuai dengan rekomendasi untuk meningkatkan status kesuburan tanahnya.

Kata Kunci: Status Hara, Areal Lahan, Kelapa Sawit

INTRODUCTION

The plants of oil Palm (Elaeis guineensis Jacq.) is one of the plantation crops in Indonesia, which has a future is quite bright. The oil palm plantation was originally developed in the area of North Sumatra and Borneo, but now has expanded to various regions including Sulawesi, Maluku, and Papua. (Nugraha et al., 2018)

Southeast Sulawesi is one of regional development of oil palm plantations, but palm oil development in the region has factors problems, especially the fertility of the soil because of agricultural land in this area is dominated by the type of Ultisol soil that has a high level of low fertility is estimated 60% of the total area of oil palm plantations are on land ultisols (Adiwiganda et al., 1994). The problems encountered in the development of oil palm on this land is pH and low organic matter content, poor nutrient potassium (K), calcium (Ca), and magnesium (Mg) percentage base saturation is low, the content of aluminum is mixed up high, and has the power of fixation is high (Fadhillah, and Harahap, 2020).

The land cultivated for agriculture and plantation has a fertility rate that is different. the land management is appropriate is an important factor in determining the growth and yield of crops to be cultivated (Harahap *et al.,* 2020). Provision of nutrient-optimal is one way to increase the production of palm oil. This is because the needs of palm oil nutrients is quite high, while the capacity of soil to provide nutrients for the plants is limited. Declining soil fertility can be a major factor affecting the productivity of the land, so that the addition of nutrients in the soil through the process of fertilization is very important in order to obtain agricultural production that benefit soil fertility is the process of assessment of land and making recommendations fertilization (Harahap *et al.,* 2020).

Evaluation of fertility status to assess and monitor the soil fertility is very important to be aware of the nutrient elements that become an obstacle for the plant. Assessment evaluation of soil fertility status can be done through the approach of testing the ground where the valuation using this method is relatively more accurate and faster (Surianto et al., 2015). The measurement of the chemical properties of the soil as a parameter of soil fertility is then set in the criteria of soil fertility (Nasution et al., 2015).

Declining soil fertility can be a major factor affecting the productivity of the land, so that the addition of nutrients in the soil through the process of fertilization is very important in order to obtain agricultural production profitable. Age and type of vegetation can also affect soil properties and soil quality, due to the type and age of the different vegetation have different abilities to protect the land from the influence of erosion. This is caused by the difference in the extent of the canopy of plants covering the soil at different levels of the age of the plant (Yasin, S. 1991).

Based on the background above, the research regarding the evaluation of fertility status is very important given the absence of the latest data on the status of soil fertility in the region. The Data obtained can be used as basic data and as a reference in the management of soil fertility for the cultivation of crop plantation of oil palm in order to be profitable and sustainable. This study aims to identify the variables fertility constraints in the District Slats Upstream by evaluating the fertility status of the soil and assess alternative management in accordance with the status of soil fertility contained in the center of palm oil plantation in the Village Sidorukun, District Pangkatan, Kabupaten Labuhanbatu.

MATERIAL AND METHOD

This research was conducted in the Center of Palm oil Plantation Village Folk

Sidorukun, District Pangkatan, District Labuhanbatu with a height of ± 70 meters above sea level. This research is a descriptive qualitative phenomenological with the survey of land and supported the laboratory analysis qualitatively. Soil sampling conducted in the area of the survey in a sequence based on the place of estimated properties of soil vary with the method of purposive random sampling, then the results of the analysis of the land acquired is expected can reflect the true value, the taking of soil samples taken in the upper layer at the depth of the top soil of 0 -20 cm, 30-60 cm. Sample-a soil sample that has been taken in the field, then analyzed in the laboratory (Rauf and Harahap, 2019). Properties-the chemical properties of soil were analyzed in laboratory C-organic matter (method of Walkley and Black); CEC (method 1 N NH_4OAC pH 7); Base saturation (Cation Bases/CEC*100%); presented in Table 1.

Table 1. The Criteria Of Assessment Of Soil Chemical Properties

Soil Chemical Properties	Very Small	Small	Medium	High	Very high	
C (%)	< 1	1-2	2-3	3-5	> 5	
CEC (me/100 g)	< 5	5 –16	17 - 24	25 – 40	> 40	
Base Saturation (%)	< 20	20 40	41-60	61 –80	> 80	
pH (H_2O)	Very acid	acid	Rather acid	neutral	Rather Alkalis	Alkalis
	< 4.5	4.5 - 5.5	5.6 - 6.5	6.6 - 7.5	7.6 - 8.5	>8.5

Source : Agency for Agricultural Research and Development Ministry of agriculture (2012)

RESULTS AND DISCUSSION

The results of the analysis of soil samples in the laboratory showed that the pH Values (H_2O) are the organic matter content is very low and are kadungan (Table 1). From the analysis of Table 1. Analysis of soil fertility on sloping land in irrigated oil palm showed the results of the analysis base saturation is very low of 1.12%. The levels of C-organic very low (0.36 percent) (Table 1). Table 1. indicate the soil requires additional organic material so that it can support the growth and development of the oil palm plantations that live on it.

The low fertility status of the soil at the study site due to the presence of limiting factors, namely the low content of C - organic soil and Base Saturation. The content of C-organic (organic matter) the soil is very influential on the ability of the soil to maintain fertility and productivity of soil through the activity of soil microorganisms. This is in accordance with the opinion of the Tolaka (2013), the Addition of organic material absolute should be given because soil organic matter plays an important role to create the fertility of the soil. The role of organic material for the soil is forming granulation in the soil and is very important in the formation of soil aggregates that are stable (Rauf and Harahap, 2020).

The spread of the value of C-organic in to three units of land classified as a variety of low-to-moderate with a range of 1.08 % to 3.04 %. This situation is caused because the soil at the study site is too often processed without the return of organic material remains of the harvest, as the stem of the harvest or the use of organic fertilizer.(Shawwal and Rauf, 2017). In addition, farmers are reluctant to add organic fertilizer in the management of the land so that these circumstances lead to loss of organic matter through harvest increasingly high. The content of C-organic soil in addition can determine the magnitude of the value of the CEC of the soil also determine the addition of nutrient elements they contain, such as N, P, K, Ca, Mg, S and micro elements (Luta *et al.,* 2020).

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Table 2. Analysis of soil fertility in oil palm acreage in the year of planting 5 years

Planting Year	Area	Depth (cm)	Organic Materials	CEC (me/100g)	Base Saturation (%)	pH Soil
5	Nether	0-30	2.15 (S)	30.84 (T)	5.94 (SR)	5.74 (S)
		30-60	2.13 (S)	28.12 (T)	4.36 (SR)	5.66 (S)
	Slope	0-30	2.22 (S)	35.45 (T)	1.16 (SR)	5.60 (S)
		30-60	1.06 (R)	30.42 (T)	1.46 (SR)	5.70 (S)
	Summit	0-30	2.20 (S)	30.29 (T)	1.16 (SR)	6.02 (S)
		30-60	1.84 (R)	31.14 (T)	1.12 (SR)	6.08 (S)

Description : AM: Slightly Sour, SR: Very Low, L:Low, T:High, ST: Very High

Table 3. Analysis of soil fertility in oil palm acreage in the year of planting 15 years

Planting Year	Area	Depth (cm)	Organic Materials	CEC (me/100g)	Base Saturation (%)	pH Soil
15	Nether	0-30	2.25 (S)	34.39 (T)	10.60 (SR)	6.02 (S)
		30-60	2.48 (S)	33.90 (T)	7.04 (SR)	5.38 (R)
	Slope	0-30	3.06 (S)	30.88 (T)	5.11 (SR)	5.76 (S)
		30-60	2.26 (S)	33.37 (T)	5.22 (SR)	5.46 (S)
	Summit	0-30	2.48 (S)	30.21 (T)	5.02 (SR)	5.89 (S)
		30-60	2.34 (S)	32.32 (T)	3.93 (SR)	6.03 (S)

Description : AM: Slightly Sour, SR: Very Low, L:Low, T:High, ST: Very High

This is supported by the Sevindrajuta, (2012) the Provision of the organic matter not only adds nutrients for the plants, but can also create the appropriate conditions for the plant and improve the aeration, easy root penetration, improves water holding capacity, increase soil pH, CEC, and nutrient uptake soil organic matter largely determine the interaction between the components of the abiotic and biotic in the soil ecosystem. Harahap *et al.,* (2020), in his research stated that the content of organic matter in the form of C-organic in the soil should be maintained not less than 2 percent. This state is necessary so that the content of organic matter in the soil does not decrease with time due to decomposition process of mineralization. The addition of organic material at the time of land management is absolutely necessary every year.

The Cation Exchange capacity at three units of land classified as high with a range of 35,45 up with 30,51 Cation Exchange Capacity (CEC) of the soil is the ability of colloidal soil adsorb and exchange cations (Tan, 1991). The high CEC value of the soil on the third unit of land due to both the type of soil encountered in the study area belong to the soil of young and emerging and not a lot of experience the washing process. This is in accordance with the opinion of the Solar et al.,(2019), this situation is supported also by the pH data ranged between 6,9-7 are classified as neutral, the Magnitude of the CEC is determined by soil pH, soil texture or moisture content of clay, type of clay mineral, organic matter content and fertilization.

The value of base saturation in the three units of land classified as very low i.e. range is 10.80 to 1.12%. Very low values of base saturation in the area of the land unit show the topography at the study site classified as ramps so that the occurrence of erosion and the state of this give a very big influence on the loss of bases. Base saturation (KB) is relatively determined by the number of cations of alkaline and soil reaction (pH). the value of the

base saturation, it is also supported by the high cation levels K-the total land. The cation K is a cation bases that determine the KB value of the land. The pH value of the soil contained in the third unit of land shows in addition to the cation K are base cations, other such as Ca, Mg, and Na (Solar *et al.,* 2019).

CONCLUSION

Parameters of soil fertility constraints in the soil fertility status in the Village Sidorukun, districts Pangkatan, Labuhanbatu regencyis the content of soil Organic matter is low and Kejunah Wet soil is very low. The direction of the management of soil fertility for the unit sloping land in the area of coconut sawait the bottom, living on the slope, the peak of the form of action the addition of organic matter with compost and fertilizer and inorganic in accordance with the recommendations to improve the fertility status of the soil.

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