

Panchagavya: An Eco-Friendly Formulation For Insect-Pest Management

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ARTICLE ID: 039

Panchagavya is an organic formulation, which in Sanskrit means the blend of five disparate products viz., milk, curd, ghee, urine and dung obtained from Deshi cow (all these products are individually called as “Gavya” and jointly named as Panchagavya). In India, use of Panchagavya in organic farming is gaining attention in recent years especially in states like Tamil Nadu, Kerala, Maharashtra and Himachal Pradesh. Panchagavya has the potential to promote growth and induce immunity in plant system. Panchgavya contains growth regulatory substances such as indole acetic acid, gibbrellins, cytokinins, essential plant nutrients, and beneficial micro-organisms like lactic acid bacteria, yeast, actinomycetes etc. It also contains biofertilizers like Acetobactor, Azospirillum and Phosphobacterium and plant protection substances. It has a noteworthy role in imparting resistance to crops against pests and diseases increasing the yield by and large.

Ingredients for preparation of Panchagavya

The following ingredients are needed to prepare Panchagavya for use as pesticide:

Sr. No.	Ingredient	Quantity
1	Cow dung	5 kilograms
2	Cow urine	3 litres
2	Cow milk	2 litres
3	Curd	2 litres
4	Clarified butter/ Ghee	1 litre

Method of preparation

1. Mix all the ingredients in a wide mouthed mud pot, concrete tank or plastic can and stir well.
2. Keep in the shade and cover with a wire mesh or plastic mosquito net to prevent houseflies from laying eggs and the formation of maggots in the solution.
3. Allow this mixture to ferment for about 7 days under shade.
4. Stir this mixture 2 times in a day, morning and evening.
5. Store it in airtight containers in a cool place sheltered from direct sunlight. The container's lid can be opened once in two to three days to release the gas that may sometimes be formed by further fermentation of solution.
6. To speed up the fermentation process, coconut water (1.5 litre) or sugarcane juice (1.5 litre) can be used. If either is not available, use 250 grams of jaggery mixed in 1.5 liters of water. This also helps in reducing the bad odour emanating from the mixture.

Precautions

1. Do not use products obtained from buffalo.
2. Always use products obtained from indigenous cow.
3. Store the mixture under shade.
4. The diluted mixture has to be stirred exhaustively for 20 minutes before spraying.

Treatment of soil/seed/plants

Panchagavya can be used as seed treatment, soil application, foliar sprays, or along with irrigation water.

For seed treatment: The seeds are soaked in 3% solution of Panchagavya or the seedlings are dipped in the solution for 20 minutes before planting. Rhizomes of turmeric, ginger and sets of sugarcane need to be soaked for 30 minutes before planting. Before storage, the seeds are dipped in 3% solution of Panchagavya, dried under shade and then stored.

For soil treatment: 3 litres of Panchagavya is diluted in 100 litres of water and applied in soil.

For sprays: 10 litres Panchagavya is mixed in 100 litres of water and sprayed on the crop. The prepared solution can be stored for a month.

For use with irrigation water: The solution of Panchagavya can be mixed with irrigation water at 50 litres per hectare either through drip irrigation or flow irrigation.

Benefits of Panchagavya

1. It gives resistance against pests and diseases.
2. The cow urine present in the mixture naturally repels insects.
3. It boosts growth and vigour of plants and ultimately the yield.
4. It acts as an organic growth promoter.
5. It also helps in ameliorating the soil health.
6. It leads to quick and profuse flowering.
7. The leaves become greener.
8. It augments root proliferation.
9. It works as an organic manure and improves water holding capacity of soils.
10. It may increase the canopy of the crop which helps in better photosynthesis.
11. Panchagavya is rich in macronutrients like Nitrogen, Phosphorus and Potassium which are the major elements required for plant growth.
12. It also has micronutrients which are indispensable for proper growth and healthy development of plants.
13. Panchagavya contains many vitamins, amino acids, gibberellins and auxins which regulate the growth of plants.
14. It helps in proper growth and reproduction of beneficial soil microorganisms like Pseudomonas, Azotobacter, Phosphate solubilizing bacteria resulting in vigorous plant growth.
15. It helps in providing various beneficial metabolites produced by microorganisms such as organic acids, hydrogen peroxide and antibiotics which are effective against numerous pathogenic microorganisms.

Physico-chemical properties of Panchagavya

Sr. No.	Property	Value
1	pH	5.45
2	EC (dS/m ²)	10.22
3	Total N (ppm)	229
4	Total P (ppm)	209

5	Total K (ppm)	232
6	Sodium (ppm)	90
7	Calcium (ppm)	25
8	Organic Carbon (%)	17.45
9	Total Zinc (ppm)	1.27
10	Total Copper (ppm)	0.38
11	Total Iron (ppm)	29.71
12	Total Manganese (ppm)	1.84

Biochemical properties of Panchagavya

Sr. No.	Property	Range
1	IAA (ppm)	8.5
2	GA (ppm)	3.5
3	Acetate (%)	60.05-68.28
4	Propionate (%)	14.39-17.79
5	Butyrate (%)	6.40-7.65

Biological properties of Panchagavya

Sr. No.	Microbe	Microbial count (cfu/ml)
1	Fungi	38800
2	Bacteria	1880000
3	<i>Lactobacilli</i>	2260000
4	Total anaerobes	10000
5	Acid formers	360
6	Methanogens	250
7	Actinomycetes	4.20×10^3
8	Phosphate solubilizing bacteria	5.70×10^2

The physico-chemical, biochemical and biological properties of this formulation are bounteous. Almost all the essential properties are present in this mixture because of the organic and natural ingredients used to prepare this mixture.

Work done on Panchagavya for managing insect-pests in India:

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In annual Moringa, sprayings of Panchagavya doubled the stick yield besides giving resistance to pests and diseases (Vivekananda, 1999). Boomiraj *et. al.* (2004) reported that Panchagavya was effective against *Amrasca biguttula biguttula* and *Bemisia tabacci* in okra. Mudigora *et al* (2009) documented that Panchagavya + cow urine in combination with Neem Seed kernel Extract proved effective in controlling *Atherigona soccata*. Chandrasekharaiah *et al.* (2015) observed repellent and antifeedant effects of Panchagavya against *Plutella xylostella* at 1, 2.5, 5 and 10% concentrations. Panchagavya at 7% and 5% concentrations was found more effective in controlling the major pests of teak viz *Paracoccus marginatus*, *Hyblaea puera* and *Eutectone macheralis* at Kattabkulathur, Chennai (Senthilkumar *et al* 2015). In soybean at Meghalaya, least *Myloccerus* and leaf folder population (0.36) was observed with Derisom 3 ml/litre + Panchgavya 3% + cow urine 3% mixture (Das *et al* 2018). Laboratory studies conducted at Chidambaram, indicated that neem leaf extract (5%) + Panchagavya (3%) showed maximum mortality (83.33%) of *Earias vittella* larvae and field studies indicated that highest percent reduction of *E. vittella* was recorded in Panchagavya (3%) + NSKE (5%) treated plots (Pazhanisamy and Archunan, 2019). Highest mortality of *Spodoptera litura* was recorded in neem oil 3% + Panchagavya 3% mixture under laboratory conditions (Sathya *et al.* 2019).

The escalating concern for environmental security and global demand for pesticide residue free food has induced zealous interest in the use of eco-friendly products which are biodegradable and at the same time do not leave any harmful toxic residues on the plants. Such products are cheaper, safe to beneficial organisms and pose no risk of pests developing resistance. So it is high time to use products like Panchagavya to produce chemical residue free food crops and save our environment and soil from the adverse effects of synthetic pesticides.

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