



Comparative Study of Plant Growth in different Conditions like Normal, Organic, Inorganic and Effect of Magnetic Field

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ABSTRACT

In the case of minerals soils, Most of the essential elements are found in liberal quantities. The present study deals with the assessment of Macronutrients, i.e, N, P, K, S, B, and micronutrients, Zn, Fe, Cu, Mn and OC from Choradi and sannivasa villages of shimoga taluk of Karnataka, India. Soil samples collected from different locations of this Study area.

The soil samples (depth 0-15cm) were collected randomly in selected area and compare these properties in Normal, Organic, Inorganic Magnetic Field conditions on plant growth.

The results are help for Researchers and farmers for findings the problems related to the soil nature and nutrient status and improve the sustainable agricultural production.

1. INTRODUCTION

A magnetic field is an inescapable environmental factor for plants on the Earth. During the evolution process, all living organisms experienced the action of the Earth's magnetic field (geomagnetic, GMF), which is a natural component of their environment. Geomagnetic field is steadily acting on living systems, and is known to influence many biological processes. There are significant local differences in the strength and direction of the geomagnetic field. A magnetic field is usually measured in terms of its magnetic induction B whose unit is given in Tesla (T). The SI unit of the magnetic flux (ϕ) is Weber (Wb).

The literature describing the effects of weak magnetic field on living systems contains a plethora of contradictory reports, few successful independent

replication studies and a dearth of plausible biophysical interaction mechanisms. Most such investigations have been unsystematic, devoid of testable theoretical predictions and, ultimately, unconvincing. The progress and status of research on the effect of magnetic field on plant life have been reviewed in the past years. In current study, we can consider two experimental approaches aimed to evaluate the physiological responses of plant exposed to either weak or strong magnetic field.

Germination [4] is the process by which the embryo wakes up from the state of dormancy and takes to active life. This process, in fact, covers all the changes from the earliest sprouting of the seed till it established itself as an independent plant. A mature seed is living. But the embryo remains dormant. Magnetic field treatment of seeds became very popular in the

agricultural sector.[4] Pre-sowing seed treatment with MF called magnetopriming [6]. It is a non-destructive and dry seed priming treatment that has been reported to increase the rate of germination and seedling vigour of many crops. There are several reports on the metabolic changes occurring during germination in seeds in response to magnetopriming under non-stressed environments. Another advantage in the use of magnetic field is in relation to increasing the germination rates and the possible increase in membrane permeability, facilitating the process of water absorption by seeds. Specifically, magnetic field affected the antioxidant activity and increased the activity of the free radical ions in plants.

MATERIAL AND METHODS

In our present study, soil samples were collected from different villages in shimoga taluk are Choradi and Sannivasa. Soil samples were also collected from Shimoga district and this district is situated at 14° 0' North latitude and 75° 42' east latitude of 650 metre above the mean sea level and receives annual average rainfall of 817 mm, which describes locally as malnad region. It receives good rain fall and is one of the drought prone districts in the state. In region of malnad we have collected soil samples from two villages.

Soil sample were collected from different malnad region of Shimoga districts individually by inserting a spade into the soil by making a pit of about 15 cm. Further, the spade is again inserted from opposite side to get a pit of Vee (V) shape. The above said procedure was repeated for 8 to 10 places in zigzag manner of the same plot. From this V shape pit, about one kg of soil sample was taken. Such composite soil from 8 to 10 places was mixed to get 5 kg of soil sample and further air dried under shade. After air dried, the samples were placed in a labelled plastic buckets. The details of sampling site, field number and details of farmer were recorded. It is noted that, the soil samples from recently fertilised areas, bunds, low lying corners, spots near trees, fences, channels, compost pits were excluded.

The main hypothesis is that static magnetic field has effect on plant growth. The plants grow in an environment with magnetic field. They will grow differently than if they grow without magnetic field.



Figure 2.1:- soil samples in different conditions

We took eight plastic pots, each with a diameter varies from 32-48cm and height 13cm. We placed two different types soil in four pots each One set of pot contained soil-C, the plants grow under four condition i.e. effect of magnetic field, organic, inorganic and normal conditions. Another set of pot contained soil-S, the plants grow under four conditions i.e. magnetic field, organic, inorganic and normal conditions. Kept the seeds below the 1 cm from the upper layer of the soil.

Sample - C	Normal condition	Organic condition	Effect of magnetic field	Inorganic condition
Sample - S	Normal condition	Organic condition	Effect of magnetic field	Inorganic condition

Table 2.1. different conditions of soil samples

Each nursing container is facing the east direction and exposed to sunlight. Pots are exposed both day and night. The plants grow under the atmospheric conditions. The soil in each container is kept wet by watering once in a day. The soil surface is neither dry nor soggy to touch. We recorded on a 5 days basis on the number of seeds that have germinated. Plant growth and observation about health such as colour of leaves and spots or holes due to pest and diseases. Diseased spots will be quantified. Plant growth was measured by plant height and leaf size.

RESULT AND DISCUSSION

Sl no	sample	place	PH	EC dsm ⁻¹	OC %	N Kg/ha	P ₂ O ₅ Kg/ha	K ₂ O Kg/ha	S ppm	Zn ppm	B ppm	Fe ppm	Mn ppm	Cu ppm
1	S 1	choradi	5	0.1	1.17	606.69	286.51	273.60	9.88	0.43	4.57	28.94	12.78	1.25
2	S 2	sannivasa	5.20	0.1	1.49	770..80	173.09	212.35	4.73	0.48	8.29	39.92	18.81	0.72

Table 4.3. Variation of physico- chemical properties of soil samples

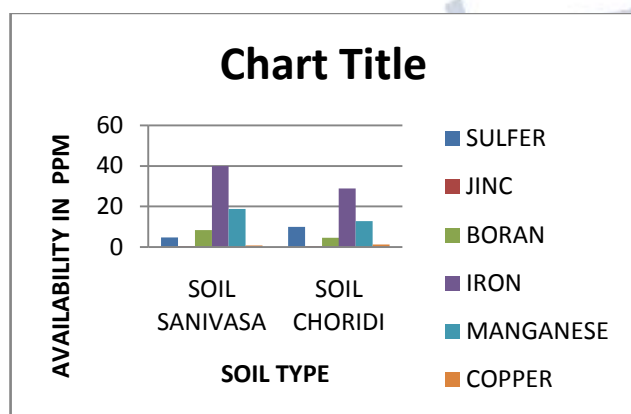


Figure 4.1. graphs of the of micro nutrients

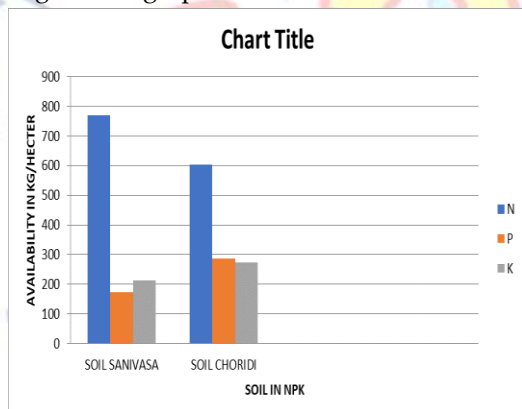


Figure 4.2. graphs of macro nutrients

Soil C:-

Days	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Organic contents	0-2.5	2.5-11	11-25	25-33	33-36	36-40	40-43	43-47
Normal	0-0	0-6	6-19	19-28	28-31	31-37	37-40	40-43
Magnetic effect	0-0	0-6.6	6.6-30	30-40	40-44	40-53	53-60	60-69
Organic contents	0-0.5	0.5-11	11-30	30-39	39-42	42-60	60-67	67-78

Table 4.1 plant growth of plants in different conditions

There were four experimental conditions organic condition, normal condition, Inorganic condition and in the effect of magnetic field. Plant growth was measured by plant height and leaf size. In the initial day, we kept seed in the soil in different conditions of soil pot. . We observe the growth of plant from the zeroth day to fifth day, the growth increases

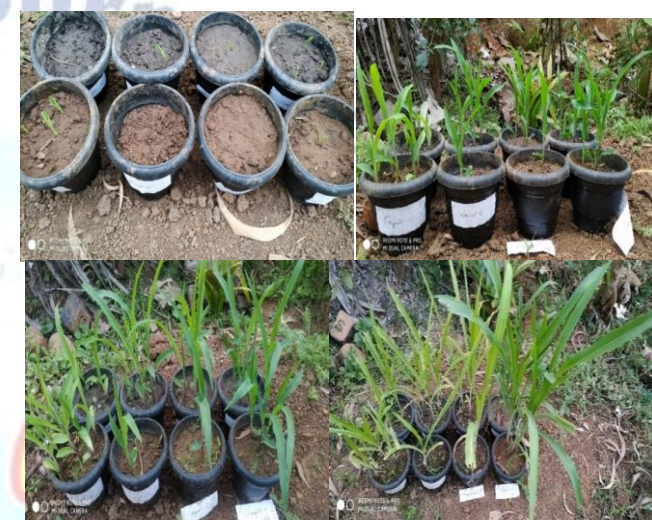


Figure 4.3: (a) plant growth from 0-5 days (b) plant growth from 5-15days (c) plant growth 15-30 days (d) plant growth from 30-45 days.

GROWTH RATE OF PLANTS IN SOIL SAMPLES

upto 2.5cm in organic condition, 0.5cm in inorganic condition and there is no increase in normal condition and effect of magnetic field.

We observe growth of the plants from fifth day to fifteenth day, growth increases to 2.5 to 25cm in organic condition, 0.5 to 30 cm in inorganic condition, 0 to 30cm in normal and 0 to 30cm in effect of magnetic field. The

growth of the plants from fifteenth day to thirty day, growth increases to 25 to 40cm in organic condition, 30 to 60 cm in inorganic condition, 19 to 37cm in normal and 30 to 53cm in effect of magnetic field. The plants from fifth day to fifteenth day, growth increases to 40 to 47cm in organic condition, 60 to 78 cm in inorganic condition, 37 to 43cm in normal and 53to 69cm in effect of magnetic field. The increasing values of the plant growth is tabulated in table 4.1. and the graphs 4.2 shows the variation of the increasing plant growth different conditions. In this sample containing large amount of macronutrients it help to moderately increases in the growth of plants in the magnetic field, but comparatively less in growth of plant in inorganic condition because sufficient supply of macro and micro

Soil S:

Days	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Organic contents	0-0.5	0.5-5	5-18	18-25	25-27	27-30	30-35	35-39
Normal condition	0-0.25	0.25-12	12-36	36-41	41-43	43-47	47-52	52-55
Magnetic effect	0-0.2	0.2-11	11-36	36-43	43-46	46-50	50-56	56-60
Inorganic contents	0-1.2	1.2-10	10-31	31-35	35-49	49-55	55-63	63-59

Table 4.3 plant growth of plants in different conditions

There were four experimental conditions organic condition, normal condition , Inorganic condition and in the effect of magnetic field. Plant growth was measured by plant height and leaf size. In the initial day, we kept seed in the soil in different conditions of soil pot. We observe the growth of plant from the zeroth day to fifth day, the growth increases upto 0.5cm in organic condition, 1.2cm in inorganic condition and 0.25cm in increase in normal condition and 0.2 cm in effect of magnetic field.

We observe growth of the plants from fifth day to fifteenth day, growth increases to 0.5 to 18 cm in organic condition, 1.2 to 31 cm in inorganic condition, 0.25 to 36 cm in normal and 0.2 to 36 cm in effect of magenitc field. The growth of the plants from fifteenth day to thirty-day, growth increases to 18 to 30 cm in organic condition, 31 to 55 cm in inorganic condition, 36 to 50 cm in normal and 36 to 47 cm in effect of magenitc field. The plants from thirty day to day, growth forty-five 30 to 39cm in organic condition, 49 to 59 cm in inorganic condition, 43 to 55 cm in normal and 46 to 60 cm in effect of magenitc field. The increasing values of the plant growth is tabulated in table 4.3. and the

nutrients supply to the plant. In case of organic condition, the insufficient supply of macro and micro nutrients to the plants so we observe lesser growth compare to inorganic and magnetic field.

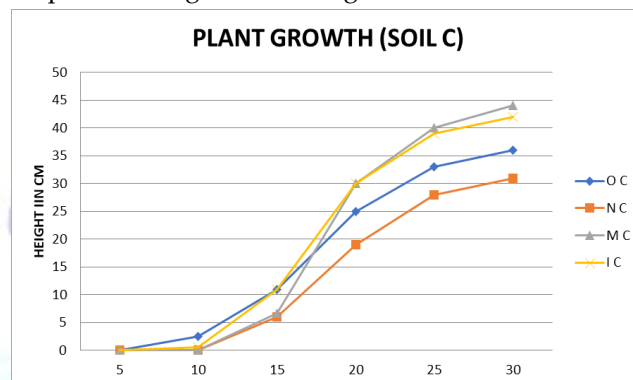


Figure 4.2 graph of the plant growth day by day

graphs 4.4 shows the variation of the increasing plant growth different conditions. In this sample containing large number of macronutrients, it helps to increases in the growth of plants in the magnetic field. The growth of plant is less in inorganic condition because sufficient supply of macro and micro nutrients supply to the plant. In case of organic condition, the insufficient supply of macro and micro nutrients to the plants so we observe lesser growth compare to inorganic and magnetic field.

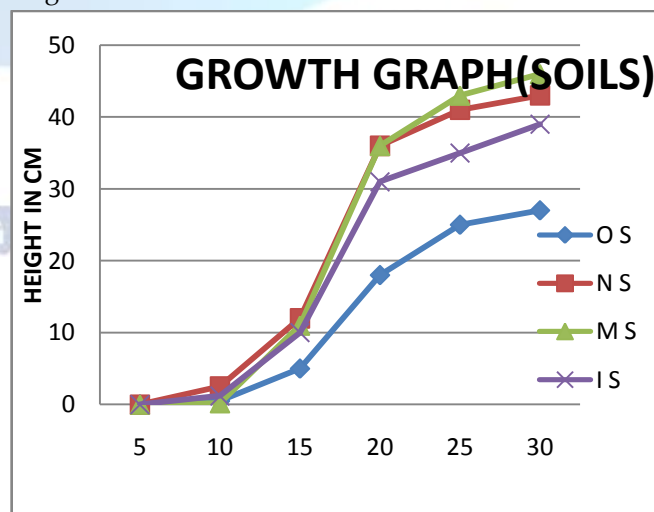


Figure 4.4 graph of the plant growth day by day

CONCLUSION

The plant growth increases in sample c compared to sample s because sample c is rich in macronutrients and a smaller number of micronutrients present in it.

Under the influence of magnetic field, the seed germination rate is high hence plants grew taller, larger and healthier than compared to other conditions.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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