Soil Fertility Level In The Aek Kundur River Area Regardless Of Factory Waste Disposal

Risky Surya Ramadani Pane [1*] , Widya Lestari [2] , Hilwa Walida [3] , Dini Hariyati Adam [4]

[1,2,3,4] Agrotechnology Study Program, Faculty of Science and Technology, Universitas Labuhanbatu,Indonesia.
*Corresponding Author:
Email : rizkypohansurya@gmail.com

Abstract.

Soil fertility is the ability of the soil to provide the nutrients needed by plants in adequate quantities and in a form that can be absorbed by plant roots. The aim of this research is to determine the level of soil fertility in the Aek Kundur river area regarding factory waste disposal in Lingga Tiga Village, District. West Bar. This research was carried out in June 2024 in Lingga Tiga Village, Bilah Hulu District, Labuhanbatu Regency with an altitude of 28 meters above sea level with coordinates N: 98022'44.34" E: 02032'34.23". Analysis of the physical and chemical properties of soil was carried out at the Laboratory of the Faculty of Agriculture, University of North Sumatra using an exploratory-descriptive survey method. Research results on the physical properties of the soil in Lingga Tiga Village have a clayey clay texture and in Liga Tiga Village have a clay texture. Furthermore, the chemical properties of the soil in Lingga Tiga Village have criteria, namely neutral pH, low organic C, moderate P2O5 and low soil fertility status in the Aek Kundur river area against factory waste disposal. For this reason, fertilization treatment is needed to improve soil fertility status.

Keywords: *Aek Kundur; Soil fertility; Land Capability; Linga Tiga; and Fertility Status.*

I. INTRODUCTION

Soil fertility is the ability of the soil to provide the nutrients needed by plants in adequate quantities and in a form that can be absorbed by plant roots. Fertile soil has physical, chemical and biological properties that support optimal plant growth. Physical properties include soil texture, soil structure, and the soil's ability to hold water and air [1]. Chemical properties include nutrient content such as nitrogen, phosphorus, potassium, as well as appropriate soil pH. Biological characteristics include the presence of soil microorganisms which play a role in the decomposition of organic matter and providing nutrients for plants [2].The value of soil fertility around the palm oil factory waste disposal area in Aek Kundur Hamlet can be negatively affected due to the impact of discarded waste. Waste from palm oil mills can contain dangerous chemicals such as heavy metals and organic compounds that can pollute the soil [3]. This contamination can cause a decrease in soil quality by reducing the availability of nutrients for plants and increasing the risk of soil toxicity which can inhibit plant growth and soil microbial activity[4]. Apart from that, palm oil mill waste can also increase the acid content in the soil, which can change the structure of the soil and reduce the soil's ability to hold water and nutrients, thus potentially damaging soil fertility and the productivity of surrounding agricultural land [5].Factory waste is a waste product from the production process in a factory which can be in the form of solid, liquid or gas. This waste often contains dangerous chemicals that can pollute the environment if not managed properly. Factory liquid waste, for example, can pollute groundwater and rivers, threatening aquatic life and the health of humans who consume the water [6]..

Solid waste, such as leftover raw materials or defective products, can cause waste accumulation problems and pollute the soil. Gaseous waste, including emissions from factory chimneys, can pollute the air and contribute to climate change and health problems such as respiratory problems. Effective factory waste management is very important to protect the environment and public health. Factories need to implement waste processing systems that comply with environmental standards, such as using wastewater treatment technology to reduce pollutants before being discharged into the environment [7].The Aek Kundur River is one of the important rivers in the region, but its existence is threatened by industrial activities that have the potential to pollute the surrounding environment. Factory waste discharged into rivers can contain various

dangerous chemicals and other pollutants, which, if not managed properly, can damage river ecosystems and reduce the quality of the surrounding soil [8].The aim of this research is the aim of study This is For know level fertility land in the Aek Kundur river area against factory waste disposal in Lingga Tiga Subdistrict Bilah Barat Village

II. MATERIALS AND METHODS

Time and place Study

This research has held on Month June Year 2024 in Lingga Tiga Village, Bilah Hulu District, Labuhanbatu Regency with a height of 28 meters above sea level with coordinates N: 98 ^{0} 22'44.34" E: 02 ^{0} 32'34.23". Analisis s And land use is carried out Laboratorium Faculty of Agriculture, University Sumatera Utara .

Tools and materials

The tools used were GPS, bergia type soil drill, hoe, knife, cell phone camera, Munsell soil color chart book, Inclinometer, Accurate altimeter and writing tools. Meanwhile, the materials used were soil samples, rubber bands, paper labels, plastic bags and guidebooks sampling.

III. METHODS

Several stages in the survey method are: Preparing the tools and materials needed for land survey research, Conducting interviews that include previous land use as research support material, Visually viewing the research area, Creating and determining observation points in the field, Taking coordinate points. at the research location, see the color of the soil using a muzzle, take samples to take to the soil laboratory at the University of North Sumatra

Observation Parameters

The parameters that will be observed are: Determining the coordinates of the Lingga Tiga research location, Bilah Hulu District, research location, soil fertility analysis data, namely soil physical properties (pH, texture) and soil chemistry N-total, organic C , P_2O_5)

IV. RESULTS AND DISCUSSION

Physical Properties (Texture)

Based on results analysis land obtained characteristic physique land that is texture land for the village that became sample research in the District Blade Upstream can be seen in Table 1 as following :

Table 1. Results of Analysis of Soil Physical Properties (Soil Texture)

Location	Texture%			Criteria
	Sand	Dust	Look	
I	35	37	28	Clay Clay
II	40	39	21	Clay
III	36	39	25	Clay Clay

Source : Laboratory Faculty Agriculture University of North Sumatra, 2024.

The results of Table 1 show that Lingga Village Three own criteria texture land clay berliat , Lingga Village Three own criteria texture Clay Clay. Based on matter the so from both Villages who are in the District The Western bar is a perfect fit with condition grow Patchouli plant . [9] Researching about influence giving material organic in the soil clay and loam look . Based on results research that has been attempted and existing descriptions can be concluded that giving material organic in origin from fertilizer cage and compost can push rate evaporation that happened in land . Land with texture clay own level more evaporation low if compared to with land clay look . According to opinion Sutedjo and Kartasapoetra [10], soil that is rich in humus, fertile , has structure crumbly and crumbly with Power sufficient water binding as well as the drainage Good . Condition grow from cultivation plant patchouli more good on textured soil clay until clay sandy[11].

Reaction (pH)

Based on results analysis land obtained characteristic chemistry land namely soil pH For several villages that became sample research in the District The West Bar can be seen in Table 2 as following :

Table 2. Results of Soil Chemical Properties Analysis (pH)

Location	Soil pH	Criteria
I	5.9	Sour
II	6.4	Neutral
III	6.2	Neutral

Source : Soil pH measuring instrument

The results of Table 2 show that Lingga Village Three own soil pH criteria neutral . Based on matter the so from the two villages in the sub-district The West Bar is dominated by soil pH neutral . This is very appropriate with condition growing and classification suitability plant So soil with a neutral pH is very good For help growth plant in absorb nutrient . According to [11] the importance of soil pH that is can determine easy or not nutrients are absorbed plants at a neutral pH . [12] researched about increasing soil pH . Based on from experiments that have been done done can concluded that very much calcification needed For classified land land sour with content high clay . Land will often become sour If planted or For activity agriculture , cause small talk will missing (follow harvested) as well often happen washing land [13]

C- organic

Based on results analysis land obtained characteristic chemistry land namely C- organic in Lingga Village Three became sample research in the District The West Bar can be seen in Table 3 as following :

Table 3. Results of Soil Chemical Properties Analysis (C - Organic)

Location	C_Organic	Criteria
I	1.72	Low
II	1.52	Low
III	1.82	Low

Source : Laboratory Faculty Agriculture University of North Sumatra, 2024.

The results of Table 3 show that Lingga Village Three own C- organic criteria land low , p This caused Because content litter and vegetation above that which is on the surface land low . Organic material beside influential to supply neither do soil nutrients lost importance to characteristic physical , biological and chemical. [14] researched about connection characteristic physical and chemical land , based on tested results that C- organic is classified low means material Lots contains N and is easy decomposed , so fast supplies N divide plant. [15] explains that material organic is very influential characteristic physical , chemical and biological land , land rich in diameter material capable bind and save charged plant nutrients positive or element metal . Condition land as a growing medium needed condition physique good chemistry [16]. By physique organic materials can form aggregate land . Influence material organic to characteristic chemistry that is can increase load negative so that will increase capacity swap cations . Organic materials provide real contribution on land CEC [17]

P_2O_5 Soil

Based on results analysis land obtained characteristic chemistry land namely P_2O_5 in Lingga Tiga Village Three became sample research in the District The West Bar can be seen in Table 4 as following :

Table 4. Results of Soil Chemical Properties Analysis (P_2O_5)

Location	P_2O_5	Criteria
I	30.08	Currently
II	29.38	Currently
III	29.87	Currently

Source : Laboratory Faculty Agriculture University of North Sumatra, 2024.

Table 4, shows that Lingga Village Three own P_2O_5 criteria land currently . Based on matter the so from Lingga Village Three are in the District The Western bar is dominated by the P_2O_5 state with criteria currently . P_2O_5 states in circumstances Enough available or currently Because land contain sufficient phosphorus minerals , content material low organic as well as transported results harvest or not done replacement results harvest to land the . [18] researched about study of fertility status land , based on results test can be concluded that availability phosphorus in the the ground is very tight relationship with acidity (pH) of soil , mostly land maximum P availability found in the pH range between 6.0-7.0, [19] P availability will decrease when the soil pH more low of 6.0 or more tall of 7.0. P_2O_5 content low land signify low content material organic and poor in minerals containing P , so cause low soil P- total content , besides That

rate very low phosphorus in solution land on a moment will washed so that move little by little Phosphor from in land [20]

Soil Fertility Status

Fertility Status in Lingga Village Live in the Aek Kundur River area have fertility status land low . Based on matter the so from Lingga Village Stay in the Aek Kundur area in the sub-district Blade The West is dominated by fertility status land low. [21] Fertility status land said low Because P_2O_5 and C- organic content in circumstances combination others where the criteria are low until medium and more dominate is criteria low in C- organic content , P_2O_5. [22] researched about characteristics characteristic chemistry soil and fertility status land in agroforestry, based on results test can concluded that addition fertilizer organic at times planting capable improve fertility status become tall after harvesting , fertilizer organic own characteristic slow available , nature slow availability from fertilizer organic this is what matters to pH conditions , C- organic , P_2O_5 , [23]. According to Nurrohman *et al*, 2015, said that Content material organic Soil is very influential to ability land For maintain level fertility land through activity microorganisms land . Addition material organic Soil plays a big role important in formation aggregate stable soil [24]

V. CONCLUSION

Based on results analysis laboratory characteristic physique land in Lingga Village Three textured clay see and in the League Three Village textured clay . Next , nature chemistry land in the village Phallus Three the have criteria namely neutral pH , C- organic low , P_2O_5 currently and fertility status land low in the Aek Kundur river area regarding factory waste disposal . For That need exists treatment fertilization For improve fertility status land .

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