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S Thirumeninathan
M. Sc (Agronomy) Room No:
95/, PG Hostel, Tamil Nadu
Agricultural University,
Coimbatore, Tamil Nadu, India

T Tamilnayagan
Ph. D Scholar (Agricultural
Entomology), Tamil Nadu
Agricultural University,
Coimbatore, Tamil Nadu, India

A Rajeshkumar
Ph. D scholar (Agronomy)
Tamil Nadu Agricultural
University, Coimbatore, Tamil
Nadu, India

S Ramadass
Ph. D scholar (Agronomy)
Tamil Nadu Agricultural
University, Coimbatore, Tamil
Nadu, India

Correspondence
S Thirumeninathan
M. Sc (Agronomy) Room No:
95/, PG Hostel, Tamil Nadu
Agricultural University,
Coimbatore, Tamil Nadu, India

Response of panchagavya foliar spray on growth, yield and economics of Fodder cowpea (*Vigna unguiculata* L.)

S Thirumeninathan, T Tamilnayagan, A Rajeshkumar and S Ramadass

Abstract

The field experiment was conducted at the East farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal District in the Rabi season during January to March 2016. Results revealed that the time of harvesting the recommended fertilizer dose applied plot registered significant plant height (121.9 cm) followed by 3% at 10 days interval registered (113.5cm). The recommended dose of fertilizer applied plot and 3% at 10 days interval registered higher green forage and dry matter yield (28.8 and 26.9 t/ha) 6.44 and 5.18 t/ha respectively and while, the control plot without fertilizer and panchagavya spray registered significantly lower green forage and dry matter yield (14.5 and 14.5 t/ha). B:C ratio is highest in 2 % at 20 days interval treatment plot produce benefit of 2.71 for every 1.00 rupee of invested while, lower cost of cultivation in control plot was 1.64.

Keywords: *Vigna unguiculata* L., harvesting, panchagavya spray, both human

1. Introduction

Cowpea (*Vigna unguiculata* L.) is an annual legume grown throughout the semi- arid tropics, where it is valued as both human and livestock food. It is drought tolerant, can be grown on relatively poor soils and fixes nitrogen thereby improving soil fertility. It requires minimum annual rainfall of 200 mm. Fodder cowpea is usually superior to other forage legumes in terms of both quantity and quality. It is grown as a green manure and also a cover crop, retain moisture, reduce soil erosion and provide high forage yield and high palatability. But in this present day situation organic farming is alternative to conventional system, Utilize the locally available farm inputs and reduces the cost of cultivation. Up to now, many of them is focusing organics in commercial crops. It is the pioneer attempt in organic farming on forage crops. Panchagavya, an organic product is the potential source to play the role for promoting growth and providing immunity in plant system. Panchagavya is a bio promoter with a combination of five products obtained from the cow viz., dung, urine, milk, curd and ghee. Panchagavya acts as growth promoter (75%) and immunity booster (25%) and exactly fills the missing link to sustain the organic farming without any yield loss (Vedivel, 2007) [8]. Biochemical properties of panchagavya revealed that it contains almost all the major nutrients like N, P, K and micronutrients necessary for plant and growth hormones like Indole acetic acid (IAA) and Gibberallic acid (GA) required for crop growth as well as the predominance of fermentative microorganisms like yeast, azotobacter, phoshobacteria and lactobacillus (Selvaraj, 2003) [4].

2. Materials and methods

Study period and area

The field experiment was conducted at the East farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA &RI) Karaikal District in the Rabi season during January to April 2016. The area is located on latitude 10°57'24.18" N and longitude 79°46'32.01" E 293 m above sea level. The design was randomized complete block and replicated thrice. The soil of the experimental field was sandy clay loam in texture, medium in organic carbon (0.48%) and low in available nitrogen (276 kg/ha), high in available phosphorus (28.1 kg/ha) and high in available potash (412 kg/ha) with soil pH 6.5. Eight treatments viz., T₁- Control, T₂ – Recommended Dose Fertilizer (RDF) (25: 40: 20 NPK/ha), T₃ – Panchagavya spray 2% @ 10 days interval, T₄ - Panchagavya spray 3% @ 10 days interval, T₅ - Panchagavya spray 2% @ 15 days interval,

T6 - Panchagavya spray 3% @ 15days interval, T7 - Panchagavya spray 2% @ 20 days interval and T8 - Panchagavya spray 3% @ 20 days interval were tested randomized complete block design, replicated three times. Forage Cowpea (Co (FC) 8 variety) was used as a test crop. All other cultural practices were performed uniformly for all treatments. The crop was sown on January 20th using recommended agronomical practices and plant protection measures were undertaken as per the need and the required plant population was maintained.

Observation and record

Plant height (cm)

The height of the plant was measured from ground surface to the tip of the longest vine and expressed in cm. The plant height measurement was taken in the five randomly selected tagged plants at 30 DAS and at harvest stage.

Leaf - stem ratio

The leaves and stem of the five randomly selected plants from the border rows were separated first and dried in shade and then oven dried @ 70 °C for 72 hrs. The dry weight was recorded separately for leaves and stem and expressed as leaf - stem ratio.

Dry matter yield (q/ ha)

Five plants were removed from outside the net plot area at harvesting for estimating the dry matter yield. The plants removed were first dried in shade and then oven dried @70°C at 72 hrs. The dry weight was recorded using electronic top pan balance and the DMY was calculated as per the standard formula and expressed in q/ha

Benefit cost ratio

The benefit cost ratio was calculated as follows,
BCR = Gross return (Rs. /ha) / cost of cultivation (Rs. /ha)

3. Results and discussion

Effect on plant height (cm)

The average plant height of the fodder cowpea under various panchagavya foliar sprays treatments were recorded at 30 DAS and at the time of harvesting were furnished at table 1. The plant height of fodder cowpea was significantly not differed within the treatment levels of panchagavya foliar spray at 30 DAS and the time of harvesting stage shows significant difference within the panchgavya treatments. At the time of harvesting the recommended fertilizer dose applied plot registered higher plant height (121.9 cm) followed by 3% at 10 days interval (113.5cm) while, the control plot without any fertilizer and panchagavya foliar spray had registered significantly shorter plant height (84.87 cm). The similar finding have been reported that Kumaravelu and Kadamban 2009 [2] the concentration of 3 % of panchagavya to spray on fodder cowpea plants its showed that significantly increase the growth of plant. Kumar *et al.* (2011) [1] reported that the efficacy of panchagavya foliar spray on the physiological growth and yield of the black gram.

Leaf – Stem ratio

The average Leaf – Stem ratio of the forage cowpea under various panchagavya foliar spray treatments was furnished at

table 1. Leaf – stem ratio of the fodder cowpea among the panchagavya treatments not differed significantly. Based on the numerical value the highest recorded at 3 % at 10 days interval and 15 days interval (0.88 and 0.86 respectively) while, the forage cowpea at control plot and 3 % at 15 days interval recorded significantly lower value (0.75).

Effect on green forage yield (t/ha)

The average green forage yield of the forage cowpea under various panchagavya foliar spray treatments was furnished at table 1. The green forage yield of fodder cowpea differed significantly within the panchagavya foliar spray treatments. The recommended dose of fertilizer applied plot and 3% at 10 days interval registered higher green forage yield (28.8 and 26.9 t/ha) while, the control plot without fertilizer and panchagavya spray registered significantly lower green forage yield (14.5 t/ha). Somasundaram *et al.* (2003) [5] had found that foliar spray of Panchagavya at 3 % on 15, 25, 40 and 50 DAS with no fertilizers was the most effective low cost technology in terms of grain yield of green gram. Swaminathan *et al.* (2007) [7] found 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.

Effect on dry matter yield (t/ha)

The average dry matter yield of the forage cowpea under various panchagavya foliar spray treatments was furnished at table 6. The dry matter yield of fodder cowpea differed significantly within the panchagavya foliar spray treatments. The recommended dose of fertilizer applied plot and 3 % at 10 days interval registered higher dry matter yield (6.44 and 5.18 t/ha) while, the control plot without fertilizer and panchagavya spray registered significantly lower green forage yield (3.13 t/ha). Sridhar (2003) [6] reported that application of Panchakavya @ 3% increased the dry matter production ultimately leading to higher yield in *Solanum nigrum*.

Benefit cost ratio

The common cost, treatment cost and total cost of cultivation along with gross returns, net returns and benefit cost ratio were worked out to simulative crop of cowpea for the panchagavya foliar spray treatments were furnished in table 1. The common cost of cultivation of fodder cowpea without fertilizer and panchagavya foliar spray works to Rs. 17,650, recommended dose of fertilizer applied plot works to 23, 517 and including the full cost of panchagavya spray as per the varies treatments at 2 and 3 % at 10, 15 and 20 days interval, the cost of cultivation ranges from Rs. 19,450 to Rs. 20, 750. Depending upon the green forage yield of various treatments the gross return of fodder cowpea varies from Rs. 29,000 in the control without fertilizer and panchagavya spray to Rs. 56,600 at recommended dose of fertilizers applied plot. On contrary, the net income after deducting the cost of cultivation and gross income ranged from Rs, 11350 in control plot to Rs. 33950 in 3 % at 15 days interval. Benefit cost ratio is highest in 2 % at 20 days interval treatment plot produce benefit of 2.71 for every 1.00 rupee of invested while, lower cost of cultivation in control plot was 1.64. The results are in confirmation with those reported by Swaminathan *et al.* (2007) [7] and Prabhu *et al.* (2010) [3].

Table 1: Effect of panchagavya on growth, leaf - stem ratio, yield, and economics of fodder cowpea

Treatments	Plant height (cm)	Leaf and stem ratio	Green forage yield (t/ha)	Dry matter yield (t/ha)	Cross return (Rs./ha)	Net return (Rs./ha)	B : C Ratio
T1- Control	84.87	0.75	23.93	3.13	29000	11350	1.64
T2 – Recommended Dose Fertilizer (25: 40: 20 NPK/ha)	121.90	0.78	28.80	6.44	56600	33083	2.41
T3 – Panchagavya spray 2% @ 10 days interval	101.47	0.81	24.80	46.97	49600	29350	2.45
T4 - Panchagavya spray 3% @ 10 days interval	113.50	0.88	26.93	51.76	53800	33950	2.64
T5 - Panchagavya spray 2% @ 15 days interval	95.83	0.78	24.10	42.95	48200	27950	2.32
T6 - Panchagavya spray 3% @ 15 days interval	108.50	0.86	26.40	50.62	52800	33350	2.71
T7 - Panchagavya spray 2% @ 20 days interval	93.13	0.75	23.33	41.02	47800	27950	2.41
T8 - Panchagavya spray 3% @ 20 days interval	103.43	0.81	25.46	48.21	50800	31350	2.54
S.Ed	6.33	0.05	9.72	4.50	-	-	-
CD (p= 0.05)	7.57	0.10	2.085	0.96	-	-	-

4. Conclusion

Based on the results of experiment, it is concluded that plant height, higher green forage and dry matter yield, net return and B: C ratio of Fodder cowpea can be secured by foliar spray of panchagavya @ 2% at 20 days interval.

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