

PANCHAGAVYA FOR ORGANIC GARDENING

Submitted in partial fulfilment of the requirements

for the award of Bachelor of Science

By

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Under the Guidance of

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SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

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March 2021

DECLARATION

I R.Snega (38770015) hereby declare that the Project Report entitled “**Panchagavya for Organic Gardening**” done by us under the guidance of **Dr. D. Prabavathy**, Assistant Professor, Department of Biotechnology, Sathyabama Institute of Science and Technology is submitted in partial fulfilment of the requirements for the award of Bachelor of Technology degree in Biotechnology.

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BONAFIDE CERTIFICATE

This is to certify that this project report is the bonafide work of R.Snega (38770015) who have done the project work as a team who carried out the project entitled “**Panchagavya for Organic Gardening**” Under my supervision from October 2020 to March 2021 submitted for viva voce examination for Bachelor degree in Biotechnology.

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LIST OF CONTENTS

CHAPTER	CONTENT	PAGE NO
	Abstract	1
1	Introduction	2
1.1	Major problems of agriculture system	5
2	Literature Survey	6
2.1	Eco-friendly Management of Plant Diseases	8
2.2	Effect on soil fertility and productivity	11
2.3	Benefits of panchagavya	12
3	Aims & Objectives	14
3.1	Aim	14
3.2	Objectives	14
4	Materials and Methods	15
4.1	Materials Required	15
4.2	Method of preparation	15
4.3	Step involves in the preparation for panchagavya	16
5	Result and Discussion	18
6	Summary	25
7	Conclusion	26
9	Reference	27

CONTENT OF THE PICTURES

FIGURE NO	TITLE OF THE PICTURE	PAGE NO
1	Ingredient list for preparation of Panchagavya	15
2	The steps involved in preparation of panchagavya	16
3	Preparation of panchagavya	18
4	Test plant 1 for field experiment – fenugreek plantlets in control pot without foliar spray of panchagavya (5days)	19
5	Test plant 1 for field experiment – fenugreek plantlets in foliar sprayed panchagavya pot (5days)	19
6	Test plant 1 for field experiment fenugreek plant in control pot without foliar spray of panchagavya (after 10 days)	19
7	Test plant 1 for field experiment fenugreek plant in control pot in foliar spray of panchagavya (after 10 days)	19
8	Test plant 1 for field experiment fenugreek plant in control pot without foliar spray of panchagavya (after 15 days)	20
9	Test plant 1 for field experiment fenugreek plant in control pot in foliar spray of panchagavya (after 15 days)	20
10	Test plant 2 for field experiment – tomato plantlets in control pot without foliar spray of panchagavya (5days)	20

11	Test plant 2 for field experiment – tomato plantlets in foliar sprayed panchagavya pot (5days)	20
12	Tomato plant after 8 days without using panchagavya Solution	21
13	Tomato plant after 8 days with using of panchagavya Solution	21
14	Tomato plant after 18 days without using panchagavya Solution	21
15	Tomato plant after 18 days with using panchagavya solution	21

CONTENT OF THE TABLES

TABLE NO	TITLE OF THE TABLE	PAGE NO
1	The parameter of the ingredient used for panchagavya	17
2	Test plant 1 & 2 without using panchagavya solution	22
3	Plant used panchagavya solution showed the result of growth	23

ABSTRACT

The present study was aimed to improve the growth and development of Fenugreek plant (*Trigonella foenum - graecum*) and Tomato plant (*Solanum lycopersicum*) under foliar application of Panchagavya as organic nutrient. A pot culture experiment was conducted to evaluate the efficacy of Panchagavya foliar spray on the physiological growth and yield of fenugreek and Tomato plant.

The results of the experiment revealed that foliar application of Panchagavya recorded significant improvement in chlorophyll content, N content of root nodules, plant height, and number of branches per plant, leaf area index and increase in bud production. Three percent Panchagavya foliar spray given at 1st, 3rd and 5th day itself showed significantly higher growth in Fenugreek plant when compared tomato plant.

Key Words: Panchagavya, foliar application, Fenugreek plant, tomato plant.

1. INTRODUCTION

The increasing concern for environmental safety and global demand for pesticide residue free food has evolved interest in crop plantation for sustainable agriculture. Chemical Fertilizers increase the yield, they pose certain serious health threats to human beings especially pregnant and nursing mothers. Another concern for health is contamination of medicinal plants with toxic heavy metals. The cost of inorganic fertilizers is increasing enormously to an extent that they are out of reach of small and marginal farmers (Gore and Sreenivasa, 2011). The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable agriculture. Another concern for health is contamination of medicinal plants with toxic heavy metals. The cost of inorganic fertilizers is increasing enormously to an extent that they are out of reach of small and marginal farmers (Gore and Sreenivasa, 2011).

Panchagavya (PG) is an organic formulation prepared from the different by-products of cow which has been extensively utilized as an alternative, cheaper, and effective source of organic manure in India. Its application resulted in the improvement of various factors including soil alkalinity, sodicity, acidity, fertility, nutrients, plant growth, metabolites, defense response, and yield. It plays important role in promoting growth and providing immunity in plant system thereby confers resistance against pest and diseases. Panchagavya or Panchakavyam is basically prepared by mixing five products of cow and used in traditional Hindu rituals. The three direct constituents are cow dung, urine, and milk; the two derived products are curd and ghee. These are mixed in proper ratio and then allowed to ferment.

Panchagavya can be also made more effective by consisting the mixture of nine products viz. cow dung, cow urine, milk, curd, jaggery, ghee, banana, Tender coconut and water. Cow dung acts as a medium for the growth of beneficial microbes. Milk provides protein, fat, carbohydrates, amino acid and calcium. Curd provides Lactobacillus which acts as catalyst in the digestion of organic wastes Ghee provides vitamin, calcium and fat (Singh and Pant, 2018). Cow urine has many beneficial properties particularly in the areas of agriculture and therapeutics. Cow urine contents are water 95%, Urea 2.5%, minerals, salts, hormones, and enzymes

2.5%. It also contains iron, calcium, phosphorus, salts, carbonic acid, potash, nitrogen, ammonia, manganese, sulphur, phosphates, potassium, urea, uric acid, amino acids, enzyme and cytokine (Bhadauria, 2002).

Panchagavya was not only useful for agricultural purpose, but can also be used for improvement of human medicine, to enhance soil fertility, to protect plant from diseases and animal health. For example, in plant Panchagavya promotes growth, yield and immunity and is also an organic pesticide. For animals, Panchagavya stimulates the production of antibodies increasing immunity. In humans, Panchagavya has been reported to increase appetite, heal wounds, and as a cure for psoriasis and white patches. Tharamaraj *et al.*, (2011) says panchagavya, a Vedic formulation for increased productivity, disease resistance in plants and potential of utilizing panchagavya as biofertilizer was tested on various pulses *Vigna radiata*, *Vigna mungo*, *Arachis hypogea*, *Cyanopsis tetragonoloba*. *Lablab purpureus*. *Cicer arietinum* and the cereal *Oryza sativa* var. ponni by growing in soil amended with dried traditional and seaweed based Panchagavya.

Experimental seedling recorded higher rates of linear growth of both shoots and roots as compared to controls and that too maximum growth was observed in seedling grown in soil amended with seaweed based panchagavya at low concentration (1:100; Panchagavya; soil). The Panchagavya is diluted to three percent and sprayed on crops to get the best results. Various crops such as mango, banana, guava, Cash crops such as sugarcane, turmeric, jasmine etc., and plantation crops have responded extremely well to application of panchagavya. Earth worms grew faster and produced more vermi – compost when treated with this solution. When sprayed with Panchagavya, the plants produce larger leaves, and develop denser canopy. The stem produces lateral shoots and much more branches to bear heavy yields. The rooting is profuse and dense, and penetrating to deep layers. Roots helps in better intake of nutrients and water. Plants are able to stand protracted drought conditions, and needed less than a third of the irrigation in regular times”, explains Dr. Natarajan. The Panchagavya has been field-tested by a network of organic farmers in the country.

Panchagavya has several beneficial effects on animals and fish as well. When fed to cows at 200ml per day, they turned healthier and produced milk with

high fat content. Their rate of conception increased, and the various common ailments were completely cured. Similar effects were found in sheep and goats. When mixed with the poultry feed or drinking water at the 5 ml for bird per day, the birds became disease – free and healthy. They laid eggs for longer periods. In the broilers, the weight gain was impressive and the feed to weight conservation ratio improved. In the fishponds, the addition of panchagavya increased the growth of phyto and Zoo plankton, which contributed to improved fish feed availability and thus increased fish growth, according to Mr. Natarajan. Panchagavya treated plants showed lesser viral intensity than control. The effect of foliar spray of panchagavya on virus concentration in the local lesion host also studied, by inoculating the plants with virus of different time intervals after foliar spray.

Srimathi *et al.*, (2013) were studied on organic seed fortification with *Jatropha curcas* and *Pongamia pinnata* using ‘Panchagavya’ at one, two, three, four, and five per cent concentrations with the three different soaking durations revealed that Panchagavya at 2 and 5% with the soaking duration of 16 and 8h were superior than the control and other concentrations in terms of germination and seedling vigour for *Jatropha curcas* and *Pongamia pinnata* respectively. The biofertilizer potential of Panchagavya prepared in the traditional way and a modified preparation amended with seaweed extract have been evaluated for their fertilizer potential using the pulses viz., *Vigna radiata*, *Vigna mungo*, *Arachis hypogea*, the cereal *Oryza sativa* var. ponni as the experimental plants (Amalraj *et al.*, 2013).

Some farmers in the southern parts of India use a modified Panchagavya that contains many other plant products to boost fermentation and to support the growth of beneficial microorganisms. Similarly, soils amended with Panchagavya promoted the production of lateral roots, leaves, leaflets, and the growth of lamina in all the experimental plants leaves which had 93% more surface area than that of their respective controls. Agricultural country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India.

India exported 38 billion dollar worth of agricultural products in 2013, making it the seventh largest agricultural exporter worldwide and the sixth largest net exporter. Most of its agriculture exports serve developing and least developed

nations. Indian agricultural/horticultural and processed foods are exported to more than 120 countries.

"Slow agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible.

World Bank: "India Country Overview 2008"

Agricultural Problems:

About 57% of the land is covered by crop cultivation in India; however, in the world, the corresponding share is only about 12%.

1.1. MAJOR PROBLEMS OF AGRICULTURE SYSTEM

- Dependence on erratic monsoon;
- Low productivity; major problems of the Indian agriculture system are
- Constraints of financial resources and indebtedness;
- Lack of proper land reforms;
- Small farm size and fragmentation of landholdings;
- Lack of commercialization; under-employment; and
- Degradation of cultivable land.

2. LITERATURE SURVEY

Panchagavya means "mixture of five products (cow dung, cow urine, milk, ghee, and curd) of the cow. Of these, the three direct constituents are cow dung, urine, milk and the two derived products are curd and ghee. It has been used in traditional Indian rituals throughout history. It is also called Cowpathy treatment based on products obtained from cows used in Ayurvedic medicine and of religious significance for Hindus. Panchagavya is also used as fertilizers and pesticides in agricultural operations. Panchagavya is an organic product recommended for the improvement in organic agriculture (Sangeetha and Thevananthan, 2010). In Sanskrit literature, Panchagavya means the blend of five products obtained from cow. Every one of these five products are called 'Gavya' and together termed as 'Panchagavya.' Panchagavya plays an important role in the quality of fruits and vegetables. It is used as a foliar spray, soil application along with irrigation, as well as a seed treatment (Natarajan, 2002). Farmers in South India practice panchagavya for sustainable agriculture. Use of chemical fertilizers and pesticides in agriculture fields led to environmental degradation and hence as an alternative to chemicals. Panchagavya is also being sought to improve crop establishment and health (Kumar *et al.*, 2020).

Fungicides are known to effectively control soil borne disease in general and damping-off in particular but their indiscriminate usage has led to the development of resistant strains of plant pathogens, destroyed natural predators and parasites (Corke, 1980), induced environmental pollution and health hazards (Brimmer and Boland, 2003; Okhibo and Ogbonnaya, 2006). There is a need to develop and adopt an alternate and environment friendly plant protection solutions, like use of organic amendments and animal by-products such as panchagavya, cow urine, fermented butter milk, verminwash and biosol. The exploitation of conventional organic inputs has already been described in Vedas, Puranas and Arthashastra (Nene, 2003).

Some people believe that chemicals alone could give the high yield. Frequently use of chemicals in agriculture has weakened the ecological base, in addition to degradation of soil, water resources and quality on foods. Soon the adoption of "Panchagavya" as a remedy to cure the ills of modern chemical agriculture, it is very much essential to develop a strong workable and compatible package of nutritional management through organic resources for various crops

based on scientific facts, local conditions and economic viability. Panchagavya is a foliar nutrition prepared by organic growers, used widely for various agricultural and horticultural crops (Tharmaraj *et al.*, 2011).

The first mention of Vrikshayurveda (VRK) is found in Kautilya's Arthashastra, but even by the time of Varahamihira [505-587 CE] (Kangle, 1995), who compiled the Brihat Samhita (Bhat, 2010), the science of VRK was in its early stages. The first systematic text on VRK was written in Sanskrit by Surapala [C.1000 CE]. Its English translation was published for the first time by the Asian Agri-History Foundation (AAHF) (Sadhale and Nene, 2009). Almost around the same time as VRK, the compendium Lokopakara [1025 CE] with a chapter on Vrikshayurveda was compiled in old Kannada by Chavundaraya in Kalyani, near present-day Bidar in northern Karnataka (Valmiki, 2006). Subsequently, texts on VRK with titles such as Vishvavallabha and Upavanavinoda (Sadhale, 2004; Sadhale, 2011). The most significant innovation, apparently a first in world agrihistory, was the development of fermented liquid manures from organic wastes Kunapajala [literally, 'Filthy fluid'] or Kunapambu [fermented filth].

Surapala's procedure involved collecting and storing animal wastes as and when available. Although wastes from dead boar were mentioned first Surapala, expanded the source of wastes to other animals, especially those with horns. The wastes were cooked and then stored after mixing with husk. When needed for use, sesame oil cake, honey, soaked black gram, and finally ghee (clarified butter) were added to the preparation. Many historians and Indology scholars have a chronic habit of not accepting the dates given by Indian scholars from India. Surapala, in the colophon of his Vrikshayurveda, mentions that he was a physician [Ayurveda] in the court of King Bhimpala, son of Trilochanapala (Sadhale and Nene, 2009) of the Shah Pala dynasty, in a Hindu confederation, spreading from Gujarat to the Kanauj region, including the Shivalik Hills (Barnett and Lionel, 1999). Bhimpala died in 1026 CE. It was common during those times to ask Ayurvedic physicians to develop gardens for kings and nobles, and maintain them.

All these products are individually called as "Gavy" and collectively named as Panchagavya. Panchagavya has got reference in the scripts of Vedas and Vrikshayurveda (Natarajan, 2002). Cow urine therapies in Indian system of medicine

have a strong scientific base. Cow urine has been described in “Sushrita Samhita” and “Ashtanga Sangraha” to be the most effective substance/secretion of animal origin with innumerable therapeutic values. Ancient books on ayurveda state that consumption of cow urine increase resistance to diseases by up to 104%. In India, drinking of cow urine has been practiced for thousands of years. Panchagavya is a term used in Ayurveda to describe five important substances obtained from cow namely Urine, Dung, Milk, Ghee and Curd. Many people use Panchagavya in some rituals (puja) and for medicinal purposes. It is also used in Yajur Veda for ark as a medicine.

2.1. ECO-FRIENDLY MANAGEMENT OF PLANT DISEASES

Cow dung is being used for different purposes from the ancient time and has a significant role in crop growth because of the content in humid compounds and fertilizing bio elements available in it. Composted cow dung is rich in total nitrogen (0.74%) including some hormones and favour's plant growth (Dharma 2005; Marry *et al.*, 1986). cow dung extract spray was also reported to be effective for the control of bacterial blight disease of rice and was as effective as Penicillin, *Paushamycin* and *Streptomycin*. Found that cow dung as organic manure increase vigour of plant and reduce the disease incidence of root rots in cotton caused by *Phymatotrichum omnivorum*. Similar investigations were conducted by (Abawi and Widmer 2000; Akhtar and Malik 2000; Alias and Ram 2017) reported that organic manure reduce disease incidence caused by a wide range of plant pathogens including bacteria, fungi and nematode species. Therefore, application of cow dung in proper and sustainable way can enhance not only productivity of yield but also minimizing the chances of disease.

Coriander suffers from various abiotic and biotic diseases. Among the biotic diseases, stem gall caused by *Protomyces macrosporus* is a major disease, which causes yield loss up to 33-36% (Kumar *et al.*, 2019). Damping-off is a serious fungal disease affecting seeds and seedlings in both nursery and field conditions. In this experiment, effectiveness of panchagavya in inhibiting the growth of two damping-off pathogens viz., *Fusarium solani* and *Sclerotium rolfsii* (Rathore and Patil, 2019). The cow urine against three fungal pathogens (*Fusarium oxysporum*, *Rhizoctonia solani*, and *Sclerotium rolfsii*) isolated from infected plants of Methi and Bhindi that

showed symptoms of damping off and wilting disease by poison food technique. The extent of growth of test fungi in plates poisoned with cow urine was lesser when compared with the control plates. Finally, concluded that the cow urine has antifungal activities and the inhibitory activity can be used in the control of fungi (Jaindaik and Preethi 2015). In India, use of Panchagavya in organic farming is gaining popularity in recent years especially state like Tamil Nadu and Kerala (Shailaja *et al.*, 2014). It is also called cow pathway treatment based on products obtained from cows used in ayurvedic medicine and of religious significance for Hindu (Srimathi *et al.*, 2013).

Panchagavya is an organic product recommended for crop improvement in organic agriculture (Sangeetha and Thevanathan 2010). It is used as a foliar spray, soil application along with irrigation, as well as seed treatment (Natarajan (2002). Panchagavya has played a significant role in providing resistance to pests and diseases, resulting in an increased over all yields (Tharmaraj *et al.*, 2011). Panchagavya possess the properties of fertilizers and bio pesticides and have been resulted in positive effect on growth and yield of crops (Somasundaram and Amanullah, 2007). Effective microorganisms in panchagavya are a mixed culture of naturally occurring beneficial microbes mostly lactic acid bacteria (*Lactobacillus*), yeast (*Saccharomyces*), actinomycetes (*Streptomyces*), photosynthetic bacteria (*Rhodopseudomonas*) and certain fungi (*Aspergillus*, *Penicillium* etc.) (Xu, 2001; Swaminathan and Swaminathan, 2007). Chemoethotrops and autotrophic nitrifiers (Ammonifiers and nitrifiers) are present in panchagavya, which colonize on the leaves and increased the ammonia uptake and enhance the total N supply (Papen *et al.*, 2002). The pH of panchagavya was lowered to 4.5 at 30 days of fermentation; it is might due to *Lactobacillus* bacteria in panchagavya, which produced more organic acid during fermentation (Mathivanan *et al.*, 2013). The efficiency of individual treatments varied but panchagavya + kunapajala was found to be best in better utilization of leaf nitrogen, efficient photosynthetic activity and improving yield. At the same time panchagavya can be used as prophylactic measures against the disease incidence of vegetable crops. Foliar spray of panchagavya provides the nutrient, IAA and GA to the plant which is present in the panchagavya.

Srimathi, *et al.* (2013) reported the *J. curces* and *P. pinnata* seeds fortification with panchagavya at 2 and 5% concentration for 16 and 8 hours, respectively.

Panchagavya soaking had highest invigoration effect than water soaking and control. This study suggests that panchagavya application is one of the traditional, eco-friendly and low-cost techniques to enhance the better invigoration and promote the successful large-scale afforestation in tree species. Panchagavya use of seed soaking and foliar spray tillering are higher enhanced growth and yield parameters of wheat crop (Pagar *et al.*, (2015). The mixture of panchagavya sprayed on seedling of tomato, chilli and cowpea increased the linear growth of both shoot and root system in all the vegetable seedling (Sarkar *et al.*, 2014). They have found induced defence mechanism acquired by the tomato, chilli and cowpea due to application of liquid organics, which was quantified in terms of polyphenol oxidase contained in panchagavya.

Maha panchagavya, *Pythium aphanidermatum* causing damping-off in tomato and results showed 48.2 per cent control of disease in nursery beds (Kumar *et al.*, 2010). Antifungal potentiality of panchagavya was evaluated against *R. solani*, *S. rolfsii*, *F. solani*, *S. sclerotiorum* and *Phytophthora colocasiae* (Sugha 2005). The antifungal activity of panchagavya against major soil borne pathogens viz. *F. solani f. sp. pisi*, *F. oxysporum f. sp. pisi*, *R. solani*, *S. Solfsii* and *S. Sclerotiorum* were studied, and found 90 per cent inhibition in *F. oxysporum f. sp. pisi* and *F. solani f. sp. pisi* and 100 per cent inhibition in *S. rolfsii*, *S. sclerotiorum* and *R. solani* (Dogra 2006). Basak and Lee (2005) conducted the experiment on the efficacy of cow urine and cow dung in vitro for controlling wilt caused by *F. oxysporum f. sp. Cucumerinum* and *F. solani f. sp. cucurbitae* in cucumber (Plotnikova, 1977) observed the presence of *mycolytic* bacteria in cow manure.

The extract of cow dung compost has showed the presence of bacterial isolates, which inhibited the mycelial growth of *Fusarium oxysporum f.sp. cucumerinum* and *Helminthosporium sigmoideum* (Kai *et al.*, 1990). Czaczyk *et al.* (2000) isolated four strains of *Bacillus* from cow dung which has possessed strong inhibition properties of *R. solani*, *Bipolaris sorokinaria*, *S. sclerotiorum*, *Trichothecium roseum*, *F. solani* and *F. oxysporum*. Chung, *et al.* (2000) isolated *Paenibacillus koreensis* from compost that have antifungal activity against *Fusarium oxysporum*, *Colletotrichum lagenarium*, *Sclerotinia sclerotiorum*, *Botrytis cinerea* and *Rhizoctonia solani*. Muhammad and Amusa (2003) were found major microbes *Aspergillus niger*, *Trichoderma harzianum*, *Bacillus cereus* and *Bacillus subtilis* in

cow dung compost. The microbes *Bacillus subtilis* and *B. cereus* were sprayed on seedling blight inducing pathogens such as *Sclerotium rolfsii*, *F. oxysporum*, *Pythium aphanidermatum*, *H. Maydis* and *R. solani*. Charest, et al. (2005) observed the presence of two bacteria *Pseudomonas aeruginosa* and *Rhizobium radiobacter* in cow dung manure. Raja and Kurucheve (1999) studied the fungi toxicity of animal dung and urine against *Fusarium oxysporum f. sp. lycopersici*, the causal agent of tomato wilt. Soils amended with composts provided 20-60 per cent reduction in *Pythium ultimum*, *Rhizoctonia solani*, *Phytophthora*, *Fusarium oxysporum*, *Verticillium dahlia* and *Sclerotinia* (Noble and Coventry, 2005).

Cow urine has got agricultural importance in terms of control of insects and fungi (Abubakar et al., 2004). The laboratory analysis of cow urine shows that it contains nitrogen, sulphur, phosphorus, sodium, manganese, iron, chlorine, magnesium and other minerals, which has attributed as growth inducer in plants (Singla and Kaur, 2016). These components enhance the fungicidal and insecticidal activities of Panchagavya. It is a mixed culture of naturally occurring beneficial microbes mostly lactic acid bacteria (*Lacto bacillus*), yeast (*Saccharomyces*), Actinomyces (*Streptomyces*) photosynthetic bacteria (*Rhodopseudomonas*) and contain fungi (*Aspergillus*), which promotes the disease free growth and yield in different crops and provide high B:C ratio due to presents of plants growth hormones like IAA and GA (Pagar et al., 2015). It is used as a foliar spray, soil application along with irrigation, as well as seed treatment (Natarajan, 2002). Botanicals are unique because they can be produced easily by the farmers and small industries (Roy et al., 2005).

2.2. EFFECT ON SOIL FERTILITY AND PRODUCTIVITY

- 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.
- It encourages growth and reproduction of beneficial soil microorganisms
- Increases nutrient uptake in plants and enhances plant growth (Beaulah 2001).

The beneficial microorganisms from panchagavya and their establishment in the soil improved, 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. Panchagavya enhances the growth and vigour of crops, inducing resistance to pests and diseases and improving the keep inequality of vegetables and fruits (Natarajan, 2002). Panchagavya spray was also reported as effective on all the crops than their commended nutrients and growth regulators (RFS) in terms of higher growth and productivity (Somasundaram and Amanullah, 2007).

2.3. BENEFITS OF PANCHAGAVYA

- The beneficial microorganisms of panchagavya and their establishment in the soil have improved the sustainability of agriculture as the microorganisms present in the rhizospheric environment i.e. around the roots, which influence the plant growth and crop yield was might due to presence of growth accelerating enzyme in panchagavya which favoured rapid cell division and multiplication (Sanjutha *et al.*, 2008; Vasumathi 2001).
- A work carried out on modern approaches has showed that cow urine has different activities like antioxidant, anti-diabetic, wound healing property, immune modulator, also act as bio enhancer to increase the efficacy of antibiotics, nutrients and anticancer drugs like taxol (Singla and Kaur 2016) .
- It helps in increasing the size of the leaves thus by having a denser canopy and final yield.
- With the application of panchagavya, the plants show an increase in growth of side shoots. It will help in increasing the fruits.
- The magic fertilizer will help in increasing the root growth profusely. Also, the health of roots is very important for plants.
- Panchagavya use will increase the shelf-life of fruits and vegetables.
- The quality of yield increases considerably.
- Panchagavya in agriculture helps in decreasing the use of chemical fertilizers.
- Panchagavya for plants is perfect for Organic Farming.
- It can be also used as a feed for cattle animals like Cow, Buffaloes, Pigs, Fish and Poultry etc.

- Since it has many antibodies, you can use it for many diseases in animals and humans.
- It is one of the easiest processes to prepare at home.
- Anyone can prepare this magic fertilizer at their home.
- No need for technical knowledge to prepare and use it.
- Cost of Preparation is very less.

The above literature clearly demonstrated that the panchagavya is used as fertilizers and pesticides in agricultural operations. Panchagavya is an organic product recommended for the improvement in organic agriculture. Cow dung is being used for different purposes from the ancient time and has a significant role in crop growth because of the content in humid compounds and fertilizing bio elements available. 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. The beneficial microorganisms from Panchagavya and their establishment in the soil improved the sustainability of agriculture as the microorganisms presenting.

Hence the present study mainly focused on feasible preparation of panchagavya with other additional food products and it is implemented in two types of plant that is fenugreek (*Trigonella foenum-graecum*) – which is rich with medicinal property and considered to be most important spices in Indian food. Secondly, panchagavya imported in tomato plant (*Solanum lycopersicum*) – which is well known for its taste and most of the food variety are can't be thought without it. This study keenly discussed the rate of growth, production, and disease control on plant by use of panchagavya.

3. AIMS AND OBJECTIVES

3.1. AIM

- The aim of present study is the successful production of Panchagavya to increase the stability, diseases resistant and increase the yield of plant.

3.2. OBJECTIVES

- ❖ To produce panchagavya with cow by-products and some special ingredients.
- ❖ To increases the growth of plant and fertility of soil.
- ❖ To grow plant as a diseases resistant against pest and microbes.
- ❖ To increase the yield of plant.
- ❖ To increase the macro and micro essential nutrient for plant growth naturally without presence of chemical fertilizers and pesticides.

4. MATERIALS AND METHODS

4.1. MATERIALS REQUIRED

A clean and sterile plastic tub, a long sterile wooden stirrer, fresh cow dung (200g), cow urine (200ml), cow milk (200ml), cow curd (200ml), cow milk (200ml), cow ghee (100g), tender coconut water (1), ripened banana (6), jaggery (100mg), two pot with fertile soil, seeds of fenugreek and tomato plant, and a spray bottle.

4.2. METHOD OF PREPARATION

Panchagavya was prepared by mixing cow dung (200 gm), cow urine (200 ml), cow milk (200 ml), cow curd (200 ml) and cow ghee (100 ml), both the preparation was kept in a separate plastic container. The mouth of the containers were covered with a thin cloth and kept in the shade. The preparations were then left for incubation (to ferment). During this incubation period the liquid bio-manures were stirred twice a day (morning and evening), 10 times of clock wise and anti-clockwise direction to release the gas and to oxygenate the solution. After nine days of preparation, both the manures were ready for field application.

PANCHAGAVYA INGREDIENTS	
Fresh cow dung	-200g
Cow urine	-200ml
Cow milk	-200ml
Cow curd	-200ml
Cow ghee	-100g
Tender coconut water	-
Ripened banana	- 6
numbers	
Jaggery	-100g



Figure 1. Ingredient list for preparation of Panchagavya

4.3. STEP INVOLVES IN THE PREPARATION FOR PANCHAGAVYA

The measured amount of cow dung and cow ghee should be mixed thoroughly early in the morning and also in evening into a selectable container. This should be kept for Three days for fermentation.

On the fourth day added the remaining ingredients to the container. The ingredients in the container should be 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. The container should be kept open under shade. The panchagavya stock solution will be ready after 15 days. It should be kept under shade and covered with wire mesh or mosquito net to prevent house flies laying eggs and to prevent the contamination. To stir the mixture after 15 days well using wooden stick at least twice in a day, can also see glass bubbles released from the mixture. The mixture has a somewhat pleasant smell like (toddy).

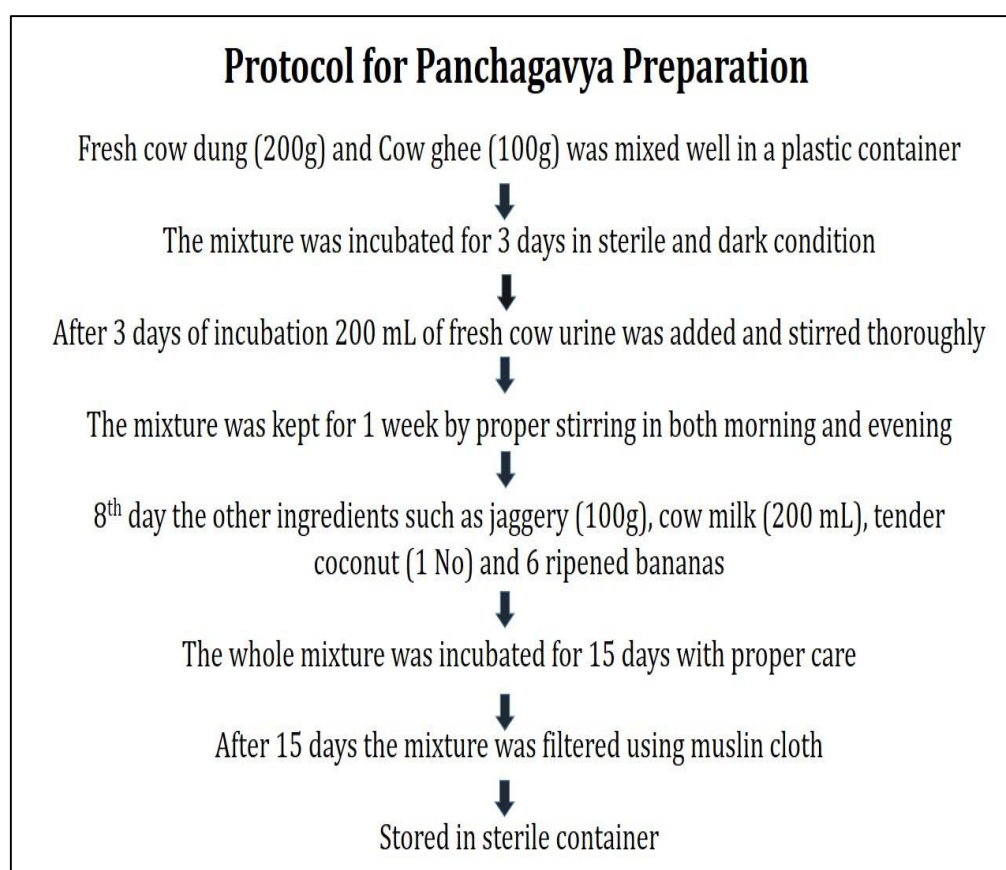


Figure 2. The steps involved in preparation of panchagavya

The fermentation process may take about fifteen Panchagavya is ready. It has a pleasant smell and is in a semi liquid state. If it gets very thick you can dilute it using a little amount of cow's urine. If panchavya used in agricultural field or organic gardening, 3 percentage mixture of panchagavya is very effective in agriculture so in experimental field 2 percentage of panchagavya was used. Foliar application was in tomato plant and Fenugreek plant continuously for 5 days. The growth and yield of the plants were proved. 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.

Table 1 - The parameter of the ingredient used for panchagavya

PARAMETERS	ODOUR	TOUCH	TASTE	COLOUR
Cow dung	Un pleasant	Sticky	-	Brown
Ghee	Pleasant	Oily	Slightly sweet	Yellow
Urine	Un pleasant	Watery	Bitter	Straw yellow
Curd	Pleasant	Faint oily	Sour	White
Milk	Pleasant	Viscous than water	Sweet and faint alkaline	Yellowish white
Jaggery	Slightly pungent	Thicker than honey	Buttery caramel	Dark brown
Ripened Banana	Fruity smell	Soft	Sweetness	Yellow with brown spots
Tender coconut	Sweet smell	Watery	Creamy and fruity character	Green coloured and water

5. RESULT & DISCUSSION

When panchagavya was prepared at initially mixture of cow dung and cow ghee it produce a stringest odour which is unbearable. After addition of urine the smell even became higher. After adding jaggery, milk, tender coconut and ripened bananas, the smell of panchagavya bearable. Same way at initial stage the colour was as like as the cow dung after one week of mixing the ingredients, the changes of colour observed which is darker brown.

Panchagavya: at first day of preparation



Panchagavya: Final product



Figure 3. Preparation of Panchagavya

With the change of colour and smell, came to an understanding that prepared panchagavya was sterile without any contamination and ready to use in field. By using panchagavya on Tomato and fenugreek plant, it helps to bring rapid changes in plant and also improves growth, yield and it increases immunity power in plants thereby confers resistance against pest and diseases apart from using chemical fertilizers, pesticides etc., so it is necessary to use natural products like panchagavya to produce chemical residue free food crops and hence panchagavya play a major role in agricultural farming and organic gardening.



Figure 4. Test plant 1 for field experiment – fenugreek plantlets in control pot without foliar spray of panchagavya (5days)



Figure 5. Test plant 1 for field experiment – fenugreek plantlets in foliar sprayed panchagavya pot (5days)



Figure 6. Test plant 1 for field experiment fenugreek Plant in control pot without foliar spray of panchagavya (after 10 days)

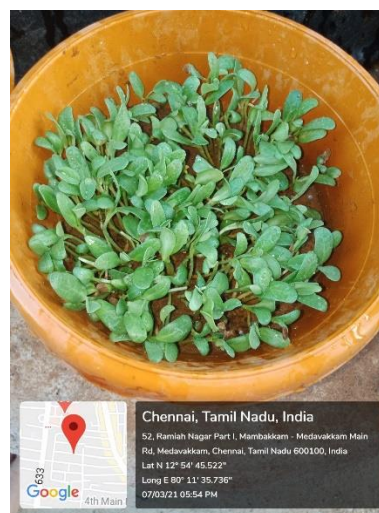


Figure 7. Test plant 1 for field experiment fenugreek Plant in control pot in foliar spray of panchagavya (after 10 days)



Figure 8. Test plant 1 for field experiment fenugreek
Plant in control pot without foliar spray of panchagavya (after 15 days)

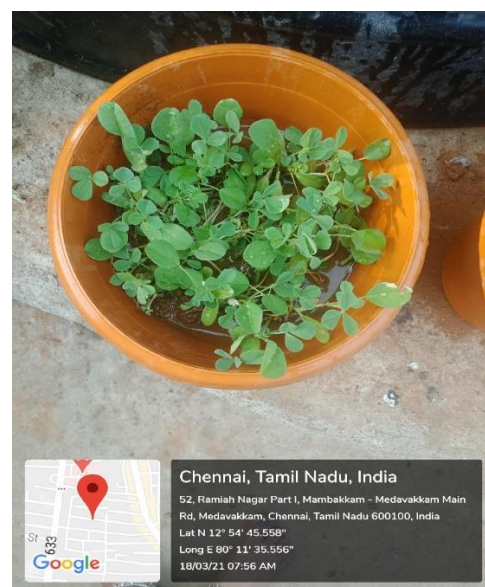


Figure 9. Test plant 1 for field experiment fenugreek
Plant in control pot in foliar spray of panchagavya (after 15 days)

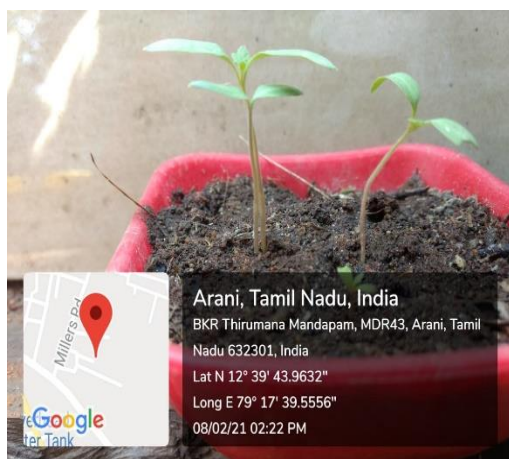


Figure 10. Test plant 2 for field experiment – tomato plantlets in control pot without foliar spray of panchagavya (5 days)



Figure 11. Test plant 2 for field experiment –tomato plantlets in foliar sprayed panchagavya pot (5 days)



Figure 12. Tomato plant after 8 days without using panchagavya Solution.



Figure 13. Tomato plant after 8 days with using of panchagavya Solution.



Figure 14. Tomato plant after 18 days without using panchagavya

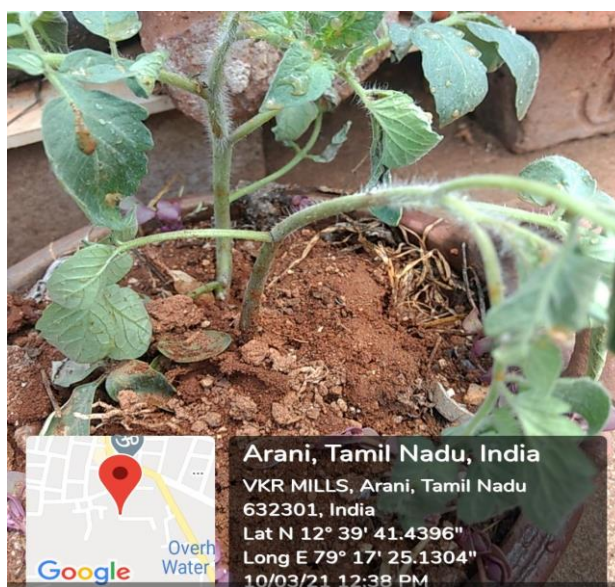


Figure 15. Tomato plant after 18 days with using panchagavya solution

From this by using panchagavya on plant, it helps to bring rapid changes in plant and also improves the growth, yield and it increases immunity in plants there by confers resistance against pest and disease apart from using chemical fertilizers. Normal plant without using panchagavya it also grown but it taken longer time to grow and not healthy as like as Panchagavya treated plant.

Physiological growth foliar application of 3 percent Panchagavya recorded significantly the highest values of these growth parameters at all the observed stage of plant growth when compared with control. The Panchagavya treatment recorded the maximum plant height, number of branches per plant, LAI, dry matter production when compared with control at all the observed stage of plant growth (Table. 2 & 3).

Table 2: Test plant 1 & 2 without using panchagavya solution

NAME OF PLANT	GROWTH DAYS	NUMBER OF LEAVES	HEIGHT
Fenugreek	5 th day	9	Dwarf
Fenugreek	8 th day	20	Tall
Fenugreek	15 th day	24	Same height
Tomato	5 th day	7	Dwarf
Tomato	8 th day	14	Same
Tomato	18 th day	22	Tall

5.1. Physiological Growth

Foliar application of 3 percent Panchagavya recorded significantly the highest values of these growth parameters at all the observed stage of plant growth when compared with control.

The Panchagavya treatment recorded the maximum plant height, number of branches per plant, LAI, dry matter production when compared with control at all the observed stage of plant growth (Table. 2 & 3). Plant height and growth characters of fenugreek and tomato plants were improved due to foliar spray of Panchagavya. The LAI is also related to the supply and availability of N to plants which is supplied by the source of foliar applied Panchagavya. It might have contained microbial metabolites in appreciable amount that help in maintaining the opening of stomata for longer period both in optimum and adverse conditions during the crop growth which led to increased LAI providing stronger source for sink (Xu et al., 2000).

Table 3: Plant used panchagavya solution showed the result of growth

Name of plants	Growth days	Number of leaves	height
Fenugreek	5th day	22	Dwarf but increases
Fenugreek	8th day	More than 30	Increase in size
Fenugreek	15 th day	More than 50	Tall
Tomato	5th day	16	Dwarf but increases
Tomato	8th day	26	Increase in size
Tomato	18th day	More than 30	Increase in height and breadth

Improved nutrition may enable greater leaf area production that results in greater interception of light thereby increasing dry matter production (Kumawat, 2009). The significant improvement in the accumulation of dry matter in plant and its distribution in different plant parts in the study was attributed to increased supply of plant nutrients, specific weight of leaf, chlorophyll synthesis, nitrogen metabolism, root nodules and phytohormones with the application of Panchagavya.

6. SUMMARY

In the present project, by using organic gardening it is the type of farming which avoids the use of synthetic fertilizers, pesticides, growth regulators and livestock feed additives. When inorganic systems change in organic gardening then reduce yield, growth and immunity. But panchagavya have the capacity to restore the efficacy of yield level. It can be prepared easily at regular intervals in a short period of time at low cost without special technique. Panchagavya is an organic bio fertilizer can acts as a growth promoter and immunity booster. 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.

For making a small amount of panchagavya. Fresh cow dung (200g) is taken from cow farm and cow ghee (100g). Both are mixed in a plastic container thoroughly and kept it for 3 days. After 3 days, on fourth day the remaining ingredients like Cow urine, Curd, milk, jaggery, ripened bananas and tender coconut. Mixed thoroughly and kept in the shade and covered tightly with a lid protecting from houseflies which lays eggs and the formation of maggots in the solution because if kept at sunlight which will easily get contaminated.

The mixture was stirred daily routine (morning and evening). The whole mixture was incubated for 15 days. When the gas formation stopped, the panchagavya stock solution was ready after 15 days. At initial stage the colour was as like as cow dung with stringent odour after that the remaining ingredients was added and after one week the changes of colour observed which is darker brown .The smell of panchagavya was bearable. The prepared panchagavya was used in organic gardening to increase naturally occurring food like vegetables, fruits and flowers .To increase plant growth yield and immunity.

7. CONCLUSION

From this study, it is inferred that application of 3 percent Panchagavya foliar spray increase physiological growth in both fenugreek and tomato plant. Therefore, it can be recommended as an alternate source of nutrients for organic cultivation of fenugreek and tomato plant. The growth of plants were high and healthier. Hence, this present study says using panchagavya instead of chemical fertilizer, which is an organic remedy for plant growth. This can be highly implemented in large scale production of plant in fields to produce healthier, diseases resistance group which is free from chemicals and contamination.

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