

Morphological analysis of *Arachis hypogaea* and evaluation of organic growth promoters

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ABSTRACT

Objective: Vermicompost is the type of composting that was studied on the growth parameters of groundnut plant (*Arachis hypogaea* L.). Vermicompost chemical composition contains, especially, nitrates, exchangeable phosphorous, soluble potassium, calcium, and magnesium than that of growth media. **Results:** The study was mainly aimed on the plant growth on the seedlings that were grown in different composition of the vermicompost such as 10%–100%. The effect of vermicompost of root and shoot length, germination percentage and vigor index, and the leaf area index were studied. **Conclusion:** The study indicated very positive results of vermicompost on the parameters studied.

KEY WORDS: *Arachis hypogaea*, Germination, Growth, Nutrition, Vermicompost, Vigor index

INTRODUCTION

A large quantity of organic wastes produced entire world creating a serious disposable issues and environment pollution.^[1] On the other hand, the use of synthetic fertilizers causes the huge impact on the environment and the cost of these fertilizers is increasing over the years. Now, it is a well-established fact that the organic fertilizers provide a enough requirements for a proper growth of the crop and enhance the consumption of nutrients increase the assimilation capacity and will stimulate the hormonal activity as well.

The huge decomposition increases the temperature during composting procedure leading to a relatively homogenous, odourless, pathogen free compost and the handling the product also becomes easy.^[2] Vermicompost is nutritionally rich natural organic fertilizer which releases some amount of nutrients relatively slowly in the soil which improve the quality of the plants at both physical and biological property levels.^[3] This increases the usefulness of introducing low cost organic farming techniques.^[4]

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MATERIALS AND METHODS

Experimental Description

The experiment was carried out in the laboratory using the vermicompost mixed with red soil. The red soil was collected from the agricultural land, sieved and mixed with vermicompost at various proportions and filled in black plastic bags 20cm diameter and 20cm depth. The experimental work can be conducted in a complete randomized block design with 10 treatments and 1 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 1a shows the vermicompost used and Figure 1b shows the experimental plant, *Arachis hypogaea*. The groundnut growth parameters such as shoot length (SL), root length (RL), total length, fresh weight of shoot, fresh weight of root, dry weight of shoot, dry weight of root, total dry weight total plant, number of

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Figure 1: (a) Vermicompost, (b) *Arachis hypogaea* plant

nodules, number of pods per plant (PP), and leaf area index (LAI) were analyzed.

LAI

LAI is the ratio of leaf area PP to the land area occupied by the plant and is calculated as follows:

$$LAI = \frac{\text{leafareaperplant}}{\text{landareaoccupiedbyplant}}$$

Fresh Weight of the Plant

The groundnut seedlings were separated into root part and shoot parts. The fresh seedlings were covered with blotting paper and the total water content present in the seedlings were removed.

Dry Weight of the Plant

The seedlings were kept in hot air oven at 80°C for 24 h. Then, their dry weight was weighed and recorded with the help of an Electronic Single Pan Balance.

Germination Percentage

The germination percentage can be calculated as follows:

$$GI = \frac{\text{number of seeds germinated in the experiment}}{\text{total number of seeds sown for the experiment}} \times 100$$

Vigour Index of the Seedlings

The seedling vigour index can be measured by Abdul-Baki and Anderson (1973).

$$VI = \text{germination percentage} \times \text{length of the seedlings.}$$

RESULTS

Table 1 indicates the effect of vermicompost of root and SL. Table 2 indicates germination percentage and vigour index, while Table 3 indicates the LAI.

The shoot length and RL show the difference with the vermicompost compositions and proportional to the vermicompost concentrations.

Table 1: The variation of RL and SL with respect to vermicompost ratio with soil

Number of sample	SL	RL	TL
S1	5	2	7
S2	7.7	4.9	12.6
S3	9.7	5.9	15.6
S4	10	6.0	16
S5	15.5	6.0	21.5
S6	16	6.2	22.2
S7	17	6.7	23.7
S8	21	7.0	27
S9	22.9	7.1	30
S10	24	8.5	32.5

SL: Shoot length, RL: Root length, TL: Total length

Table 2: The effect of vermicompost on germination percentage and vigour index of seeds of groundnut

Number of sample	Germination percentage (G %)	Vigour index (VI)
S 1	33.3	233.1
S 2	33.3	419.58
S 3	66.67	1040.52
S 4	83.3	1332.8
S 5	83.3	1790.95
S 6	83.3	1849.26
S 7	100	2370
S 8	100	2700
S 9	100	3000
S 10	100	3250

Table 3: The effect of vermicompost on LAI

Number of sample	LAI
S 1	2
S 2	2.33
S 3	3
S 4	3
S 5	4.6
S 6	5.67
S 7	6.3
S 8	7.67
S 9	7.33
S 10	8.67

LAI: Leaf area index



The vigour index increases with an increase of the vermicompost composition as the germination yield shows a steady increase with the same ratio.

The LAI shows linear variations that it increases with the increase of the vermicompost composition.

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