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Panchagavya: A low cost organic input in organic farming-a review

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Abstract

Panchagavya, an organic product has the potential to play the role of promoting growth, development and providing immunity in plant system. Panchagavya consists of nine products viz., cow dung, cow urine, milk, curd, jaggery, ghee, banana, Tender coconut and water. When suitably mixed and used, these have miraculous effects. It has the ability to play the function of promoting the growth, development and supplying immunity in plant machine thereby confers resistance against pest and provides drought hardiness to the plants. It also improves fertility status in soils by increasing macronutrients, micronutrients and beneficial microorganisms thus increase soil health. Thus, Panchagavya plays a major role in organic farming and sustainable agriculture.

Keywords: Panchagavya, cow milk, ghee, curd, cow urine and dung, gur and organic farming

Introduction

The present world scenario explosively emphasizes the need to adopt eco-friendly agricultural practices for sustainable agriculture. Heavy use of chemicals pesticides in agriculture has weakened the ecological base in addition to degradation of soil, water resources and quality of the food. At this juncture, a keen awareness has sprung on the adoption of “organic farming” as a remedy to cure the ills of modern chemical agriculture (Kannaiyan, 2000) [6]. Organic farming has developed very rapidly in recent years. Indian agriculture has a better chance to convert itself as organic agriculture because, the per capita and per ha consumption of chemical fertilizer and pesticides the country is much lower than the global standards.

The Sanskrit word *Panchagavya* means "mixture of five cow products". It is also called *cowpathy* treatment based on products obtained from cows used in Ayurvedic medicine and of religious significance for Hindus. Panchagavya is an organic formulation, which in Sanskrit means the blend of five products obtained from Deshi cow milk, ghee, curd, dung and urine (all these products are individually called as “Gavya” and collectively named as Panchagavya). In India, use of Panchagavya in organic farming is gaining popularity in recent years especially in states like Tamil Nadu and Kerala. Panchagavya has the potential to play the role of promoting growth and providing immunity in plant system. Panchagavya plays a major role in organic farming.

Ingredients used to prepare Panchagavya

To make 20 litres of Panchagavya solution, the following inputs / ingredients are required

- Cow dung mixed with water: 5 kg.
- Cow urine: 3 litres.
- Cow milk: 2 litres.
- Cow curd: 2 litres.
- Cow ghee: 1 kg.
- Well-ripened yellow banana: 1 dozen (12 pieces).
- Tender coconut water: 3 litres.
- Sugarcane juice: 3 litres or half kg of Jaggery should be mixed with 3 litres of water.
- Toddy: 2 litre

Other requirements for Panchagavya preparation

- Mut Pots with wide mouth or Concrete Tank or Plastic

Step involves in the preparation of Panchagavya

Step I: The measured amount of cow dung (5 kg) and ghee (1 kg) should be blended thoroughly early in the morning and also in evening into the selected container. This should be kept for about three to four days for fermentation to happen.

Step II: On the fourth or fifth day, cow urine (3 litres) along with water (5 litres) should be added to the container and kept for 7 to 8 more days. The ingredients in the container should be well mixed by stirring for 20 to 30 minutes. This stirring should be carried out both in the morning and evening to facilitate aerobic microbial activity. Now you have to leave this Mixture without disturbing for about 15 days.

Step III: Now after 15 days, you should add the rest of the ingredients like cow milk, cow curd, tender coconut water, bananas and jaggery or sugarcane juice. Once you mix all these ingredients, you have to mix stir this mixture twice a day, in the morning and evening. You have to do this for about a total period of 30 days. After a month or so, your Panchagavya products are ready to use.

Physico-chemical and Biological properties of Panchagavya

The physico-chemical and biological properties of this mixture are numerous. Almost all the essential chemical properties are available in this mixture. The main reasons behind is the organic and natural ingredients to prepare this mixture. Panchagavya contains several macronutrients nutrients *viz.*, nitrogen, phosphorus, potassium and micronutrients (Zn, Fe, Cu, and Mn) which are required for the normal growth and development of plants. It also contains different carbohydrates, enzymes, amino acids, vitamins, antioxidants, immunity booster, growth regulators like Auxins, Gibberellins and also beneficial microorganisms like *Pseudomonas*, *Azotobacter* and phosphobacteria etc.

Chemical composition		Microbial load	
pH	5.45	Fungi	38800/ml
EC dSm ²	10.22	Bacteria	1880000/ml
Total N (ppm)	229	Lactobacillus	2260000/ml
Total P (ppm)	209	Total anaerobes	10000/ml
Total K (ppm)	232	Acid formers	360/ml
Sodium	90	Methanogen	250/ml
Calcium	25		
IAA (ppm)	8.5		
GA (ppm)	3.5		

Beneficial Effects of Panchagavya

Panchagavya is a component of crop production and it plays a crucial role in each and every component of crop management like integrated soil fertility management, integrated pest management, and integrated disease management. The advantages of Panchagavya are given below (Anonymous 2018) ^[1].

- This organic fertilizer significantly improves the immunity of the plants. This will result in the curing of plants that are suffering from different diseases.
- It also acts as an organic growth promoter which we have discussed earlier.
- This mixture is very helpful in growing the Organic Farming Sector in India.
- This decrease the use of Chemical fertilizers which are degrading the human health.
- It also helps in developing the soil health.
- This mixture will help in improving the health of the environment.

- It gives more results than the chemical fertilizers and other sprays that a farmer uses.
- It also acts as a pest repellent in major commercial crops.
- Farmers have observed that it is helping the crops to mature early.
- It helps in retaining water. This reduces the water requirement for irrigation by 25% to 30%. This is a staggering number in the drought-prone areas.
- This wonder mixture helps the roots to grow profusely thus by helping them to penetrate deeper layers of water.
- This is helping farmers to increase the shelf life of vegetables, fruits, and other produce.
- Farmers are claiming that it helps in increasing the canopy of the crop which helps in better photosynthesis.
- The Sugar content and aroma of fruits is also high when they use this organic fertilizer.

Different beneficial uses of Panchagavya

(1). Growth promoter

Panchagavya has the potential to play the very important role in promoting growth and providing immunity in plant system. Sridhar *et al.*, (2001) observed that application of panchagavya as sprayed on chillies crop produced dark green colour and new growth of leaf within 10 days. Balkrishnamurthy *et al.*, (2006) conducted a field experiment to find out the effect of different bio-regulators on turmeric variety BSR-2 and reported that the application of humic acid (0.05%) spray at monthly interval from 30-180 DAS significantly increased growth parameters like plant height (141.99 cm), numbers of tillers (3.67), leaf length (60.55 cm), leaf breadth (17.54 cm) and stem girth (10.04 cm) followed by Panchagavya 3% spray over control (110.83, 2.67, 39.51, 12.87 and 8.32 cm, respectively). Pinjari (2007) conducted a field experiment during 2005-6 and 2006-7 to find out the effect of 3% Panchagavya spray on sweet corn and reported that all the growth characters *viz.*, plant height, number of functional leaves and dry matter accumulation at different crop stages in the different plant part at 60, 90 DAS and at harvest significantly influenced during both year of study and the mean of two years. At 30 DAS, all the growth characters remained unaffected due to the application of growth stimulates. Mohanalakshmi and Vadivel (2008) ^[7] observed that ashwagandha plant sprayed with Panchagavya (3%) produced higher number of leaves per plant.

(2). Yield enhancer

Crop yield is the complex function of physiological processes and biochemical activities, which modify plant anatomy and morphology of the growing plants. There are several reasons for increased yield in different crops due to spray of panchagavya. Smaller quantities of IAA and GA present in panchagavya when foliar sprayed could have created stimuli in the plant system which in turn increased the production of growth regulator in cell system and the action of growth regulators in plant system stimulated the necessary growth and development, leading to better yield. This might be due to favourable effect of panchagavya on vegetative growth *viz.*, number of branches plant⁻¹ and reproductive growth *viz.*, pods plant⁻¹, seeds pod⁻¹ and test weight, which were the important yield attributes having significant positive correlation with seed & straw yield.

Panchagavya increased synthesis of growth promoting substances which in turn helped in increased growth and yield attributes and finally grain yield. Similarly findings have been reported by Swaminathan *et al.*, (2007) ^[11] and Choudhary *et*

al., (2014) ^[3]. Panchal *et al.*, (2017) ^[8] conducted a field experiment during *rabi*, 2014-15 at Agronomy Instructional Farm, College of Agriculture, Dantiwada Agricultural University, Sardarkrushinagar, to study the effect of *panchagavya* on growth, yield and economics of chickpea and reported that among different treatments, foliar spray of *panchagavya*@ 4% at branching and flowering stage showed its superiority by producing the seed (2054 kg ha⁻¹) and stover (2483 kg ha⁻¹) yield of chickpea, respectively. Rakesh *et al.*, (2017) reported that there was increase in growth and yield parameters at low concentration of *panchagavya*; it is recommended that the *panchagavya* can be used for spray after diluted properly to 3%. Pinjari *et al.*, (2007) conducted a field experiment during 2005-6 and 2006-7 to find out the effect of 3% *Panchagavya* spray on sweet corn and reported that all the yield characters *viz.*, number of cob ha⁻¹, cob yield, straw yield and biological yield were significantly higher with the application of 3% *panchagavya* and *amrutpani* through irrigation over the control during both years and in the mean of two years. Selvaraj (2003) ^[10] reported that application of *panchagavya* and vermicompost combination had given the highest pod yield of French bean variety Ooty-2 which was 36% higher than the conventional method.

(3) Fertility booster

Application of *panchagavya* improves fertility status in soils by increasing macronutrients, micronutrients and beneficial microorganisms thus increase soil health. It improves water holding capacity of soils because it acts as organic manure. *Panchagavya* help in proper growth and reproduction of beneficial soil microorganisms resulting vigorous plant growth. 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.

Beulah (2001) ^[2] found that the beneficial micro-organisms from *panchagavya* and their establishment in the soil improved the sustainability of agriculture as the microorganisms presenting the rhizosphere environment around the roots influence the plant growth and crop yield. It may be due to presence of plant growth promoting substance in cattle dung and other nutrients which provide substrate for growth of microbes.

(4). Disease preventers both in plant and animal

Application of *panchagavya* increases immunity power in plants thereby confers resistance against pest and diseases and also provided various beneficial metabolites produced by microorganisms such as organic acids, hydrogen peroxide and antibiotics which are effective against various pathogenic microorganisms. It also plays important role in animal health and human health. Jandaik, *et al.*, (2015) ^[5] reported that the cow urine has antifungal activities and the inhibitory activity can be used in the control of fungi. Darma *et al.*, (2005) reported that *panchagavya* substances are abundantly used in Ayurveda for treatment of several disorders such as leucoderma, hyperlipidemia, arthritis, renal disorders, dietary disorders, gastrointestinal track disorders, acidity, asthma etc. These remedies seem to be potent anticancer and anti HIV agents.

(5). Drought Hardiness

A thin oily film is formed on the leaves and stems, thus reducing the evaporation of water. The deep and extensive roots developed by the plants allow to with stand long dry periods. Both the above factors contribute to reduce the irrigation water requirement by 30% and to ensure drought hardiness.

Conclusion

From the foregoing review, it can be concluded that plant growth substances present in *Panchagavya* help to bring rapid changes in plants and also improves the growth, yield and ultimately improve the productivity of the crops. Its application increases immunity power in plants thereby confers resistance against pest and diseases and also provided various beneficial metabolites produced by microorganisms such as organic acids, hydrogen peroxide and antibiotics which are effective against various pathogenic microorganisms. Thus, *Panchagavya* plays a major role in organic farming and sustainable agriculture.

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