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INFLUENCE OF PANCHAGAVYA ON SEED GERMINATION OF *VIGNA RADIATA* L.

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***Abstract*:** Panchagavya is a mixture of five cow products namely the dung, urine, milk, curd and ghee. It contains organic compounds, hormones, micro and macro nutrients and minerals besides having anti-bacterial and insecticidal properties. In the current study, the impact of different concentrations (control, 10, 20, 30, 40 and 50%) of panchagavya on the germination behaviour of green gram seeds (*Vigna radiata* L.). Control treated as water. The following morphological parameters were analysed such as germination percentage, shoot length, root length, fresh weight and dry weight of seedlings. The result shows that the lower concentration (10 percent) of panchagavya increased the germinating percentage and growth and higher concentrations (20, 30, 40 and 50%) of effluent decreased the germination percentage, seedling growth, fresh weight and dry weight of green gram. It concluded that the lowest concentration (10%) of panchagavya can be used for agricultural production.

Keywords: **Panchagavya, *Vigna radiata* L., Seed Gerimination and Agricultural production.**

I. INTRODUCTION

Farming is the livelihood of millions of people in India, whose crops depend primarily on rainfall and fertilizers. India is not only self-sufficient in food production but also has a substantial reserve. The traditional practice in agriculture is the use of chemical fertilizers, bio-fertilizers and organic manures. In order to increase yield to respond to population pressures, conventional varieties spontaneously resistant to pests and diseases have been replaced by new hybrids and improved varieties. However, the uncontrolled application of pesticides and insecticides not only affected the environment, but also affected soil quality. Crops have also been made more vulnerable to disease. Therefore, other ways of controlling pests and insects must be developed. Integrated resistance management and integrated pest management have been developed and a new approach has been implemented. India is the third largest manufacturer and consumer of fertilizers in the world. The increasing cost and unavailability of fertilizers, growing ecological concern and the government's interest in promoting the organic farming have forced us to try new methods of application of nutrients in the form of panchagavya, vermiwash, vermicompost etc., For ages people were cultivating crops organically. Chemical fertilisers and pesticides were not used at that time. But the yield was higher and more stable, and the people who ate that food that was organically grown were stronger and healthier.

The traditional biological formulation may contain many plant growth promoting bacteria (PRMPs), which can enhance plant growth through nitrogen fixation, production of growth hormones and control of plant pathogens. In many Asian countries, farmers develop their own organic formulations through fermentation or composting. For example, in India, panchagavya is one of the widely used traditional organic formulations, which is usually made by farmers themselves. Panchagavya is a term used in Ayurvedic fermented products from five ingredients obtained from the cow, such as milk, urine, dung, curd and clarified butter [1]. Panchagavya is a popular organic fertilizer prepared by organic growers of Tamil Nadu as an indigenous material and used widely for agricultural and horticultural crops [2] and [3].

The green gram is one of the most widely used pulses in India. It belongs to family Fabaceae. This is a great cheap source of high quality and easily digestible protein. However, their seed productivity (5q/ha) and protein content (18-22%) are rather low in India. In developing countries, insufficient availability of protein was identified as the main sources required for society. The current research has been carried out to assess panchagavya on the germination of green gram seeds (*Vigna radiata* L.).

II. MATERIALS AND METHODS

2.1. Seed materials

The seeds of experimental crop *Vigna radiata* L. were procured from Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, India.

2.2. Preparations of Panchagavya

3 kg of fresh cow dung, 3 liters of cow's urine and 2 liters of water were added and left in a tank and the mixture was stirred thoroughly every day. After three day ½ liter of milk, 1/2 liters of sour curd and ¼ liter of ghee were added to the above mixture. The stirring process was continued. On the 25th day, panchakavya solution was ready for use.

2.2.1. Preparation of different concentrations of Panchagavya

The different concentrations (10, 20, 30, 40, 50 and 60 per cent) of Panchagavya were prepared freshly by using tap water whenever necessary. They were used for germination studies.

Control : Tap water

10% : 10 ml Panchagavya + 90 ml water

20% : 20 ml Panchagavya + 80 ml water

30% : 30 ml Panchagavya + 70 ml water

40% : 40 ml Panchagavya + 60 ml water

50% : 50 ml Panchagavya + 50 ml water

2.3. Germination Studies:

Germination study was conducted with green gram seeds treated with panchagavya. The seeds of green gram were surface sterilized with 0.2 per cent of $HgCl_2$ for two minutes and they were thoroughly washed with tap water. The seeds were equispacially arranged in petridishes filled with sterilized garden soil and they were treated with different concentrations (10, 20, 30, 40, 50 and 60 per cent) of panchagavya. The control set was maintained by using tap water. Three replicates were maintained for each treatment. On the 7th day, the germination percentage, shoot length, root length, seedling fresh weight and seedling dry weight were taken.

2.4. Germination percentage

The number of seeds germinated in each concentration was counted on the 7th day and the germination percentage was calculated by using the following formula

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

2.5. Shoot and root length (cm/seedling)

Twenty seedlings were taken from each treatment and their shoot length and root length were measured by using a cm scale and the values were recorded.

2.6. Fresh weight (g/seedling)

Ten seedlings were collected from each treatment and their fresh weights were measured with the help of an electrical single pan balance.

2.7. Dry weight (g/seedling)

The same seedlings used for fresh weight were kept in hot air oven at 80^{0}C for 24 hours. Then, the seedlings were taken from the oven and kept in desiccators for some time. Their dry weights were taken by using an electrical single pan balance.

III. STATISTICAL ANALYSIS

The statistical analysis of experimental results was carried out by SPSS version 16.0 was used for the statistical analysis. All the data were given as mean of 3 assays. The level of significance was calculated at p value < 0.05%.

IV. RESULTS AND DISCUSSION

Germination, the critical phase in the life cycle of a crop plant, is subjected to numerous environmental stresses. Any disturbance in the environment in which the seed germinates affects the germination and ultimately the growth, dry weight and yield of crop [4]. Germination study was conducted with green gram seeds treated with different concentrations (10, 20, 30, 40 and 50 per cent) of Panchagavya. The morphological growth parameters of *Vigna radiata* L. seedlings were estimated and recorded at 7th days after sowing. The germination percentage, root length, shoot length, fresh weight and dry weight of green gram seeds grown under different concentrations of Panchagavya is given in Figure 1 to 3 and Plate - I. The highest values of seed germination percentage (99.66), root length (6.08 cm/seedling), shoot length (29.10 cm/seedling), fresh weight (3.59 g/seedling) and dry weight (0.42 g /seedling) were recorded in seedlings treated with 10 per cent concentration of Panchagavya. At the same time, the minimum values of germination percentage (46.34), shoot length (9.43 cm/seedling), root length (1.83 cm/seedling), fresh weight (0.76 g/seedling) and dry weight (0.07g/seedling) were recorded in seedlings treated with 60 per cent concentration of Panchagavya.

In the present study, the germination percentage, shoot length, root length, fresh weight and dry weight of green gram seeds gradually decreased with the increase in the level of Panchagavya concentration. The highest germination was observed in 10 per cent concentration of Panchagavya treated seeds and the lowest germination percentage was observed in 60 per cent concentration of Panchagavya treated seeds. Similar results were reported on different crops treated with Panchagavya [5], [6], [7] and [8]. [9], [10] and [11] also reported that Panchagavya possess almost all the major nutrients, micronutrients and growth hormones enhances the metabolic activity of plants and supports better seed invigoration. [12] opined that Panchagavya contains bacteria producing plant growth promoting substances as well as bacteria having biological deterrent activities. Microbes such as Rhizobium, Azotobacter, Azospirillum, Phosphorous solubilizing bacteria, Trichoderma and Pseudomonas present in Panchagavya act as liquid bio fertilizer and bio-pesticides [13] and [14]. The presence of favourable amount of nutrients in lower concentration of Panchagavya created good environmental condition for seed germination. At the same time, the higher concentrations of Panchagavya inhibited the germination of green gram seeds. The presence of excess amount of organic and inorganic substances in higher concentration of Panchagavya adversely affected the seed germination. The higher salt content caused for change of osmotic pressure outside of the seed. It decreased water absorption of the seed and then inhibited the seed germination. Sometimes seed germination and seedling quality characteristics were reduced with increasing concentration levels and duration with organic fortification which might be due to supra optimal dose of the organic product which is normally specific to crops [15], [16] and [17].

Plate – 1: Panchagavya preparation

Plate – 2: Green gram (*Vigna radiata* L.) grown under different concentrations of Panchagavya

Fig. 1. Effect of different concentrations of Panchagavya on seed germination percentage of *Vigna radiata* L. seedlings.

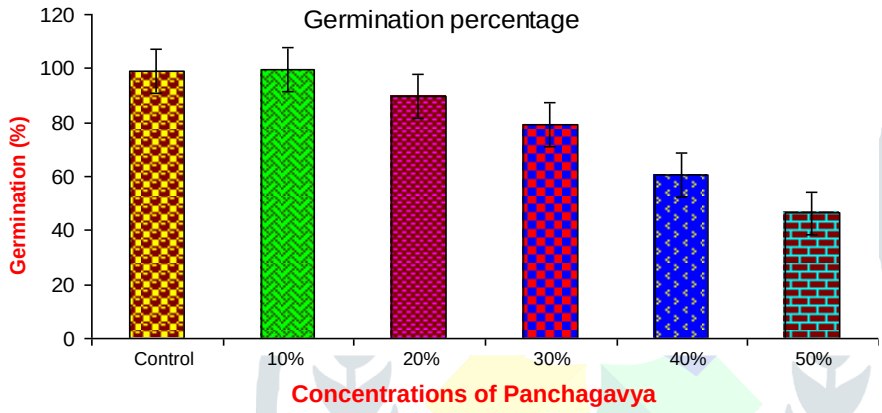
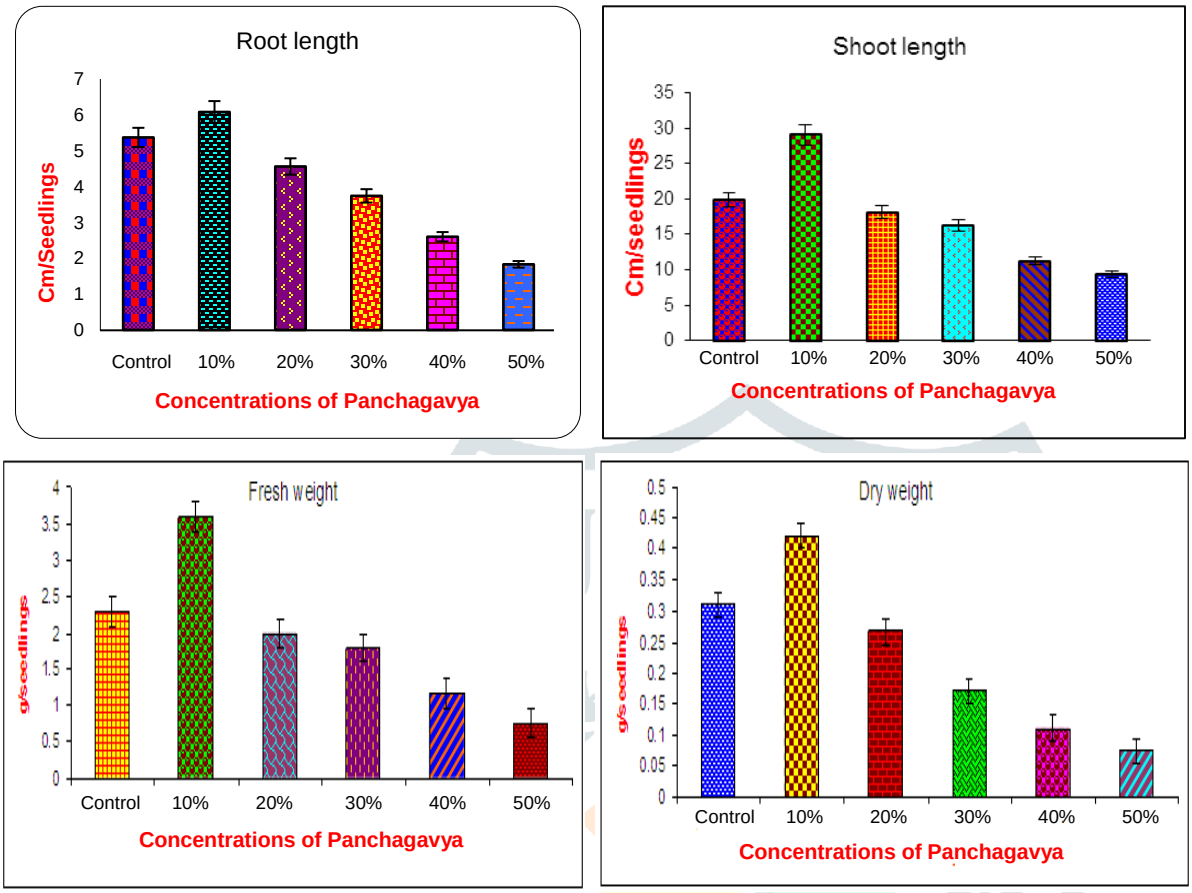


Fig. 2. Effect of different concentrations of Panchagavya on root length, shoot length, fresh weight and dry weight of *Vigna radiata* L. seedlings.



V. CONCLUSION

From this experiment, it is concluded that the higher concentrations of Panchagavya is toxic to germination of crops. But, the lower concentration (10 per cent) of Panchagavya increased seed germination and seedling growth of crop. So, the diluted Panchagavya can be utilized for agricultural irrigation.

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