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## To improve the fertility of soil by using Biochar

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### ABSTRACT

Now a days due to use of artificial fertilizers in farming, the yield of crop is getting damaged. Soil becomes polluted and unfertilized for crop production. So, we made use of Biochar which is organic material. By using Biochar fertility of soil is improved and healthy food is produced for mankind. Biochar has been proven a renewable resource and eco-friendly material for improving soil fertility. The main objective of our study is to increase the water absorbing capacity of soil and to produce crop by organic fertilizer. In this experiment we made a comparative study between Biochar and fertilizer (that is NPK and organic manure). The time taken by each fertilizer for production of the crop (Tomato) and how much water is absorbed by each fertilized soil is compared.

**Keywords**— Water absorbing capacity, Organic fertilizer

### 1. INTRODUCTION

Biochar is an organic material produced from biomass under high temperatures of pyrolysis in the absence or depleted oxygen. It is a carbon-rich material with plenty of porous structure and functional groups. Biochar is a stable carbon (C) compound created when biomass (feedstock) is heated to temperatures between 300 and 1000°C, under low (preferably zero) oxygen concentrations. The mechanisms involving chemical and physical properties of biochar particles affecting water movement through soil, remove pollutants, alter microbial communities and reduce emissions of greenhouse gases.

Preserving soil moisture is important for maintaining water balance for agricultural production, and also helps in reducing the irrigation needs of the crops. This is especially important in areas where rainwater and/or groundwater resources for irrigation are scarce or decreasing due to climate change or other causes. But due to the use of artificial fertilizer the water absorbing capacity of soil gets reduced and due to this crop production becomes less.

The main objective of our project is to increase the water absorbing capacity of the soil and to produce crop by organic fertilizer. By using Biochar, we tried to analyze the production of the crop in short duration of time and also its maximum water absorbing capacity in comparison to other fertilizers.

In this project, we made a comparative study between Biochar and fertilizer (that is NPK and organic manure). The time taken by each fertilizer for production of the crop (Tomato) and how much water is absorbed by each fertilized soil is compared.

### 2. LITERATURE SURVEY

**Biochar and its Role in Soil Fertility Management (November 2016) Charu Gupta, Prof. Dhan Prakash, Sandip Gupta.** Due to its ability to increase soil fertility, Biochar is unique for many people. It is prepared from pyrolysis of agricultural waste. It is the product obtained from the carbonation of biomass. It helps to reduce emission from biomass which helps to reduce greenhouse effect. Biochar has several benefits like it increase water holding capacity of the soil.

**Impact of Biochar Amendment on Fertility of a South-eastern Coastal Plain Soil. (February 2009) Mohamed Ahmedna, Don W Watts, Mohamed A. S. Niandou.** The purpose of the study is to analyze the effect of pecan shell-based Biochar in addition to North folk loamy sand. Additions of Biochar to the Norfolk soil increased soil pH, soil organic carbon, Ca, K, Mn, and P and reduced soil acidity, S and Zn. Water leaching Biochar with North folk showed enrichment Potassium.

**Biochar: A Tool for Improving Soil Fertility (7 July 2018) Muhammad Shaaban:** Use of Biochar helps in reducing bulk density, improve soil structure and water porosity. Biochar also helps in reducing soil acidity and also increase soil ionic capacity. Nutrients of Biochar and mineralization of organic matter of Biochar are a good source of essential elements for the plant.

### 3. OBJECTIVES

- (a) To increase the fertility of the soil.
- (b) To increase the water holding capacity of the soil.
- (c) To increase the production of the crop in a short duration of time
- (d) To help plants to grow better in high salt situations.
- (e) To reduce soil acidity.

### 4. METHODOLOGY

#### 4.1 Material specification

- (a) **Water:** Normal boring water with pH 7 is used for irrigating plants.
- (b) **Seeds:** Tomato seeds from the local market are purchased with effective germinating properties.
- (c) **Soil:** Black cotton soil is used. It is commonly available in the Deccan plateau of Maharashtra.
- (d) **Fertilizers:** N P K in the proportion of 10:26:26 is purchased from the local market.
- (e) **Biochar:** Biochar is prepared by pyrolysis of agriculture waste that is corn Stover; cotton plant stems are used. Pyrolysis set up is prepared using used oil cans and small tin containers.

#### 4.2 Sowing of seeds

- (a) 6 waste oil boxes were filled with black cotton soil.
- (b) Out of 6 boxes, in 3 boxes sowing of seed is done with a mixture of Biochar in soil and in remaining 3 boxes sowing is done without any mixture.



**Fig. 1: Raw material before pyrolysis**



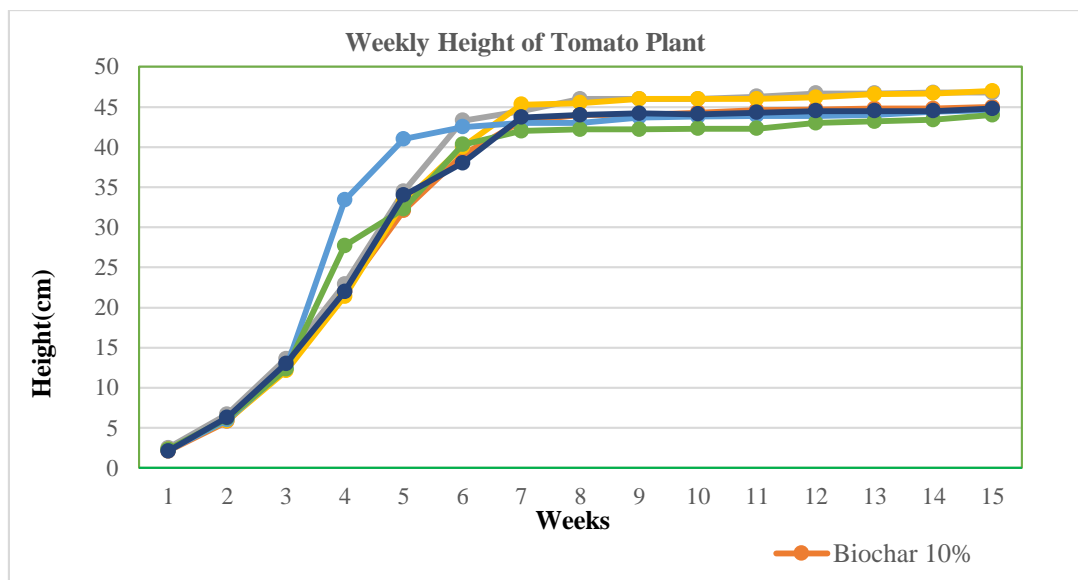
**Fig. 2: Product of Biochar after pyrolysis**

## 5. RESULT

### 5.1 Measurement of Height

**Table 1: Measurement of Height**

Weeks	Biochar 1 (cm)	Biochar 2 (cm)	Biochar 3 (cm)	Sample 4 (cm)	Sample 5 (cm)	Sample 6 (cm)
1	2.1	2.5	2.3	2.2	2.3	2.1
2	5.8	6.7	5.9	6	6.2	6.3
3	12.9	13.6	12.1	12.4	12.3	13
4	22	22.9	21.4	33.4	27.7	22
5	32.1	34.5	33.2	41	32.3	34
6	39	43.3	40	42.5	40.3	38
7	43.2	44.5	45.3	43	42	43.7
8	44	46	45.5	43	42.2	44
9	44	46	46	43.7	42.2	44.2
10	44.3	46	46	43.8	42.3	44.1
11	44.6	46.3	46	43.9	42.3	44.3
12	44.7	46.7	46.2	43.9	43	44.5
13	44.8	46.7	46.6	44	43.2	44.5
14	44.8	46.8	46.7	44.4	43.4	44.5
15	45	46.8	47	44.6	44	44.8

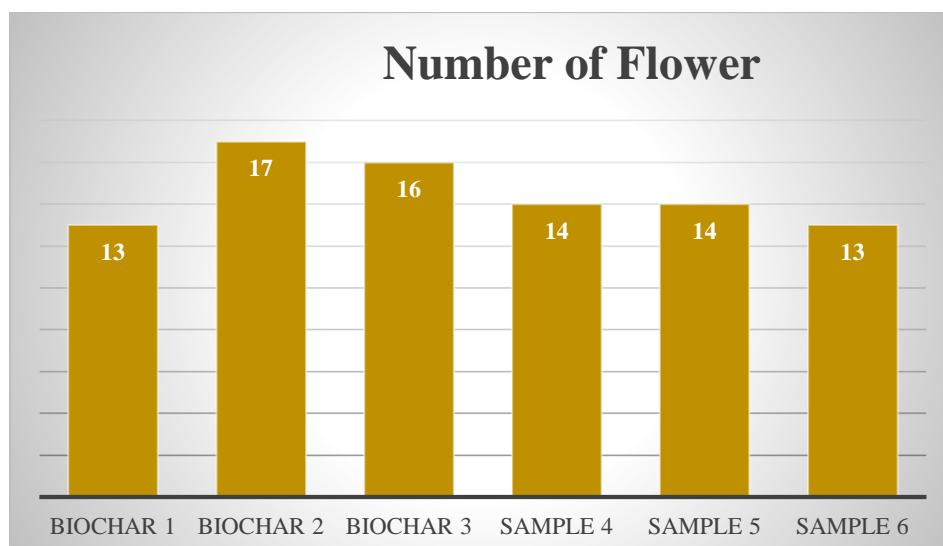


**Fig. 3: Measurement of height**

### 5.2 Number of Flower

**Table 2: Number of flowers**

	Biochar 1	Biochar 2	Biochar 3	Sample 4	Sample 5	Sample 6
Number of Flower	13	17	16	14	14	13



**Fig. 4: Number of flowers**

## 6. CONCLUSION

- It can be concluded that biochar provides better production of tomato.
- Corn cob used in biochar helped in increasing carbon contain in the soil which increases its fertility.
- It can be concluded by the above table and observation that production can be increased by 15%.

## 7. REFERENCES

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