

## Effects of panchagavya on growth and biocontrol of Tomato plant (*Lycopersicon Esculentum Linn*)

### Publication History

Received: 08 March 2015

Accepted: 02 April 2015

Published: 6 May 2015

### Citation

Serfoji P, Devi R, Siva T, Parameswari D. Effects of panchagavya on growth and biocontrol of Tomato plant (*Lycopersicon Esculentum Linn*). *Species*, 2015, 14(42), 11-20

**EFFECTS OF PANCHAGAVYA ON GROWTH AND BIOCONTROL OF  
TOMATO PLANT (*Lycopersicon Esculentum Linn*)**

**P. Serfoji, Devi.R, Siva.T and Parameswari. D**

P.G & Research Department of Zoology, Govt Arts College (Autonomous)

Kumbakonam-612 002.

**Corresponding Author Email:** pserfoji@yahoo.com

**ABSTRACT:**

The World population is increasing by millions every year. It will be necessary to increase the supply of food and other agricultural products to meet their needs. At the moment many of these methods being used to increase production are damaging to natural resources and the environment and farmers are supposed to invest heavily into inputs to improve yields and productivity. Biodynamic farming could help to reverse the degenerative momentum of modern agriculture. Now a day the cost of chemical fertilizers are going up very high. The farmers are getting used to organic manures to reduce the expenses towards fertilizers and to increase the yield of crops. The product from the cow milk, cow dung, cow urine, curd milk, and ghee is called as “Panchagavya”. The method preparing Panchagavya is not an easy task. Each product was taken with a proper measure to prepare Panchagavya. These five products are to be mixed to get Panchagavya. These matters collected or found in “Vishnu Dharma” a holy book for Hindus. In fact offerings to the cow are an essential part of the Hindu life called “PanchamahaYagna” cow is worshipped as a god. In the present study a preliminary attempt have been made to find out the effect of Panchagavya on the growth of plants especially on tomato to *Alternariasolani* and to isolate and identify the microorganisms from the dairy products. The Panchagavya applied plants is well growth and not the attack of pathogens including fungi, bacteria, etc. The present investigations were made on the dairy compounder derived from the cow and used as fertilizer and bio-insecticides on the plants. The present study has been undertaken to find out the effect of Panchagavya on the growth and bio control of tomato (*Lycopersiconesculentum L*). All these five products obtained from the cow and individually called Gavya and collectively as Panchagavyahave been used in this study. Every product has distinct qualities and used in health, agriculture and other fields.

## **KEYWORDS:**

Panchagavya, *Lycopersiconesculentum*, Biodynamic, Synergistic, Biofertilizers, Productivity.

## **INTRODUCTION:**

The World population is increasing by millions every year. It will be necessary to increase the supply of food and other agricultural products to meet their needs. At the moment many of these methods being used to increase production are damaging to natural resources and the environment and farmers are supposed to invest heavily into inputs to improve yields and productivity. India is an agricultural country (FAO 2004). We solely depend on agricultural to meet our food demand. We have lands, manpower, but our economic conditions are poor, our population is increasing in a geometrical proportion. Government has introduced schemes such as green revolution, white revolution and blue revolution to augment of our food supply. Any scientific, conventional or non-conventional effort to increase crop production is termed green revolution. Microorganisms play a major role in all these revolutionary programmes. Agriculture contributed to be the main stay of the India economy contributes about 25 per cent to the national gross domestic product (Vidyasagar et al., 1978). In the last few decades, there were changes in the agricultural practice from small to larger forming that emphasized in production efficiency using modern agricultural strategy.

The soil is not a dead inert material. Actually it is full of life. One gram of soil has about 200-500 billions of microorganisms (Michel, J.pelzer, 1998). Man depends upon the soil for his food. The soil depends upon the microorganisms for its fertility. The microorganisms play a major role to improve the fertility and productivity rate within the cultivable lands. The predominant group of microorganism such as bacteria, algae, protozoa etc. Commonly survive in the agricultural soil. The extensive use of chemical fertilizer and pesticide according to this strategy caused numbers of deaths and illnesses to the farmers. Several methods of alternative agricultural systems were introduced into Thailand in the last decades according to Setboonsarng and Gilman (1999). Their common objective is to provide socioeconomic and ecological benefits. Among these benefits, improvements of soil quality is one of the interesting aspects since it contributes to a broad attributes including food quality and safety, human and animal health, and also environmental quality (Parr, et al., 2002). These of non-chemical fertilizers and

pesticides is one of the common practices that have been introduced with alternative agricultural systems, which include the use of biofertilizer.

Among different techniques to produce biofertilizer, the concept of effective microorganisms, which is available in liquid form, has been introduced in 1991 by Dr. Teruo Higa of Japan (Setboonsarng and Gilman 1999). The major groups of microorganisms contained in the EM include filamentous fungi, Yeast, lactic acid and other soil bacteria (Higa and Parr 1994). Panchagavya induces the synergistic effect with biofertilizers and soil microorganisms, it leads to improved water and nutrient-holding capacity. The soil begins to take on a spongy quality and is less prone to compaction (Natarajan, 1999). Panchagavya is a nutrient prepared by organic farmers of Tamilnadu (One of the states in India) using indigenous materials and applied widely for agricultural and horticultural crops (Natarajan, 2002). In the present study a preliminary attempt has been made to find out the effect of Panchagavya on the growth of plants especially on tomato to *Alternaria solani*.

## **MATERIALS AND METHODS:**

For the present study, the tomato plant for doing experiment to study the effect of Panchagavya on the plant mentioned above. For Panchagavya preparation, Cow milk, curd, ghee, cow dung and cow urine were obtained from the Sundaraperumalkoil village near by kumbakonam, Thanjavur (DT) of Tamil Nadu.

Preparation of Panchagavya:

Details of Ingredients added for the preparation of Panchagavya

Fresh cow dung	-	500g
Fresh cow's urine	-	500g
Cow's milk	-	375g
Cow's curd	-	375g
Cow's ghee	-	50ml
Sugarcane juice	-	50ml

Ripe banana fruit	-	50ml
Distilled water	-	500ml

### **Methods of Preparation**

All the above items can be added to a wide mouthed mud, concrete tank or plastic cans in the order specified above. The Container should be kept open but in the shade.

The cow urine and cow dung mixed the wide mouthed mud pot 3 days and cow milk, cow curd mixed the another wide mouthed pot or plastic cans. The solution mixed 4<sup>th</sup> days and mixed twice a day. On the 7<sup>th</sup> day along with the cow ghee, jiggery with water or sugarcane juice and banana fruit was added. The contents were stirred twice a day for about 20 minutes, both in the morning and evening to facilitate aerobic microbial activity and allowed to ferment.

About fifteen days after the preparation, from the stock solution three per cent concentration was prepared and foliar sprayed with hand-operated sprayer using high pores size nozzle in 1 litre of water.

### **Collection of plant sample**

The healthy plant of tomato in an equals size, select for the experimental use. The fresh healthy leaves of plants *Lycopersiconesculentum* Linn, was collected from the Sundaraperumalkoil village near by kumbakonam, Thanjavur (DT) Tamil Nadu.

### **Pot culture**

There are two types of pot culture in tomato plants (A, B). The growth conditions were recorded from the Panchagavya treated plants grown thus biocontroland without Panchagavya by pot culture method and observed for the growth rate at 10,20,30 days of plants. The growth studies were observed in *Lycopersiconesculentum* Linn, plants at 10,20,30 days old plant include leaf length, shoot length, number of flowers, fruits calculated from the A, B pot cultured plants. After the control plant affect the leaf spot diseases. The leaf spot diseases, leaf cut and culture the laboratory condition.

## RESULTS

The present study reveals that microbes are abundant in the five products obtained from cow namely cowmilk, curd milk, cowurine, ghee, cowdung. This product was prepared in different concentration and used as liquid fertilizer and biocontrol agent for the commercially valuable vegetable crops, and tomato's. Chemically high pH and optimum level of moisture and temperature having soil slowly altered by adding of Panchagavya solution which forms better nutrient media for the microbial growth. The Panchagavya solution can be stored for 15 days for the purpose of sufficient fermentation. After completion of fermentation the effect on the growth and disease control in *Lycopersicon esculentum* L. grown in mud pots were studied. After fermentation the mixture was sprayed on the leaves and mixed within the soil in experimental pot culture. After spraying the Panchagavya solution on the potted plants the plant shows prominent changes of morphological characteristics.

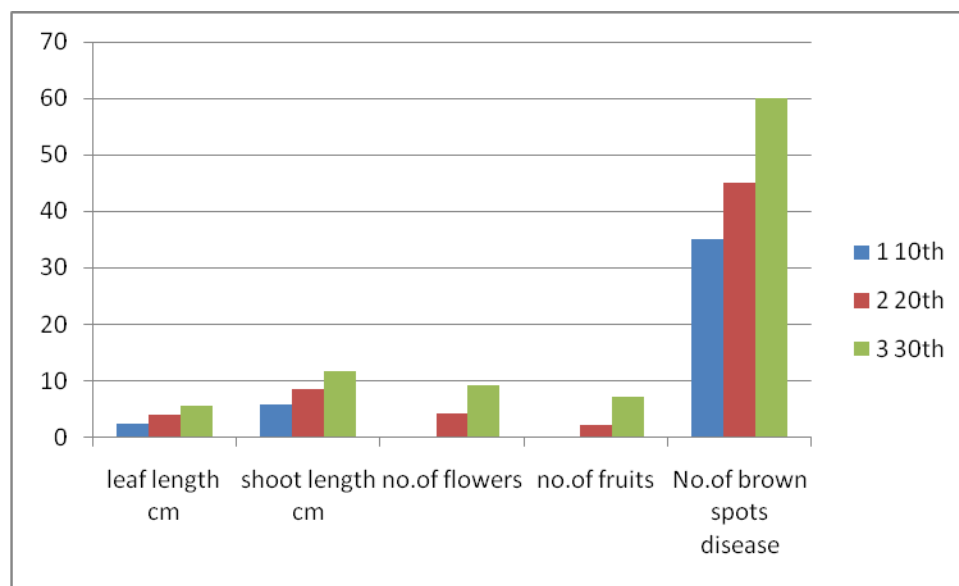
The plant grown in pot (A) is a control plant. The plant grown in pot (B) had Panchagavya solution mixed with foliar spray. The plant growth and variation in morphological features were noted after 10 days, 20 days, 30 days. The plant B showed better shoot growth when compared to A. The plants in pot B showed (12.2cm) and pot A showed (11.6cm). According to the number of flowers, the plants in pot B maximum flower produced of (12) neat pot A showed flower (9). The leaf length, it was observed that plant in pot B had (6.1) and pot A showed in (5.4). After the control plant, brown black spots in the leaves of *Lycopersicon esculentum* L. appeared showing the symptoms of disease. In order to know the effect of Panchagavya in control it of leaf spot diseases. Panchagavya (5%) was sprayed on the leaf at 12 days intervals. After 15 days of spraying Panchagavya, the brown spots are begun to disappear and on the 16<sup>th</sup> day the plant was free of any brown spots. This shows the effective control of leaf spot (or) foliar disease by Panchagavya.

### Morphological studies in tomato plants (*Lycopersicon esculentum* Linn.)

**A = control**

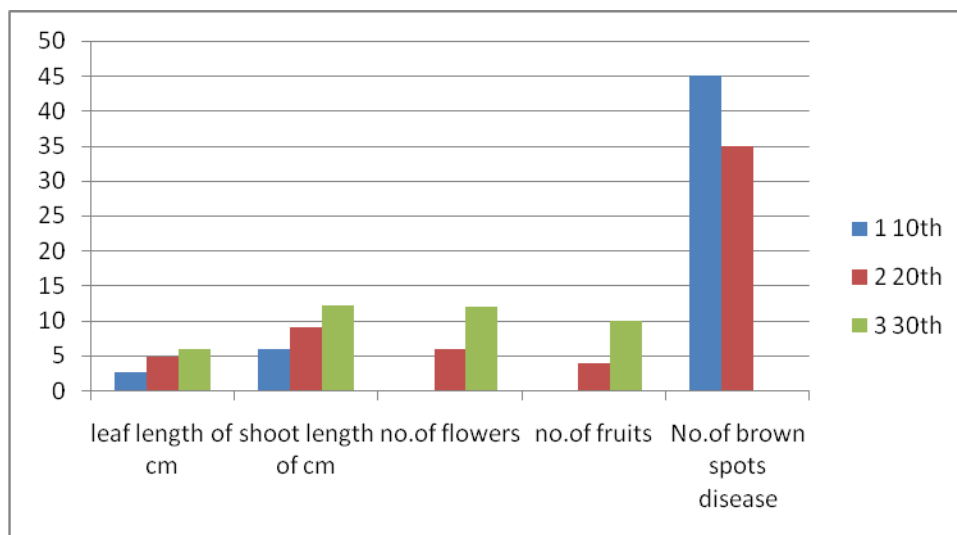
S.No	Days	Leaf	Shoot	No.of	No.of	No.of
------	------	------	-------	-------	-------	-------

		length cm	length cm	Flowers	Fruits	brown spots disease
1.	10 <sup>th</sup>	2.3	5.6	-	-	35
2.	20 <sup>th</sup>	3.9	8.5	4	2	45
3.	30 <sup>th</sup>	5.4	11.6	9	7	60



### B = Panchagavya solution

S.No	Days	Leaf length cm	Shoot length cm	No. of Flowers	No. of Fruits	No. of brown spots disease
1.	10 <sup>th</sup>	2.8	6.0	-	-	60
2.	20 <sup>th</sup>	4.9	9.1	6	4	45
3.	30 <sup>th</sup>	6.1	12.2	12	10	-



## DISCUSSION

This is conformed after the earlier finding of Dalhamman et al., (1996) studied cow dung and showed that it is used as renewable cooking energy and slurry for compost. Ramachandra Reddy (1996) studied three modified formulations of Panchagavya prepared and tested by him. Bhaskara Padmodaya (1996) described Panchagavya as effective Ayurvedic medicines in human diseases. Mattarino (1997) reported that 30 to 150 kg cow dung poured into gunny bags. Gunny bag moved upwards and downwards for 10 to 14 days in 200 litre of water in a drum. Drum water turns brown in colour and developed Ammonia smell, when this mixture along with 2 per cent water was sprayed on the plants, better yield was observed. Rajesekaran (2002) invented and studied effect of three modified formulations of Panchagavya in *Oryzasativa* and sprayed MPG1 was most effective.

The preparation and use of Panchagavya has been mentioned in ancient literature like Vishnu Dharma the holy book and Padarthaguna Sindhamani (Kannusamy Pillai, 1992). KalyanGonak (1945) detailed urine as an effective medicinal and biopesticidal agent in human and plant diseases. The present attempt has been to use cow urine, cow milk and cow dung mixture as biopesticides in *Lycopersiconesculentum* L., with reference to the reduce the fungal pathogenic activity on the above crops. Now-a-days traditional methods which were time consuming in the past is being replaced by more efficient and low cost techniques. The microorganisms have earned an important place in improving soil fertility and productivity. Cattle play a very important role in India and for many households cattle play an integral part in their life. The useful products obtained from cattle are cow milk, cow dung, cow urine, and

© The Author(s) 2015. Open Access. This article is licensed under a [Creative Commons Attribution License 4.0 \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).



processed products. Such as curd milk and ghee. These products are used as organic manure and called as “Panchagavya”.

## CONCLUSION

The present investigations were made on the dairy compounder derived from the cow and used as fertilizer and bio-insecticides on the plants. The present study has been undertaken to find out the effect of Panchagavya on the growth of tomato (*Lycopersicon esculentum L*). All these five products obtained from the cow and individually called Gavya and collectively as Panchagavyahas been used in the study. Panchagavya proved to be very good biocontrol agent when concentration of Panchagavya treated medium showed a good control of the leaf spot disease causing microorganism compared to the medium where in Panchagavya was not added or added in minor amounts. Thus Panchagavya proved to be enhancement of plant growth as well as biocontrol of tomato leaf spot disease.

## REFERENCES

- Adeniran, J.A., L.B. Taiwo and R.A. Sobulo, 2003. Effect of organic waste and Method of composting on compost maturity, Nutrient Composition on Compost and Yields of Two Vegetable Crops. *J. of Sustainable agriculture*, Vol. 22:95-101.
- Abdulla, M.Y. and Al-Rokibath, A., 2001. Pathogenicity of Toxigenic *Fusarium* proliferation from Datepalm in Saudi Arabia, *Plant Dis.*, 84: 321-324.
- Atlas, R.M. 1993. *Handbook of Microbiological Media*. L.C. Parks (Ed.), CRC Press, Boca Raton, FL, USA.
- Aba Alkhail AA 2005. Antifungal Activity of Some Extracts against Some Plant Pathogenic Fungi. *Pak.J.Biol.Sci.* 8 (3):413-417.
- Castro, M.E.A., Cheves, G.M., Zambolim, L., Cruz, C.D. and Silva, D.J.H., 2002. Effect of inoculum concentration on the resistance of tomato to *Alternaria solani*, *Rev. Plant pathology*, 81 (7).

Chauhan, R.S. 2002 b Medical importance of Panchagavya (cow therapy). In: National symposium on Historical Overview on Veterinary Sciences and Animal Husbandry in ancient India, Vedic and Ashokan Period. IVRI, Izatnagar, April 16-17.

Chakraborty G.S., Antimicrobial activity of the leaf extracts of *Calendula Officinalis* (Linn.), *Journal of Herbal Medicine and Toxicology* 2008, 2(2), 65-66.

Chauhan, R.S. 2004 b Panchagavya therapy (cowpathy): Current status and future directions. *The Indian Cow* 1:3-7.

Datar, V.V. and Ghule, K.K., 1987. Investigations on fruit rot of chilli, *Ind. Phytopath.*, 40:289.

DOA. 2003. Plant hormones and plant nutrients in liquid biofertilizer. Department of Agriculture, Bangkok, Thailand (in Thai).

Furedy, C., 1987. Social considerations in the recycling of organic wastes, *Conservation and Resources*, 13:103-106.

Gill, L.S., 1994. Reported Solanaceae in ethnomedicinal practices of Nigeria, *Journal of Economic and taxonomic Botany*, 18(2): 329-331.

Hasiji, S.K., Gulyas, F. and Szegi, J., 1979. Cellulose decomposition of phytopathogenic species of *Alternaria*, *Actaphytopathological Academic Scientiarum, Hungaricae*, 14 (1&2):13-15.

James, Martin, F., 1950. Water is a liquid fertilizer, sustainable agriculture and environmental voluntary action, Food Foundation, New Delhi, pp.24-25.

Jarvis, N.R., Khosla, S.K and Barrie, S.D., 1994. *Fusarium* stem and fruit rot of sweet pepper in Ontario green houses. *Can. Plant Dis.Sur*, 74(2).

KaiyanGoanak, 1945. Urine is abiopesticides, National cattle Research Institute, p.81.

Mittal, R.K., 1984. Seed rot of *Capsicum annum*, *Ind. Phytopath.*, 37(2):585.

Malarkodi, S.M., Deepa, R., V., Vanathi, B., 2003. Studied the Panchagavya and analysed and isolated. National Conference on Frontiers in Biotechnology.

Natarajan, K. 2002 Panchagavya-A manual. Other India Press, Mapusa, Goa, India, pp: 33.

Setboonsarng, S., and Gilman, J. 1999. Alternative agriculture in Thailand and Japan. (Internet) Available from: <http://www.solutions-site.org/artman/publish/article-15.shtml>. (Cited March 2006).

Sugha, S.K. 2005 Antifungal potential of Panchagavya. *Plant Disease Research Ludhiana* 20: 156-156.

Smith D.A. (1981), Toxicity of Phytoalexins. In 'Phytoalexins' edited by J.A. Bailey and J.A. Mansfield. Blackie, London, pp 218-248.

Selvaraj, N., B. Anitha, B. Anusha and M. Guru Sarawathi. 2007. *Organic Horticulture*. Horticulture Research Station, Tamil Nadu Agricultural University, Udhamamanda.