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The Effect of the Ameliorasi Action on the Reeds (Imperata) Land Area

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ABSTRACT: This evaluation is being conducted with intended to determine the rate of Organic Soil Treatment (OST) and identifying the benefits of Organic soil treatment as a material that improves the chemical properties of the soil in the reeds (imperata) area as arable land. The OST material contains Leonardite humus and various organic elements to stimulate biological processes has the ability to regenerate the soil. Treatment uses a full factorial randomized design with 4 doses of OST, i.e no treatment (control), 3 grams/pot, 6 grams/pot and 9 grams/pot. Treatment results showed improvements in pH, organic matter, organic C, ECEC, B-c, N, P, K and instead it degrades Al-dd which is a detrimental chemical property.

KEYWORDS: soil chemical, ameliorasi, reeds (imperata) land

INTRODUCTION

The expansion of land for growing agricultural products is still very possible in East Kalimantan, because in this area there are about 11.5 million hectares of peripheral land, of which about 13% is alang alang land (reeds land). Alang-alang (*Imperata cylindrica*) is a very harmful weed for agricultural cultivation because it absorbs a large amount of macronutrients, especially N, P, K and Ca. Countries dominated by alang-alang are generally red-yellow podzolic soils, the several have unfavorable plots of land to develop as agricultural farmland. Because it contains macronutrients, organic matter and low soil acidity. In addition, it also has poor physical properties, namely, dense structure, prone to high soil density, slow soil permeability, and poor soil aeration because it is saturated with water relatively quickly and stagnates easily, causing severe erosion. This condition makes the land of reeds (imperata) has low cultivation capacity both physically and in its fertility status, because the growth rate of reeds (imperata) is low from 1 to 4 years, then the growth rate from 5 to 7 years or more is too short.

Overcoming the low bearing capacity of Reeds (imperata) soil does not produce satisfactory results when only macro and micronutrients are added through organic fertilizers and inorganic fertilizers through soil and foliage. And it turns out that simply adding agricultural lime to the soil or just treating the fertilizer has no appreciable effect. This is because reeds (imperata) land in humid tropical areas such as East Kalimantan is known to have very high erodibility and soil erodibility values. For this reason, an improvement measure is required by introducing into the soil a special organic material capable of remodeling and generating a biological activity of the soil. Application of a specific amelioration technology is expected to optimize the soil in the area of marginal to support the growth of food crops. Which in turn has a positive effect on the chemical state of the soil (nutrient availability).) and the state of the physical structure of the soil, including through the use of Organic Soil Treatment (OST). Organic Soil Treatment (OST) is a result of the mixing process assortment of organic elements such as humus, peat surface bog, fossil flour, a mixture of a wide variety of natural proteins, and soil bacteria (Azotobacter, Agrobacterium, Azospirillum, Aspergillus, Rhizobium, Mycorrhiza, etc)

. OST fertilizer contains organic compounds that have undergone a decomposition process perfect and will be able to turn a marginal soils become productive again in natural processes. Therefore, technology is needed to improve soil properties through amelioration and fertilization to improve soil fertility. Thus, if mineral nutrients can be extracted from the soil in a controlled manner and the availability of organic matter renewed, then soil treated with improvements can certainly produce good and sustainable agricultural growth and production.

The Effect of the Ameliorasi Action on the Reeds (Imperata) Land Area

RESEARCH METODOLOGY

This study was conducted in an area with a yellow-red podzolic soil type that was dominated by the actively growing alang alang plant for 7 to 10 years. OST treatment was consists of 4 levels, namely no OST (UP_0), 3 grams OST/pot (UP_1), 6 grams OST/pot (UP_2) and 9 grams OST/pot (UP_3), and was performed for 8 replicates . All research units were in the open field for 4 months without additional treatment.

RESULTS AND DISCUSSION

Analysis of the chemical properties of the soil was carried out in 2 stages, namely the soil before receiving the improving treatment and the soil after 3 months after receiving the improving treatment. The analysis of the chemical properties of the soil was carried out 3 months after the improvement treatment, assuming that at the age of 3 months the food crop, especially on dry land, was in the generative phase, i.e. the nutrient requirements were relatively constant.

The results of the analysis of the chemical properties of the soil of all research units (PU) can be seen in Table 1,

Table 1. The results of the analysis of the chemical properties of the soil.

chemical properties of soil	UP_0	Crit.	UP_1	Crit.	UP_2	Crit.	UP_3	Crit.
pH H2O	3,81	MB	4,65	Ac	4,85	Ac	5,78	Ac
IO (%)	1,57	B	2,99	Ac	3,23	Ac	3,61	Ac
CO (%)	0,91	MB	2,66	Ac	2,31	Ac	2,51	Ac
ECEC	17,16	Ac	51,08	A	58,05	A	59,83	A
CB (me)	63,35	A	80,01	A	92,24	mA	95,49	mA
N-t (%)	0,11	MB	0,81	B	1,09	Ac	1,09	A
P-d (ppm)	46,00	Ac	50,61	Ac	55,75	A	58,75	A
K-d (ppm)	24,56	Ac	30,52	Ac	32,43	A	33,01	A
Al-dd (me)	6,29	A	2,51	B	1,38	B	0,51	B

Information:

Criteria = criteria; CO = Organic Carbon; IO = Organic Ingredients; Bc = Base Capacity

K-d = Available Potassium; P-d = Available Phosphorus; N-t =Total Nitrogen

ECEC = Effective cation exchange capacity; Al-dd=Aluminum is interchangeable.

mA = Very High; A = High ; Ac = Currently; B = Low; MB = Very Low

The results of the soil tests showed that the soil chemistry in Reeds (imperata) land had various bad conditions with very low pH and high Al-dd content. The state of the chemical properties of the soil in Reeds (imperata) land is theoretically very likely for the occurrence of aluminum (Al) element poisoning and will lead to saturation or decomposition of the proteins that make up the cells, which in turn will cause other elements to become less present . Because soils with a very low pH and a very high Al-dd content easily increase the fixation process of the P element, since this element very easily combines with the elements Al, Fe or Mn and forms complex compounds which are not easily soluble are. in the water, making it unavailable to plants.

The application of organic soil treatment as an improvement material over a 2 month period has improved several poor soil characteristics on Reeds (imperata) land. All treatments were able to increase the content of organic C and CEC, but the increase was too small when compared with those without ameliorant having C-organic content and CEC. From Table 1 it can be seen that soil acidity changes from very low to moderate, even approaching the optimum pH required for food crops, particularly rice, corn, soybeans, peanuts and others. The same can be seen in the increased availability of other macronutrients.

Changes in these macronutrients include increased total N availability from a very low to a moderate to high state. P-available and K-available items from mid state to high state. The same can also be seen in the parameters Total Organic Matter and C-Organic content.

The increasing existence of the two soil chemistry properties has a beneficial effect on other essential components required by plants, especially the availability of groundwater. This is due to the increased ability of the soil to store water, which greatly stimulates the activity and mechanism of the mineralization process in the soil. At the same time, the strengthening of soil mineralization processes and the increase in soil water holding capacity are very beneficial for the development of soil microorganisms. The general condition obtained after 2 months of application of the organic soil treatment corresponds to the main function of OST as a soil regenerator.

The Effect of the Ameliorasi Action on the Reeds (Imperata) Land Area

The OST material contains Leonardite humus to stimulate biological processes in the soil so that it has the ability to regenerate the soil. In addition, OST also contains various organic elements that naturally help to increase soil uptake based on the principle of controlled release of mineral nutrients and nutrients to activate soil microorganisms. The benefit of using OST is the high nutrient, organic matter, and protein content of OST. Added to this is the supply of nitrogenous nutrients by reducing their formation from the soil, this is due to the availability of N elements in organic form bound to carbon compounds necessary for plants. This will tend to reduce leaching losses, support micronutrient solubility and availability, create stable conditions for favorable long-term soil chemistry, and allow for the controlled release of nutrients from the soil that are directly available to plants. available and required by plants for use by soil microorganisms and plants.

According to Suswati (2009), the coastal sediment ameliorant could replace the role of lime in increasing pH and base saturation (BS). Results of the study of Suswati et al. (2015) showed that the addition of coastal sediment on PIGM land reduced soil acidity, and improved CEC, BS, and availability of soil nutrients (K+ , Ca2+, Mg2+ and Na+).

There are several physico-chemical properties of soil that are improved by adding soil ameliorants. These are the soil properties improved by soil ameliorants: pH

Salinity, fertility. heavy metals, micronutrients. macronutrients, electrical conductivity, biological and biochemical quality The impact of ameliorants of different nature (source ofnitrogen – urea, mineral adsorbent – glauconite, humicagent – potassium humate, bacterial preparation) and with different mode of action on the biological condition of black soil was assessed for the first time. Application of coastal sediment at a dose of 40 t/ha on peat could increase the yield of hybrid maize that reached 12 ton/ha. Application of agricultural lime and rice husk charcoal produced the same growth rate value but it was significantly higher than without ameliorant treatment.

The results of this study showed that vegetationapplied with OST gave better growth rate than that without ameliorant. The results of this study indicated a significant influence between the three treatments tested. In this case, ameliorant application was capable in improving soil chemical properties thus creating a better condition for crop growth.

CONCLUSION

Based on the above description, it can be generally concluded that the application of ost as a improver can reduce poor soil chemical properties of reeds (imperata) plots and at the same time improve soil fertility with a tendency to have a beneficial impact with higher OST provisions

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