

The Foliar Spray Application of Selected Organic Fertilizers and Their Effects on Selected Plants

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ABSTRACT

Fertilizers are any organic or inorganic natural or synthetic materials [other than liming materials], which is applied to a soil to provide one or more plant nutrients necessary for plant growth. One of the most extreme conditions that have a detrimental impact on the climate is sandy soil. The use of different organic amendments is a tool for developing sustainable development that is both economically and environmentally viable. The aim of this study is to see how milk tea waste extract, banana peel extract and coconut peat extract affect the growth of coriander and spinach plants when applied as a foliar spray. Different pots for various organic fertilizers were used. In this study we discussed how they affected plant growth and how they improved the biochemical properties of sandy soil. The different concentration (2g, 4g, 6g) of banana peel powder, milk tea waste powder and coconut peat were used in this study. The result showed that the highest plant height, root height, number of leaves and shoot height was found in 4g milk tea waste powder in both plants spinach and coriander compared to other fertilizers and control plant. This observation is suggested that the use of milk tea waste is feasible amendment strategy for improving the growth and soil fertility quality of sediments.

Keywords : - Banana Peel, Coconut Peat, Waste Milk Tea, Fertilizer, Plants Growth, Soil Analysis.

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I. INTRODUCTION

The world's population continues to grow, putting enormous strain on the environment, food, and vegetable production. Vegetable crop production would place a strain on soil and water resource protection in the coming decades to meet leafy plant

production. Fertilizer is any natural or synthetic organic or inorganic substance that is applied to a soil to supply one or more plant. Fertility is necessary for good plant development and fertilizer and organic fertilizer application is an important chromatic aberration act operation. For healthy plant growth, adequate nutrient levels in the soil must be

maintained. By determining current soil nutrient concentrations, soil analysis may help avoid over application. Soil analysis is recommended when nutrient-hungry crops are regularly cultivated, a new area is being established, or after a long time without cultivation. For plant growth, the cheapest and safest materials can be used. The current research looks at how fruit peel, milk tea waste, and coconut peat can be used to improve efficacy.

The banana peel is a significant contributor to agricultural produce. Banana peel waste is commonly disposed of in urban landfills, contributing to existing environmental issues. You can, however, resolve this problem. People use bananas for a variety of purposes, such as making banana chips and eating fruit, but banana peels are a waste product that no one uses, which is why peels are discarded. Bananas are plentiful in our country because they grow every year, so we get a lot of banana peel. We may use the banana peel powder for plant growth because banana peels are readily available. Waste peels can be used instead of genomics film as a novel product. Since a commercial tilling film is required, production of such a product is required. It is a valuable bio-product that is both helpful and environmentally friendly. For root traits, plant development, soil quality, and nutrient content throughout sandy soil, milk tea waste is a better choice. Milk tea was used as a source of nutrients for the plants, and the sandy soil was fertilized with chemical fertilizer. As compared to other organic amendments, milk tea waste contains nutrients such as nitrogen, potassium, and phosphorus, and has a low ratio. For sandy and low-fertility soils, it might be a stronger amendment. The TW decomposes the soil by breaking it down. In sandy soil, there are high N, P, K loss due to leaching and other environment effect. Nitrogen (N) is the element required by crops in greatest amount because the nitrogen is helpful to improvement of chlorophyll. So milk tea waste is the best option for crop production.

Coconut coir dust, also known as coco peat in the commercial world, is a commonly available soil material in the tropics. Coco peat is a by-product of the coconut husk fiber extraction process. Coco peat produces a variety of crop species, and it improves crop quality in terms of crop height, fruit, root, stem, and flower, among other things. Coco peat has been shown to be a less cost-effective production substrate than industrial substrates. Coco peat has a high capacity for retaining water and chemical fertilizer components, as well as neutralizing soil acidity. Coco peat also aids in the improvement of soil's chemical and physical properties, as well as its moisture content. It aids in the improvement of soil nutrient content, infiltration rate, total porosity, and hydraulic conductivity. Potassium, phosphorus, calcium, magnesium, and sodium are among the macro and micro nutrients found in coco peat.

II. METHODS AND MATERIAL

2.1 Study area

This research was carried out in Chandkheda, Ahmadabad, from February 11 to March 4, 2021. Combinations of treatments (selected different natural organic fertilizers- banana peel, milk waste, and coconut peat) with different concentrations at doses were used in a pot experiment (2, 4, 6 g.pot⁻¹). Foliar spray treatment was used as the tool of application. Ten treatments were provided in three replications using this process, with 20 pots and two plants (coriander and spinach) chosen for the application. Power, banana peel powder (2, 4, 6 g. pot⁻¹), milk tea waste (2, 4, 6 g. pot⁻¹), and coconut peat were used in the coriander plant experiment (2, 4, 6 g. pot⁻¹). Similarly, banana peel powder (2, 4, 6 g. pot⁻¹), milk tea waste (2, 4, 6 g. pot⁻¹), and coconut peat powder (2, 4, 6 g. pot⁻¹) were used in spinach plant experiment.

2.2 Collection of Soil and pot

Plastic pots were used for the coriander plant and terra cotta pots were used for the spinach plant in this experiment. The coriander plant grows well in plastic pots, but the spinach plant does not. It takes longer to develop in plastic pots, so terracotta pots were chosen for the spinach plant. In this experiment, sandy soil was used, which had poor soil quality, low soil fertility, low organic matter, and lacked nutrients. There were 20 pots used, each filled with 300gm of dried chandkheda sandy loam soil. Three seeds were sown in each pot, and one plant was removed every week for compared to untreated plant.

2.3 Collection of banana peel, milk tea waste, coconut peat

The banana peel came from a nearby fruit market, the milk tea waste came from home, and the waste coco peel came from a nearby grocery store. Banana peels were collected and washed thoroughly with tap water to remove any dust or unwanted stuff, and then cut into small pieces (1-4cm) and air dried for 20 days at room temperature. The milk tea waste was air dried for 20 days at room temperature. The banana peels and milk tea waste was grinded after 20 days, resulting in banana peel powder and milk tea waste powders were prepared.

Here's how to make coco peat at home: - Coconut peel was used to make coco peat. First, a small volume of water was collected in a bucket or other container. After that, some soil was added to the bath, followed by the coconut peels. This training took at least 20-25 days to complete. Separation of the water from the container was completed after 20 days. The coconut peel was cut down and ground at this stage, and coconut peat was prepared for the experiment as well.



Figure 1:- Shows the dried powder of (a) Banana peel, (b) Milk tea waste (c) Coconut peat

2.4 Preparation of organic fertilizer:-

The plant growth was compared to that of a control plant using various organic fertilizers such as banana peels, milk tea waste, and coconut peat powder. Water was added to each formulation in various amounts. 2g banana peel powder, milk tea waste powder, and coconut peat were combined in 100 ml distilled water to make a total volume of 100 ml, from which extracts were produced. In 100 ml distilled water, 4g banana peel powder, milk tea waste powder, and coconut peat were combined to make a total volume of 100ml. In 100 ml distilled water, 6g banana peel powder, milk tea waste, and coconut peat were combined to make a total volume of 100ml. The control plant was maintained without the use of any fertilizer.

Table 1:- Preparation of selected organic fertilizers

No.	Organic fertilizer	F1	F2	F3
1.	Banana peel powder	2g powder Total vol.=100ml	4g powder Total vol.=100ml	6g powder+ Total vol.=100ml
2.	Milk tea waste powder	2g powder Total vol.=100ml	4g powder+ Total vol.=100ml	6g powder+ Total vol.=100ml
3.	Coconut peat	2g powder+ Total vol.=100ml	4g powder+ Total vol.=100ml	6g powder+ Total vol.=100ml

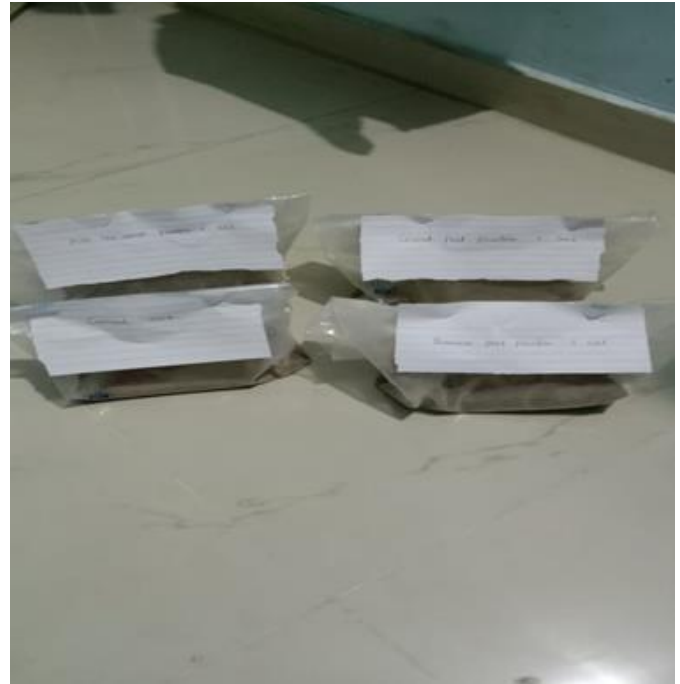


Figure 3 : Method of soil analysis

2.5 Soil Analysis

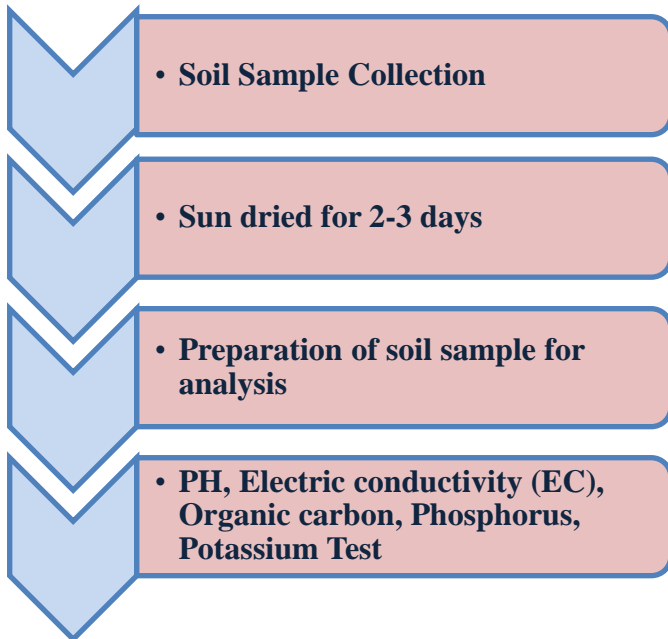


Figure 2 :- Soil sample (applied with banana peel powder, milk tea waste, coconut peat)

III. RESULT AND DISCUSSION

3.1 After 7 day’s spinach plant growth:-

In control plant there was no result found in first week. Not a single seed found to be germinated in control plant. After 7 days we had extracted one plant from every pot and noted readings for the crop height, root height and shoot height etc. Different concentrations of selected organic fertilizer banana peel powder, milk tea waste powder, coconut peat powder were used, such as 2, 4 and 6gmspot-1. After 7 days, we removed one plant. From each pot and reported measurements for crop height, Root height, shoot height, among other items. In 2gm pot (B1) and 6gm pot (B3) of banana peel powder no result were found but 4gm pot(B2) seed was sprouting and plant growth in 1st week. In 4gm pot (T2) and 6gm pot (T3) of milk tea waste powder seed germinate and small size plant growth but in 2gm pot (T1) no seed germinate and no result found in first week. In coconut powder pot only 6gm pot was sprouting the seed and germinated the small plant.

3.2 After 14 day's spinach plant growth:-

In Control plant, the result presented increasing height in small amount after 14 days. In second week, B1 pot exhibited sprouting of the seed and the size of the plant found to be very small. In B2 pot increasing shoot of plant, root of plant and 2 leaves were growths. In B3 pot sprouting of the seed and one leaf growth was seen in second week. The seed sprouted in the T1 pot in the second week, and the plant was found to be small. The shoot of the plant increased in T2 pot, the root of the plants also increased in second week. In T3 pot, the plant grew slowly and the roots grew slowly, with a red and long stem and two leaf growth. The C1 pot grew slowly in the second week, with a very small plant. The leaves had an oval shape and 2 leaves growth, C2 pot was exhibited increasing shoot of the plant. The entire plant measured 4.8cm. Root of the C2 pot plant is well formed, small and stem was thin, long and reddish in color. In C3 pot, was increasing the leaves number. The color of the leaves gradually changed from green to yellow, indicating that the chlorophyll content was gradually decreasing and the total plant measured 5.1 cm.

3.4 After 21 day's spinach plant growth:-

There was no impact in plant only number of leaves was found two to three and the plant started to wither. The leaves of the crop were seen shrieked. Plant growth was found to have increased, In the B1 pot, there were two leaves, and in the B2 pot, there were four leaves. The leaves were oval in shape and green in color, but in the B2 pot, one or two of the green leaves turned yellow. Only the number of leaves has been increased in B3, which has been increased from two to three. The number of leaves in T1 pot had increased from two to four, with one of them changing color from green to brown. Plant growth was highest in a 4gm pot (T2) of Milk tea waste powder. Two large and two small leaves appeared in the T3 pot. The number of leaves did not rise in the third week, In the C1 pot, the plant began to wither and the crop leaves shrank. Two large and one small leaves appeared in the C2 pot, and two large and two small leaves appeared in the C3 pot, but the tiny yellowish leaves shrank as the season continued.

Table 2 :- After 21 days spinach plant growth result

Name of Parameters	Control (C0)	Banana peel powder			Milk tea waste powder			Coconut peat powder		
		B1	B2	B3	T1	T2	T3	C1	C2	C3
		2 gm.	4 gm.	6 gm.	2gm.	4gm	6 gm.	2gm.	4gm	6gm.
Plant height(cm)	4.3	3.2	5.2	3.0	3.3	9.2	5.9	3.1	5.1	6.5
Shoot Height(cm)	3.5	2.0	3.7	1.8	2.7	6.8	4.1	2.1	2.9	4.5
Root Height(cm)	0.6	1.2	1.5	1.2	0.6	2.4	1.8	1	2.2	2
No. of leave	3	2	4	3	4	5	4	2	3	4
Fresh weight of plant(gm)	0.76	0.18	1.35	0.28	0.89	2.14	1.68	0.58	0.63	1.80
Dry weight of whole plant(cm)	0.30	0.11	1.29	0.11	0.30	1.89	1.33	0.39	0.52	1.43

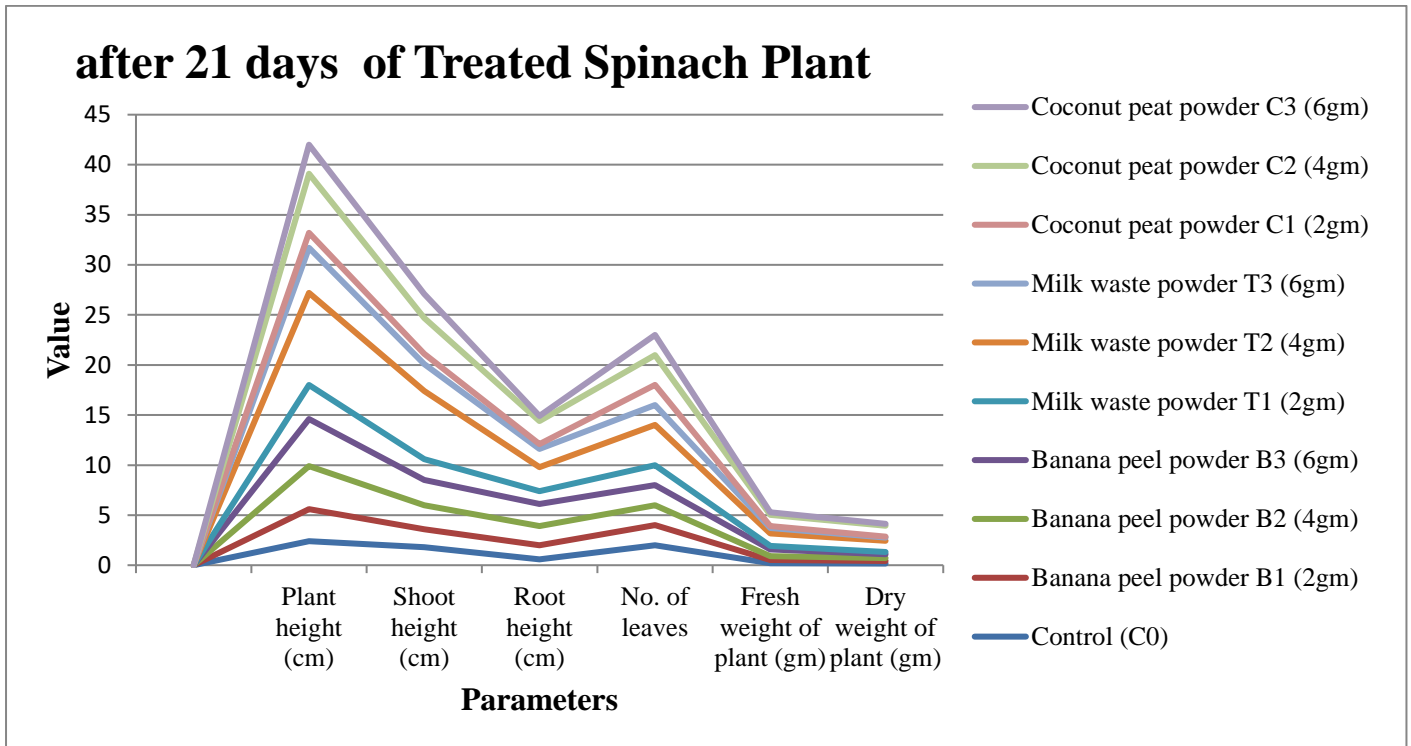


Figure 4 :- Effects of Treatments on spinach plant growth

3.5. After 7 days Coriander plant growth

In the first week, the seeds sprouted, and the control plant's tiny shoot had risen up. Seeds of banana peel powder were sprouting in a 2gm pot (B1), and small leaves, shoots, and roots were discovered. In the first week, germination of the seed was observed in a 4gm pot of banana peel powder, and an increase in the height of the tip, the height of the shoot, the height of the entire plant, and two leaf growth was observed in a 4gm pot (B2) of banana peel powder. In the first week, small leaves, shoots, and roots were discovered in a 6gm banana peel pot (B3). In 2gm pot (T1) of milk tea waste powder seeds were not sprouting but small size shoot, root were found, in 4gm pot (T2) milk tea waste powder, seed germination was found of seed and there was very good plant growth. The shoots, roots and 2 leaves were well growth in first week. In T3 pot germination was found of the seed and observed increment in height of root, shoot, the height of whole plant etc. In 2gm pot (C1) of coconut peat powder seeds were not sprouting but small leaves, shoot, and root were found and In C2

pot, germination was found of the seed and observed increment in height of root, the height of shoot, the height of the whole plant and 2 leaf growth was in 1st week. In 6gm pot of coconut peat powder seed were not sprouting but compare to 2gm pot well growth shoots and root in first week.

3.6 After 14 day's coriander plant growth

In Control plant, 2 leaves, small root, shoot were growth in second week. In B1 pot, the whole plant size was found merely 3.2 cm and 2 leaves were growth, In B2 pot was presented sprouting of the seed, one leaf growth was seen and the whole plant size was reached up to 4.3cm. B3 pot was exhibited increasing shoot of the plant, the root of plant was also found to be increased in second week and 2 leaves growth was found and whole plant size was 4.7cm. In T1 pot was presented sprouting, one leaf growth was seen and the whole plant size was reached up to 3.4cm. In T2 pot, the root of the plant, 2 new branches were growth, old leaves converted to yellow color and the whole plant size was 9.2 in diameter. T3 pot was exhibited increasing shoot of

the plant. The size of the whole plant was found nearby 4.5 cm. After 14 days, the seeds in the C1 pot had sprouted and had grown in height by a slight amount. In a 4gm pot of coconut peat powder, there was a rise in the height of the root, shoot, entire plant, and two leaf development. The total height of the plant was 5.9cm. After 14 days, seeds in the C3 pot sprouted and grew taller than those in the C1 pot.

3.7 After 21 days Coriander plant growth

The consequence in the control plant was an increase in the height of the plant root, shoot but leaves number were not increased. In 2g banana powder or B1 pot, two leaves were found. Plant growth was observed to have improved in the third week. In 4g banana powder or B2 pot, there were also two leaves visible. In the b3 pot, the old leaves

fell off and new leaves sprouted; two branches emerged, and one of the branch leaves began to turn yellowish in colour, indicating that the chlorophyll content was steadily decreasing. Old leaves were withering and new leaves and branches were sprouting in T1 pot. Three new branches with new leaves emerged from the T2 pot. The consequence in T3 was an increase in the height of the plant root, shoot, and leaves. The effect of the C1 pot was an increase in plant height, root, and shoot but no reduction of the number of leaves. The consequence in the C2 pot was an increase in the number of leaves and branches, but not in the height of the plant root or shoot. The plant increases gradually in a C3 pot, but the whole plant vanishes and dries out. There is no influence.

Table 3 :- After 21 days coriander plant growth result

Name of Parameters	Control (C0)	Banana peel powder			Milk tea waste powder			Coconut peat powder		
		B1 2 gm.	B2 4 gm.	B3 6 gm.	T1 2gm.	T2 4gm	T3 6 gm.	C1 2gm.	C2 4gm	C3 6gm.
Plant height(cm)	5.0	6.3	7.6	8	5.1	11.0	6.5	3.7	10.5	8.3
Shoot Height(cm)	2.2	3.2	4.9	4.8	3.6	8.1	3.5	2.5	6.3	5
Root Height(cm)	2.8	3.1	2.7	3.2	1.5	1.9	3	1.2	4.2	3.3
No. of leave	2	2	2	4	3	5	3	2	4	2
Fresh weight of plant(gm)	1.09	1.18	1.35	1.58	1.29	2.28	1.25	0.58	2.13	1.23
Dry weight of whole plant(cm)	0.89	1.11	1.29	1.39	1.20	1.94	1.13	0.39	2.02	0.93

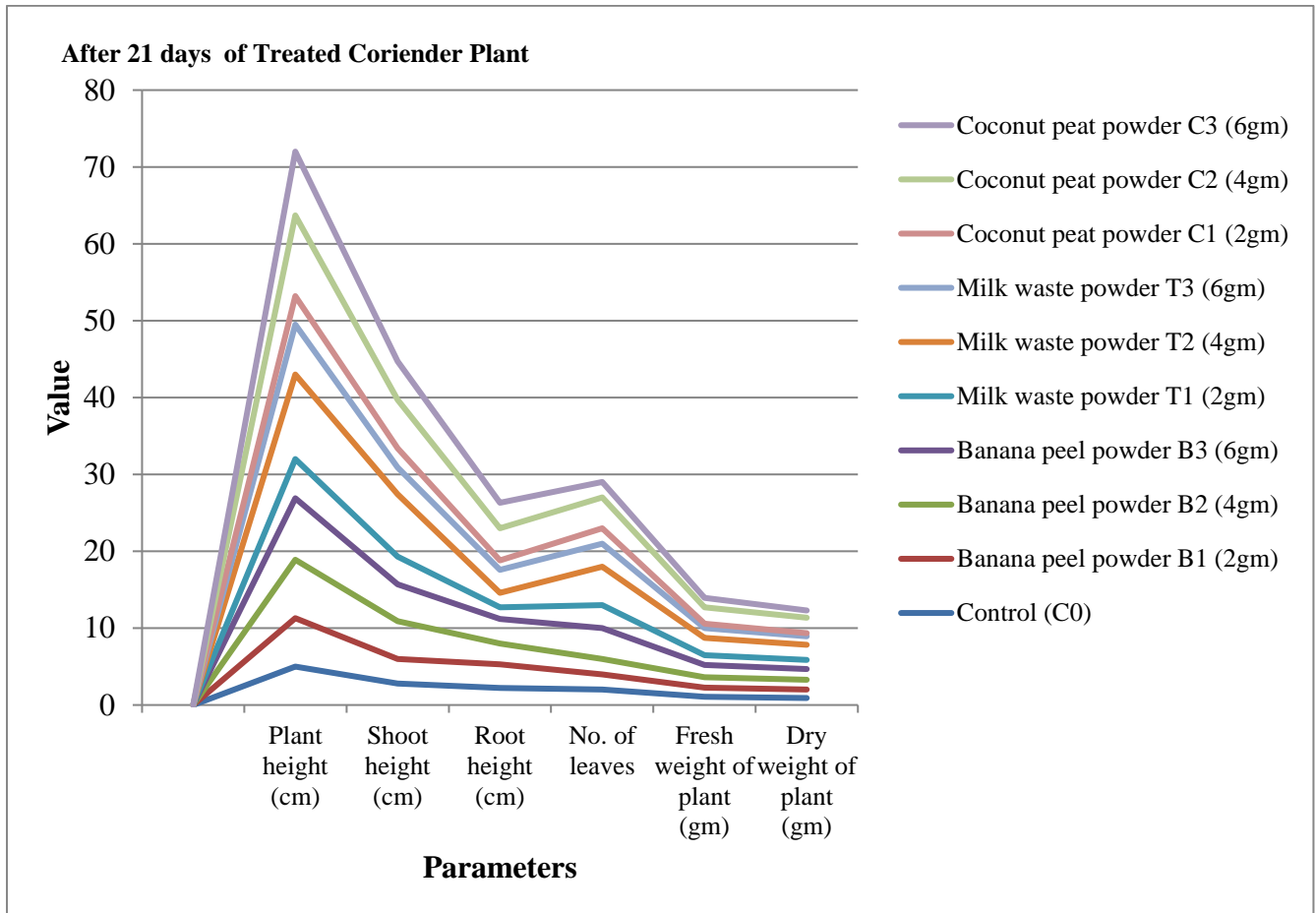


Figure 5 :- Effects of Treatments on Coriander plant growth

3.8 Soil Analysis Result

Table 4 :- Observation table of soil with different organic fertilizer

Organic fertilizer + soil	PH	E.C	% Carbon	Potassium	Phosphorus
Blank	-	-	20 ml	-	0
Control	9.72	1.67	19.5	14.98	24
Banana peel	7.67	4.8	12.5	18.11	43
Milk tea waste	8.57	1.80	6.0	84.44	40
Coconut peat	8.93	2.3	16.0	16.68	30

Table 5 :- result of soil analysis

Soil + organic fertilizer	PH	E.C (milli.moh/cm)	Organic Carbon (%)	Potassium Kg. /Hac.	Phosphorus Kg. /Hac.
Control	9.72	1.67	0.075	201.33	66.96
Banana peel powder	7.67	4.8	1.125	243.40	119.97
Milk tea waste powder	8.57	1.80	2.1	1,134.87	111.6
Coconut peat powder	8.93	2.3	0.6	224.18	83.7

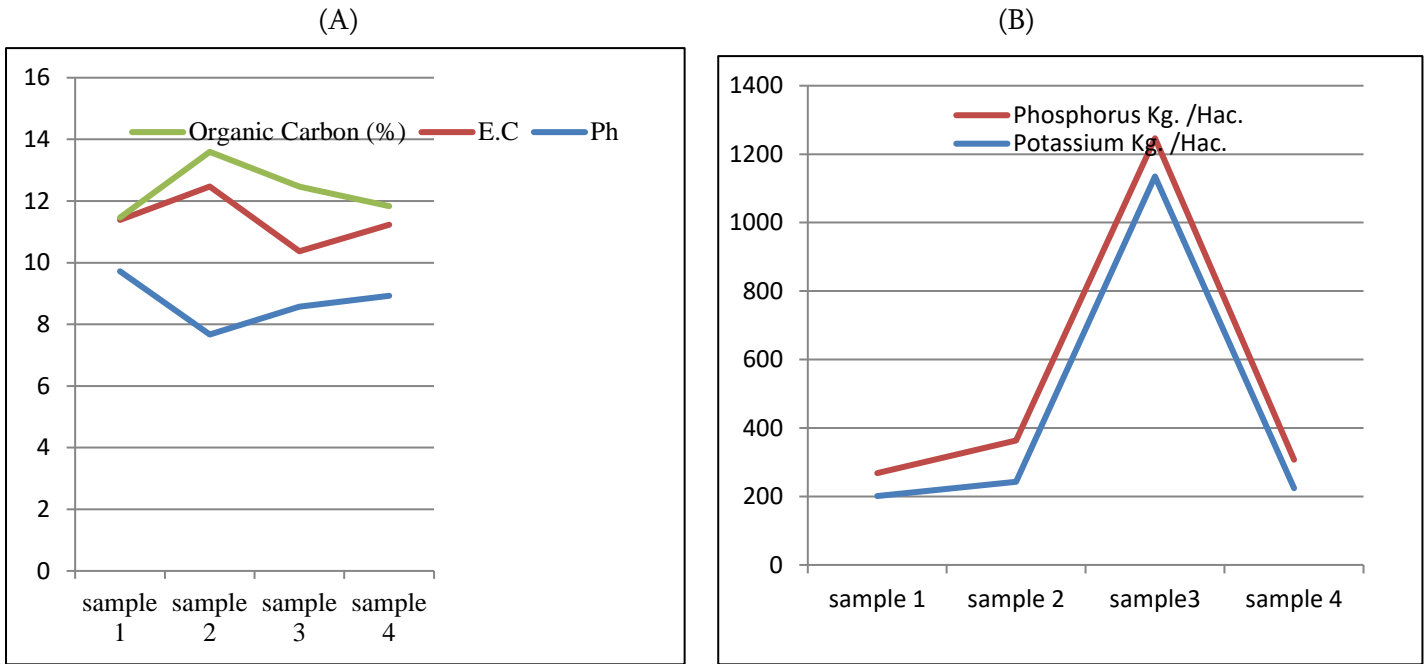


Figure 6 :- Influences of application different organic fertilizer soil chemical properties, Soil, Ph, E.C, Organic carbon (A), and Potassium, phosphorus (B) after plant growth. Without amended (sample 1), Banana peel powder mixed soil (sample 2), Milk tea waste powder mixed soil (sample 3), coconut peat mixed soil (sample 4).

Discussion

Sail, T. A.et al., 2019 presented the treatment including practical usage of milk tea waste (TW) combined with chemical fertilizer. The highest root total length, root surface area, root volume and diameter were recorded for T4 among all treatments. They were used milk tea waste and inorganic fertilizer but in this study same result as that paper but not used the inorganic fertilizer.

Mercy, S.et al., 2014 studied the effect of the fruit peels for the effective growth of plants and higher yield. The result length of the plant was observed as lower in control and size of the leaves was increased in the plants which were grown on the soil having applied formulation. And they were used different fruit peel. But in this study only banana peel powder used and the result was different as that paper.

Khan, M. Z., Era, M. D., et al., 2019 presented the effect on the coconut peat on growth and yield

responses of ipomoea aquatic. T4 treatment was shown highest response of plant growth. In this study different concentration used and result was different as that paper.

IV. CONCLUSION

This project focuses on the use of organic fertilizers such as banana peel powder, milk tea waste powder, and coconut peat powder in practical applications. The 4gm powder of milk tea waste and 6gm powder of coconut peat were found to be the most effective treatments for spinach plant growth and overall improvement. When compared to the control plant, the treatments resulted in spinach plant growth (plant height, shoot height, root height, and leaf number). The best organic fertilizers for coriander plants were 4gm milk tea waste and 4gm coconut peat powder, which were found to aid plant production and enhance soil

nutrient content. Of all of the therapies, milk tea powder was found as being the most effective.

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