Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 7 [SPL 1] 2018 : 147-151

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Productivity and economics of summer greengram [*Vigna radiata* (L.) Wilczek] as influenced by different organic manures and organic sprays

K. Bhargavi, V. Sumathi, G. Krishna Reddy, V. Umamahesh and H. Bhargavi
Department of Agronomy, S.V. Agricultural College, Tirupati-517502,
Andhra Pradesh, India.
E-mail of corresponding author: bhargavireddykoturi@gmail.com

ABSTRACT
A field experiment was conducted to study the effect of organic manures and organic sprays on the productivity and economics of summer green gram. The experiment was laid out in split plot design with three replications. The main plot consisted of four treatments of organic manures viz., Control (M_1), Farm yard manure (M_2), Vermicompost (M_3) and Poultry manure (M_4) and sub plots consisted three treatments of organic sprays viz., Control (S_1), Panchagavya (S_2) and Jeevamrutha (S_3). The results revealed that combination of poultry manure and panchagavya spray recorded higher seed yield (779 kg ha^{-1}) and haulm yield (1909 kg ha^{-1}) of summer greengram. Higher gross return (₹ 48,648 ha^{-1}) net return (₹ 30,125 ha^{-1}) and B C ratio (2.60) were also higher with the same combination.
***Key words**: Green gram, Organic sprays, Panchagavya, Jeevamrutha, Seed yield, Economics.*

Received 23.04.2018 Revised 29.05.2018 Accepted 02.07.2018

INTRODUCTION

India grows nearly 23.55 million hactares of pulses with an annual production of 17.15 million tones and an average productivity of 728 kg ha^{-1}. In Andhra Pradesh it is cultivated in 1.04 million hactares with a production of 0.95 million tonnes and with a productivity of 911 kg ha^{-1} (Indiastat, 2014-15).

Both under rainfed and irrigated conditions of Southern Agro-climatic zone of A.P. crops are grown in *kharif* to utilize the rainfall and in *rabi* to use residual moisture, leaving summer fallow, where the fields would remain fallow for 3 to 4 months from February to April. Looking into the lurking opportunity the summer green gram can be introduced into the cropping system to meet the demand of pulses.

Summer green gram can be introduced into the cropping system as it takes only 60 to 65 days to maturity, so the extra short duration varieties fit in very well within the available window of time. It is grown solely on the available residual moisture and with the involvement of least farm inputs. Summer green gram has fast growing habit without much agronomic care and management, weed problems are also well taking care of, mainly on account of its smothering growth habit and ground covering ability well within the 2 to 3 weeks from the time of sowing.

Heavy use of chemicals in agriculture has weakened the ecological base in addition to degrading the 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. Organic farming is gaining importance in recent years as it sustains crop production as well as environment. FYM, vermicompost and poultry manure not only increase organic carbon status of the soils but also increase the soil water holding capacity, floculation of soil and availability of all micro and macro nutrients, thus improve the soil and crop production. Since, helps in enhancing the activity of microorganism in soils which further enhance solubility of nutrients and their consequent availability, so plants are known to be altered by microorganism by reducing soil p^{H} at micro sites, chelating action of organic acids produced by them (Chhonkar, 2002). *Panchagavya* and *jeevamrutha* an organic products have potential to play the role in prompting growth and providing immunity in plant system. The use of *panchagavya* and *jeevamrutha* not only provides the nutrients but also hydrates the leaf cells, improves the chlorophyll content thus

increase the photosynthetic activity. As they contain nutrients, growth promoting hormones and naturally occurring, beneficial, effective micro-organisms predominantly, lactic acid bacteria, yeast, actinomycetes, photosynthetic bacteria and certain fungi besides beneficial microbes, proven fertilizers such as azotobacter, azospirillum and phosphobacterium were detected which have the beneficial effect especially in improving soil health, growth and yield of crops.

MATERIAL AND METHODS

The field experiment was conducted during summer season of 2017 at S.V.Agricultural College Farm, Tirupati. The experimental soil was sandy loam in texture, neutral in reaction (p^H 6.8), low in organic carbon (0.38 per cent) and available nitrogen (150 kg ha^{-1}), medium in available phosphorus (12 kg ha^{-1}) and high in available potassium (161 kg ha^{-1}).

The experiment was laid out in split plot design with three replications. The main plot consisted of four treatments of organic manures *viz.,* Control (M_1), Farm yard manure (M_2) @ 10 t ha^{-1}, Vermicompost (M_3) @ 2 t ha^{-1} and Poultry manure (M_4) @ 2 t ha^{-1} and sub plots consisted three treatments of organic sprays *viz.,* Control (S_1), *Panchagavya* (S_2) as 3 % spray concentration and *Jeevamrutha* (S_3) direct spray without dilution @ 200 l ha^{-1}.

The scheduled organic manures were thoroughly incorporated in to the soil 15 days prior to sowing of crop. *Panchagavya* was prepared one month before application and *jeevamrutha* was prepared 2-5 days before application and applied on green gram crop from 10 days after sowing to 10 before harvest.

RESULTS AND DISCUSSION

Yield attributes

Yield attributes like number of pods $plant^{-1}$, length of the pod, number of seeds pod^{-1} and test weight of green gram were influenced by different organic manures and organic sprays except number of pods $plant^{-1}$ which was influenced by different organic manures and organic sprays as well as by their interaction and number of seeds pod^{-1} was not influenced by any of the organics (Table 1).

Higher yield attributes were recorded in plots incorporated with poultry manure, which was superior to all other remaining treatments. The next best treatment was with vermicompost incorporation followed by farm yard manure incorporation. Lower number of pods $plant^{-1}$ was recorded in plots which have not received any of the organic manure. This might be due to more vigorous and luxuriant vegetative growth, which in turn favoured a better partitioning of assimilates from source to sink. Similar results were obtained by Yadav *et al.* (2007) and Rao *et al.* (2013).

Table-1: Yield attributes of greengram as influenced by different organic manures and organic sprays

Treatments	Number of pods plant^{-1}*	Length of the pod (cm)	Number of seeds pod^{-1}	Test weight (g)
Organic manures				
M_1 – Control	18.9	8.6	11.8	22.70
M_2 - FYM @ 10 t ha^{-1}	26.0	8.8	12.3	23.03
M_3 - Vermicompost @ 2 t ha^{-1}	29.6	9.3	12.1	23.74
M_4 - Poultry manure @ 2 t ha^{-1}	31.7	9.4	12.6	25.50
SEm±	0.39	0.10	0.17	0.51
CD (P=0.05)	1.3	0.3	N.S.	1.8
Organic sprays				
S_1 - Control	23.2	8.8	11.8	21.87
S_2 - *Panchagavya* as 3 % spray	29.9	9.4	12.5	25.29
S_3 - *Jeevamrutha* without dilution @ 200 l ha^{-1}	26.6	8.9	12.3	24.07
SEm±	0.48	0.14	0.28	0.388
CD (P=0.05)	1.4	0.4	N.S.	1.16
Interaction				
S at M				
SEm±	0.68	0.17	0.30	0.879
CD (P=0.05)	2.9	N.S.	N.S.	N.S.
M at S				
SEm±	0.87	0.25	0.48	0.812
CD (P=0.05)	2.7	N.S.	N.S.	N.S.

* Interaction table furnished separately

Table-2: Number of pods plant^{-1} of green gram as influenced by interaction of organic manures and organic sprays

Treatments	Organic manures				
Organic sprays	**M_1**	**M_2**	**M_3**	**M_4**	**Mean**
S_1	17.0	23.7	29.6	31.7	23.2
S_2	20.7	31.0	32.7	35.0	29.9
S_3	19.0	23.3	31.3	32.7	26.6
Mean	18.9	26.0	29.6	31.7	

Higher yield attributes were noticed in the plots where *panchagavya* was sprayed, which was on par with that resulted due to spraying of *jeevamrutha*. Lower yield attributes were with unsprayed treatment. This might be due to increased supply of almost all plant essential nutrients which provides good vegetative growth thus increased the photosynthetic activity and further, the translocation and accumulation of photosynthates in the economic sinks. The results were in line with the findings of Patil *et al.* (2012), Chaudhari *et al.* (2013) and Jadhav and Kulkarni (2016).

The interaction effect of organic manures and organic sprays was significant, with the higher number of pods plant^{-1} being produced with (poultry manure and *panchagavya* combination, Table 2), which was significantly higher than with any of the combinations tried and the lower number of pods plant^{-1} recorded with (no manure and no organic spray). Significant interaction between organic manures and organic sprays with respect to yield attributes was in conformity with the findings of Rao *et al.* (2013).

Table-3: Seed yield and haulm yield (kg ha^{-1}) of greengram as influenced by different organic manures and organic sprays

Treatments	Seed yield	Haulm yield
Organic manures		
M_1 – Control	444	1023
M_2 - FYM @ 10 t ha^{-1}	642	1635
M_3 - Vermicompost @ 2 t ha^{-1}	670	1816
M_4 - Poultry manure @ 2 t ha^{-1}	726	1852
SEm±	8.9	27.5
CD (P=0.05)	31	95
Organic sprays		
S_1 - Control	529	1482
S_2 - *Panchagavya* as 3 % spray	672	1642
S_3 - *Jeevamrutha* without dilution @ 200 l ha^{-1}	660	1620
SEm±	5.6	17.4
CD (P=0.05)	17	52
Interaction		
S at M		
SEm±	15.5	47.6
CD (P=0.05)	N.S.	N.S.
M at S		
SEm±	12.9	39.6
CD (P=0.05)	N.S.	N.S.

Seed yield and Haulm yield

Higher seed yield was recorded with the poultry manure incorporation, which was higher than remaining treatments (Table 3). The next best treatment was vermicompost which was however comparable with farm yard manure but significantly higher than with control and regarding the haulm yield higher was produced with poultry manure which was however, comparable with vermicompost. The next best treatment was farm yard manure. The Lower haulm yield was recorded with control. Higher seed yield and haulm yield might be accounted to the increased supply of almost all plant essential nutrients by

translocation of photosynthates accumulated under the influence of the source of organic nutrients. Further, the translocation and accumulation of photosynthates in the economic sinks thus increased yield attributes, chlorophyll content and nitrate reductase activity resulted in increased grain yield. The same was obvious through the findings of Anil Kumar *et al.* (2007), Rao *et al.* (2013) and Singh *et al.* (2015).

As regards the organic sprays, higher seed and haulm yield was recorded with *panchagavya*, which was at par with *jeevamrutha* with no significant difference between them, Lower seed and haulm yield was produced with control. Higher seed yield and haulm yield might be due to IAA and GA present in *panchagavya* when foliar sprayed could have created stimuli in the plant system which in turn increased the production of growth regulators in cell system and the action of growth regulators in plant system stimulated the necessary growth and development coupled with better translocation and accumulation of photosynthates from source to sink increased the grain yield. Similar results were obtained by Somasundaram *et al.* (2007), Swaminathan *et al.* (2007), Chaudhari *et al.* (2013) and Yadav and Tripathi (2013).

The combination of poultry manure and *panchagavya* spray recorded higher seed yield (779 kg ha^{-1}) and haulm yield (1909 kg ha^{-1}) of summer green gram than individual application of organic manures and organic sprays.

Table – 4: Gross return (ha^{-1}), net return (ha^{-1}) and B C ratio of green gram as influenced by different organic manures and organic sprays

Treatments	Gross return	Net return	B C ratio
Organic manures			
M_1 - Control	27,683	12,440	1.79
M_2 - FYM @ 10 t ha^{-1}	40,343	19,989	1.99
M_3 - Vermicompost @ 2 t ha^{-1}	42,016	10,824	1.30
M_4 - Poultry manure @ 2 t ha^{-1}	45,429	27,936	2.56
SEm±	577.7	411.4	0.044
CD (P=0.05)	1,994	1420	0.15
Organic sprays			
S_1 – Control	33,235	14,173	1.80
S_2 - *Panchagavya* as 3 % spray	41,962	19,831	1.99
S_3 - *Jeevamrutha* without dilution @ 200 l ha^{-1}	41,406	19,389	1.94
SEm±	353.7	302.7	0.031
CD (P=0.05)	1,060	907	0.09
Interaction			
S at M			
SEm±	1000.7	712.7	0.077
CD (P=0.05)	2,281	1,927	0.20
M at S			
SEm±	817.0	643.2	0.068
CD (P=0.05)	2,634	2,047	0.21

Economics

The higher gross return was obtained with the poultry manure tried, which was superior to all the treatments (Table 4). The next best treatment was vermicompost, which was however comparable with farm yard manure. Control resulted in the Lower gross return. Poultry manure produced the higher net return and B C ratio which was significantly superior to all other remaining treatments. This was followed by farm yard manure and the next best treatment was control. The lower net return and B C ratio was observed with vermicompost. Higher gross return might be because of better nutrition to the crop resulting in higher grain and haulm yield. Similar findings were reported by Yadav and Tripathi (2013) and Rao *et al.* (2013).

As regards the organic sprays, the higher gross return, net return and B C ratio were recorded with *panchagavya*, which was at par with *jeevamrutha*. Lower gross return was obtained with control. Higher gross return might be because of better nutrition to the crop due to steady application of organic sprays resulting in higher grain and haulm yield.

Hence, the experiment concluded that the high green gram production was possible with pre sowing incorporation of poultry manure @ 2 t ha^{-1} and spraying of 3 % *panchagavya* with 10 days interval.

REFERENCES

1. Anil Kumar Yadav, Kins Varghese and Thomas Abraham. 2007. Response of biofertilizer, poultry manure and different levels of phosphorus on nodulation and yield of green gram (*Vigna radiata* L.) CV. K-851. *Agricultural Science Digest*. 27 (3): 213-215.
2. Chaudhari, I. A., Patel, D. M., Patel, G. N and Patel, S. M. 2013. Effect of various organic sources of nutrients on growth and yield of summer green gram [*Vigna radiata* (L.) Wilczek]. *Crop Research.* 46 (1- 3): 70-73.
3. Chhonkar, P. K. 2002. Soil research in India – some oversights and failures. *Journal of Indian Society of Soil Science*. 50(4): 382-432.
4. Jadhav, R.L and Kulkarni., S. 2016. Effect of foliar spray of nutrients on productivity of green gram (*Vigna radiata*) in North Eastern transitional zone of Karnataka, India. *Legume Research*. 39 (5): 817-819.
5. Patil, S.V., Halikatti, S.I., Hiremath, S.M., Babalad, H.B., Sreenivasa, M.N., Hebsur, N.S and Somanagouda, G. 2012. Effect of organics on growth and yield of chickpea (*Cicer arietinum* L.) in vertisols. *Karnataka Journal of Agricultural Science.* 25 (3): 326-331.
6. Rao, K. T., Upendra Rao, A and Srinivasula Reddy, D. 2013. Residual effect of organic manures on growth, yield and economics of green gram in maize-sunflower-green gram system. *International Journal of Agricultural Sciences.* 9(1): 275-279.
7. Singh, R.V., Tripathi, S.K and Singh, R. P. 2015. Effect of integrated nutrient management on productivity, nutrient uptake and economics of green gram (*Vigna radiata* L.) in custard apple-based agri-horti system under rainfed condition. *Current Advances in Agricultural Sciences.* 7(1): 76-78.
8. Somasundaram, E., Sankaran, N., Meena, S., Thiyagarajan, TM., Chandaragiri, K and Panneerselvam, S. 2007. Response of green gram to varied levels of *panchagavya* (organic nutrition) foliar spray. *Madras Agricultural Journal.* 90(1-30): 169-172.
9. Swaminathan, C., Swaminathan, V and Vijayalakshmi, V. 2007. *Panchagavya* Boon to Organic Farming. International Book Distributing Co., India. www.indiastat.com
10. Yadav, A.K., Varghese, K and Abraham, T. 2007. Response of biofertilizer, poultry manure and different levels of phosphorus on nodulation and yield of green gram (*Vigna radiata* L.) CV. K-851. *Agricultural Science Digest*. 27 (3): 213-215.
11. Yadav, P and Tripathi, A.K. 2013. Growth and yield of green gram (*Vigna radiata*) under foliar application of *panchgavya* and leaf extracts of endemic plants. *Indian Journal of Agronomy.* 58 (4): 618-621.