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Research Article

Effect of liquid organic fertilizer of panchagavya on growth and development of *Luffa acutangula*

Sornalatha S*, Tamilarasi M and Esakkiammal B
Department of Zoology, Sri Parasakthi College for Women, Courtallam
*Corresponding author: sornalatha0392@gmail.com
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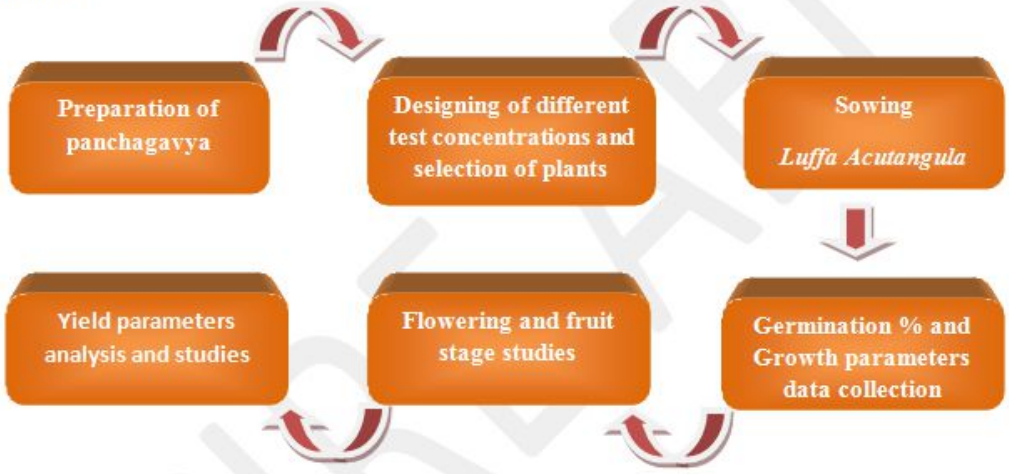
Objective: To analyze and compare the morphological and yield parameters of *Luffa Acutangula* by the foliar applications of panchagavya.

Methodology:



Duration taken for the research: 5 months

Conclusion: The results obtained from the field experimental conditions suggest that 2.5% panchagavya could be explored as effective foliar spray for the better growth of vegetable crops. The use of Panchagavya had positive effect on the morphological and yield parameters of *Luffa Acutangula*.

Applicable Industries: Biofertilizer industry

Applicable geographical area: It thrives well in hot climatic conditions. Sandy loamy soil is well suited for better growth.

Expected outcome: These organic farming products have an advantage to the agricultural field and the farmers due to its low-cost inputs, promising growth productivity, eco-friendly and free of chemicals. It is a system that begins to eliminate issues raised through overusage of synthetic fertilizers and pesticides.

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Sornalatha et al.

Abstract

Higher use of fertilizers reduces the quality of food produced as well as soil fertility. Panchagavya is an efficient plant growth stimulant that enhances the biological efficiency of crops. It is used to activate biological reactions in the soil and to protect the plants from disease incidence. The work was conducted in Courtallam, near Tiger falls, Tamil Nadu, India. The experiment was designed with four treatments with the view to study the effect of panchagavya. The different concentrations used for the study were 1.5%, 2.0%, 2.5% and 3.0%. Their efficacy was compared by studying the yield contributing characters like plant height, root length, shoot length, fruit length and fruit weight. In the study, highest plant growth and root length was recorded with the application of T3 (2.5%) and it was found to be significantly higher over the other treatments.

Keywords

Panchagavya, Ridge gourd, cow products, growth parameters

Introduction

Ridge gourd is an important commercial crop fetching good yields and returns with proper farm management practices. This vegetable belongs to the family of ‘‘Cucurbitaceae’’ and genus of *Luffa* (Loofah). India is considered as a primary centre of origin. Ridge gourd is one of the major vegetable crops in Asia. It is also known as Ribbed Gourd and the scientific name ridge gourd is *Luffa acutangula*. This vegetable is mainly used for culinary purpose and it is very popular in China, Vietnam, South and East India. Ridge gourd thrives very well in warm hot climatic conditions. It has low calories and numerous medicinal properties. The optimum temperature for ridge gourd cultivation is 24˚C-30˚C.

The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable agriculture. Panchagavya is a single organic input derived from five products evolving from cow, and it has been used in Indian medicine since time immemorial. It is showing that Panchagavya modified with a few more ingredients has a lot of beneficial effects on a variety of crops and livestock (Natarajan, 2002).Vallimayil and Sekar (2012) reported that Panchagavya is an organic product blended from five different cow products, commonly applied to crop plants in organic farming. It is used as foliar spray, soil application and seed treatment. The usage of fermented organic formulations with supportive beneficial microorganisms as foliar nourishment has come into the picture of modern agriculture for giving rise to good quality non residue protected

food (Galindo *et al*., 2007). Panchagavya is an organic growth promoter for small and marginal vegetable growers (Boomathi, 2016). It possesses the properties of fertilizer and bio pesticides (Sireesha, 2013). It has resulted in positive effect on growth and productivity of crops as reported by Somasundaram *et al*. (2007). Tharmaraj *et al*. (2011) says Panchagavya is a Vedic formulation for increased productivity, disease resistance in plants.The cost-benefit to farmers was greatest when Panchagavya was used as a growth promoter and proved as the cheapest, while Amrit Pani, and Bokashi were the costliest alternative input (Francis and Smith, 2006)

Materials and Methods

Materials required

Cow dung - 3kg, cow ghee -1/2 ltr, cow urine - 3l, cow milk-2l, cow curd - 2l,Toddy -2l,Tender coconut - 2l, Jaggery - 2l, Banana- 12 nos, Fertile soil - A Handful .

Method of Preparation

In the 1st day of preparation cow dung and cow ghee have put in a plastic drum and mixed thoroughly twice in a day. In this 1kg of jaggery is added and made up to 2 litres with non-chlorinated water. After 3rd day of preparation, cow urine, cow milk, cow curd, toddy, tender coconut, jaggery, banana, and fertile soil were added. The entire contents were mixed in clockwise manner two times daily, in the morning after sunrise and in the evening before the sunset. After 21st day of prepartion the liquid content was filtered using mesh and stored in a air tight container for future use upto 6 months

Vegetable cultivation

This experiment was carried out at Courtallam near tiger falls. Four different concentrations such as 1.5 %%, 2.0%, 2.5 %, 3.0% and a control were used in the study. The seeds were soaked for overnight in panchagaya prior to sowing. 5 seeds were sown in each pit. There are 8 pits were prepared for every concentration. Totally 200 seeds were used for this experiment. The ridge gourd seeds were sown by dibbling method at 1.5m×1.0m×1.5m. In this, control plants were grown without any fertilizers. The plants were provided with bamboo sticks for creeping support. After germination, Panchagavya was used as a foliar spray to the plants in 10 days of interval. The biometric analysis of ridge gourd such as germination percentage, plant height, root length, shoot length and yield parameters were recorded.

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Table 1: Dilution Ratio for the Plant Growth

S.NO	TREATMENT	CONCENTRATION	DILUTION RATIO
1.	control	No fertilizer	----------
2.	Treatment(T_1)	1.5%	98.5mL water+1.5mL panchagavya
3.	Treatment(T_2)	2.0%	98.0mL water+2.0mL panchagavya
4.	Treatment(T_3)	2.5%	97.5mLwater+2.5mL panchagavya
5.	Treatment(T_4)	3.0%	97.0 mL water+3.0mL panchagavya

Table 2: Germination percentage of ridge gourd

S.NO	TREATMENT	GERMINATION %
1.	control	82.5
2.	T1	87.5
3.	T2	95
4.	T3	97.5
5.	T4	92.5

Table 3: Growth parameters of *Luffa acutangula* in 10 days

S.NO	TREATMENT	PLANT HEIGHT(cm)	ROOT LENGTH(cm)	SHOOT LENGTH(cm)
1.	control	8.8	3.2	5.1
2.	T1	9.4	3.5	5.9
3.	T2	13.1	5.2	7.8
4.	T3	19.8	6.3	11.8
5.	T4	19.5	7.7	11.6
6.	S.E		0.643	2.80

Table 4: Growth parameters of *Luffa acutangula* in 20 days

S.NO	TREATMENT	PLANT HEIGHT(cm)	ROOT LENGTH(cm)	SHOOT LENGTH(cm)
1.	control	18.7	7.7	10.9
2.	T1	31.4	15.6	15.8
3.	T2	42.2	19.9	22.3
4.	T3	48.5	21.5	26.9
5.	T4	48.7	22.2	26.5
6.	S.E		1.19	3.97

Table 5: Growth parameters of *Luffa acutangula* in 30 days

S.NO	TREATMENT	PLANT HEIGHT(cm)	ROOT LENGTH (cm)	SHOOT LENGTH (cm)
1.	control	70.5	21.8	48.7
2.	T1	84.4	23.2	61.2
3.	T2	97.5	26.8	70.7
4.	T3	127.3	37.4	89.9
5.	T4	117.1	34.1	83.2
6.	S.E		2.736	6.62

Table 6: Growth parameters of *Luffa acutangula* in 40 days

S.NO	TREATMENT	PLANT HEIGHT(cm)	ROOT LENGTH(cm)	SHOOT LENGTH(cm)
1.	control	89.7	32.8	56.8
2.	T1	105.8	34.1	71.6
3.	T2	118.8	37.6	83.2
4.	T3	145.9	43.7	102.8
5.	T4	136.6	39.4	97.2
6.	S.E		0.782	7.46

Table 7: Growth parameters of *Luffa acutangula* in 50 days

S.NO	TREATMENT	PLANT HEIGHT (cm)	ROOT LENGTH (cm)	SHOOT LENGTH (cm)
1.	control	105.9	36.8	69.1
2.	T1	122.1	40.3	81.8
3.	T2	138.2	45.1	93.1
4.	T3	168.4	49.1	113.3
5.	T4	153.8	45.9	108.4
6.	S.E		1.891	7.33

Table 8: Yield parameters of *Luffa acutangula*

S.NO	TREATMENT	FRUIT LENGTH(cm)	FRUIT WIDTH (cm)	FRUIT WEIGTH (g)
1.	control	18.6	11.2	160
2.	T1	20.1	12.1	185
3.	T2	23.4	10.8	210
4.	T3	24.8	12.8	335
5.	T4	20.8	11.4	290

Table 9: Statistical Analysis for the plant growth parameters

S.NO	TREATMENT	T-test	F-value	P-value
1.	**control**	0.254	1.904	0.191
2.	T1	0.188	2.250	0.147
3.	T2	0.159	2.548	0.119
4.	T3	0.130	2.816	0.099
5.	T4	0.123	2.912	0.093

Significance at 5% level

Statistical Analysis

The data were subjected to One-way Analysis of Variance (ANOVA) to determine the significance of individual differences at p>0.05% level.

Results and discussion

There is an increase in the percentage of germination shown in the gourd cultivation. T3 2.5% concentration has fasten the germination rate (Table 1). When compared to the control, treated plants showed good growth. In this study, four different concentrations of panchagavya were tested on ridge gourd. Among the tested treatments, application of panchagavya 2.5% was found the most effective in which plant growth was 168.4 cm. This was followed by the application of T4 3.0% which showed shoot length as 108.4 cm. However, the plant growth and shoot length have increased in all the experimental plants as compared to the control (Table 2 – 7). In the current study, it was found that T3 plants attain maturity at early stage and the fruiting was carried out immediately (Table 7). In treated plants, the female flowers are ready to be pollinated easily and no one was damaged in flowering stage. But in the case of control, only one out of four flowers was open and formed a fruit. T3 plants showed earlier fruit formation than the rest. The biomass content, fruit yield and the weight of the fruit were also higher in treated plants in compared to control plants. The average fruit weight was about 335g in treated plants but in control the fruit weight was about 160g only (Table 8).

Panchagavya is an organic product recommended for crop improvement in organic agriculture (Sangeetha and Thevanathan, 2010). These results were found to be consistent with the studies of Ali *et al.,* (2011) which reported the effect of Panchagavya and Sarifibani, liquid organic manure on the yield of green gram, *Vigna radiata*, chilli, *Capsicum frutescens* (Chili) and mustard. It enhances the length of the plants and increases the surface area of the leaves. The study clearly revealed that there was significant improvement in the growth and yield. Panchagavya has resulted in positive effect on growth and productivity of crops as reported by Somasundaram *et al.* (2003). In the preparation of panchagavya, tender coconut water is being used. It contains kinetin which is reported to accelerate fermentation. It has a role in enhancing chlorophyll content in plant leaves, thus in turn, enhance photosynthetic activity, growth and yield. Toddy also improves fermentation and helps in in minimizing the bad odour whereas; Jaggery helps in growth of beneficial micro organisms. It is repoted that pachagavya enhanced the growth, vigour of crops, resistance to pest

and diseases and improvement of keeping quality of vegetables and fruits (Natarajan, 2002). There is presence of macro (N. P, K and Ca) and micro (Zn, Fe, Cu, Mn) nutrients besides total reducing sugars (glucose) in panchagavya. Chemolithotrops and autotropic nitrifiers (ammonifers and nitrifers) present in panchagavya and colonize in the leaves increased the ammonia uptake and enhance the total Nitrogen supply (Papen *et al*., 2002). Panchagavya improves the beneficial soil microorganisms and increases the soil fertility and stability. Perumal *et al.,* (2006) reported that presence of growth regulatory substances such as Indole Acetic Acid (IAA), Gibberlic Acid (GA3), Cytokinin and essential plant nutrients from panchagavya caused a remarkable influence on the growth rate. Regular and uniform water supply to the developing fruits resulted in increased ascorbic acid content and crude protein content (Vennila and Jayanthi, 2008). Panchagavya is also being sought to improve crop establishment and health (Shakuntala *et al.,* 2012).

Conclusion

In the present study, the use of Panchagavya had positive effect on the morphological and yield parameters of *Luffa Acutangula.* Better growth effects were observed in the T3 (2.5%) treated plants than the control. Thus, the results obtained from the field experimental conditions suggest that 2.5% panchagavya could be explored as effective foliar spray for the better growth of vegetable crops.

Social relevance and expected outcome

These organic farming products have a advantage to the agricultural field and the farmers due to its low-cost inputs, promising growth productivity, eco-friendly and free of chemicals .It is a system that begins to eliminate issues raised through overusage of synthetic fertilizers and pesticides.

Industry application

Biofertilizer industry

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