

Features of Compost Made From Eggshells and Coffee Beans For Green Cos Lettuce Cultivation

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Abstract - The aim of this study is to examine the quality of compost made from coffee beans and eggshells in various ratios and investigate how composting affects the growth of green cos lettuce. To do this, the research will be divided into 10 experimental sets, each with a different quantity of coffee grounds, eggshells, and soil. Based on the findings, all ten sets of trials had fermentation temperatures between 25 and 40°C, or in the mesophilic range. The pH is between 6.0 and 7.0. In contrast to the market's fresh weight of Green Cos lettuce, which ranges from 150 to 200 grams, the green cos lettuce used in all of the trials weighed between 2.97 and 7.70 grams.

Keywords: Coffee Beans, Eggshells, Compost, Cultivation

1. Introduction

At the moment, a greater usage of chemicals in agriculture is encouraging and guaranteeing healthy plant growth. There are chemical residues in cultivated crops as a result of the extensive use of agrochemicals. The chemical also affects the environment, economy, and health, which raises consumer use. Because a lot of coffee establishments throw away their leftover and unwanted coffee beans. It has been noted that using organic fertilizer in addition to eggshells is an additional way to cut back on the usage of chemical fertilizers. Fermentation has the potential to lower farming expenses, minimize chemical residues from agricultural processing, and enhance soil quality. Numerous studies have also been carried out to incorporate these elements as constituents in the production of biofertilizers, so supplanting the utilization of chemicals. This project aims to investigate the quality of compost made from coffee beans and eggshells in various ratios as well as the impact of composting on the growth of green cos lettuce. To this end, it will be divided into ten experimental sets, each with a different quantity of coffee grounds, eggshells, and soil.

2. Materials and Methods

2.1. Design of experimental sets and composting processes

The ratio of raw materials prepared in the different quantities of compost is shown in Table 1. Measurements are made of temperature, pH, nitrogen, phosphate, potassium, organic matter, and growth of Green Cos Lettuce at day sixty.

Table 1: The ratio between the coffee bean and the eggshells

Set	Weight (kg)		
	Coffee bean	Eggshells	Soil
1	0	0	10(100%)
2	0.5(5%)	0	9.5(95%)
3	1.0(10%)	0	9.0(%90)
4	1.5(15%)	0	8.5(%85)
5	0	0.5(5%)	9.5(95%)
6	0	1.0(10%)	9.0(%90)
7	0	1.5(15%)	8.5(%85)
8	0.5 (5%)	0.5 (5%)	9.0 (%90)
9	1.0 (10%)	1.0 (10%)	8.0 (%80)
10	1.5 (15%)	1.5 (15%)	7.0 (70%)

3. Results and Discussions

3.1. Temperature

In addition to indicating how well the fertilizer transfers heat, temperature also indicates how the fermented material is degrading. The temperature range of composts is 25–40°C, which is consistent as shown in Table 2. In the process of producing organic fertilizers, temperature plays a significant role in determining how quickly or slowly the biological fertilizers will alter. The breakdown of organic matter is the reason for the compost's elevated temperature.

Table 2: Temperature throughout the experiment

Set Time (day)	Temperature (°C)									
	1	2	3	4	5	6	7	8	9	10
0	25	27	31	36	26	26	27	28	30	45
10	27	30	32	39	29	28	28	30	33	42
20	30	30	31	32	30	29	29	31	31	31
30	29	29	29	29	29	28	29	29	29	29
40	27	27	27	27	27	27	27	27	28	28
50	31	29	29	29	28	28	28	29	29	29
60	31	29	29	29	30	28	28	29	29	29
Average	25	29	30	32	28	28	28	29	30	33
S.D.	2.30	1.25	1.70	4.39	1.51	0.95	0.82	1.29	1.68	7.09

3.2. pH

As seen in Table 3 and Fig. 1, the pH range of the compost made from coffee beans and eggshells was 6.0–7.0. Plants can absorb important nutrients like nitrogen, phosphate, and potassium when the pH is between 6.0 and 6.5, which is the optimal range for nutrient absorption.

Table 3: pH throughout the experiment

Time (day) \ Set	pH									
	1	2	3	4	5	6	7	8	9	10
0	7.0	7.0	6.5	6.5	7.0	7.0	7.0	7.0	6.5	7.0
10	6.0	6.0	6.0	6.0	6.0	6.5	6.5	6.5	6.0	6.5
20	6.5	6.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
30	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
40	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5
50	7.0	7.0	7.0	6.5	7.0	7.0	7.0	7.0	7.0	7.0
60	7.0	7.0	7.0	6.5	7.0	7.0	7.0	7.0	7.0	7.0
Average	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
S.D.	0.39	0.39	0.39	0.38	0.38	0.19	0.19	0.19	0.39	0.24



Fig. 1: pH during the experiment

3.3. Nitrogen, Phosphorus, Potassium and Organic Matter

Nitrogen

After 30 days, 45 days, and 60 days of fermentation, the total nitrogen content of the compost was measured. All nitrogen levels are in the range of extremely low to moderate, which causes the formation of green cots in some areas of the little leaf.

Phosphorus

After 30 days, 45 days, and 60 days of fermentation, the total phosphorus content of the compost was measured. All phosphorus levels are in the region of high to extremely high, giving the compost a longer stem range than standard Green Cos Lettuce.

Potassium

After 30 days, 45 days, and 60 days of fermentation, the total potassium content of the compost was measured. All potassium levels were found to be between extremely low and moderate, meaning that Green Cos Lettuce was not strong [1], [2].

Organic Matter

Following 30 days, 45 days, and 60 days of fermentation, the organic matter content of the compost was measured. The results showed that the quantities of organic matter were moderate, which led to poor soil quality.

3.4. Growth of Green Cos Lettuce

Ten sets of experiments were conducted to examine the effects of fermentation on the growth of green cabbage. The results are displayed in Table 4. In contrast to the market's fresh weight of Green Cos lettuce, which ranges from 150 to 200 grams, the green cos lettuce used in all of the experiments weighed between 2.97 and 7.70 grams.

Table 4: Growth of Green Cos Lettuce

Set	Ratio Coffee Beans:Eggshells:Soil	Avg.Height (cm.)	Avg. No. of Leaf (Number)	Avg.Gain Weight (g.)
1	0:0:10	31.6	9	3.98
2	0.5:0:9.5	35.0	11	7.65
3	1:0:9	35.3	10	7.70
4	1.5:0:8.5	33.7	12	6.80
5	0:0.5:9.5	26.1	7	3.28
6	0:1:9	29.1	9	4.63
7	0:1.5:8.5	32.0	8	3.47
8	0.5:0.5:9	33.4	10	4.83
9	1:1:8	31.5	8	3.43
10	1.5:1.5:7	26.4	6	2.97

4. Conclusions

1. All ten of the tests' fermentation temperatures fall within the mesophilic range, which is between 25 and 40 °C. This is a highly diverse range of microorganisms. The pace of degradation accelerates as a result.
2. Fermented fertilizers made from eggshells and coffee beans have a pH between 6.0 and 7.0.
3. The green cos lettuce used in all of the experiments weighed between 2.97 and 7.70 grams. In contrast to the market's fresh weight of Green Cos lettuce, which ranges from 150 to 200 grams.

References

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