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## Comparative Study of the Vegetative Growth of *Amaranthus tricolor* L. in Different Composts

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### Abstract

Organic farming is a method of farming system aimed at cultivating the land and raising crops, as to keep the soil alive and in good health by use of organic wastes. The usage of techniques in organic farming achieve good crop yields without harming the natural environment. Organic farming uses fertilizers, pesticides plant growth regulators etc. From the present study different types of composts are used to determine which compost is more influenced by the growth and yield of the crop. This work consists of vegetative growth of *Amaranthus tricolor* L. in different composts. Growth of *Amaranthus* was tested in control, in coir pith, in potting mixture and also in vermicompost. Shoot length, width, leaf length and leaf breadth were measured. The vegetative growth of *Amaranthus* is maximum in vermicompost when compared to potting mixture, coir pith and control.

**Key words:** organic farming, composts, *Amaranthus*, potting mixture, coir pith

### Introduction

*Amaranthus* is an important vegetable crop in Indian and other Countries<sup>13,14</sup>. *Amaranthus* leaves contain good source of dietary fibre and high amounts of protein, vitamin and minerals<sup>18</sup>. Organic farming is a method of farming and compost is a key ingredient in organic farming and it can be rich in nutrients. Composting is one of the effective approaches for reducing the amount of disposed organic waste and produces value added products to optimize its use for agriculture<sup>6</sup>. Composting is the biological decomposition of biodegradable organic wastes under controlled, predominantly aerobic conditions<sup>10</sup>. C/N ratio is one of the most important factors affecting composting process and compost quality<sup>4</sup>.

The combined action of worms and microorganisms can improve crop vigor, yield and nutritional quality<sup>1</sup>. Vermicomposting is basically a managed process of worms digesting organic matter to transform the material into a beneficial soil amendment. Vermicompost is compost generated by worms and associated microorganisms. Vermicompost may give resistance to improve vegetable pests including nematodes and fungal diseases<sup>2,7</sup>. Coir pith can be converted into rich organic manure for horti, flori-and agriculture by the action of certain strains of white rot fungi<sup>12</sup>. Coir pith is a major byproduct of coir fibre and it is a fluffy, spongy material with significant water holding capacity. Coir pith contain many characteristics and it is used as a productive resource in agriculture<sup>5</sup> and it is a lingo-cellulosic biomass formed during extraction of coir fibre from coconut husk<sup>17</sup>. The objective of the present study was to evaluate the importance of various compost and which compost will affect the growth of the *Amaranthus* plant in high proportion.

### Materials and methods

*Amaranthus* seeds were collected from agricultural university. From this bulk of seeds viable and healthy seeds were selected and soaked in water for 24 hours for germination. The germinated seeds were transferred to a tray, after 2 or 3 days the growing plants were transferred to experimental pots. Equal weight of control (soil), vermicomposts, coir pith and potting mixture were weighed and transferred to experimental pots. 12 clay pots of equal in size were used and 3 pots for each compost. First 3 pots were filled with soil kept as control. Next 3 pots were filled with coir pith, another 3 pots with potting mixture and the last 3 with vermicomposts. The growing

plants were transferred to these 12 pots and were well watered daily. The growing plants of 12 pots were measured independently from 10<sup>th</sup> day onwards. Shoot length, shoot width, leaf length and leaf breadth were measured and summed for getting average of each experimental pots.

### Observations and analysis

<b>Table 1 Growth – Shoot length (cm)</b>			
<b>Treatment</b>	<b>10<sup>th</sup> day</b>	<b>20<sup>th</sup> day</b>	<b>30<sup>th</sup> day</b>
Control	3	8.5	9.5
Coir pith	2.2	8	9
Potting mixture	4.8	9.2	13
Vermicomposts	5	10	23

<b>Table 2 Growth – Shoot width (cm)</b>			
<b>Treatment</b>	<b>10<sup>th</sup> day</b>	<b>20<sup>th</sup> day</b>	<b>30<sup>th</sup> day</b>
Control	0.1	0.3	0.4
Coir pith	0.1	0.1	0.2
Potting mixture	0.2	0.3	0.4
Vermicomposts	0.2	0.4	0.5

<b>Table 3 Growth – Leaf length (cm)</b>			
<b>Treatment</b>	<b>10<sup>th</sup> day</b>	<b>20<sup>th</sup> day</b>	<b>30<sup>th</sup> day</b>
Control	4.2	7	8
Coir pith	3	4.5	7
Potting mixture	5	8	10
Vermicomposts	5.3	8.5	15

<b>Table 4 Growth – Leaf breadth (cm)</b>			
<b>Treatment</b>	<b>10<sup>th</sup> day</b>	<b>20<sup>th</sup> day</b>	<b>30<sup>th</sup> day</b>
Control	1.6	3.8	4
Coir pith	1.5	3.6	3
Potting mixture	2	4	4.5
Vermicomposts	2.5	4.5	7.5

### Result and discussion

The result of the comparative vegetative growth analysis of *Amaranthus* are given in Table 1,2,3 and 4. From the study shoot length, its width, leaf length and its breadth were analysed. From these comparative studies of plant soil is used as control; coir pith, potting mixture and vermicomposts are used as different type of composts to analyse the growth of the plant. Large beneficial microbial population and biologically active metabolites were observed with application of vermicompost alone or in combination with organic or inorganic fertilizers, to get better yield and quality of different crops<sup>3</sup>. Application of recommended quantities of vermicompost to different field crops has been reported to reduce the requirement of chemical fertilizers without affecting the crop yield<sup>8</sup>. Yield is possible to increase plant height, leaf size and early flowering by use of *Azospirillum*<sup>11</sup>. Increased mean fruit weight and fruit yield by the application of NPK and FYM and also vermicomposts leading to increased uptake of NPK<sup>15</sup>. In the case of *Amaranthus* among the sources of organic manures, vermicompost has a special place because of the presence of readily available plant nutrients, growth enhancing substances and number of beneficial microorganisms<sup>16</sup> reported by Sultan, (1997). The nutrient requirements of an extremely short duration *Amaranthus*, a judicious mix of organic and inorganic sources may be appropriate<sup>9</sup>.

The shoot length was highest for plants grown in vermicompost followed by potting mixture, control and it was least for that grown in coir pith (Table 1 & Figure 1).

The shoot width was highest for plants grown in vermicompost followed by potting mixture, control and it was least for that grown in coir pith (Table 2 & Figure 2).

The leaf length showed high value up to 15 cm for plants grown in vermicompost followed by potting mixture, control and it was least for that grown in coir pith (Table 3 & Figure 3).

The leaf breadth also showed similar result *ie* plants grown in vermicompost showed maximum value followed by that grown in potting mixture, control and it was least for that grown in coir pith (Table 4 & Figure 4).

*Amaranthus* plant grown in vermicompost showed maximum growth in all aspects *ie*, shoot length, shoot width, leaf length and leaf breadth. Second comes the plants grown in potting mixture and followed by that grown in control and coir pith. This results obtained clearly indicate that the vermicompost is more effective than other composts.

### Conclusion

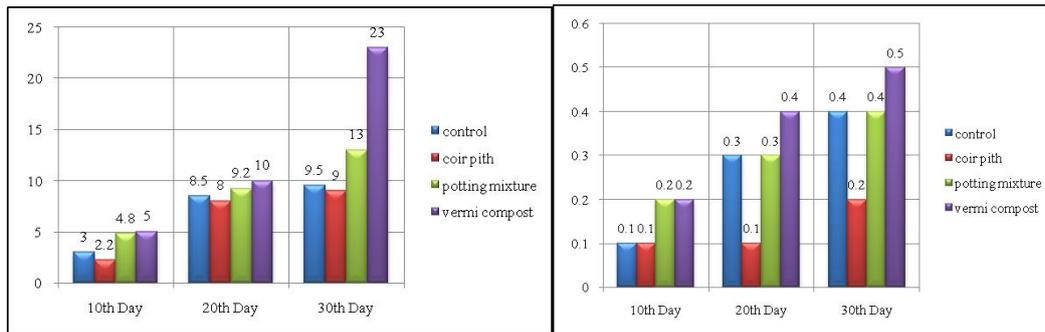
The present investigation on the study of comparative vegetative growth of *Amaranthus* in different composts. To produce healthy crops, organic farmer needs to manage the soil well. This involves considering soil life, soil nutrients and soil structure. Compost is cheap, easy to make and is a very effective material that can be added to the soil, to improve soil and crop quality, allows more air in to the soil improves drainage and reduces erosion. Compost improves soil fertility by adding nutrients and by making it easier for plants to take up the nutrients already in the soil. This produces better yields and to reduce pests and diseases in the soil and on the crop.

The study showed that vermicompost support increased growth of *Amaranthus* plant, in all aspects such as shoot length, shoot width, leaf length and leaf breadth. To improve the quality yield of plants different composts are used and in the case of *Amaranthus* vermicompost is more effectively used to increase the production of the crops.

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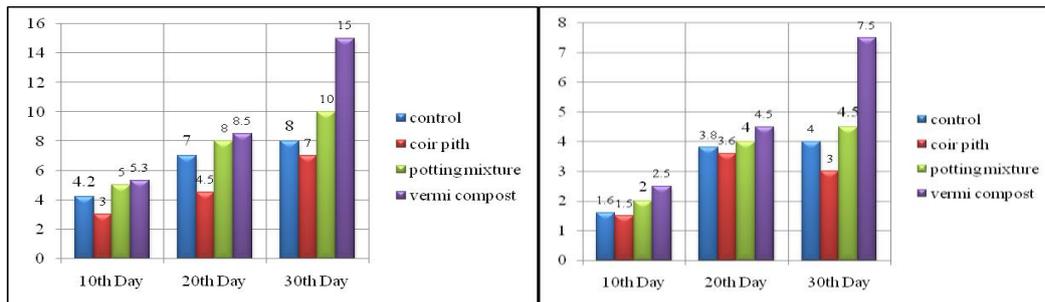
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**Figure 1** Shoot length

**Figure 2** Shoot width



**Figure 3** Leaf length

**Figure 4** leaf breadth



**Plate 1.** Vegetative growth of *Amaranthus tricolor* in different mediums. **A**, In control medium. **B**, In coir pith compost. **C**, In potting mixture. **D**, In Vermicompost.