



# Panchagavya: A low cost liquid organic manure for sustainable agriculture

Reddy Venkata Ram Teja 1 , Reddy Sudheer Kumar 1 , Dipti Bisarya 1\* , Vinai Kumar 2 and A. K. Singh 3

1 M. Sc. Agronomy, School of Agriculture, Lovely Professional University, Phagwara, Punjab

A.B.M, college of horticulture, Dr. Y.S. Parmar University of horticulture and forestry, Naini, Solan, H.P.

1\* Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab

2 Assistant Professor, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh

and

3 Department of Agril Economics, College of Agriculture, Campus Azamgarh, NDUAT, Ajudhya, Uttar Pradesh

\*Corresponding author: dipti.bisarya@gmail.com

## ABSTRACT

Panchagavya or panchakavyam is a mixture used in traditional Hindu rituals that is prepared by mixing five ingredients. The three direct constituents are cow dung, urine, and milk; the two derived products are curd and ghee. It has the potential to play the role of promoting growth and providing immunity in plant system. Panchagavya contains macro and micro nutrients and play a significant role in growth and development of plants. It comprises of different amino acids, nutrients, increment controllers like Auxins, Gibberellins and furthermore valuable microorganisms like pseudomonas, Azatobacter and phosphate Solubilizing microbes and so forth Panchagavya additionally contains plant development substances, for example, IAA and Gibberellic acid, just as other fundamental plant supplements. Because of synthetic fertilizers contamination and unfavorable impact on the dirt wellbeing, Panchagavya plays a significant role in organic farming as a substitution for synthetic fertilizers. Besides, considers uncovered the presence of a few useful microorganisms like Actinomycetes, Pseudomonas, photosynthetic microscopic organisms and parasites in panchagavya which assumes a significant part as development enhancer for harvests and make soil greater efficiency.

**Keywords:** Panchakavyam, panchagavya, Organic farming, liquid manure.

## INTRODUCTION

Organic agriculture is a production management system that encourages and improves agro-ecosystem sustainability; including bio-diversity, soil biological activity, and biological cycles. It emphasizes the use of management practices, especially off-farm inputs, in light of the fact that regional conditions necessitate locally tailored systems. Panchagavya is an organic form that in Sanskrit refers to a mixture of five products made from cow milk, ghee, curd, dung, and urine (all of these products are referred to as "Gavya" individually and as "Panchagavya" collectively). In the Vedas (divine texts of Indian wisdom) and Vrikshayurveda, Panchagavya is listed and its uses has been elaborated (Natarajan, 2002). In recent years, the usage of Panchagavya in organic farming has gained in popularity in India, in most of the states

Organic farming has been gaining more attention in recent years as a result of the detrimental effects of chemical inputs. The United Nations' Food and Agricultural Organization (FAO) reported that organic agriculture covered 37.2 million hectares in 2011, three times more than in 1999. Synthetic pesticides, inorganic fertilizers, genetically modified organisms, and other chemicals are strictly not allowed to use in organic farming. Bio fertilizers or conventional organic formulations made from organic materials/waste are also recommended for plant nutrition (Badgley *et al.*, 2007).

Organic farming relies heavily on Panchagavya. It is described in Hindu Vedas such as the Vrikshayurveda as a source of nutrients for the soil (Natarajan, 2002). Effective Micro Organisms (EMO) in Panchagavya were a combine culture of naturally produced, useful microbes that enhanced soil fertility, primarily lactic acid bacteria (*Lactobacillus*), yeast (*Saccharomyces*), actinomyces (*Streptomyces*), photosynthetic bacteria (*Rhodospseudomonas*), and certain fungi (*Aspergillus*)(Natarajan, 2002).

Panchagavya affects the quality of fruits and vegetables significantly. It is used in various ways like as seed treatment, foliar spray, and soil application along with irrigation. Panchagavya is a sustainable approach in agriculture used by farmers in South India. Synthetic fertilizers and pesticides have wreaked havoc on the environment, so organic fertilizers and pesticides have emerged as a viable alternative. Panchagavya is also known to enhance crop growth and establishment.

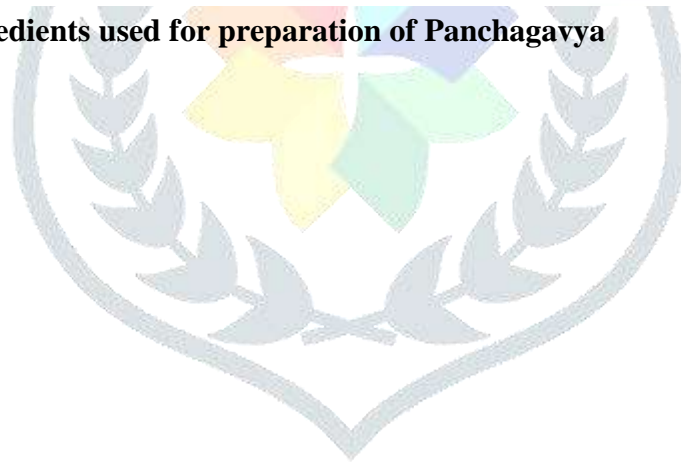
## Preparation of Panchagavya

Panchagavya or panchakavyam is prepared by mixing five major ingredients. The three direct constituents are cow dung, urine, and milk; the two derived products are curd and ghee. Besides these other ingredients used are jaggery, ripe banana, coconut water and water.

- Cow ghee : 1 Kg
- Cow urine : 10 L
- Water : 10 L
- Sugarcane juice/ Jaggery : 3 L / 3kg
- Cow milk : 3 L
- Cow curd : 2 L
- Coconut water :3 L
- Yeast powder : 100 g
- Ripe bananas : 12 nos



Figure1: Five major ingredients used for preparation of Panchagavya



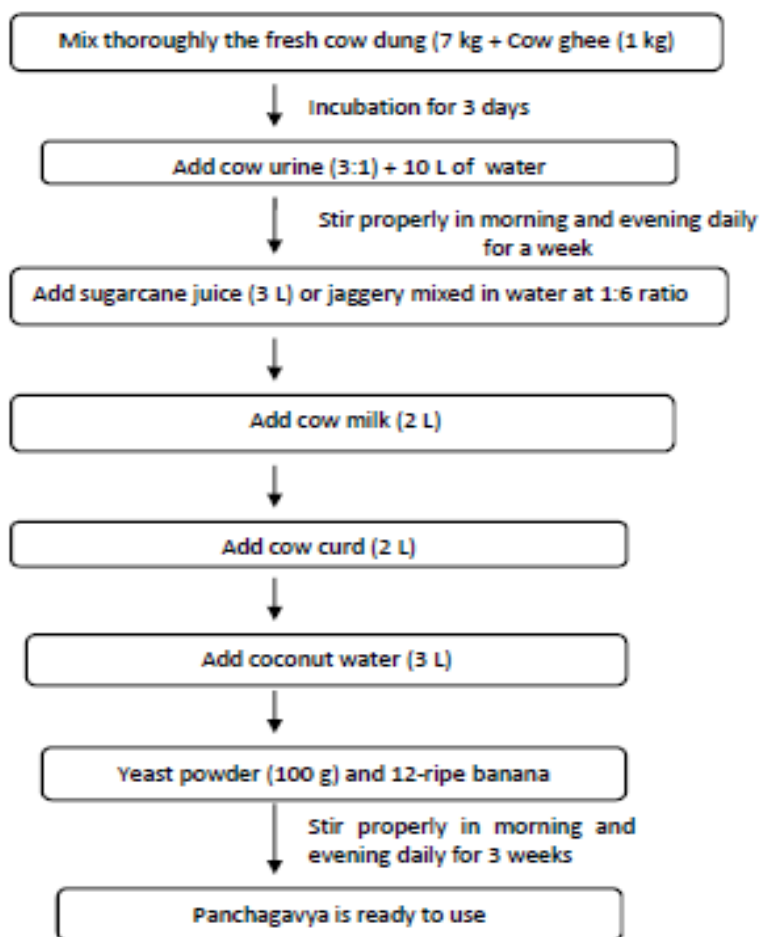


Figure 2: Steps involved in preparation of Panchagavya (Ram, 2017)

Table 1: Physico-chemical and biological properties of Panchagavya

Parameter		Microbial colony count (cfu/ml)	
pH	6.82	Bacteria	26.1x10 <sup>5</sup>
Soluble salt (EC) dSm-1	1.88	Fungi	18.0x10 <sup>3</sup>
Total Nitrogen per cent	0.1	Actinomycetes	4.20x10 <sup>3</sup>
Total Phosphorus (ppm)	175.4	Phosphate solubilizing organisms	5.70x10 <sup>2</sup>
Total Potassium (ppm)	194.1	Free living N <sub>2</sub> -fixers	2.70x10 <sup>2</sup>
Total Zinc (ppm)	1.27	-	-
Total Copper (ppm)	0.38	-	-
Total Iron (ppm)	29.71	-	-
Total Manganese (ppm)	1.84	-	-

(Source: [https://agritech.tnau.ac.in/org\\_farm/orgfarm\\_ofk\\_soil.html](https://agritech.tnau.ac.in/org_farm/orgfarm_ofk_soil.html) )

## Beneficial effects of Panchagavya

### 1. Microbial activity and soil fertility

Panchagavya consists of naturally occurring microbes which are beneficial for plant nutrient availability viz., Bacteria, fungi, Yeast, Actinomycetes, and some photosynthetic bacteria. Different microbial populations present in Panchagavya are listed in table: 1

- Panchagavya improves soil fertility by increasing macronutrients, micronutrients, and beneficial microorganisms, resulting in improved soil health.
- It increases soil water holding capacity by acting as organic manure.
- It promotes the reproduction and growth of beneficial soil microorganisms.
- Improves plant nutrient uptake and promotes plant growth.

## 2. Crop morphology and yield

### Leaf

Plants that have been sprayed with Panchagavya grow larger leaves and a denser canopy. The photosynthetic system is turned on for increased biological production, allowing for optimal metabolite and photosynthetic synthesis.

### Stem

The trunk produces robust side shoots that can hold a large number of fruits to maturity. Also branching is higher.

### Root

Rooting is abundant and dense. They even keep their freshness. For quite some time the roots were also seen spreading and growing into deeper layers. Both of these roots aid in nutrient and water absorption.

Studies have shown expanded yields where the rancher has utilized natural practices (**Singh et al., 2001; Ramesh et al., 2005**) in crops like bean stew (**Subhashini et al., 2001**), moringa (**Beulah, 2001**) green gram (**Somasundaram et al., 2003**) and French bean (**Selvaraj, 2003**). It very well may be concluded that Panchagavya as a natural development advertiser for little and minimal vegetable cultivators (**Boomathi, 2006**). The money saving advantage to ranchers was most prominent at the point when Panchagavya was utilized as a growth advertiser and demonstrated as the least expensive, while AmritPani and Bokashi were the costliest alternative info (**Francis and Smith, 2006**).

The most successful low-cost technology was a foliar spray of Panchagavya at 3% on 15, 25, 40, and 50 DAS with no fertilizers. Green gram grain yield (**Somasundharam et al., 2007**).

The bio fertilizer capability of Panchagavya arranged in the conventional way and a changed arrangement altered with kelp extricate have been assessed for their manure potential utilizing the beats viz., *Vigna radiata*, *Vigna mungo*, *Arachis hypogea*, *Cyamopsis tetragonoloba*, *Lablab purpureus*, *Cicer arietinum* and the cereal *Oryza sativa* var. ponni as the exploratory plants (**Thevanathan et al., 2005**).

(**Srimathi et al., 2013**) were concentrated on natural seed fortress with *Jatropha curcas* and *Pongamia pinnata* utilizing 'Panchagavya' at one, two, three, four furthermore, five percent focuses with the three distinctive splashing spans uncovered that Panchagavya at 2 and 5% with the drenching term of 16 and 8 h were prevalent than the control and other fixations as far as germination and seedling life for *Jatropha curcas* and *Pongamia pinnata* separately.

The manures included unique levels of supplements and foliar use of panchagavya (3 and 4%) at different phases of baby corn. The outcomes uncovered that four splashes of three percent panchagavya at 15, 25, 35 and 45 Days In the wake of Sowing (DAS) alongside 100% Recommended Portion of Fertilizers (RDF) recorded the most noteworthy new baby corn yield (7439 and 7476 kg ha<sup>-1</sup>, in 2008 and 2009, separately) trailed by 3 showers of 3% panchagavya alongside 100% suggested portion of manures (7226 kg ha<sup>-1</sup> 2008 and 7262 kg ha<sup>-1</sup> in 2009).

## Effect on

### Paddy

Increases tillering Eliminates chaffy grains Increases grain weight by 20% Enhanced cooking efficiency Harvest is 15 days ahead of schedule. During milling, the percentage of broken rice is reduced.

**Maize, sorghum, and barley:** Some of the most common grains grown in the United States.

Plant growth has increased.

Palatability has improved.

Increases the amount of nutrients in plants

Harvest has been pushed back ten days.

### 3. Disease and pest control

(Boomiraj *et al.*, 2004) revealed that Panchagavya was powerful against leaf miner (*Amsacta biguttula*) and white fly (*Bemisia tabacci*) in bhendi. Comparative outcomes were seen by (Mudigora *et al.*, 2009) in cabbage and sorghum. Cow dung is viable excrement for diminishing the bacterial and parasitic pathogenic infections. It showed positive reaction in suppression of mycelial development of plant pathogenic parasites like *Fusarium solani*, *F.oxysporum* and *Sclerotinia sclerotiorum* (Basak and Lee, 2002). Essentially, according to (Mary *et al.*, 1986) cow compost separate shower was likewise revealed to be compelling for the control of bacterial scourge disease of rice also, was just about as compelling as penicillin and streptomycin. (Pammel, 1889) found that cow dung as natural fertilizer increment power of plant and reduce the sickness frequency of root decays in cotton brought about by *phymatotrichum omnivorum*. Similar investigations were led by (Abawi and Widmer, 2000); (Akhtar and Malik, 2000) and (Gamiliel *et al.*, 2000) announced that natural excrement decrease infection rate caused by a wide scope of plant microbes including microscopic organisms, parasites also, nematode species. Along these lines, use of cow excrement in appropriate and reasonable way can improve not just efficiency of yield yet additionally limiting the odds of sickness.

### 4. Quality of produce

Panchagavya plays an important role in quality making of the produce as it a way of providing nutrients to the plants in organic way apart from synthetic fertilizers which are not good for health. The product is said

to be of superior one with the application of organic manures like jeevamruth, beejamruth and Panchagavya. An experiment was conducted on tomato to check the yield and quality produce parameters. The findings of this experiment was N, P and K concentration in plants were significantly higher because these liquid manures which contains cow dung, urine, macro flora and fauna activity make the nutrients in available form and easily taken up by plant. The quality of the tomato fruit in terms of its weight also increased with the application of these liquid manures (Shweta, 2008) and (Gore and Srinivasa, 2011).

### **Advantages of Panchagavya**

It improves soil wellbeing and fruitfulness

It is utilized against irritation and infections

It expands yield and nature of produce

No synthetics are utilized

Eco-accommodating methodology

Cost needed for planning is less

No uncommon procedures is required

It gives different employments

Reduces cost of development by diminishing synthetics like manures, pesticides, fungicides, development controllers and so forth

Farmer well-disposed strategy

### **Constrains and barriers in Adopting Panchagavya**

Lack of mindfulness about its employments

Sometimes during maturation defilement happens

Slow activity

Limited accessibility of its items in business sectors

Encourages weed development likewise as it is non-specific

Less usage by ranchers

It might lessen nature of the produce here and there

### **Conclusion**

The above audit depends on panchagavya, a fluid natural alteration. From the gathered writing this survey gives data on panchagavya arrangement, supplement creation, microbial populaces and impact on development and yield of plants. panchagavya is considered as a wonder of normal cultivating as it is not difficult to plan, made out of full scale and miniature supplements, presence of useful miniature organic entities like microorganisms, actinomycetes and a few parasites. This common planning animates the action of N-fixers, P solubilizers and other useful miniature living beings which are helpful to plants. In crop creation

utilizing eco-accommodating items which are effectively biodegradable and don't leave any destructive poisonous buildups other than monitoring nature. So it is important to utilize common items like Panchagavya to create synthetic buildup free food crops and thus Panchagavya can play a significant part in natural cultivating.

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