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PRODUCTION AND COMPARISON OF SOLID - LIQUID FERTILIZER FROM VEGETABLE WASTE

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ABSTRACT

Vegetable wastes are produced in large quantities in the markets across the world, to make use of this waste and to reduce the pollution they can be used to produce Biofertilizers. The collected five vegetables were produced in large quantity because they are daily used in everyday life; they are subjected to decomposition (1month) for producing solid and liquid fertilizers. Since Biofertilizers are one of the best tool that is used in the agricultural field, which is applied as a replacement of conventional fertilizers. The nutrients present in the fertilizers were determined and comparative study was undertaken to evaluate the efficiency of produced fertilizers. The main objective of this work is to build a platform that Biofertilizers obtained from vegetable waste are better than the conventional fertilizers.

KEYWORDS: Solid fertilizer, Liquid fertilizer, Vegetable waste.

INTRODUCTION

Vegetable waste make an extraordinary measure of contamination which contain high part of natural matter that causes genuine ecological and wellbeing issues. India is the second most top nation that produces foods grown from the ground squanders from which they deliver 14% of vegetable and 10% of natural product creation. It is important to treat the vegetable waste to decrease the green house emission and the most utilized strategy is the anaerobic absorption process which is additional tedious (6). Fertilizing the soil is essentially a procedure for decay of natural strong wastes. The decay procedure is expert by different microorganisms including microscopic organisms, actinomycetes and parasites. During the time spent for fertilizing the soil, microorganisms separate natural matter and create carbon dioxide, water, vitality in types of warmth humus, and the generally stable natural component5s. Under ideal conditions, fertilizing the soil continues through three stages: the mesophilic, or moderate-temperature stage, the thermophilic, or high-temperature stage, a cooling and development stage (9). Current status of bio-fertilizers development is to give supplement sources and great soil conditions for the developments of harvests when utilized as a live body; to halfway substitute and upgrade the capacity of manure (18). Future perspective of bio-fertilizers is to gather abundance supplements in soils, especially P as an after effect of over utilization of concoction composts by farmers among concentrated rural practices. Henceforth, real research center ought to be on the creation of effective and practical bio-composts for product plants, wherein inorganic manure application can be lessened altogether to keep away from further contamination issues (8). In perspective of overcoming the obstacle, it will be important to attempt short-term, medium, and long term research, in which soil microbiologists, agronomists, plant raisers, plant pathologists, and even

nutritionists and financial analysts must cooperate (1, 4). The present work is carried out to explain the uses of Biofertilizers that are produced naturally from the vegetable waste which are produced in two different ways and its comparison to select the better source for further application.

MATERIALS AND METHODS

COLLECTION OF SAMPLE AND DECOMPOSITION PROCESS

Vegetable wastes were collected from Madiwala market in Bangalore. A different type of waste was collected and they were separated according to the requirement. The types of vegetable waste that are collected from market are varieties of green leaves, potato, tomato, beans and carrot as they are used in large quantities in day to day life. The collected samples were finely chopped and grounded with the help of mixer and they were kept in separate bins for solid and liquid fertilizer. For solid fertilizer the 500grams of each sample were added containing ½ kg of soil in it and allowed for decomposition (15). For liquid fertilizer 500grams of each sample were added and approximately 3litres of water was added depending upon the requirement and they were subjected to aerobic decomposition process for 1month.

PREPARATION OF FERTILIZER SAMPLE

After 1 month of decomposition process, the solid fertilizer sample was air dried and finely powdered and stored for further analysis. The liquid fertilizer sample was filtered and centrifuged at 10,000 rpm for 10 minutes and stored for further analysis. The fertilizer sample is of its suitable characteristics which should be sealed tightly and then stored at room or cold temperature. Samples are stored in tightly sealed containers at 1°C-5°C when they are easily deteriorated by moisture (16). The test samples are prepared by pre-drying, diminishing, and crushing the samples as required.

DETERMINATION OF COMPONENTS PRESENT IN FERTILIZER SAMPLE

Solid – liquid fertilizers are subjected to different tests to estimate the components present in it. Predetermined samples were taken to estimate the components like pH (7), moisture content (2), organic content (3), particle size (16) followed by major components like nitrogen (14), potassium (5) and phosphate (15), minor components like calcium and magnesium (20), sulfur (5) and micro components like boron (16), manganese (17) were also estimated. The results that are obtained are tabulated and represented in figures

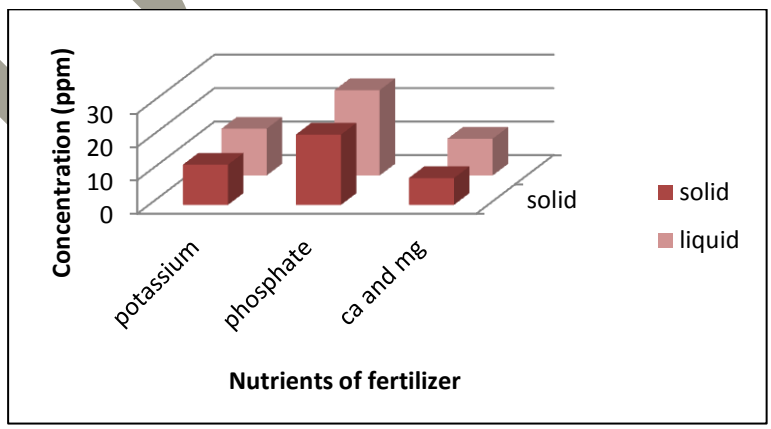
RESULTS AND DISCUSSIONS

Vegetable waste biomass is created in huge sum by agro-food industries, forestry crop and horticultural yield generation. Vegetables' development, harvest, choice and modern change for creation of sustainability, synthetic, composts produce various types of deposits (22). There are many wastes that are available in market, due to high population in the world there are so many vegetables that are grown and thrown due to high production and they are decomposed as shown in figure 1. It is the measure of acidity, corrosiveness or lack of bias. It is a basic however critical estimation for manures as its pH has a significant impact on the accessibility of supplements to crops. The particular colors are seen within the sight of different pH indicators and the color changes because of pH change (9). Excessive moisture may harm the granular structure of composts, influence their quality and impact their supplement content by expanding the heaviness of manures in a given compartment (19, 20). The moisture content of the solid fertilizer was 23.76%. Molecule size estimation is a critical perspective in deciding the manure quality. Most granular composts range around 1 and 4 mm, with a particular molecule size for some type of

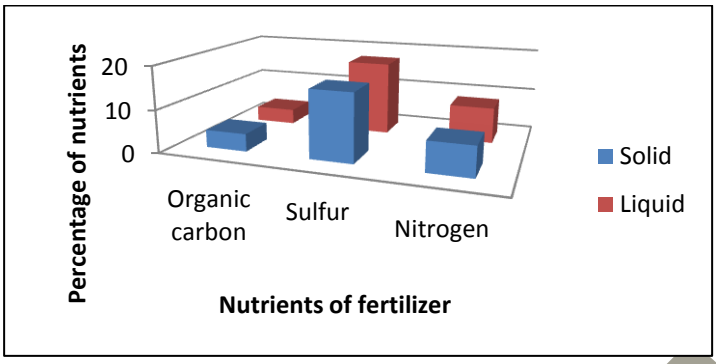
fertilizers. The particle size was estimated through sieve analysis, each sieve consists some particles in it (19). They were measured and the percentage of particle and percentage retained was calculated and the particle size was found to be 0.177mm which has 56.86% of passing efficiency.

Figure 1: Decomposition process of solid and liquid fertilizer using vegetable waste

The determination of natural carbon in composts serves in an indirect way as measure of accessible nitrogen. In most of the fertilizer cases the minimum carbon content or organic matter was found to be approximately 6-7%. The impact of natural matter (OM) on fertilizer properties and consequently on plant development is far more noteworthy despite the fact that the rate of natural matter (OM) is less in the dirt (11). The estimation of components present in the solid and liquid fertilizers are determined and represented in the figure 2 (a), (b), (c) and (d). Nitrogen is the essential supplement and makes up 1-4% of day weight of plants and it frames chlorophyll, amino acids, proteins, alkaloids and protoplasm. Since the measure of chlorophyll in the plant decides the sugar combination, nitrogen, as it were, might be said to control this movement. At the point when there is less uptake of nitrogen, the leaves stay little and light yellow in shading (21). Phosphorus is a pre imperative for microbial development in the watery bodies. The expanded convergence of phosphate is the key element for the eutrophication of surface water. Substantial algal development happens when phosphate is available in water and thus it is undesirable. Subsequently the determination of phosphorus is vital to water examiner and limnologist. Substantial amounts of phosphate have been utilized as a part of cleansers, composts and sugar industries (10).



(a)



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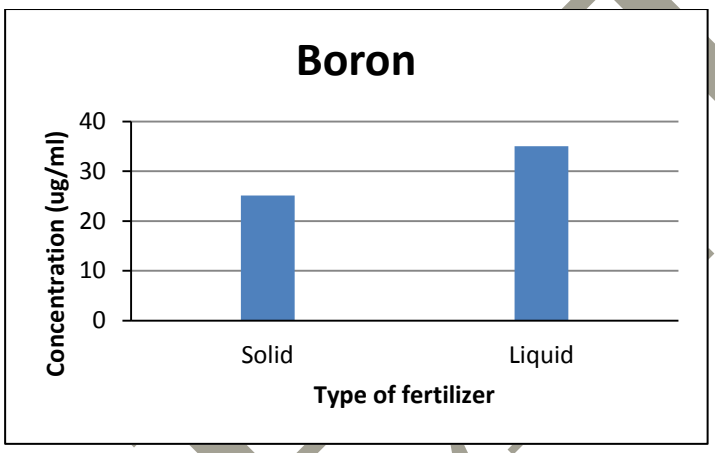

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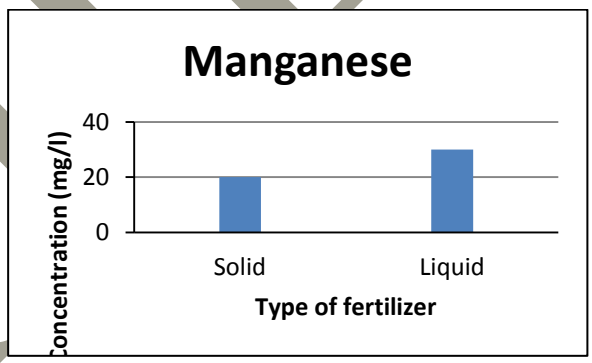

(d)

Figure 2: (a), (b), (c) and (d) are representation of solid and liquid fertilizer components with respect to concentration and percentage of nutrients

Potassium is essential in deciding the osmotic weight of plant liquids, and K^+ insufficient plants are described by wasteful water use. Plant development is influenced, and the more established leaves show lack manifestations as rot starting at the edges of tips and leaves The most terrific capacity of magnesium is its fundamental part in the chlorophyll particle (13). Thus, it is essential to calculate the available potassium present in soil. Calcium and magnesium has magnificent

physical conditions. It grows through uprightness of the flocculation and collection of essential particles which permit free development of water without stagnation and contains adequate air for the best possible air circulation of plant roots. Such dirt is very gainful which supplies fundamental plant supplements (12). Sulfur is a fundamental supplement for plant development. In recent years, sulfur deficiencies have turned out to be more frequent and the significance of sulfur in yield generation is turning out to be increasingly perceived (15). Boron is a fundamental supplement for development and improvement of solid plants. Boron compounds are utilized as a part of little fixations as micronutrients in manures. At the point when utilized as a part of extensive fixations they work as herbicides, algaecides and different pesticides (14). Manganese (Mn) is a critical plant micronutrient and is required by plants in the second most noteworthy amount contrasted with iron. Like whatever other component, it can have a restricting variable on plant development on the off chance that it is lacking or lethal in plant tissue (20). The obtained results are tabulated (table 1) and comparisons of the results are carried out to check the efficiency of the fertilizer.

Table 1: Comparison table of solid and liquid fertilizer for various components

Components	Solid fertilizer	Liquid fertilizer	Comments
pH	8.18	6.56	Solid fertilizer is moderately alkaline and liquid is neutral in nature
Organic carbon (%)	4.12	3.6	Both the fertilizers are highly organic in nature
Nitrogen (%)	7.005	8.406	Concentration of nitrogen is medium in nature
Phosphate (ppm)	21	25.5	They are moderately high in nature
Potassium (ppm)	12	14	Very less in nature
Calcium and magnesium (ppm)	8	11	They are comparatively less in nature
Sulfur (%)	15.85	17.34	Concentration of sulfur is high in nature
Boron (µg/ml)	25.1	35	Liquid fertilizer has more concentration of boron than compared to solid
Manganese (mg/ml)	20	30	Manganese is very high in nature

CONCLUSION

The present examination, in this manner, was completed to evaluate the effect of treating the soil on microbial progression in business sector squanders. Chemical, physical and natural properties of fresh manure are also highly variable than that of the commercial fertilizers. Farmers spend huge sum for purchasing manufactured composts every year this cost decreased by delivering bio-manures as result cultivating profession can turn out to be more useful than past. By executing these techniques issue of vitality and also awful impact of conventional composts on human, creatures and environment can be completely stopped. Hence forth using natural composts or Bio fertilizers will help in retaining the soil properties and produce organic food crops which does not have any side effects.

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