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IMPROVING THE SOIL QUALITY AND NUTRITIONAL STATUS OF AMARANTH LEAVES BY USING VERMICOMPOST

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ABSTRACT

Vermicomposting is the best solution to solve the problem of waste management. It is an environment friendly and cost effective method to reuse kitchen waste. Vermicompost is far better than the chemical fertilizer because it is a natural fertilizer. Kitchen waste, household waste, cowdung and earthworms were used to prepare vermicompost. Earthworms are capable of transforming garbage into gold. In the present study, vermicompost prepared from household and kitchen waste was used for growing Amaranth vegetable. Palatability of this vegetable was studied through sensory evaluation and compared with vegetable grown on chemical fertilizer. Results showed that, vegetable grown on vermicompost were highly accepted than chemical fertilizer.

Keywords: Vermicompost, amaranth, chemical fertilizer, sensory evaluation.

INTRODUCTION

India and many other countries are suffering from the problem of solid waste management due to urbanization, industrialization, population and changing standard of living. Deteriorating quality of urban environment is one of its important impacts. Hence the importance of efficient "SOLID WASTE MANAGEMENT" is increasingly recognized (http://www.vermico.com/summary.htm).

Before disposal one can process and treat the waste so as to reduce the "wasteful wasting of waste". Some of the techniques available to achieve this objective are volume reduction, recovery of resources, energy recovery. This study has been done for reducing the pollution problems due to solid

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waste and industrial sludge's by converting it into compost by using earthworms very successfully, economically and usefully. (Gandhi, M., et. al.1997)

Vermicompost is the excreta of earthworm, which are capable of improving soil health and nutrient status. Vermiculture is a process by which all types of biodegradable wastes such as farm wastes, kitchen wastes, market wastes, bio-wastes of agro based industries, live- stock wastes etc. are converted while passing through the worm-gut to nutrient rich vermicompost. Vermi worms used here act as biological agents to consume those wastes and to deposit excreta in the process called vermicomposting (http://www.vermico.com/summary.htm).

Vermicomposting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better product. Vermicomposting differs from composting in several ways (Shruti Gupta,et.al.2014). It is a mesophilic process that utilizes microorganisms and earthworms that are active at 10˚C to 32˚C (not ambient temperature but temperature within the pile of moist organic material). The process is faster than composting; because the material passes through the earthworm gut, a significant but not fully understood transformation takes place, whereby the resulting earthworm castings (worm manure) are rich in microbial activity and plant growth regulators, and forti-fied with pest repellence attributes as well. In short, earthworms through a type of biological alchemy are capable of transforming garbage into "gold" (http://www.vermico.com/summary.htm).

MATERIAL METHODS

1. Pre-composting : The pre composting process takes 10 days for their completion.

2. Collection of material: The material required for vermicomposting such as vegetable waste, fruit waste are collected

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from house. While remaining material such as cow dung was collected from nearby cattle shed.

3.Collection of earthworm species: Earthworms are collected from vermicomposting project at agriculture college, Nagpur.

4. Experimental-design or Vermicomposting : Vermicompost beds were prepared by adding precomposting material 5kg and5 kg cowdunk under shed condition. The important parameter i.e. moisture and temperature were controlled by means of spraying water over the bed thereby, the temperature maintain not to exceeding 35°C by placing wet gunny bags over bed and moisture were maintained between 50-60% at least 50 adult Earthworms Eisenia fetida was introduced in bed. And the pre compost was finally covered with mat to protect earthworm from bird. The appearance of black granular powder on top of vermin beds indicates harvest stage of compost. Watering was stopped for at least 5 days at this stage and vermicompost was collected. Vermicomposting can be made in concrete tanks, wooden boxes, and plastic boxes or in mud pots. Depending on the availability of the raw material and land it may vary (Tara Crescent, 2003).

2.2 Preparation of bed for sowing seeds -

The selected plots were firstly harrowed and pre-sowing irrigation was done so as to create a favourable soil moisture level. When the soil reached the field condition, then the prepared vermi-compost was applied uniformly and mixed with soil by harrowing. Amaranth Seeds were sown.

2.3 Sensory evaluation

It was done on the basis of organoleptic characteristics of the amaranth vegetable that was prepared using fresh amaranth, ploughed from the experimental plot, grown on vermicompost. After collection of 100gms of amaranth was cleaned, washed, chopped, in a kadhai 10 ml oil was heated and then chopped amaranth leaves, 1/4th spoon salt was added. It was cooked till tender and served to the

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judges. Same procedure was followed for amaranth grown on artificial fertilizer. The cooking time for vermicompost grown amaranth vegetable was 6 mins. 30sec. and that for artificial fertilizer grown amaranth was 8 min. Score card was developed for the recipe on the basis of – appearance, colour, texture, taste, and acceptability.

2.4 Statistical Analysis - Statistical Analysis of the data was done by using Arithmatic mean/Average and 't' test

RESULT AND DISCUSSION

3.1 Preparation of vermicompost by using household waste :

The material required for vermicompost are shown in table 3.1

Time required for preparation of vermicompost:

Time is one resource, which we are all sharing. We usually indicate the need for synchronizing our activity with that of others whether it may be for food, work, rest, etc; Vermicompost is the Excreta of earthworm, which is rich in humus. Earthworms eat cow dung or household waste along with other kitchen waste and pass it through their body and in the process convert it into vermi-compost. Vermicompost is preparation in 45-60 days.

3.2 Palatability of cooked vegetables:

Palatability of Amaranth was tested for vegetable grown on vermicompost and chemical fertilizer only. Amaranth vegetable was cooked and tested for its appearance, colour, texture, taste and acceptability. Each sensory characteristics with statistical treatment is discussed below –

a) Appearance :Appearance (Table-3.2.1) is the first appraisal of the food. Eye appeal is gained through contrasting and interesting combination of foods differing in types of colour and form.

From the table 3.2.1, it can be noticed that the appearance of amaranth vegetable of vermin-compost variety had scored highest than artificial fertilizer variety. That means vermicompost variety

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is superior over artificial fertilizer. It was statistically proved significant.

b) Colour : Colour is an important factor that regulates overall appearance of the product (Table-3.2.2). The colour of the green leafy vegetable vary according to the chlorophyll content of these vegetables.

From the table 3.2.2, it can be noticed that the colour of amaranth vegetable of vermin-compost variety had scored more because it had retained its original green colour and was appreciated more than artificial fertilizer variety. This showed highly significant difference in both the varieties when compared on the organoleptic characteristics.

c) Texture: The Texture (Table-3.2.3) of the food is an important factor affecting its general acceptance. Each food has its special identifying texture depending on its composition and its physical state and size. Texture is a factor of importance in the evaluation of all looked products. Any deviation from usual results in rejection.

From the table 3.2.3, it is seen that the texture of amaranth vegetable of vermin-compost variety had scored highest because after cooking it was tender and firm and artificial fertilizer variety had scored less because after cooking it was slightly hard in texture. Thus vermin-compost variety is superior to artificial fertilizer variety. It was statistically proved significant when compared on the organoleptic characteristics.

d) Taste: Taste (Table-3.2.4) plays a very dominating role in food acceptability.

From the table 3.2.4, it is observed that the taste of amaranth vegetable of vermi-compost variety had scored highest because it had maintained its original taste and artificial fertilizer variety scored less in taste 8.66, because it had pungent to taste. Hence, it can be concluded that vermi-compost variety was appreciated more than artificial fertilizer variety.

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e) Acceptability: The term acceptability (Table-3.2.5) or unacceptability is used to describe whether the product is liked or disliked by the consumer. Exterior part plays an important role for acceptability.

From the table 3.2.5, it is clear that the acceptability of amaranth vegetable of vermicompost variety had scored more because it is highly accepted than artificial fertilizer variety. This showed highly significant difference in both the varieties when compared on the organoleptic characteristics.

Thus, it can be concluded that when compared on the organoleptic characteristics vermicompost variety had been appreciated more than the artificial variety. Thus it shows that vermicompost was more superior over artificial fertilizer variety which was statistically proved.

CONCLUSION

Vermicompost not only adds microbial organisms and nutrients that have long lasting residual effect, but it also modulates structure to the existing soil. It increases water retention capacity, is a good soil conditioner, improves soil fertility and plant growth, improves nutrient status of soil, palatability, shelf life of vegetables. It is environment friendly and cost effective method of waste management. Thus, vermicomposting is a better way of waste management and sustainable agriculture.

Table 3.1 – Material Required For Vermicompost

Sr.No.	Material Required	Quantity
01.	Kitchen waste	5 Kgs.
02.	Cowdung	5 Kgs.
03.	Earthworm	50 Nos.

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Table 3.2.1 - Palatability Evaluation Scores for Amaranth Vegetable

Judges	Appearance of Amaranth Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	8	8	10	8.66
J2	10	10	10	10	8	8	8	8
J3	10	10	10	10	10	10	10	10
J4	10	10	10	10	10	10	10	10
J5	10	10	10	10	10	10	8	9.33
J6	10	10	10	10	10	8	8	8.66
Mean				10				9.10

't' value = 9*

Table 3.2.2- Palatability Evaluation Scores of Amaranth Vegetable

Judges	Colour of Amaranth Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	8	8	10	8.66
J2	10	10	10	10	8	8	8	8
J3	10	10	10	10	8	10	8	8.66
J4	10	10	10	10	10	10	10	10
J5	10	10	10	10	8	10	10	9.33
J6	10	10	10	10	10	10	10	10
Mean				10				9.10

't' value = 9*

Table 3.2.3 Palatability Evaluation Scores of Amaranth Vegetable

Judges	Texture of Amaranth Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	8	8	10	8.66
J2	10	10	10	10	8	8	8	8
J3	10	10	10	10	8	8	8	8
J4	10	10	10	10	8	8	8	8
J5	10	10	10	10	8	6	10	8
J6	10	10	10	10	8	8	8	8
Mean				10				8.11

't' value = 19*

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Table 3.2.4- Palatability Evaluation Scores of Amaranth Vegetable

Judges	Taste of Amaranth Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	10	10	10	10
J2	10	10	10	10	8	8	8	8
J3	10	10	10	10	10	10	10	10
J4	10	10	10	10	8	8	8	8
J5	10	10	8	9.33	8	8	8	8
J6	10	10	10	10	8	8	8	8
Mean				9.88				8.66

't' value = 12.2*

Table 3.2.5 - Palatability Evaluation Scores of Amaranth Vegetable

Judges	Acceptability of Amaranth Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	8	8	10	8.66
J2	10	10	10	10	8	8	10	8.66
J3	10	10	10	10	10	10	10	10
J4	10	10	10	10	8	8	8	8
J5	10	10	10	10	6	8	8	7.33
J6	10	10	10	10	8	8	8	8
Mean				10				8.44

't' value = 15.6*

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