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## RESEARCH ARTICLE

### STUDY ON THE GROWTH OF VEGETABLE CROPS USING PANCHAGAVYA

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#### ABSTRACT

The present study on the growth of plants such as, tomato, french beans and lady's finger using panchagavya was conducted during January 2015 to March 2015. Panchagavya was prepared and it was initially used to soak the seeds. Later, the germination percentage was observed. The germination percentage was found to be higher in seeds treated with panchagavya solution than the control seeds. The morphological characters such as, number of leaves, shoot length and root length were measured in plants treated with different concentrations of panchagavya solution (5%, 6%, 7% and 8%). As the concentration increased, the values also increased accordingly in all the tested plants.

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#### INTRODUCTION

India is an agricultural country. Most of the people depend on agriculture because of its economical and ecological importance. High yield is the aim of each farmer. Some people believe that chemicals alone could give high yield. Organic farming is gaining gradual momentum across the world. Growing awareness of health and environmental issues in agriculture has demanded production of organic food, which is emerging as an attractive source of rural income generation (Bhattacharya and Chakraborty, 2005). Organic farming was started with establishment of the International Federation of Organic Agriculture Movement (IFOAM) on 5<sup>th</sup> November 1972 in France. Out of the total marketed food, the production of organic agriculture occupies 3-5 % in Germany, 10 % in Austria, 1-2 % in USA. In India, national standard committee had drafted concepts and principles of basic standards of organic agriculture in 1996. Uttaranchal seed certification and organic production agency (USCOPA), Dehradun is the nodal agency at the state level for certification of organic farm products (Bhatt et al., 2004). Heavy use of chemicals in agriculture has weakened the ecological base, in addition to degradation of soil, water resources and quality of food.

Soon the adoption of "organic farming" as a remedy to cure the ills of modern chemical agriculture, it is very much essential to develop a strong workable and compatible package of nutrient management through organic resources for various crops based on scientific facts, local conditions and economic viability. Panchagavya is a foliar nutrition prepared by organic growers, used widely for various agricultural and horticultural crops (Tharmaraj, 2011). Panchagavya contains growth regulatory substances that help in the development of integrated pest management (IPM) such as IAA, GA, Cytokinin, essential plant and organic farming nutrients and effective microorganisms (Vallimayil, 2012).

Panchagavya is a concoction prepared by mixing five products of cow. The Sanskrit word *Panchagavya* means "mixture of five products," and it has been used in traditional Indian rituals throughout history. It is also called cowpathy treatment based on the products obtained from cows used in Ayurvedic medicine and of religious significance, for Panchagavya is used as fertilizers and pesticides in agricultural operation. It can act as growth promoter and immunity booster. Panchagavya treated plants showed lesser viral intensity than control. The three direct constituents from cow used in panchagavya are cow dung, urine and milk; the two derived products are curd and ghee. These are mixed in proper ratio and then allowed to ferment. The mixture is made by using jaggery as a fermenter. Puvvan bananas is a potent organic pesticide and growth promoter. Suitable mixing

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and use of it gives a miraculous effect. Panchagavya is used in different means such as foliar spray, soil application along with irrigation water, seed or seedling treatment etc. Cow dung acts as medium for the growth of beneficial microbes. Cow's urine provides nitrogen which is essential for the plant growth. Milk provides protein, fat, carbohydrate, amino acid and calcium. Curd provides lactobacillus which act as a catalyst in the digestion of organic wastes. Ghee provides vitamin A and B, calcium and fat (Saritha and Vijayakumari, 2013).

### Objectives of Panchagavya

The main objectives are

- To assess the efficiency of panchagavya in tomato, French beans and lady's finger.
- To produce high quality yield in sufficient quantity by using panchagavya.
- To maintain the ecological balance between crop production and live stock.
- To maintain the genetic biodiversity of the crop and environment.
- To encourage the biological cycles within farming system by using microbes.
- To promote the sustainable use of natural resource.
- To reduce pollution.
- Use the wastes as useful product.

### MATERIALS AND METHODS

#### Soil, Seed and Panchagavya collection

Soil collected from the Avinashilingam University Campus, Coimbatore, Tamilnadu and the fresh seeds of french beans (*Phaseolus vulgaris*), lady's finger (*Abelmoschus esculentus* (L.) Moench.) and tomato (*Lycopersicon esculentum*) were collected from Agriculture office Malappuram, Kerala. The commercial product of panchagavya was prepared in Anaikatty, Kerala.

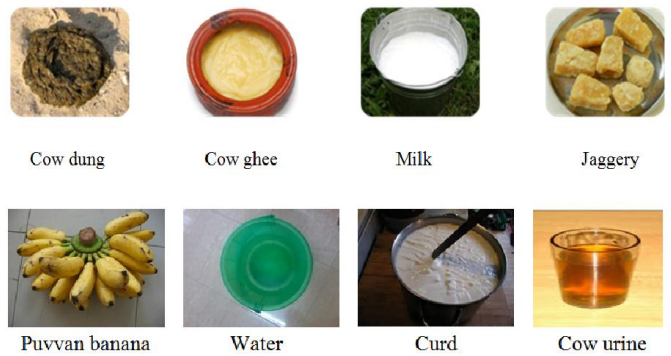
#### Preparation of Panchagavya

The ingredients of panchagavya are:

- Cow dung (2kg)
- Cow urine (1.5L)
- Milk (200ml)
- Curd (50ml)
- Jaggery (50g)
- Ghee (50ml)
- Puvvan banana (1No.)
- Water (1.5L).

The cow dung and ghee were taken in a wide mouthed pot and thoroughly mixed in the morning and evening and kept for 3 days. After setting, cow's urine and water were added, then mixed regularly for another 15 days, and then , other ingredients such as curd, milk, jaggery and puvvan banana were added to it, and left to settle for another 15 days. Panchagavya is stored in a wide-mouthed pot as open in the shade and covered with a plastic mosquito net to prevent houseflies from laying eggs and the formation of maggots in

the solution. Sufficient shade was provided and the prepared panchagavya solution was diluted before spraying onto plant.



The seeds of lady's finger (*Abelmoschus esculentus* L.), seeds of french beans (*Phaseolus vulgaris* L.) and seeds of tomato (*Lycopersicon esculentum* Linn.) were soaked in water and panchagavya solution in 1:1 ratio and separately in water for 1 hour. After that, the seeds were sown in polythene covers with soil. Triplicates were maintained. After 24 hours, the seeds soaked in panchagavya solution germinated. The control and seeds with water alone germinated after 48 hours. The percentage germination was calculated by using the formula:

$$\text{Germination percentage} = \frac{\text{Seedling germinated}}{\text{Total number of seeds}} \times 100$$

The panchagavya solution was diluted and 5%, 6%, 7% and 8% solution were sprayed on 3<sup>rd</sup>, 7<sup>th</sup>, 11<sup>th</sup>, 16<sup>th</sup>, 20<sup>th</sup> and 24<sup>th</sup> day in morning for all plants. The plants were irrigated twice a day.

#### Biometrical Observation

Germination percentage of seeds, number of leaves formed, shoot length (the distance between collar region to the tip of the primary leaf) and root length (distance between the collar region to the tip of the primary root) were calculated. The percentage of germination was calculated three days after sowing the seeds. Number of leaves formed, root length and shoot length are taken in 15<sup>th</sup> and 25<sup>th</sup> day.

### RESULTS AND DISCUSSION

The experiment on the effect of panchagavya on lady's finger, tomato and beans have shown a miraculous result on different concentrations of 5%, 6%, 7% and 8% solution. This experiment initially started with soaking the seeds in 1:1 ratio solution of panchagavya solution and water alone as control.



Figure 3. Growth of plants in control on 15th day



Figure 4. Growth of plants in panchagavya solution on 15th day

The average numbers of leaves were found to be more in all the three plants that were treated with panchagavya solution and that too in 8% solution (Table 2). As the concentration of panchagavya increases, the number of leaf, shoot length and root length also increases. The root length and shoot length were found to be higher in plants treated with 8% panchagavya solution (Table 2). The average number of leaves, shoot length and root length were also calculated on the 25th day of the seedling growth. It was found to be higher in plants treated with 8% solution of panchagavya (Table 3; Figure 5&6).

Table 1. Germination percentage

Germination percentage	Solutions	Tomato	French beans	Lady's finger
	Water	50%	66.67%	50%
	Panchagavya solution	83.33%	77.78%	66.67%

Table 2: Effect of panchagavya solution on plant growth after 15 days

Name of the Plant	Treatment	Number of leaves	Shoot length (cm)	Root length (cm)
Tomato	Control plant	3	9	3
	5%	5	10	3
	6%	5	12	3.5
	7%	6	12	4
	8%	6	13	4
French beans	Control plant	4	12.5	3
	5%	6	16.5	3
	6%	7	18	3.5
	7%	7	18	4
	8%	8	20	4
Lady's finger	Control plant	4	11	3
	5%	5	12.5	3
	6%	5	13	3.5
	7%	6	13	4
	8%	6	14	4

Table 3: Number of leaves, shoot length and root length of plants after 25 days

Name of Plant	Treatment	Number of leaves	Shoot length(cm)	Root length(cm)
Tomato	Control plant	7	15	4
	5	9	18	4.5
	6	10	19	4.5
	7	10	20	5
	8	11	20	5
French beans	<b>Control plant</b>	<b>10</b>	<b>18</b>	<b>4</b>
	5	14	20.5	4
	6	15	22	4.5
	7	16	22	4.5
	8	17	24	4.5
Ladies finger	Control plant	10	11	3.5
	5	12	12.5	3
	6	14	13	3.5
	7	15	13	4
	8	16	14	4

### Germination percentage

The germination percentage was found to be maximum in seeds soaked with panchagavya and water in the ratio 1:1 (Fig. 2) rather than the control (Fig. 1). In tomato, it was found to be 83.33%. In beans and lady's finger, the germination percentage were found to be 77.78% and 66.67% respectively (Table 1). The percentage of germination was higher in tomato that was soaked in panchagavya solution than control. It was 33.3% higher than that of control. Among the three plants, the germination was less in lady's finger, but, it showed 16.67 % higher than that of the control.

After 25 days, it was observed that panchagavya treated plants showed a maximum growth in terms of number of leaves, shoot length and root length of all the plants (viz., tomato, French beans and lady's finger) taken for the study. Rapid improvement has been made in the field of panchagavya. The present work focused on the morphological variations of tomato, french beans and lady's finger plants by treating with various concentrations of panchagavya. The panchagavya treated plants produced side shoots, which were sturdy and capable of carrying maximum fruits to maturity. Branching was comparatively high. The rooting was profuse and dense. Further, they remained fresh for a long time. The roots spread

and grew into deeper layers were also observed. All such roots helped in maximum intake of nutrients and water (Organic Farming: Organic Inputs and Techniques, TNAU Agritech portal).

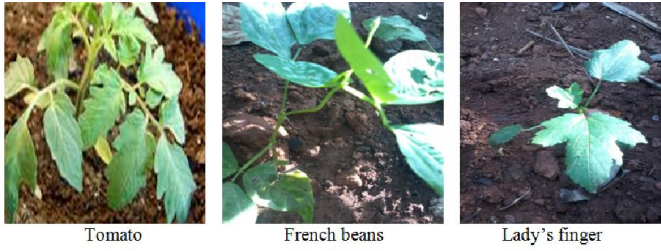


Figure 5. Control plants on 25th day



Figure 6. Panchagavya solution treated plants on 25th day

Microbial flora of soil plays an important role in soil health. The microorganisms present in the rhizosphere environment around the roots influence the plant growth and crop yield. The beneficial microorganisms from Panchagavya and their establishment in the soil improved the sustainability of agriculture (Tharmaraj *et al.*, 2011). In the present study, it has been observed that 8% concentration of panchagavya solution could bring about a drastic change in the growth of plants when compared to control plants and other concentrations. This view is being supported by studies made by Saritha & Vijayakumari (2013).

Similar results have been obtained by Tharmaraj *et al.* (2011). An important character that was observed during the present study was that the plants treated with panchagavya solution showed an increase in the size of leaves, as the concentration increases. The leaves were somewhat thick and leathery in nature. Similar results have been obtained in *Jatropha curcas* and *Pongamia pinnata* (Srimathi *et al.*, 2013). The results observed in the current study indicate that, in future, panchagavya could be used by farmers since; it has no side effects and also increases the fertility of soil.

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