

Panchgavya: A Boon in Liquid Fertilizer for Organic Farming

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INTRODUCTION

Organic farming is based on the system-oriented approach and the use of organic liquid product like Panchagavya resulted in higher growth, yield and quality of crops and hence there had been an increasing interest in the use of liquid formulations. The liquid formulations such as panchagavya, jeevamruth and beejamruth were eco-friendly organic preparations made from products of cow (Sugumaran, *et al.*, 2018). Among these, panchagavya is one of the widely used traditional liquid organic formulations, which is a fermented product made from five ingredients obtained from cow, such as milk, urine, dung, curd and clarified butter (Amalraj *et al.*, 2013). Organic agriculture is a comprehensive production management system which promotes and enhances health of agro-ecosystem, including bio-diversity, soil biological activity and biological cycles. It gives importance to the use of management practices particularly the use of off-farm inputs, taking into account that regional conditions require locally adapted systems (Raghavendra *et al.*, 2014). Panchagavya is a special preparation made from five by-products of cow along with certain other ingredients, has the potential to play the role of promoting growth and providing immunity in plant system. Panchagavya plays a major role in organic farming.

Table 1: Ingredients used for preparation of panchagavya

Fresh cow dung	10 kg
Cow urine	10 lit
Cow milk	2 lit
Cow curd	2 lit
Cow ghee	1 kg
Tender coconut water	3 lit
Sugarcane juice	3 lit
Ripened banana	12 numbers
Yeast	100 gm

Sugarcane juice and coconut water are used to accelerate the fermentation which also help in minimizing the bad odour.

Protocol for Panchagavya Preparation

The whole mixture is to be incubated for two weeks and the preparation should be filtered through double layered muslin cloth and stored in bottle under refrigerator and used as and when required.

The container should be kept open under shade. The content is to be stirred twice a day both in morning and evening. The Panchagavya stock solution will be ready after 30 days. (Care should be taken not to mix buffalo products. The products of local breeds of cow is said to have potency than exotic breeds). It should be kept in the shade and covered with a wire mesh or plastic mosquito net to prevent houseflies from laying eggs and the formation of maggots in the solution. If sugarcane juice is not available add 500 g of jaggery dissolved in 3 liter of water.

Physico chemical and biological properties

Physico-chemical properties of Panchagavya revealed that they possess almost all the major nutrients, micro nutrients and growth harmones (IAA & GA) required for crop growth. Predominance of fermentative microorganisms like yeast and lactobacillus might be due to the combined effect of low pH, milk products and addition of jaggery/sugarcane juice as substrate for their growth.

The low pH of the medium was due to the production of organic acids by the fermentative microbes as evidenced by the population dynamics and organic detection in GC analysis. Lactobacillus produces various beneficial metabolites such as organic acids, hydrogen peroxide and antibiotics, which are effective against other pathogenic microorganisms besides its growth. GC-MS analysis resulted in following compounds of fatty acids, alkanes, alconol and alcohols.

Recommended dosage

Spray system: 3% solution was found to be most effective compared to the higher and lower concentrations investigated. Three litres of Panchagavya to every 100 litre of water is ideal for all crops. The power sprayers of 10 litre capacity may need 300 ml/tank. When sprayed with power sprayer, sediments are to be filtered and when sprayed with hand operated sprayers, the nozzle with higher pore size has to be used.

Flow system : The solution of Panchagavya can be mixed with irrigation water at 50 litre per hectare either through drip irrigation or flow irrigation

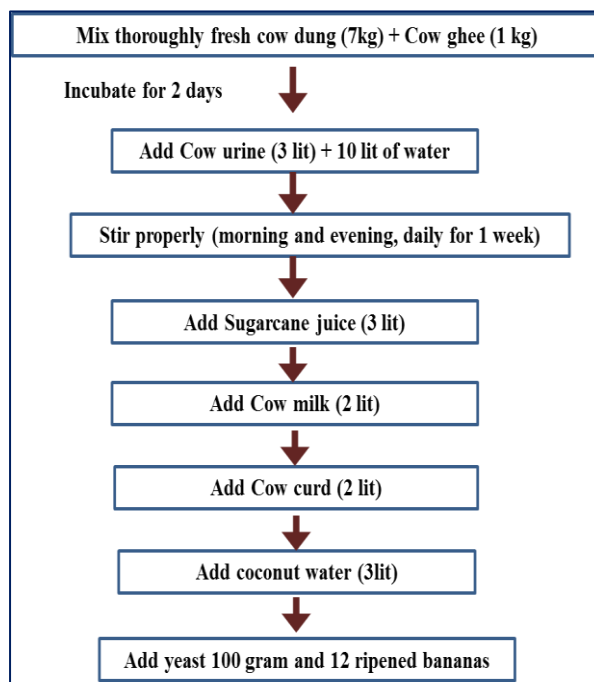


Table 2. Various compositions

Chemical Composition	
pH	5.45
EC dSm2	10.22
Total N (ppm)	229
Total P (ppm)	209
Total K (ppm)	232
Sodium	90
Calcium	25
IAA (ppm)	8.5
GA(ppm)	3.5
Microbial Load	
<i>Fungi</i>	38800/ml
<i>Bacteria</i>	1880000/ml
<i>Lactobacillus</i>	2260000/ml
Biochemical parameters	
IAA (µg/ml)	4.45
GA (µg/ml)	26.76
Cytokinin (µg/ml)	3.12
AscorbicAcid(µg/ml)	13.00
Source: Chakraborty et al., 2019	

Seed/seedling treatment: 3% solution of Panchagavya can be used to soak the seeds or dip the seedlings before planting. Soaking for 20 minutes is sufficient. Rhizomes of Turmeric, Ginger and sets of Sugarcane can be soaked for 30 minutes before planting.

Seed storage: 3% of Panchagavya solution can be used to dip the seeds before drying and storing them.

General schedule of application of Panchagavya

At Pre flowering phase : Once in 15 days

At Flowering and pod setting stage : Once in 8-10 days

At Fruit/Pod maturation stage : Once during fruit/pod maturation

Table 3: Time of application of Panchagavya for different crops

Crops	Time schedule
Rice	10,15,30 and 50th days after transpalnting
Sunflower	30,45 and 60 days after sowing
Black gram	1st flowering and 15 deays after flowering
Green gram	15, 25, 30, 40 and 50 days after sowing
Castor	30 and 45 days after sowing
Groundnut	25 and 30th days after sowing
Bhendi	30, 45, 60 and 75 days after sowing
Moringa	Before flowering and during pod formation
Tomato	Nursery and 40 days after transplanting: seed treatment with 1 % for 12 hrs
Onion	0, 45 and 60 days after transplanting
Rose	At the time of pruning and budding

Effect of Panchagavya

In leaf Plants sprayed with Panchagavya invariably produce bigger leaves and develop denser canopy. The photosynthetic system is activated for enhanced biological efficiency, enabling synthesis of maximum metabolites and photosynthates. In case of stem, the trunk produces side shoots, which are sturdy and capable of carrying maximum fruits to maturity. Branching is comparatively high. The rooting is profuse and dense. Further they remain fresh for a long time. The roots spread and grow into deeper layers were also observed. All such roots help maximum intake of nutrients and water. There will be yield depression under normal circumstances, when the land is converted to organic farming from inorganic systems of culture. The key feature of Panchagavya is its efficacy to restore the yield level of all crops when the land is converted from inorganic cultural system to organic culture from the very first year. The harvest is advanced by 15 days in all the crops. It not only enhances the shelf life of vegetables, fruits and grains, but also improves the taste. By reducing or replacing costly chemical inputs, Panchagavya ensures higher profit and liberates the organic farmers from loan.

General Advantages of Panchagavya

- It improves soil health and fertility
- It is used against pest and diseases
- It increases yield and quality of produce

- No chemicals are used
- Eco-friendly approach
- Cost required for preparation is less
- Reduces cost of cultivation by reducing chemicals like fertilizers, pesticides, fungicides, growth regulators etc

Problems, Constraints, Barriers and Difficulties in Adopting Panchagavya

- Lack of awareness about its uses
- Sometimes during fermentation contamination occurs
- Slow action
- Limited availability of its products in markets

CONCLUSION:

Conventional agriculture has made an adverse impact on soil and plant health. This eventually, leads to high demand for organic farming to protect soil and plant health. Organic farming in recent years is gaining impetus due to realization of inherent advantages as it confers in sustaining crop production and also in maintaining dynamic soil nutrient status and safe environment. The increasing concern for environmental safety and global demand for pesticide residue free food has evoked keen interest in crop production using eco-friendly products which are easily biodegradable and do not leave any harmful toxic residues besides conserving nature. So it is necessary to use natural products like Panchagavya to produce chemical residue free food crops and hence Panchagavya can play a major role in organic farming.

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