Fundamental Study on the Raw Material Selection for the Formulation of Novel Dolomite A+ Concentrated Solution

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Abstract. Dolomite (Limestone) provides beneficial nutrients to the plant and helps increase the soil's pH value to meet the plant's needs. This study focusses on the formulation of Novel Dolomite A+ Concentrated Solution (NDA), Performance comparison of NDA with inorganic chemical fertilizer and manual control treatment on the Spinacia Oleracea. The NDA was formulated using water, Dolomite base, Oil palm frond, Black Soldier Compost, and Effective Microbe. Then, 6 samples of S.Oleracea was prepared for different treatments. The samples were distributed into groups A, B, and C. These treatments were done once a week for the nutrient consistency supplied to the crop, but dolomite mixture was used to water the sample of group B every day, and the treatment was held for two months. Finally, all samples were analyzed by identifying the leaves numbers, stem thickness, pH soil, and the stem height value. Besides, the identification of Above Ground Biomass AGB (kg. hr-1) and Nitrogen Percentage Concentration (NPC) were made for evaluating these significant parameters. The NPC was analyzed by using the Kjeldahl method. The results showed the S.Oleracea of sample 2 in group B exhibited the highest stem height of 28.4 cm, the stem thickness of 5.8 mm, pH soil value of 7.5, average AGB value of 2.056×10-3 g.hr-1 among all the samples. Sample 1 of S.Oleracea in group C exhibited the highest leaves number with 17 leaves. Both S.Oleracea in group C achieved the lowest height, pH soil, and stem thickness values but achieved the highest NPC values of 0.4 % w/w. In conclusion, NDA impacted S.Oleracea growth since it had met the most stringent criteria.

1. INTRODUCTION

Dolomite powder is a limestone compound made up of magnesium and calcium. It is a sedimentary carbonate rock that commonly contains a considerable mineral, CaMg(CO3)2. According to some research, this species' excellent mixture composition is approximately 18 to 22 percent calcium and 8 to 12 percent magnesium (Roberts, Campbell, & George Robert Rapp, 1990). These elements can provide valuable nutrients to the plants. Dolomite is rarely found in sedimentary environments but is very common in the rock record. Most rock forms it as calcium carbonate muds. The acidity of the soil can have negative consequences and may even kill the plants. It is a major common problem that occurs frequently during the agricultural process. Because it does not meet the pH soil requirement values, high soil acidity will kill crops. Malaysian soils range from highly acidic to alkaline, depending on farming locations. Most plants thrive in the pH range of 4.5 to 8.0 (Gatch & Toit, 2016). The pH soil range for spinach is (6.0–7.5) (Gatch & Toit, 2016). Only when the soil pH falls into the neutral pH range can the plant receive a specific nutrient. The most acceptable pH values are between 6.2 and 7.0.

However, due to nutrient limitations from Dolomite, inorganic chemical fertilizers are widely used as a replacement to boost nutrient uptake for the plant. Chemical fertilizers are entirely artificial and manufactured in precise doses as requested by end-users (Angus, 2012). Therefore, many harmful consequences may occur when users consume this inorganic fertilizer, such as environmental pollution, greenhouse effect from Nitrogen emission, and poison to human health.

To address these issues, a study on the formulation of NDA was conducted to identify the dolomite efficiency, nutrient supply availability on *S.Oleracea* species as a sample by comparing different treatments of nitrogen (N) fertilizer and a control treatment. Dolomite is composed of Cellulose, Hemicellulose, Lignin, Protein, Ash, and effective microbes. Oil palm fronds provide hemicellulose, lignin, protein, and ash, while