

# Impact of waste tea powder as organic compost for the growth of *Glycine max.*

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## **Abstract**

The current work was focused on to the use of waste tea-powder, particularly in urban areas that is not used for any purpose and discarded as wet garbage. Waste tea powder is an excellent supply of perishable garbage, however it will create an honest source of compost in addition. The work stated the analysis of physio-chemical parameters and utilization of waste tea powder that is concerned with compost which used as organic source of fertilizer. The compost consisting of waste tea powder are equipped with essential nutrients required for the development and growth of plant, further it helps in the regulation of soil as it is consisting of chloride, organic matter, phosphorus, sulphates etc. Additionally the utilization of compost is ecofriendly approach and also helps the high yield of crop production.

**Key words:** Compost, garbage, pollution, tea powder,

## **Introduction**

When it comes to providing healthy environment for plants to grow we have various different options. The soil can be amended by using numerous fertilizers on it to grow healthy plants but they contain various synthetic chemicals. Due to the presence of synthetic chemicals, the beneficial microorganisms in the soil that convert dead matter to nutrient rich organic compost dies, also Nitrogen and Phosphate based fertilisers increases the toxicity of the ground water causing water pollution. The chemicals that makes its way towards the various water bodies disrupts the aquatic life in them. The increase of nitrate levels of the soil due to the synthetic chemicals is converted into toxic nitrites in the intestine, when plants are grown in such soil. The toxic nitrites reacts with haemoglobin in the blood which causes Methaemoglobinaemia. This damages the vascular and the respiratory systems, resulting in suffocation and death in some extreme cases. Due to the synthetic fertilisers there is a damage in the natural make up of the soil in long term. Growing plants in over fertilised soil leads to them being deficient in various nutrients like the iron, zinc, etc. Due to these reason we preferred to find an organic alternative to this which is the compost.

The organic materials that are generally required by the plants are Potassium(K), Phosphorus(P), Nitrogen(N), Magnesium(Mg), etc; which are generally present in the organic compost. This will decrease the use of inorganic fertilisers. So, to increase the status of organic matter compost is totally beneficial. The organic compost encourages the growth of the beneficial bacteria and fungus that break down organic matter to form humus which is a nutrient rich material. It also helps in the reduction of greenhouse gas methane from various landfills and decreases our carbon footprint. Compost take up a lot of waste due to which it provides a hand in waste

management. It also plays a role in improving the physical, chemical and biological properties of the soil. Compost also cleans up the contaminants present in the soil. Materials that can be used for composting are organic solid waste, Animal manure and bedding, human excreta and the sewage sludge.

## **Material and Methods**

### **Preparation of the compost**

There were basically two different type of compost which had five sample each. One of the compost contained waste tea powder and another did not. The waste powder was taken from various house, tea stalls and hotels from my home town Tinsukia and the compost were prepared there.

For the Waste Tea Powder compost we mixed equal amount of soil, cow dung and waste tea powder thoroughly and stored it in a cool place. Similarly, for the other compost we mixed cow dung and soil in equal amounts and stored it in a cool place.

The temperature and the moisture content of the compost were regularly checked and the temperature was maintained between 27-32 degree centigrade for both the compost. After 2 months the compost was fully prepared.

### **Testing of the pH and nutrients**

The test for the pH of the soil is done by mixing soil with distilled water in the ratio of 1:1 and is kept for 30 minutes Then it is filtered using a filter paper. The pH of the filtrated liquid is checked by the pH meter. Litmus paper could also been used for this.

Another method that can be used is by mixing soil with distilled water in the ratio of 1:2, thoroughly. And let it settle for 30-40minutes so that the sediments gets settled and there is a clear water separation. Then with the help of filter paper filter out the soil extract.

In this we have used the soil doctor capsules for pH and open two capsules carefully in a test tube and add 8 ml of the clear soil extract. We then let the chemical dissolve so that it gives colour so that it can be compared to the charts.

For the test of the Potassium content, it is done by mixing soil with distilled water in the ratio of 1:2, thoroughly. And let it settle for 30-40minutes so that the sediments gets settled and there is a clear water separation. Then with the help of filter paper filter out the soil extract.

In this we have used the soil doctor capsules for potassium and open two capsules carefully in a test tube and add 8 ml of the clear soil extract. We then let the chemical dissolve so that it gives colour so that it can be compared to the charts.

For the test of the Nitrogen content, it is done by mixing soil with distilled water in the ratio of 1:2, thoroughly. And let it settle for 30-40minutes so that the sediments gets settled and there is a clear water separation. Then with the help of filter paper filter out the soil extract.

In this we have used the soil doctor capsules for Nitrogen and open two capsules carefully in a test tube and add 8 ml of the clear soil extract. We then let the chemical dissolve so that it gives colour so that it can be compared to the charts.

For the test of the Phosphorus content, it is done by mixing soil with distilled water in the ratio of 1:2, thoroughly. And let it settle for 30-40minutes so that the sediments gets settled and there is a clear water separation. Then with the help of filter paper filter out the soil extract.

In this we have used the soil doctor capsules for phosphorus and open two capsules carefully in a test tube and add 8 ml of the clear soil extract and also add 8 ml of TCA reagent in it. We then let the chemical dissolve so that it gives colour so that it can be compared to the charts.

**Growing of the *Glycine max* plants**

Soybean which also called as soja bean and soya bean is an annual legume of pea family. The scientific name for Soybean is *Glycine max* Soybeans are exceptional source for essential nutrients and in 100 grams of soybean we get 446 calories and are 9% water, 30% carbohydrate, 20% fat and 36% proteins. It also has high Daily Value(DV).

The seeds are planted and allowed to germinate to see if any distinguishable morphological characteristics can be seen. The morphological characteristics being time of germination height of the plant, leaf density, size of the plant, etc.

**Result and Discussions**

The morphological features of the plant varied a little between the plant grown in the normal soil an the plants grow in the Waste tea powder compost and the Normal compost. Days taken to sprout.

	Normal soil (Control)	Waste tea powder compost	Normal compost
Sample 1	1st	1st	2nd
Sample 2	3rd	2nd	2nd
Sample 3	-	-	2nd
Sample 4	-	2nd	-
Table			

Height of the plants after a week (7 days):-

	Normal soil (Control)	Waste tea powder compost	Normal compost
Sample 1	10 cm	12 cm	7 cm
Sample 2	4 cm	9 cm	7 cm
Sample 3	-	-	6 cm
Sample 4	-	10 cm	-
Table			

The pH of the Waste Tea Powder soil was on an average of 6.36. Whereas the pH of the Normal compost was 5.9. This implies that there was an increase in the pH level of the soil by Variation in pH = pH of Waste Tea Powder - pH of Normal Compost = 6.36- 5.9 = 0.46

	Waste tea powder compost	Normal compost
Sample 1	6.2	5.8
Sample 2	6.4	5.9
Sample 3	6.5	5.8
Sample 4	6.3	6.0
Sample 5	6.4	6.1
Table		

The increase in pH implies that the nitrate level in the soil has increased in the Waste tea powder compost from that of the normal compost.

There is a change in the texture and the moisture content of the soil. This can be seen directly. The Waste tea powder is more lush and more fine compared to that of the normal compost and is more dark in colour. This implies that the Waste Tea Powder Compost is rich in nutrient content then the normal compost.

The amount of Potassium present in the Waste Tea Powder Compost is higher than that of the Normal Compost. This will help in the regulation of CO<sub>2</sub> as it regulates the opening of stomata and triggers various enzymes for the production of ATP.

Similarly there is an increase in the amount of Nitrogen and Phosphorus present in the soil which are essential for the growth of the soil. Since the nitrogen is a major component in the chlorophyll and proteins its uptake is important for the survival of the plant.

The Phosphorus is required by the plants for its growth and maturity. It plays an important role in the photosynthesis, respiration and several other metabolic process of the plant.

The saplings of the soybean started grow and there were some morphological difference time of germination and sizes of the plants which clearly indicates that Waste Tea Powder compost is better than the normal soil or the normal compost we use to grow soybean.

The Waste Tea Powder is a great cost efficient organic compost which is good for the growth of model plants like *Glycine Max* which is an important edible crop in the world.

## Conclusions

For making of compost the waste tea powder is a suitable substrate. The amount of nutrient present in the waste tea powder compost is more due to which it is good for any plant. The waste tea powder compost is more fine and cost efficient compared to the other compost. After the germination of the seeds of *Glycine max* we can see the morphological differences between the plants. This waste tea powder compost is cost efficient model of composting in this way as because other type of composing requires man power and time.

The use of waste tea powder as compost will surely reduce environmental pollution caused by the use of inorganic fertilisers. Also will increase the yield of any plant grown in it. Since, Glycine max is widely grown all over the world, this would make it easier for the farmers to grow while decreasing the soil contamination and also the cost of buying inorganic fertilisers and there by provide better income for them.

Due to the Waste Tea Powder Compost we can now decrease the use of Inorganic or synthetic fertilisers which are causing soil pollution and also are unhealthy for plant and human consumption



Fig Normal soil



Fig Compost soil



Fig Waste tea compost soil



Day 1



Day 2



Day 3



Day 5



Day 10

Fig: Soybean Saplings

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