

Cassava Leaves as a Fertilizer: A Sustainable Technique

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Abstract: In this populating and polluting era, organic and sustainable way of development is essential. Cassava leaves have high protein content and nutritional value. Due to its high demand, production of cassava plants is very high. Moreover, leaves of these plants are waste material, which will be treated and processed into fertilizers after decomposition. Switching over the organic fertilizers from synthetic fertilizers plays an important role in views of impacts on environment, societal health and economics as well. In this study, simplicity of process maintained with sustainable technique. In addition, it is an attempt of accepting natural way than chemicals. The fertility of soil increased with the use of fertilizers made from cassava leaves.

Keywords: Cassava leaves, Sustainability, Organic farming, Fertilizer.

1. Introduction

The application of compost as alternatives to reduce the use of synthetic fertilizers is considered a feasible agricultural practice to mitigate soil degradation caused by long term application of synthetic fertilizers. Investigation required to study the benefits of using cassava leaves compost for growth, yield and betterment of environment. Applying synthetic fertilizers may lead to decrease in soil fertility as well as reduce the organic matter and humus content in the soil. So, it is needful to find such alternatives like organic compost, cassava leaves compost and organic matter to stop the use of synthetic fertilizers.

Cassava is a root vegetable. It is the underground part of the cassava shrub, which has the Latin name *Manihot esculenta*. Like potatoes and yams, it is a tuber crop. It looks similar to sweet potatoes but have different properties. Study shows that cassava leaves contain 38.1% of protein, essential amino acids, dietary fiber, rich in Ca, Mg, Fe, Mn, Zn as well as ascorbic acid and vitamin A. Like many organic composts materials cassava leaf compost is a potential reservoir of organic matter and plant nutrients. The practice improves physical, chemical and biological properties of soil and improves crop yield and nutritional value. By using cassava leaves compost one can reduce the cost required for synthetic fertilizers such as urea. It has more physical and chemical benefits to plant and soil as compared with urea which can increase nutritional yield and soil quality.

Cassava is the third-largest source of food carbohydrates in the tropics, after rice and maize. Cassava plant have many applications as its barks, roots can also be used to prepare starch, biochar, tapioca pearl, medicine, biofuels and many more. Due to its health benefits people also started including it in their diet in the form cassava tofu, cassava flour as it adds good source of fibre and protein to their diet but raw cassava contains cyanide so it is always advisable to cook it properly. There are two types of cassava: sweet and bitter. Bitter cassava is hardier but has a much higher cyanide content.

Study shows that Nigeria is the largest world producer of cassava crop and while Thailand is the largest exporter of cassava starch. In the processing of cassava fermented products, the most common byproducts are cassava peels, foliage, starch bagasse, wastewaters, discarded roots and barks are obtained. Cassava grows easily in South India, but has one problem: it contains a toxin that must be removed by long soaking in water

Nowadays the most common method to avoid the wastage of this byproduct, composting of cassava peels with other organic matter such as cow dung, grass clipping, poultry waste, sewage sludge been practiced. Due to high concentration of cyanogenic glucosides, it cannot be used for the animal feed. Cassava is also known as *TAPIOCA PLANT*. Sabudana (Tapioca pearl) is made by extracting starch from the tapioca root which is also known as cassava.

Study shows that more than 80 countries throughout the tropics grow the cassava and more than 800 million people around the world consume cassava as their primary diet component. Peoples leaving along the Amazon River grew and consumed the cassava hundreds of years before Christopher Columbus first voyaged there. Tapioca plant can resist drought and require very less fertilizers to grow and that's the reason it is popular in many countries.

2. Materials and Methodology

A. Materials

Materials required to prepare cassava leaves compost are dried cassava leaves, cow dung, sewage sludge, grass clipping, poultry manure. Different steps are mentioned below one need to do to prepare fertilizers from cassava leaves.

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B. Methodology

- Step 1: Take cassava leaves and chop it into pieces it will help in microbial activity. Then air dried for 1 week at ambient temperature of 270-310°C. After 1 week we will obtain dried cassava leaves.
- Step 2: Now determine the initial carbon, nitrogen, moisture content, density and pH of dried cassava leaves along with grass clipping, poultry manure, cow dung and sewage sludge.
- Step 3: This step includes 4 treatment where in each treatment we need to mix cassava with 1 or other above-mentioned supplement in ratio of 1:1:1 by weight as shown in figure 1.
- Step 4: Now we need to take container and add 1 layer over other of the mixture we formed and cover it with net to prevent from flies.
- Step 5: Now weekly with the help of shovel mix the compost to check moisture content and aeration. Then we will get cassava leaves compost. Now determine final carbon, nitrogen, moisture content, density and pH.

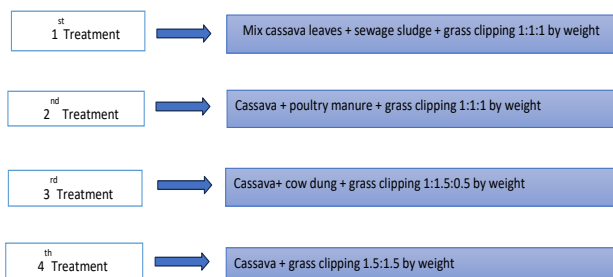


Fig. 1. Process flowsheet of cassava leaves treatment

3. Results and Discussion

The addition of CLC as soil amendments improved the soil nutrient properties, growth and yield of plant and the improvements were proportional to the amendment rates.

Cassava leaf compost increased plant growth, yield and nutrient uptake as well as soil fertility status.

Composting of cassava leaf and its application along with inorganic fertilizers will reduce the cost of farming and improve soil health by increasing C and N pool of the soils.

4. Conclusion and Future Scope

- Cassava leaves compost can be an eco-friendly and

sustainable way to improve soil fertility. As awareness of practicing sustainable farming is increasing the demand for using organic fertilizers like cassava leaves compost is likely to increase as it leads to growth, yield and betterment of environment.

- Cassava is an essential source of energy and contains nutrients such as protein, calcium, and fiber making them a valuable source of organic matter for soil enrichment. Due to its dietary fiber demand for production of cassava plant is increasing.
- By converting them into compost, farmers can reduce waste and promote a circular economy, aligning with sustainability goals.
- Due to increase in demand of practicing organic farming, synthetic farming is reducing drastically as it improves soil structure and microbial activity, enhancing the overall health of the soil.
- As further research is going on to make cassava leaves fertilizers more nutritional adding fertilizers and expanding the scope by taking its properties into consideration.

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