Research Article

The beneficial role of vermicompost on groundnut germination

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ABSTRACT

Objective: Vermicompost chemical composition contains especially nitrates, exchangeable phosphorous, soluble potassium, calcium, and magnesium than that of growth media. The study was mainly aimed on the plant growth and biochemical composition on the seedlings that were grown in different composition of the vermicompost such as 10%–100%. **Results:** It was observed that there was a positive effect of the increase in the concentration of vermicompost on the parameters studied. **Conclusion:** It is concluded that vermicompost is an effective organic fertilizer and should be brought into regular practice by farmers.

KEY WORDS: *Arachis hypogaea*, Biochemical, Chlorophyll, Vermicomposts

INTRODUCTION

Environment pollution due to organic waste is a major factor the world over.[1] These organic wastes could be usefully converted into valuable organic manure using vermicomposting. This is all the more necessary due to the use of synthetic fertilizers which also cause huge impact on the environment and also the cost of these fertilizers is increasing over the years. Now, it is a well-established fact that the organic fertilizers provide enough requirements for proper growth of the crop and enhance the consumption of nutrients increase the assimilation capacity and will stimulate the hormonal activity as well.

Vermicompost production is a relatively homogenous, odorless, pathogen free, and easy to handle.[2] It is nutritionally enriched natural organic fertilizer which releases some amount of nutrients relatively slowly in the soil and improves the quality of the plants along with physical properties and some biological properties of the soil and the environment.[3] This increases the usefulness of introducing low-cost organic farming techniques.[4]

MATERIALS AND METHODS

Experimental Description

A culture for the experiment can be performed in the laboratory method using the vermicompost enriched with biofertilizers red soil was fetched from the agricultural lands sieved and weighed in the black plastic bags with 20 cm in diameter and 20 cm in depth. The experiment was conducted in a complete randomized block design with 10 treatments and one control as follows:

BAG 1: 10% vermicompost+90% red soil (S1)
BAG 2: 20% vermicompost+80% red soil (S2)
BAG 3: 30% vermicompost+70% red soil (S3)
BAG 4: 40% vermicompost+60% red soil (S4)
BAG 5: 50% vermicompost+50% red soil (S5)
BAG 6: 60% vermicompost+40%red soil (S6)
BAG 7: 70% vermicompost+30% red soil (S7)
BAG 8: 80% vermicompost+20%red soil (S8)
BAG 9: 90% vermicompost+10% red soil (S9)
BAG 10: 100% vermicompost (S10)
BAG 11: 100% red soil (control).

Figure 1 Is a representative photograph of ground nut plant and Figure 2 indicates the vermicompost that was use for the experiment.

Biochemical Studies

Fifteenth day seedlings were separated into leaves, shoot length, and root length. Then, they are used for chlorophyll-a chlorophyll-b, total chlorophyll, carotenoids, amino acids, and proteins by the following methods.

Estimation of Chlorophyll

The chlorophyll content was determined using the following formula,

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Figure 1: Groundnut plants

Figure 2: Vermicompost

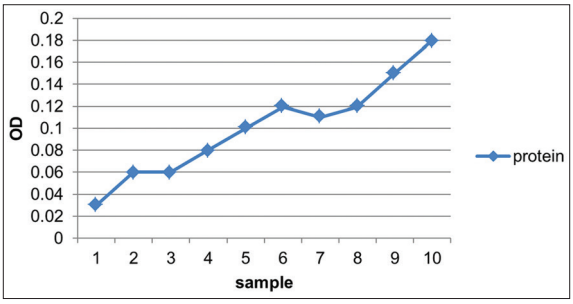

Figure 3: OD values indicate the increase in protein concentration in relation to increasing vermicompost concentration treatment

$$\text{Chlorophyll a} = \frac{26.7 * (OD663 - OD665) * V1}{V2 * L}$$

$$\text{Chlorophyll b} = \frac{(OD645 * 20.2) + (OD663 * OD663)}{1000}$$

Estimation of Total Free Amino Acids

About 0.5 g of plant material was ground with 10 ml of 80% ethanol with the help of pestle and mortar. The extract was centrifuged at 8000 rpm for 10 min. The supernatant was collected and make up to 10 ml with 80% ethanol. 1 ml of extract was taken and add a drop of methyl red,

Table 1: Effect of vermicomposting on the chlorophyll contents of *Arachis hypogaea* L.

Number of sample	Chlorophyll a	Chlorophyll b	Total Chlorophyll
S1	0.0520	0.0295	0.0649
S2	0.0961	0.0165	0.1126
S3	0.0347	0.0080	0.0433
S4	0.0117	0.0208	0.0325
S5	0.0125	0.0223	0.0348
S6	0.0694	0.0133	0.0827
S7	0.0453	0.0091	0.0544
S8	0.0675	0.0117	0.0792
S9	0.0101	0.0170	0.1711
S10	0.9211	0.0147	0.9358

Table 2: Effect of vermicomposting on the carotenoid content of *Arachis hypogaea* L.

Sample	Carotenoid
S1	0.4132
S2	−0.0165
S3	0.0067
S4	0.157
S5	0.0534
S6	0.1115
S7	0.2794
S8	0.1635
S9	0.0227
S10	0.2281

Table 3: Effect of vermicomposting on the changes in the protein content of *Arachis hypogaea* L.

Sample	Protein
S1	0.03
S2	0.06
S3	0.06
S4	0.08
S5	0.10
S6	0.12
S7	0.11
S8	0.12
S9	0.15
S10	0.18

1 ml of 0.1N NaOH, and 1 ml of ninhydrin reagent, it is heated in a water bath for 30 min. Then, the solution was made up to 20 ml with distilled water. The absorbance was measured at 570 nm in a spectrophotometer.

Estimation of Protein

Folin phenol reagent

For the estimation of protein, 1 ml of Folin-Ciocalteu's phenol reagent was diluted with 2 ml of double distilled water. 500 mg of both plant materials (root and shoot) were weighed and macerated in pestle and mortar with 10 ml of 20% trichloroacetic acid. The homogenate was centrifuged for 15,000 rpm for 5 min after adding 0.1N sodium hydroxide.

RESULTS

The chlorophyll content increase, with the increase in the vermicompost concentration and this increases the photosynthesis of the plant as shown in Table 1.

Table 4: Effect of vermicomposting on the changes in the amino acids content of *Arachis hypogaea* L.

Sample	Amino acids
S1	0.43
S2	0.42
S3	0.41
S4	0.42
S5	0.43
S6	0.44
S7	0.42
S8	0.44
S9	0.44
S10	0.44

The vermicompost composition even alters the carotenoid content and thus increases with increase of vermicompost composition as shown in Table 2.

The amount of protein has increased with the increase of vermicompost concentration. The amount of protein is directly proportional to the vermicompost concentrations, the protein estimated was graphed as shown in Figure 3.

The amino acid contents as a linear variation with the vermicompost composition. Thus, directly proportional to vermicompost composition as shown in Table 4.

From the above data, it is clear that vermicompost is ideal manure and its use should be encouraged replacing chemical manures.

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