

PANCHAGAVYA IS A BIO-FERTILIZER IN ORGANIC FARMING

(Project – Report)

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Science degree in Microbiology

By

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of R.RESHMA(38300015) who carried out the project entitled “ PANCHAGAVYA IS A BIO-FERTILIZER IN ORGANIC FARMING” under our supervision from December 2020 to March 2021.

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DECLARATION

I R.RESHMA(38300015) hereby declare that the Project Report entitled “PANCHAGAVYA IS A BIO-FERTILIZER IN ORGANIC FARMING” done by me under the guidance of Dr.Prabavathy at Sathyabama institute of Science and Technology, Chennai is submitted in partial fulfillment of the requirements for the award of Bachelor of Science degree in Microbiology.

DATE: 08/04/2021

A handwritten signature in blue ink, appearing to read 'R. Reshma', with a stylized flourish at the end.

PLACE:

SIGNATURE OF THE CANDIDATE

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ABSTRACT

The present study on growth of plants such as, fenugreek, tomato. I have tested two different types one is panchagavya added plants another one panchagavya not added plants. Panchagavya was prepared and it was initially used to spray the germination plants. Later, the germination percentage was observed. Panchagavya added plants have maximum level growth in leaves, shoot length, root length. But panchagavya not added plant have minimum level of growth in plant. Then two different plant growth will be calculated.

Keywords: Germination, Number of leaves, Root length, Shoot length.

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LIST OF ABBREVIATIONS AND SYMBOLS:

gms	-	Grams
hr	-	hours
%	-	Percentage
L	-	liters
no	-	number
kg	-	kilograms
cm	-	centimeters
GCMS	-	Gas chromatography – mass spectrometry
PH	-	potential of Hydrogen

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CHAPTER 1: INTRODUCTION

India is an agriculture country. Most of the people depend on agriculture because of its economicals and ecological importance. High yield is the aim of each farmer. Some people believe that chemicals alone *could* give high yield. Organic farming to gaining more value of food across the world. Its awareness of health and environmental issues in agriculture is lose production of organic food, which is attract the source of rural income generation (Bhattacharya and Chakraborty, 2005). Organic farming was strated with establishment of the international organic agriculture movement (IFOAM) on 5 1972 in France. Out of the total marketed food, the production of organic agriculture occuppies 3-5% in Germany and Austria,1-2% in USA. In India, national standard committee had drafted concepts and principles of basic standards of organic agriculture in 1996. Uttraranchal seed certification and organic production agency (USCOPA), Dehradun is the nodel agency at the state level for certification of organic farm products (Bhatt et al., 2004). Heavy use of chemicals in agriculture it lose the environmental ecological and soil health, water resources and quality of food.

Panchagavya contains growth regulatory and its help in the development of integrate the pest management such as IAA, GA,Cytokinin, essential plant and organic farming nutrients and effective microorganisms (Vallimayin 2020).

Panchagavya is an organic formulation made from cow goods. The usage of fermented organic formulations with supportive beneficial microorganisms as foliar nourishment has been come into the picture of modern agriculture for giving rise to good quality non residue protected food (Galindo et al., 2007). Consequences of panchagavya application are superior growth, yield and quality of crops. This liquid organic solution is prepared from cow dung, urine, milk, curd, ghee, legume flour and jaggary. It provides macro nutrients, essential micro nutrients, many vitamins, required aminoacids, growth promoting substances and beneficial microorganisms for plants well growth. Organic farmers of Tamil Nadu are preparing this foliar nutriment as a home-grown product and it is used widely for field and vegetable crops. Keeping these in view, field investigations were carried out to study the effect of foliar spray of panchagavya on the growth and yield and crops.

Panchagavya is an organic formulation, which in Sanskrit it means the blend of five products from cow milk, ghee, curd, dung and urine (called as “Gavya” and collectively named as panchagavya). Panchagavya is reference in the scripts of vedas, (devine scripts of India wisdom) and Vrikshayurveda (Natarajan,2002). In India, panchagavya is gaining organic in recent years especially Tamil Nadu and Kerala. Panchagavya is special preparation made from five of cow along with certain other ingredients, has play the major role of promoting growth and immunity in plant system. Panchagavya plays a major role in organic farming. Ingredients used for preparation of panchagavya.

Organic agriculture is a comprehensive production management system which promotes and enhances health of agro – ecosystems, including biodiversity, soil biology activity and biological cycles. It gives importance to the use of management practise particularly these of off-farm inputs, taking into account that regional condition requires locally adapted systems.

Thus the current research work wa aimed at studying the biochemical composition of panchagavya and Sanjibani and their effects on the yield and yield contributing characters of fenugreek and tomato.

Panchagavya is a concoction prepared by mixing five products of cow. The Sanskrit word Panchagavya five products," and it has been used in throughout history. It is also called on the products obtained from in Ayurvedic medicine and of religious significance, for Panchagavya is used as agricultural operation. It can act as growth promoter and immunity booster. Panchagavya treated plants showed lesser viral intensity than control. The three direct constituents from cow used in panchagavya are cow two derived products are curd proper ratio and then allowed to ferment. The mixture is made by using jaggery as a fermenter. The mixture is made by using jaggery as a fermenter. Puvvan bananas is a growth promoter. Suitable mixing and use of it gives a miraculous effects. Panchagavya is used in different means such as foliar spray, soil application along with irrigation water, seed or seedling treatment etc. Cow dung acts as medium for the growth of beneficial microbes. Cow's urine provides nitrogen which is essential for the plant growth. Milk provides protein, fat, carbohydrate, amino acid and calcium. Curd provides lactobacillus which act as a catalyst in the digestion of organic wastes. Ghee provides vitamin A and B, calcium and fat (Saritha and Vijayakumari, 2013).

Panchagavya, mentioned in the ancient text 'Vrksha5airveda' is now used as an agent in organic farming. In Sanskrit, Panchagavya means the combination of five products namely milk, curd, cow dung, urine and ghee which are obtained from cow individually called "Gavya" and collectively known as Panchagavya. Every product has distinct qualities and activity and is used in human health, agriculture and other fields (Go-vigyan.com). When they are suitably mixed and used they have a positive influence on living organisms.

The products from cow have the ability to bring the flow of cosmic energy. Cosmic energy, when made to pass through a living system, removes the imbalances in terms of physical, chemical, biological and physiological aspects and harmonizes the basic elements, which influence the growth process (Natarajan, 2000).

Stirring of Panchagavya twice a day facilitates the release of gases due to fermentation. The depression formed during the clockwise and anticlockwise stirring of Panchagavya stock solution may facilitate cosmic ray link (Sundararaman, 2001).

Rural Community Action Centre, Kodumudi, Tamil Nadu, experimented with Panchagavya by enriching it with fifteen more organic materials and finally recommended the addition of tender coconut water, sugarcane juice and banana fruits to increase the potency (Natarajan, 2000).

1.1 Application of panchagavya:

Scientists are re-discovering the value of the unique combination of five products of cow, as safe and effective pesticides and bio-catalyst of plant growth. Panchagavya has got reverence in Hindu literature also. It has roots in the scripts of Vedas (Divine scripts of Indians wisdom) and Vrکشayurveda.

The texts on vrکشayurveda systematizes the disorders in plants into two types viz., exogenous and endogenous. Endogenous disorders in plants are caused by three doshas, namely vaatha, pitta and kapha. To treat vaathaja problems in summer, ghee is mixed with irrigation water, Pittaja problems in summer and autumn, ghee, milk and butter are used and for kapaja problems in winter and spring panchamula's (roots of five herbal plants) are used. Vrکشayurveda defined certain plant growth stimulants. Among them Panchagavya is an important one that helps to enhance the biological efficiency of crop plants and increase the quality of fruits and vegetables (Anonymous, 2001).

Recent investigations on Panchagavya showed the significant physiological and agricultural values. It is a living elixir of many microorganisms including bacteria, fungi, and actinomycetes, which enhance proteins, carbohydrates, fats, amino acids, vitamins, enzymes and known and unknown growth promoting factors in plants. Panchagavya increases the immunity of animals, helps to prevent illness and cure the diseases. However much of work has not been carried out with on growth and biocontrol aspects in plants.

CHAPTER 2: REVIEW OF LITERATURE

Tharmaraj et al., 2011, The microorganisms present in the rhizosphere environment into the roots influence in the plant growth and crop yield. The beneficial microorganisms from panchagavya and their establishment the soil improved and sustained of agriculture.

Saritha & Vijayakumari 2013, In the present study, it has been observed that 8% concentration of panchagavya solution. It's a drastic change in the growth of plants when compared to control plants growth and other concentrations. This view is supported by studies.

Srimathi et al., 2013, An important of panchagavya that was observed during the present study that was plants treated with panchagavya solution showed an increase the leaves size and the concentration. The leave some what thick and hard in the nature. Same results have been observed in *jatropha curcas* and *pongamia*.

S.S.Pinjari & T.S.Bhondave et al.,2010,The panchagavya is spraying on different crops has been documented. In this article, efforts has been made it review literature available on application of panchagavya on different crop yield.

*Md.Ramjan*Vikash kumar,Naorem Bidyalemia et al., (April 2019)*, In those days farming adopted and aimed at maintaining the livelihood of farmers on a sustainable basis along with livestock with minimum damage to environment. In past decades, agriculture development focused on short-term productivity based on external inputs resulting in neglected and improper use of local resources. This is resulted in damage to the environmental resources and indigenous knowledge and hence, the agriculture can hardly be perceived as sustainable.

Shakuntala et al., 2012, Farmers in south India practice panchagavya for sustainable agriculture. Use of chemical fertilizers and pesticides in agriculture fields leads to environmental degradation and an alternative to chemicals. Panchagavya also improve crop established and health.

Pramond kumar, Naushad khan et al., 2018, 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 increase immunity power in plants thereby confers resistance against pest and disease and also provide various metabolites by produce microorganism such as organic acids hydrogen peroxide and antibiotics which are effective against various pathogenic microorganisms.

Rajiesh et al. (2013) (49) opined that under different concentration (control 1,3,5,7.5 and 10%) of panchagavya and all the parameters were increased in 3% concentration. Since they increase in growth in yield at low concentration of panchagavya, it is recommended by panchagavya can be used for spray after diluted properly. Panchagavya found to be best in better utilisation of leaf nitrogen and efficient photosynthetic activity improving the yield (*Sarkar et al., 2014*).

M.P.Sugumaran,S.Akila et al.,Dec2018, The study was conducted to find the shelf life of panchagavya using groundnut oil cake and sesame oil instead of ghee as it is costly. Samples were collected one months after adding the ingredients and six months after the addition of ingredients. Extracts was prepared and were analysed in GCMS for various biochemical properties. Derivates of phenol, alcohol, esters and fatty acids were present in all the formulations of panchagavya. The presence of vitamin E and gamma tocopherol in panchagavya produced with groundnut oil cake was responsible for the hindering of the rancidity of the organic products. But, fatty acids present in panchagavya prepared with sesame oil was responsible for rancidity thereby decreasing the shelf life of panchagavya.

S.K.Naik, D.Barman et al.,Nov 2013, The results confirmed that, panchgavya either in foliar or media application on Cymbidium hybrid 'Sleeping Nymph' resulted in better growth and spike production. Among the foliar application, the treatment T3 (1:30 foliar) recorded highest growth parameters and resulted in 31.6, 41.3 and 9 % increase in pseudobulb length, pseudobulb girth and number of pseudobulbs per clump, respectively over control. Further, flowering parameters like number of spikes per plant, number of floret per spike, spike length and rachis length registered 100, 41.3, 13 and 11.5 % increase over control in T3 treatment, respectively. Further more, the media application of panchgavya, T6 (1:30 media) was statistically at par with foliar

application, T3 treatment on growth habit of Cymbidium hybrid. Among all the treatments, the highest number of spikes per plant, number of floret per spike, spike length and rachis length were 3, 11.65, 48.35 cm and 24 cm, respectively in the media application of panchagavya, T6 and were significantly better than other treatments of media and foliar application.

K.V.Raghavendra, R.Gowthami et al., Apr-Jun 2014, The increasing concern for environmental safety and global demand for pesticide residue free food has evoked keen interest in crop production using ecofriendly 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.

M.N.Ali, S.Ghatak et al., Nov 2011, In this study, effect of different combinations of Panchagavya by varying the tender coconut water quantity on plant growth is studied and compared with current control combination used by farmers. From the result obtained, it is concluded that an addition of tender coconut as reflected in combination C-4 significantly increases the plant yield. Hence it is recommended to use tender coconut water while preparation of panchagavya solution and while preparation of organic fertilizer. The present research work was conducted in RBD. The experiment was designed with three treatments and three replications, with the view to studying the effect of Panchagavya and Sarifibani, liquid organic manure on the yield of green gram, *Vigna radiata*, chilli, *Capsicum frutescens* (Chili) and mustard, *Brassica campestris*. Their efficacy were compared by studying the yield contributing characters like plant height, primary branch, secondary branch plant¹, number of seed fruit¹, fruit length, weight of JOO seed, yield plant f¹, yield m² and experimental observation recorded that the Sarifibani and Panchagavya treated crops were higher than the control. A liquid manure specifically Sarifibani used in this study was pre-analysed to study the variation in microbial population between two Sarifibani sample prepared by using raw materials (Cow dung and Cow urine) obtained from two different source of cow breed (i.e., Native breed and Jersey breed) and the best source of breed was selected for the further research work. Meanwhile the effect of organic farming practice in soil/- health was also

studied by analysing the basic parameters of soil in the field where the research was conducted. The result shows increased microbial population, oxidisable organic carbon, nitrogen, phosphate, potash. The pH and E.C were found to be close to neutral.

Lekhika Borgohain, Hema Borgohain et al., Apr-Jul 2020, The increasing concern for environmental safety and global demand for chemical residue free food has evoked keen interest in crop producers to produce eco-friendly products. 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 it can play a major role in organic farming.

CHAPTER 3: AIM AND SUMMARY

3.1 AIM:

Panchagavya is mixture of eight products namely cow dung,urine,milk,ghee etc. Its promotes plant growth, yield and immunity and its also an organic pesticide.Its mainly used in organic farming.

3.2 OBJECTIVES:

1. To assess the efficiently of panchagavya in fenugreek seeds, tomato.
2. To produce high quality yield in medium quantity by using panchagavya.
3. To maintain the ecologies balance between crop production and live stock .
4. To maintain the genetic biodiversity of the crop and environment.
5. To encourage the biological cycles its farming system by using microbes .
6. To promote the sustainable use of natural resources.
7. To reduce pollution.
8. Use the wastes as useful products.

CHAPER 4: INGREDIENTS AND METHODS

4.1 INGREDIENTS

- 1.Cow dung – 500 grams
- 2.Ghee – 100 grams
- 3.Cow urine – $\frac{1}{2}$ liters
- 4.cow milk – $\frac{1}{4}$ liters
5. curd – $\frac{1}{4}$ liters
- 6.Jaggery – 250 grams
- 7.Banana – 2
- 8.Tender coconut – $\frac{1}{2}$ liters



Fig4.1.,[COWDUNG, GHEE, BANANA, CURD, MILK, TENDER COCONUT, JAGGERY]

4.2METHODOLOGY

STEP 1: The measured amount of cowdung (1/2kg) and ghee (100g) should be blended thoroughly early in the morning and also in evening into the selected container. This should kept for about three to four days for fermentation to happen.

STEP 2: On 4th day added rest ingredients its cow urine (1/2liters), Milk (1/4 liters),Curd (1/4 liters), Jaggery(250 grams), Banana(3), and Tender coconut (1/4liters) the mix them completely. And, this solution must be stirred daily morning and evening. At least for 15 mins.The container must always be kept covered with cotton clothes.

STEP3: On 15th day panchagavya will complete. Then panchagavya will use to organic gardening. Panchagavya will diluted in 50% water before spraying onto plants.



Fig 4.2.1; FERMENTING PANCHAGAVYA



Fig4.2.2; AFTER FERMENTED PANCHAGAVYA

The seeds of fenugreek (*Trigonella foenum – graecum*), Tomato (*Solanum Lycopersicum*) seed in germination after 2 days panchagavya will spray the plant (spray panchagavya in morning). Then the growth of plant is high after 5 days germination growth is calculated.

CHAPTER 5: RESULT AND DISCUSSIONS

The experiment on the effect of panchagavya differentiated in panchagavya added plant and panchagavya not added plant. I have taken experimented in fenugreek and tomato plant farming.

Fig 5.1; FENUGREEK PLANTS AND TOMATO GERMINATION:

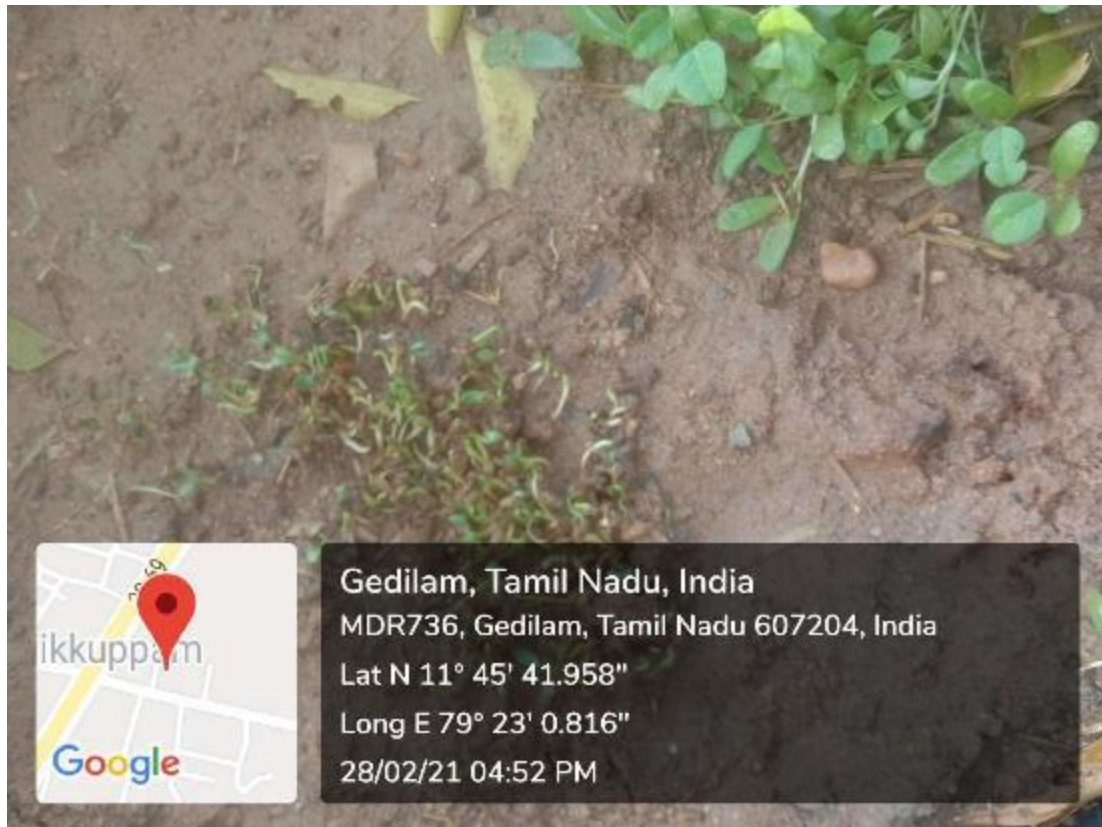


Fig 5.2.,PANCHAGAVYA ADDED FENUGREEK PLANT

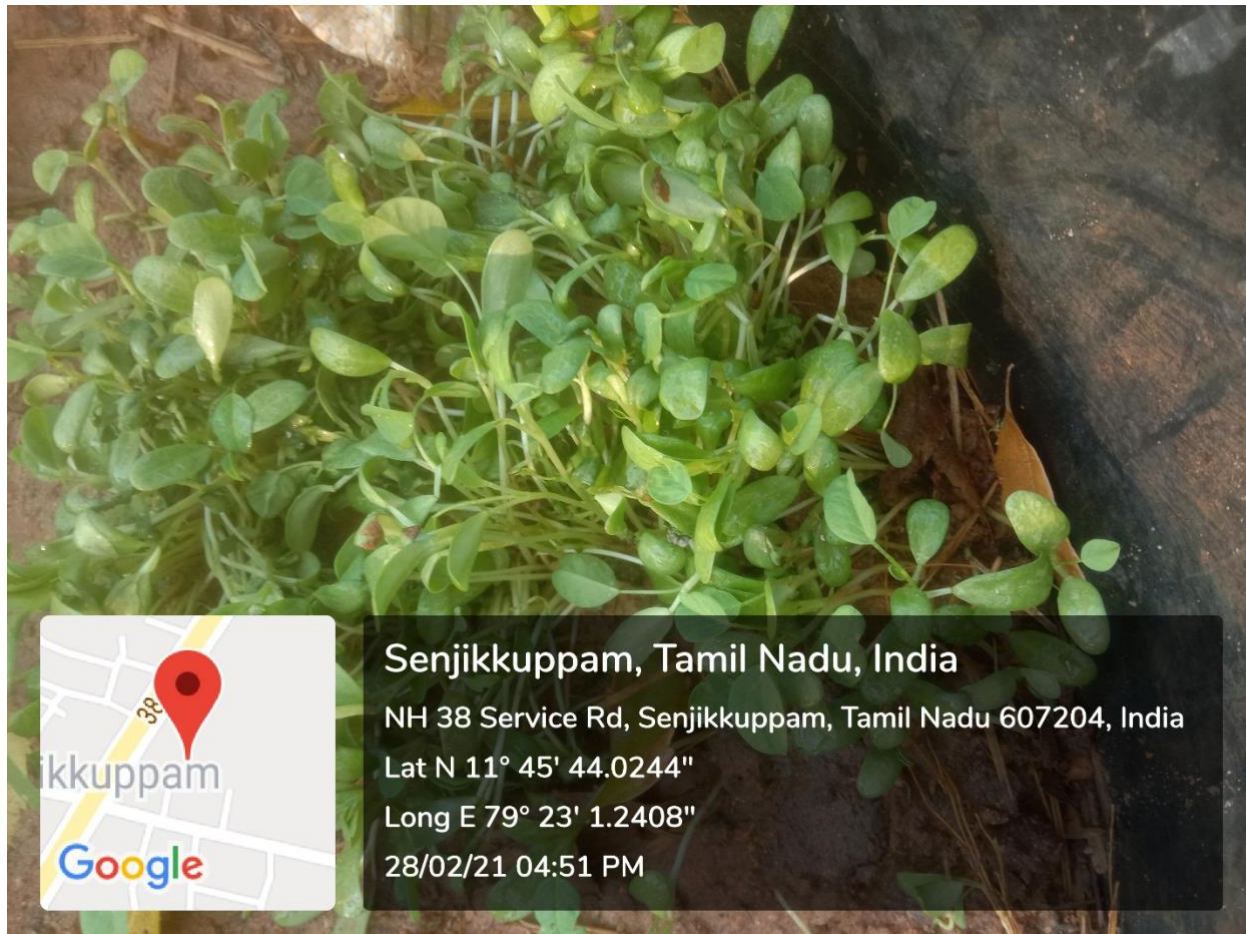


Fig 5.3; PANCHAGAVYA ADDED TOMATO PLANT



Fig 5.4., PANCHAGAVYA NOT ADDED FENUGREEK PLANT



Fig 5.5.,PANCHAGAVYA NOT ADDED TOMATO PLANT



The maximum numbers leaves were found to be more in all the two plants that were treated with panchagavya solution and that too in 15 days (Table 7). As the concentration of panchagavya increases, the number of leaf, shoot length and root length were found to be higher in plants treated with panchagavya added plant (table 7).

The minimum numbers leaves were found to be not added panchagavya plants. Not added Panchagavya plant have minimum number of leaves, shoot length and root length and that too in 15 days [Table 6]. And these plants are only growth in normal soil.so these plant are minimum growth [Table 6].

The average number of leaves, shoot length and root length were also calculated on the 15th day of the seedling growth. It was found to be higher in panchagavya added plant.

Fig5.6.,PANCHAGAVYA ADDED FENUGREEK PLANT MEASURE



Fig5.7., PANCHAGAVYA ADDED TOMATO PLANT GROWTH MEASURE



Fig 5.8., PANCHAGAVYA NOT ADDED PLANT GROWTH MEASURE

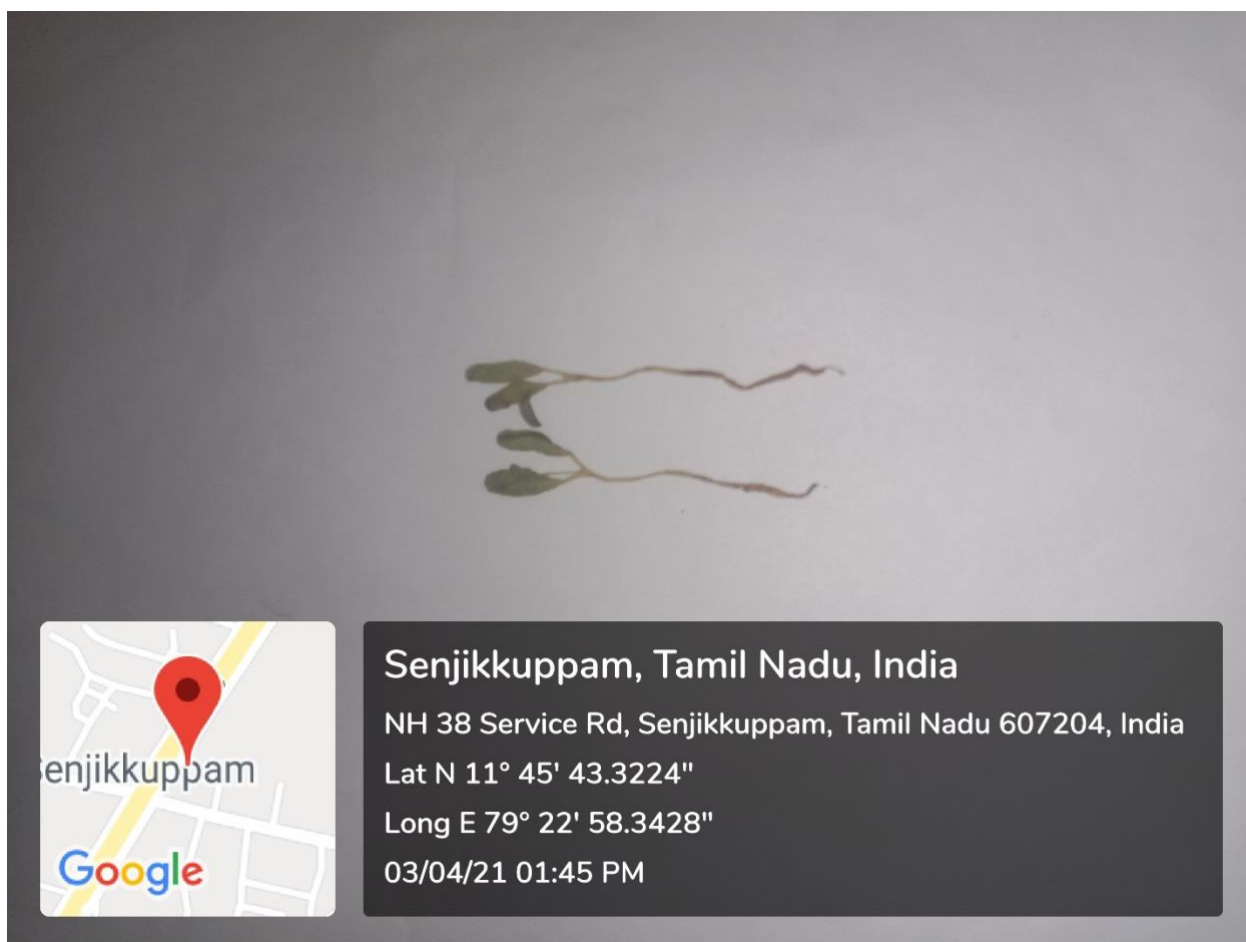


Fig5.9., PANCHAGAVYA NOT ADDED PLANT GROWTH MEASURE



TABLE5.10: EFFECTS OF PANCHAGAVYA NOT ADDED PLANT GROWTH AFTER 15DAYS

NAME OF PLANT	DAYS OF GROWTH	NUMBER OF LEAVES	SHOOT LENGTH	ROOT LENGTH
FENUGRREK PLANT	5 TH DAY	2	2.5cm	3cm
	8 TH DAY	2	3cm	4cm
	11 TH DAY	3	5cm	6cm
	15 TH DAY	4	8cm	9cm
TOMATO	5 TH DAY	3	3cm	1.5cm
	8 TH DAY	4	5cm	2cm
	11 TH DAY	5	10cm	3cm
	15 TH DAY	6	11cm	4cm

TABLE5.11: EFFECTS OF PANCHAGAVYA ADDED PLANT GROWTH AFTER 15DAYS

NAME OF PLANT	DAYS OF GROWTH	NUMBER OF LEAVES	SHOOT LENGTH	ROOT LENGTH
FENUGREEK PLANT	5 TH DAY	2	5cm	7cm
	8 TH DAY	4	8cm	16cm
	11 TH DAY	5	13cm	25cm
	15 TH DAY	8	20cm	30cm
TOMATO	5 TH DAY	3	9cm	3cm
	8 TH DAY	5	10cm	3.8cm
	11 TH DAY	6	12cm	4cm
	15 TH DAY	7	13cm	5cm

GERMINATION PERCENTAGE:

After 15 days, it was observed that panchagavya treated plants showed a maximum growth in terms of number of leaves, shoot length and root length of all the plants (Viz., Fenugreek, Tomato) taken for the study. Rapid improvement has been made in the field of panchagavya. The present work focused on the morphological variation of fenugreek, tomato plants by treating with various concentration of panchagavya. The panchagavya treated plants produced side shoot, which were sturdy and capable of carrying maximum fruits to maturity. Branching was comparatively high. The rooting was profuse and dense. Further, they remained fresh for a long time. The roots spread and grew into deeper layers were also observed. All such roots helped in maximum intake of nutrients and water. But panchagavya not added plants showed only minimum number of growth and minimum number of leaves, shoot length and root length of all the plants.

The results observed in the current study indicate that, in future panchagavya could be used by farmers since it has no side effects and also increases the fertility of soil.

CHAPTER 6: SUMMARY AND CONCLUSION:

One of the major problems of the environment is soil pollution, which is due to discharging of domestic, industrial waste and the application of synthetic chemical fertilizers, pesticides in the agricultural practices, which has not only begun to affect the soil health and crop production but has marked spoiling the whole environment as well.

Now-a-days agriculture practise the use of efficient and advanced techniques for crop production. They give better yield of crops but at higher costs and environmental hazards. Hence, inorganic farming methods were replaced and new organic strategies which have gained importance. They are practised to increase the crop productivity and to reduce the pollution level in the environment.

Microbes play a key role in improving the soil fertility and agricultural productivity. The cow is interlinked with various activities of human life. One of the efficient organic farming agents Panchagavya, a complex mixture of bovine products and byproducts.

The physico-chemical properties and microbial diversity of the soil. samples in dairy components and Panchagavya were studied for their prospective use on fenugreek and tomato cultivation.

Panchagavya is a blend of five products in cow namely milk, cowdung, urine and fermented products such as curd milk and ghee. When suitably mixed and used as organic manure, the mixture acted as growth catalyser and bio-pesticidal agent in the cereal fenugreek and tomato.

The soil quality and fertility as well as biological activity were found to significantly increase in the Panchagavya treated soil than in the raw soil. Among the four different days concentrations of Panchagavya treatments showed most significant increase in the physico-chemical and biological properties in soil.

Panchagavya organic products has the potential to play the role of promoting growth and providing immunity in plants systems. Panchagavya consists eight products viz., cow dung, urine, milk, curd, jaggery, ghee, banana, tender coconut . This mixed used crop yield it have miraculous effects. Its mainly used in organic farming thus increasing the organic fenugreek and tomato. This mixed increase the leaves, root height, shoot height in plants farming system. Panchagavya is the organic product will use the farming of agriculture land. Its increase the soil quantity and increase soil fertility. Panchagavya its form miraculous effects in crop farming. Panchagavya is best product for increase crop yield. It is easily available for farmer at cost. It also increase soil fertility and take care of environment.

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