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Abstract. The Physical damage of soil in the post mining area in overburden (OB) material in the form of hardened and compacted structure and texture of the soil. Physical soil damage affects plant growth rate. The *Enterolobium cyclocarpum* Griseb plant has the ability to grow, has a high macro-nutrient content in the leaves, high macro-chemical content can improve the repairment of the soil physical properties into crumbs and fertility.

1. Introduction

This study was focused on macro nutrient potential in "Sengon Buto" leaves (*Enterolobium cyclocarpum* Griseb) as a material to improve soil physical properties, by analyzing the availability of leaves and soil chemical nutrients from post-coal land material on a laboratory scale. The physical condition of the land after the coal mine is generally in the form of overburden (OB) overburden material in the condition of damaged soil structure, fragmentation of rock mixed with coal without layers of organic matter, drainage conditions are very poor, soil is unable to hold water, soil solids, high temperatures and conditions acid soil pH. This is in line with [1] the impact of open mining is the change in physical and chemical properties of the soil including an increase in bulk density, soil moisture and a decrease in soil permeability and fertility. The process of coal extraction causes loss of nutrients, organic matter content and the occurrence of chemical changes in the soil [2].

It is necessary to rehabilitate the land by improving the condition of the land, by planting plants that are suitable for extreme conditions. The success of a reclamation and revegetation of ex-mining areas is influenced by the selection of suitable plant species [3]. Podsolic soil types have low soil fertility, to be able to support plant growth, one of them is by adding organic materials [4].

The concentration of leaf nutrition in plants (*Macaranga gigantea*) has a role on plant growth and positively correlated with nutrient concentrations of soil potassium with leaf potassium concentration[5, 6]. Giving macro nutrients in manure and media to grow peat and soil have different effects on the growth of kiwi plants (*Actinidi deliciosa*) [7]. Administering mycorrhizae to two different types of soil increased the concentration of macro nutrient soils, which had an effect on improving root morphology, branching lateral roots of plants (*Helianthemum sessiliflorum*) [8]. Use of sludge waste fertilizer on the growth of wheat plants (Triticum durum) from drought stress and improve all growth parameters [9]. Mud is a waste produced from the treatment of wastewater from a home or industry consisting of water and dry materials which renews macro nutrients (nitrogen, phosphorus) and organic matter [10]. Potential availability of wood nutrients (*E cyclocarpum* Griseb)

parameters phosphorus (P) 0.04%, potassium (K) 0.36%, nitrogen (N) 0.10%, magnesium (Mg) 0.05% and calcium (Ca) 0.25% [11].

From the description of the narrative, the background of this research is the selection of suitable plants to accelerate the process of repairing the physical or extreme conditions of post-coal mining land. The aim of the study was to determine the availability of macro nutrients in leaves as a material that has the ability to repair the physical condition of the soil in post-coal mine land.

2. Method

2.1. Materials

As the research material are Sengon Buto leaves (*E cyclocarpum* Griseb) and OB soil material. The leaves of the Sengon Buto tree (*E cyclocarpum* Griseb) which grew in several places and OB soil material was taken at the location of the coal mining activity as a material for the analysis of macro nutrient content.

2.2. Procedure

Before the analysis test, leaf samples were treated to become compost, namely: a. leaf material + EM4 solution, b. leaf material, c. dry air leaf material, d. Composting material + overburden soil material from the coal mining location with a ratio of 1 kg of compost a: 5 kg of overburden soil material. In materials a and b composting is carried out for 1 month, whereas in material c composting is not carried out.

The criteria for evaluating the parameters of macro nutrient chemical properties are: P <0.021 very low, 0.021-0.039 low, 0.040-0.060 medium, 0.061-0,100 high,> 0.100 very high; K <0.1 is very low, 0.1-0.2 low, 0.3-0.5 medium, 0.6-1.0 high,> 1.0 very high; N > 0.10 is very low, 0.10-0.20 low, 0.21-0.50 medium, 0.51-0.75 high,> 0.75 very high; Mg <0.4 is very low, 0.4-1.0 low, 1.1-2.0 medium, 2.1-8.0 high,> 8.0 very high; Ca <2.0 is very low, 2-5 low, 6-10 moderate, 11-20 high,> 20 very high [12].

3. Result and discussion

Table 1. Macro nutrients in leaf of *E cyclocarpum* Griseb And in OB material

No	Parameter	Material Treatment Leaf *E Cyclocarpum* Griseb.			Treatment of OB Material			
		Natural leaves	Compost leaves	Leaves + EM_4	OB A	OB A1	OB B	OB B2
1	Phosphorus (P)	0.116	0.164	0.252	0.01140	0.05252	0.04098	0.07980
2	Potassium (K)	0.331	0.348	0.470	0.06468	0.11018	0.02146	0.06606
3	Nitrogen (N)	2,212	2.436	2.604	0.084	0.448	0.028	0.406
4	Magnesium (Mg)	0.06637	0.08674	0.09637	0.2448	0.3014	0.15864	0.21868
5	Calsium (Ca)	0.0222	0.0230	0.0238	0.1296	0.1461	0.1645	0.3422

Units in percent (%)

The potential of macro nutrients in the leaf of *E cyclocarpum* Griseb from the trial treatment of composting with different treatments showed increasing and consistent results in each parameter tested, namely treatment of Natural leaves, Compost leaves and Leaves + EM4. The parameters of phosphorus and nitrogen show very high potential macro nutrients contained. This is in accordance with the criteria for evaluating the parameters of macro nutrient chemical properties in leaves of *E cyclocarpum* Griseb the value of phosphorus nutrient potential above> 0.100 and nitrogen above> 0.75 [13]. The phosphorus needed in large quantities for plants because it serves to stimulate root growth, especially at the beginning of growth. The potential availability of nutrients for each parameter in the treatment of leaf material is illustrated in Figures 1,2,3,4 and 5.

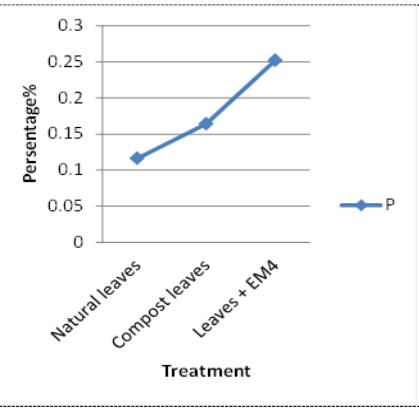

Figure 1. Potential phosphorous (P) leaves of *E cyclocarpum* Griseb

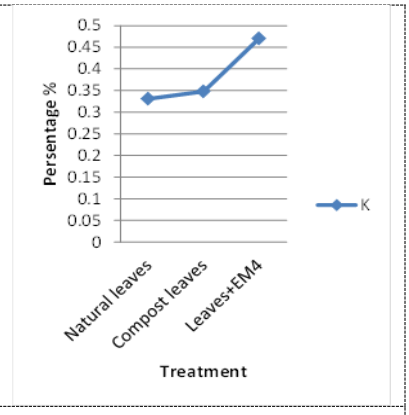

Figure 2. Potential potassium (K) leaves of *E cyclocarpum* Griseb

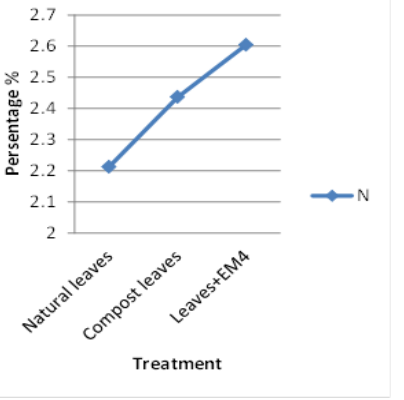

Figure 3. Potential nitrogen (N) leaves of E cyclocarpum Griseb

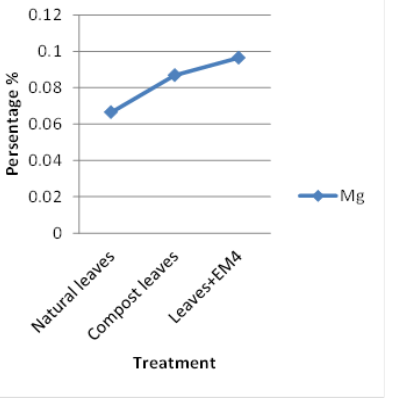

Figure 4. Potential magnesium (Mg) leaves of E cyclocarpum Griseb

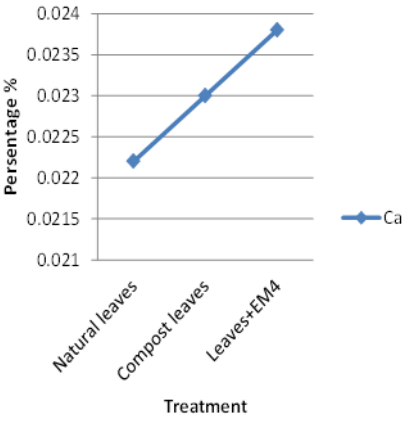

Figure 5. Potential calcium (Ca) leaves of E cyclocarpum Griseb

The results of the treatment trials by mixing leaves + EM4 material with OB A and OB B materials both showed an increase and improvement in the value of macro nutrient content in all the test material parameters, namely OB A1 and OB B1.

Increased nutrient content of OB A material to OB A1 material as well as OB B material to OB B1 material occurs due to treatment in the form of addition or amalgamation of two materials namely leaves + EM4 material with OB A material and leaves + EM4 material with OB material B. Material of leaves + EM4 at Table 1, has a very high availability of nutrients, especially phosphorus 0.252% and nitrogen 2.604%, this condition has implications for the increase in nutrient availability of OB A and OB B materials. Increasing availability of nutrients, especially parameters P and N in a large amount of material will provide benefits for the growth of a plant in a location, this is because the N parameter is a compound needed in the formation of chlorophyll, protoplasm, protein and nucleic acids in growth and the development of all living tissue of a plant while parameter P is a constituent compound for energy transfer (ATP and other nucleoproteins), for systems of genetic information (DNA and RNA), for cell membranes (phospholipids), and phosphoproteins. N is generally absorbed by plants in the form (NH4 +) or (NO3) and P in the form of primary orthophosphate (H2PO4) and a small portion in the form of secondary orthophosphates (HPO4) [14].

The addition of organic materials containing macro nutrients in nutrient-poor soils, supporting the development of plant species [15]. Use the application of organic substrate and bio mulch effective in improving soil moisture content, reducing soil erosion and improving soil health [14]. The increase in availability of macro nutrients for each parameter in the treatment of OB material is illustrated in Figure 6 and Figure 7.

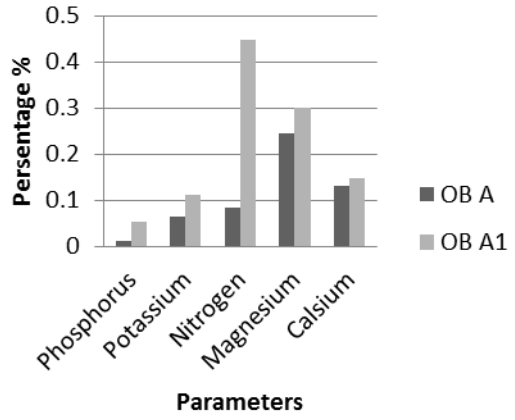

Figure 6. Increased nutrients of OB A+(Leaves + EM4) material

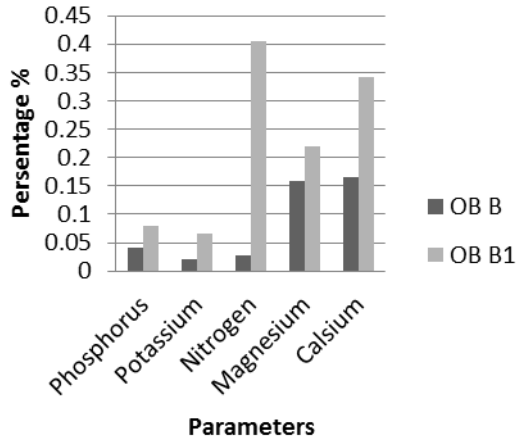

Figure 7. Increased nutrients of OB B+(Leaves + EM4) material

4. Conclusion

Leaf nutrients in plants *Enterolobium cyclocarpum* Griseb plants improved the quality of soil physical properties for the batter by 5-14 available N potential and 2-5 potential P available in table 1 comparison of soil treatment OB A-OB A1 (Very low-Very high) and soil material OB B-OB B1 (Very low- Medium).

Acknowledgments

The author would like to sincerely thankful to the Head of Samarinda State Polytechnic Silviculture Forest Laboratory; for the research facilities.

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