

Influence of Organic Supplements on Growth of Chilli (*Capsicum annuum* L.)

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Abstract: The present study revealed the morphological parameters in which maximum percentage of seed germination was observed for chilli seedlings grown in vermicompost mixed soil (86.6 %) with seed vigour index (562.9) and minimum percentage of germination (60%) was observed in coconut cake mixed soil respectively. Results showed that there was a significant difference in plant height by the various treatments of organic supplements. In general, there is an increase in plant height with the age of seedlings. At 15 days of growth, the tallest plant was observed in cowdung manure treated soil (17.5 cm), whereas in 30 days of growth also the maximum height of seedlings was observed in cowdung manure and vermicompost treated soils (27 and 26cm) with more number of leaves as compared with other treatments.

Key words: Morphological Parameters • Organic Supplements • Chilli Seedlings

INTRODUCTION

Capsicum (*Capsicum annuum* L.), a fruit vegetable, belongs to the family Solanaceae and is believed to have originated in South America. Christopher Columbus who discovered America in 1493 brought chilli to the rest of the world. Today, the sharpest and valued varieties of chillies are grown in Asia only. Currently the largest producer of chillies in the world is India accounting for 13.76 million tonnes of production annually. In India, its introduction is believed to be through the Portuguese in the 17th century [1].

The effectiveness of organic amendments is also theorized to change along with climate change [2]. Application of organic manure increases organic elements' availability in soil, thereby improving the nutrient use efficiency (NUE) of crops and alleviating the harmful impact of climate change on crop production [3]. However, the application rate of chemical fertilizers has soared extensively during the last decades to enhance crop yield in order to meet the increasing demand of populations. Hence the present study reveals the morphological parameters of chilli seedlings treated with various organic supplements.

MATERIALS AND METHODS

Seeds of chilli (*Capsicum annuum* L.) were obtained from Local seed market, Tenkasi Dt.,). Prior to starting the experiment, the seeds surface was sterilized with a 0.2% Mercuric chloride solution for 3 min, rinsed in distilled water thoroughly and left to dry at room temperature (25°C). Then, the seeds were sown directly into 2 cm depth soil in pots (30 cm in diameter). Each pot was filled with soil in the ratio of 1 part of sand. One part of garden soil and 1 part of red soil and seeds germinate under favorable environmental conditions. In another set of experiment, the soil of experimental pot was thoroughly mixed with 1:1 ratio of organic supplements viz., Vermicompost, Groundnut cake, Coconut cake and Cow dung manure individually for the cultivation of chilli. When the germination was complete after 7 days, the percentage of seed germination was calculated and the seedling density was thinned to four seedlings per pot. The parameters of germination percentage and plant height were measured.

Percentage of Seed Vigour Index: Vigour is the expression of a plants response to its environment: to

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water supply nutrition and temperature, to consider three of the more important elements. While evaluating the number of normal seedlings at the time of final count. Seed vigour index is calculated by multiplying germination (%) and seedling length (cm). The seed lot showing the higher seed vigour index is considered to be more vigorous [4].

$$\text{Vigour index} = \text{Germination (\%)} \times \text{Total seedling length (cm)}$$

RESULTS AND DISCUSSION

Germination Studies: The results regarding the days taken to seed germination of chilli was presented in Table 1. It has been found that seeds of chilli took minimum 3 days for germination in vermi compost treated soil, whereas in other supplements viz., Ground nut cake, Coconut cake and Cow dung manure recorded to a maximum of 4 to 6 days for germination as sown in poly cups respectively. This variation might be due to environmental conditions where temperature was low ($20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ in the month of December).

Present study was in accordance with reported that the germination was prompt seed of *Amaranthus cruentus* (3 - 2 days) and Seeds of *Delonix regia* germinated most on 10th April, whereas germination of *Celosia argentea* and *Abelmoscusa esculentus* at early sowing of 15th February had no main effect [5].

The results in Table (1) revealed the percentage germination of chilli with various treatments. Maximum percentage of seed germination was observed in chilli

seedlings grown in vermicompost mixed soil (86.6 %) with seed vigour index (562.9) and took 3 days to germinate. Whereas 66.6% of germination was observed in cowdung manure supplemented soil with seed vigour index of 479.52 and took 4 days to germinate, respectively.

Minimum percentage of germination (60%) was recorded in coconut cake mixed soil with seed vigour index of 474 and soil alone recorded 53.3 % germination and took 6 days for germination. Percentage of seeds germinated in groundnut cake mixed soil (80%) with seed vigour index of 800 took nearly 4-6 days (Table 1). Recently seed germination of Soyabean (*Glycine max*) in the treatments of Chlorpyrifos and ridomil found that seed germination was declined over treatment of pesticides [6].

Effect of Morphological Parameters: The effect of various treatments of organic supplements on plant height has been presented in Table (2). Results showed that there was a significant difference in plant height by the various treatments of organic supplements.

In general, there is an increase in plant height with the age of seedlings. At 15 days of growth, the tallest plant was observed in Cowdung manure treated soil (17.5 cm), whereas in 30 days of growth also the maximum height of seedlings was observed in cowdung manure and vermicompost treated soils (27 and 26cm) with more number of leaves also recorded in vermicompost treated soil. In soil alone grown chilli seedlings showed less growth (12 and 23cm) height of seedlings with 12 and 24 leaves on 15 days and 30 days of growth respectively (Table 2).

Table 1: Influence of organic supplements on germination of chilli seeds in polycups

S.No	Treatments	No. of seeds sown	No. of seeds germinated	% of germination	Seed vigour index	No. of days taken for germination	Height of seedlings
1.	Soil (control)	15	8	53.3	346.45	6	6.5
2.	Vermicompost	15	13	86.6	562.9	3	6.5
3.	Groundnut cake	15	12	80	800	4	10
4.	Coconut cake	15	9	60	474	6	7.9
5.	Cow dung manure	15	10	66.6	479.52	4	7.2

Table 2: Growth of chilli seedlings in pot studies

S.No	Treatments	15 Days				30 Days			
		Ht. of plant	Lateral branches	No. of leaves	No. of Flowers	Ht. of plants	Lateral branches	No. of leaves	No. of flowers
1.	Soil (control)	12	3	12	-	23	4	24	1
2.	Vermicompost	12	5	18	1	26	3	49	1
3.	Groundnut cake	14	2	17	1	20	6	23	3
4.	Coconut cake	16.5	4	19	1	22.5	6	24	2
5.	Cow dung manure	17.5	3	8	-	27	13	29	5

These results are in accordance that there is a significant difference in growth and yield related traits in chilli due to the application of plant growth regulators [7]. Similar observations were positively correlated that plant growth such as plant height, flowering, fruiting, fruit length, fruit girth was observed in T5 due to combination of 50% of Nitrogen as Urea and 50% of Nitrogen as vermicompost [8].

In this regard, results are in accordance that enhanced plant development is in response to organic manure application, exhibited a significant steady increase in plant growth due to the improved nutrient conditions in the root rhizosphere [9]. As expected, organic manure application initially improved soil properties and promoted plant growth, which resulted in the increase of plant nutrient uptake, growth and yield [10]. To conclude, that the scientific community has been informing the advantages of implementing organic farming in agricultural production to ensure sustainable nutrient management for crops, food safety and soil health [11]. This strategy improves NUE, while maintaining high productivity of crops, soil quality and agricultural sustainability.

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