Research Article

NOR-V SOIL BIOCARE SET

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Abstract: *Due to soil problems, humans have invented fertilizers. Nowadays, using chemical substances to improve the efficiency of fertilizers has been a choice instead of organic matter. However, the use of synthetic fertilizers will destroy soil organisms. As well as the nutrients, the soil organisms are also essential for both soil and plant. When the soil organisms have been destroyed, the soil problems might reoccur. Contradicted to it, organic fertilizers are scientifically able to encourage the growth of soil organisms thus fixing the soil problems. The study is conducted to create a product which is NOR-V SOIL BIOCARE SET that could increase living organisms in the soil using organic matters while improving soil fertility and plant health. The effectiveness of the set has been tested on the problematic soil samples. The result showed that the properties of the soil such as pH, moisture, and compaction have improved to make them able to provide a good medium for soil organisms' growth. The number of living organisms in the soil and the plant growth rate also increased rapidly after applying the product. Overall, the product prioritizes environmental sustainability and encourages the public to reduce the use of harmful chemicals.*

Keywords: soil problems; synthetic fertilizer; organic matter; soil organisms; NOR-V SOIL BIOCARE SET.

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1. INTRODUCTION

The soil problems such as insufficient nutrients, incorrect soil pH, dryness, and compaction are commonly experienced by people throughout the world. They also contributed to soil and plant infertility. That is why fertilizer has been invented to fulfil the insufficiency of nutrients requirement in soil. Fertilizers are the common names of substances or compounds containing one or more essential mineral nutrients that are applied to the soil for the purpose of providing nutrients (food) to the plant. At first, soil scientists are focusing on using manures, waste products, and composts to add nutrients and living organisms to the soil. According to the technology circulation, the use of chemicals in improving the efficiency of fertilizers has been used. Nowadays, the use of chemicals in the production of fertilizers has become increasingly widespread. For example, a few years ago, a fertilizer manufacturer decided to commercialize the balanced fertilizer concept (Formula 10-10-10), which represents three essential macronutrients in the soil: nitrogen (N), phosphorus (P), and potassium (K); abbreviated as NPK. The number indicates the content or quantity of each nutrient in a given product, expressed as a percentage or ratio (Murphy, 2015). In order to improve competitiveness, other companies decided to promote other synthetic fertilizers based on the actual nutrients required by the plants. The scientists selected different plants and analyzed their composition. For example, grass contains more N than P and K, which is why the company developed lawn fertilizer 18-10-10 (Pavlis, 2021). A new marketing method was born. Special fertilizers are made according to the needs of plants.

2. PROBLEM STATEMENT

This situation has led many customers who are less knowledgeable about fertilizers will assume that the use of chemical substances is the best solution to improve the soil and plant quality instead of organic matters. It also pollutes the public's understanding of the actual use of fertilizers. In reality, the use of synthetic fertilizers will only harm the environment and human health and the worst is it destroys the living organisms in the soil such as microorganisms, microfauna, mesofauna, and macrofauna. Soil organisms play an important role in soil and plants because they support a process called mineralization, in which nutrients are broken down and restored to their mineral form (Bot & Benites, 2005). By that, plants can absorb necessary nutrients from the soil. However, when the soil organisms are destroyed due to the use of synthetic fertilizers, the soil problems such as insufficient nutrients, incorrect soil pH, dryness, and compaction will occur. In that case, the same problems will reoccur whereas they should be solved, not hidden. Contradicted to it, organic fertilizers are scientifically able to provide beneficial soil microfauna and encourage the growth of soil macrofauna unharmed.

3. SOLUTION

To solve the problem of soil, this study is aimed at producing a product that can improve the fertility of soil as well as plant health through the increasing of the living organisms in soil as an alternative to the use of chemical substances. The product namely NOR-V SOIL BIOCARE SET is 100% on natural wealth and organic matters. This set consists of serum and powder each of which plays a big role.

Figure 1. Illustration of NOR-V SOIL BIOCARE SET.

4. INNOVATION PRODUCT FEATURES

Table 1. The details of NOR-V SOIL BIOCARE SET's serum

Components	Details
Ingredients	*Lactobacillus sp.* extract, *blue-green* algae, and seaweed extract.
Volumes	100 ml
Time of use	Every two weeks
Method of use	Watering
Usage instruction	1. 20 ml of the serum is mixed with 1 liter of water. 2. The mix is watered onto the soil.
Storage instruction	Keep the serum in the space or room with a temperature between 10 ºC and 27 ºC.
Benefits	▪Encourages the growth of fungi, yeast, and aerobic bacteria in soil ▪Limits the undesirable organisms in the soil. ▪Encourage organisms by increasing the formation of humus ▪Helps sterilize soil ▪Improves resistance of plants to frost and disease.

Table 2. The details of NOR-V SOIL BIOCARE SET's powder.

Components	Details
Ingredients	Cocopeat, eggshell powder, and vermicomposted paper powder.
Weight	200g
Time of use	Every two weeks
Method of use	Loosening
Usage instruction	Accordingly, the powder is blended with the soil.
Storage instruction	Keep the serum in the space or room with a temperature between 10 ºC and 27 ºC.
Benefits	▪Provides more space for the living organisms in soil growth ▪Reduce the acidity of the soil ▪Able to store and release the nutrients for plants for a long time ▪Boosts the organic matter stabilization in soil ▪Increase the rate of water absorption by the soil ▪Increase the soil pores

5. OBJECTIVES

The objectives of this study are to produce an innovative product that:
a. increases the living organisms in soil
b. fertilizes the soil.
c. improves the health of plants.
d. encourages the public to run organic gardening.
e. utilizes the organic matters.
f. encourages the public to reduce the use of harmful chemical substances.

6. METHODOLOGY

The effectiveness of the set has been tested on the problematic soil samples. The soil pH test, soil moisture test, and bulk density test had been conducted on a problematic soil sample to observe the changes in pH, moisture, and compaction of the soil samples from the study area before and after two weeks of NOR-V SOIL BIOCARE SET used. In addition, the extraction of soil using the Tullgren Funnel method was conducted to observe the number of living organisms in the soil samples. Tullgren funnel is a device to extract the soil organisms such as macrofauna from the soil (Romila Akoijam et al., 2014). This method is conducted by installing a hanging light bulb above the setup funnel to stimulate light energy as heat. By that, the soil organisms that live in the soil will move down to the collecting pot. On the other hand, the purpose of the moist tissue in the collecting pot is to provide a comfortable environment for the soil organisms to stay. The plant growth test has also been conducted to observe the plant growth rate (%) of the plants set before and after using NOR-V SOIL BIOCARE SET on plants. The main purpose of the test is to collect sufficient data on the plant's overall health by observing the parameters related to the plant such as weight, root mass, height, number of leaves, and number of flowers (Davis, 2020).

7. RESULTS AND DISCUSSION

7.1 Effect of product on soil pH

The change in soil pH of the study area before and after the use of NOR-V SOIL BIOCARE SET had been observed through the soil pH test. The result shows that the pH of the soil increased from 3 to 6 after two weeks. Based on the data, the ideal pH for the soil is between 5.5 and 7.0 (Perry, 2021). The result shows that the resulted soil pH 6 is within the status suitable pH range for the soil, proving that NOR-V SOIL BIOCARE SET has the ability to provide optimal pH for the soil. The optimum soil pH will encourage the growth of living organisms in the soil.

7.2 Effect of product on soil moisture

Soil moisture test has been applied to measure the moisture of the soil sample before and after the use of NOR-V SOIL BIOCARE SET. The result shows that the reading of the meter had increased from scale 2.5 to scale 6 after two weeks. Based on the indicator on the meter, the soil changes from dry to moist. The result demonstrated that NOR-V SOIL BIOCARE SET is able to moisturize the soil. The moist soil provides a comfortable medium for the growth of living organisms in the soil by improving soil aeration, facilitating water pathways, and helping in oxygen distribution in the soil.

7.3 Effect of product on soil compaction

The bulk density test has shown the density decreasing result in the soil sample of the study area from before to after the use of NOR-V SOIL BIOCARE SET. The specific calculation showed that the reading from the bulk density test of the soil sample in the study area decreased from 1.45g/cm³ to 1.17g/cm³ after two weeks. By that, it is clear that NOR-V SOIL BIOCARE SET has the ability to reduce soil compaction. When the compactness of soil decrease, the pores of soils will become larger thus improving both the infiltration rate of soil water and air diffusion as well as providing sufficient spaces for the growth of the soil organisms.

7.4 Effect of product on living organisms in the soil

The result shows that the number of soil organisms in the soil sample increased from 2 to 5 after two weeks of use of NOR-V SOIL BIOCARE SET. The result is affected by the higher ability of the soil applied with the product to provide required soil properties for the soil organisms' growth such as suitable soil pH, high moisture, and low compaction compared to the soil without the use of the product. The increase of the living organisms in the soil also indicates that NOR-V SOIL BIOCARE SET is able to encourage the growth of living organisms in the soil.

7.5 Effect of product on plants

The plant growth test (Methodology 3.4) has been conducted to observe the plant growth rate (%) of the plant sets before and after the use of NOR-V SOIL BIOCARE SET on plants.

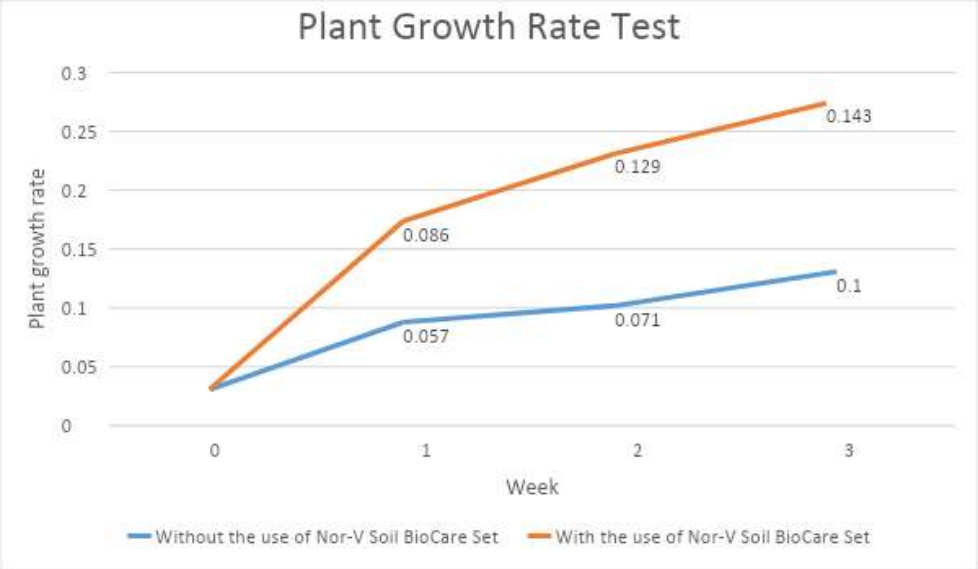

Figure 2. The comparison of the plant growth rate between the plant sets with and without the use of NOR-V SOIL BIOCARE SET after three weeks.

The result showed that the growth rate (%) of the plant set from week 0 to week 3 for the plant set with the use of NOR-V SOIL BIOCARE SET increased more compared to the plant set without the use of the product as shown in Figure 2. The soil of the plant set with the use of NOR-V SOIL BIOCARE SET has a more suitable pH, moisture, compaction, and higher amount of soil organisms compared to the soil of the plant set without the use of the product. This result scientifically proved that NOR-V SOIL BIOCARE SET is able to improve plant health as well as soil fertility.

8. CONCLUSION

Based on all the tests carried out on the soil sample of the study area, it is found that positive results are shown. After the application of NOR-V SOIL BIOCARE SET, the acidity of the soil sample is reduced from ultra-acidic to moderately acidic, the moisture of the soil sample is improved from dry to moist, the compaction of the soil sample of the study area is decreased, the amount of the living organisms in the soil sample of the study area is increased and the plant growth rate of the soil sample of the study area is increased rapidly. These results have proven that NOR-V SOIL BIOCARE SET is effective in enhancing the living organisms in soil as well as fertilizing soil and improving plant health. It also can be concluded that organic matters are very important for plant health and soil fertility. As well as the nutrients, the beneficial soil organisms are also essential to keep the soil fertile thus making the plant healthier. With the invention of NOR-V SOIL BIOCARE SET, the public will be encouraged to run organic gardening and reduce or no longer rely on harmful chemical substances such as synthetic fertilizer in daily life. In the future, using more soil and plant samples will give more data and improve the accuracy of the results. Besides, increasing the experimental duration will give a better interpretation of the changes in results.

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