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REVIEW ARTICLE

A Critical Review on Panchagavya – A Boon Plant Growth

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ABSTRACT

Panchagavya, a Vedic formulation for increased productivity, disease resistance in plants and potential of utilizing Panchagavya as biofertilizer was tested on various pulses *Vigna radiate, 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). A similar observation was made on the number of leaves produced, leaf area, number of root nodules formed in the pulses by rhizobia and increased the levels of all the enzymes.

Key words: Panchagavya, Effective Microorganisms (EMO) and Day after sowing (DAS).

1. INTRODUCTION

Heavy use of chemicals in agriculture has weakened the ecological base in addition to degradation of soil, water resources and quality of the food. At this juncture, a keen awareness has sprung on the adoption of "organic farming" as a remedy to cure the ills of modern chemical agriculture [1]. It is very much essential to develop a strong workable and compatible package of nutrient 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 of Tamil Nadu and used widely for various agricultural and horticultural crops. In Sanskrit, Panchagavya means a combination of five products obtained from cow. When suitably mixed and used, these have miraculous effects. Panchagavya is used in different means such as foliar spray, soil application along with irrigation water, seed or seedling treatment *etc*. For foliar spray 3% concentration is being adopted by organic farmers using hand-operated sprayers with high pore sized nozzle [2].

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, Cyamopsis tetragonoloba, Lablab purpureus, Cicer arietinum* and the cereal *Oryza sativa* var. *ponni* as the experimental plants [3]. 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 (both traditional and seaweed based) promoted the production of lateral roots, leaves, leaflets and the growth of lamina in all the experimental plants, as compared to control. The seedlings produced leaves which had 93% more surface area than that of their respective controls. Percent increase over control in the leaf area of the seedlings *of Vigna radiata, Vigna mungo, Arachis hypogea, Cyamopsis tetragonoloba* and *Cicer arietinum* grown in soil amended with seaweed based Panchagavya at a ratio of 1: 100 (v/v) was 27%, 35%, 46%, 140% and 37% respectively. Increased production of lateral roots would provide more surface area for absorption of water and minerals by the experimental seedlings than their controls. Similarly, large number of leaves or leaflets with greater surface area could be construed as an indication of enhanced photosynthetic efficiency in plants grown in soil amended with Panchagavya. The effect was marked in the seedlings grown in soil amended with low levels

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of seaweed based Panchagavya (Panchagavya: soil; 1: 100). The effect was more pronounced in *Arachis hypogea*. Even the use of traditional Panchagavya as manure was able to increase nodule formation by nearly 18% to 62% [4].

2. IMPORTANCE OF PANCHAGAVYA

In 1950, James F. Martin of USA made a liquid catalyst (living water) from milking cow, using dung, sea water and yeast and it was claimed that it was capable of greening degraded land [5]. Cows ghee had been used in ancient and medieval times (Kautilya 321-296 BC and Someshwara Deve 1126 AD) for managing seedling health. The ghee contains vitamin A, Vitamin B, Calcium, fat and also glycosides, which protects cut wounds from infection. Cows curd is rich in microbes (Lactobacillus) that are responsible for fermentation [6].

Panchagavya has got reference in the scripts of Vedas (divine scripts of Indian wisdom) and Vrkshayurveda (Vrksha means plant and ayurveda means health system). The texts on Vrkshayurveda as systematization of the practices that the farmers followed at field level, placed in a theoretical frame work and it defined certain plant growth stimulants, among them Panchagavya was an important one that enhanced the biological efficiency of crop plants and quality of fruits and vegetables [2]. The positive effect of panchagavya on growth and productivity of crops has been reviewed and documented by [7].

3. EFFECT OF PANCHAGAVYA SPRAY ON GROWTH PARAMETERS

Mohanalakshmi [8] revealed that ashwagandha plant sprayed with Panchagavya (3%) produced higher number of leaves per plant. Vennila [9] revealed that application of 100% recommended dose of fertilizer along with Panchagavya spray (2%) significantly increased the okra plant height (131.7 cm) and dry matter production (5.90 g plant^{-1}).

Biogas slurry with Panchagavya combination is adjudged as the best organic nutrition practice for sustainability of maize-sunflower-green gram system by its overall performance on growth, productivity, quality of crops, soil health and economics [10].

Panchagavya was tested for different crops such as turmeric, paddy, onion, gingely, sugarcane, banana, vegetables and curry leaf and it was found that it enhanced the growth, vigour of crops, resistance to pest and diseases and improvement of keeping quality of vegetables and fruits [2].

Xu [11] reported that Effective Micro Organism (EMO) cultures could synthesize phytohormones *i.e.,* auxins and other growth regulators that stimulated maize plant growth and they contained proactive substances that could significantly affect leaf stomatal response in maize. Leaf stomata of the EMO treated maize opened more rapidly than water treated control plants and when leaves were subjected to dehydration, the stomata closed more slowly (*i.e.,* remained open longer) thus showed that, EMO contained bioactive substances that could have significantly affected leaf stomata response and led to increased LAI. The Panchagavya is rich in such EMOs.

4. EFFECT OF PANCHAGAVYA SPRAY ON YIELD AND YIELD ATTRIBUTES

Mohanalakshmi [8] revealed that application of poultry manure (5 t ha^{-1}) + Panchgavya (3%) in aswagandha exhibited significantly superior performance by registering the highest root yield of 1354.50 kg ha^{-1}. Vennila [9] revealed that application of 100 per cent recommended dose of fertilizer along with panchagavya spray (2%) significantly increased the number of fruits per plant, fruit weight g fruit^{-1} and fruit yield q ha^{-1} of okra.

Swaminathan *et al.* [12] concluded that application of Panchagavya at 3% as foliar spray on 15, 25, and 40 days after sowing (DAS) on black gram recorded the highest grain yield of 1195 kg ha^{-1} Kanimozhi [13] revealed that application of Panchagavya at 4 per cent spray was found to be superior in respect of root yield (2.5 times kg/plot) when compared to control in *Coleus forskohili.*

Foliar spray of Panchagavya at 3 percent on 15, 25, 40 and 50 DAS with no fertilizers was the most effective low cost technology in terms of grain yield of greengram [10]. Panchagavya and vermicompost combination has given the highest pod yield of French bean variety Ooty 2, which was 36 percent higher than the conventional method [14]. The treatment combinations of poultry manure + neem cake + Panchagavya increased the stick yield of moringa [15]. Balasubramanian *et al.* [16] reported that dipping of rice seedlings in Panchagavya before transplanting enhanced the growth and yield.

In Panchagavya, Effective Micro Organisms (EMO) were the mixed culture of naturally occurring, beneficial microbes mostly lactic acid bacteria (Lactobacillus), yeast (Saccharomyces), actinomyces (Streptomyces), photosynthetic bacteria (Rhodopsuedomonas) and certain fungi *(Aspergillus)* and that improved the soil quality, growth and yield of sweet corn, which was equal to or higher than what was obtained from

chemical fertilizers [10].

In Jasmine, spraying two rounds of Panchagavya, one before the flower initiation and another during bud setting phase ensured continuous flowering and in annual moringa, spraying doubled the stick yield besides giving resistance to pests and diseases. Panchagavya sprayed on 25 and 40 DAS advanced the paddy harvest by 10 days [5].

5. EFFECT OF PANCHAGAVYA SPRAY ON NUTRIENT UPTAKE

Presence of macro (N, P, K and Ca) and micro (Zn, Fe, Cu, Mn) nutrients besides total reducing sugars (glucose) were observed in Panchagavya. Chemolithotrops and autotropic nitrifiers (ammonifers and nitrifers) present in panchagavya which colonize in the leaves increase the ammonia uptake and enhance the total N supply [17].

Beaulah [15] reported that the secondary and micronutrients (Ca, S and Fe), macronutrients (NPK) contents of leaves and pods of annual moringa were superior under poultry manure + neem cake + Panchagavya treatments. Higher nutrient uptake and nutrient use efficiency in both main and ratoon crops of annual moringa were also observed. Similarly, the quality parameters *viz.*, crude fibers, protein, ascorbic acid**,** carotene content and shelf life were also higher under organic manure applied with Panchagavya spray.

6. INFLUENCE OF PANCHAGAVYA SPRAY ON SOIL FERTILITY

Microbial flora of soil plays an important role in soil health. The microorganisms present in the rhizospheres environment around the roots influence the plant growth and crop yield. The beneficial microorganisms from Panchagavya and their establishment in the soil improved the sustainability of agriculture.

CONCLUSION

From the foregoing review it can be concluded that plant growth substances present in Panchagavya help to bring rapid changes in phenotypes of plants and also improves the growth and ultimately improve the productivity of the crops.

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