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Response of Greengram to Different Level of Phosphorus and Organic Liquid Fertilizer on Yield, Quality, Nutrient Content and Uptake

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A B S T R A C T

An experiment was conducted with three levels of phosphorus (0, 20 and 40 kg/ha) and three levels of spraying of Novel organic liquid fertilizer @ 10 ml/liter (at branching, at flowering and at branching and flowering both) to study the effect of phosphorus and organic liquid fertilizer on yield, quality and nutrient content and uptake. An application of 40 kg P_2O_5/ha was recorded significantly higher seed yield (1168 kg/ha), haulm yield (2475 kg/ha), protein content (19.34 %), N (3.09% and 0.59%) and P (0.71 and 0.58%) content in seed and haulm over control, respectively. Remarkable improvement in uptake of N, P and K by seed and haulm as well as maximum net realization of ₹ 55302/ha and BC ratio were also recorded under the same treatment. The seed (1139 kg/ha) and haulm (2368 kg/ha) yield were produced significantly higher under spraying of Novel liquid fertilizer @10 ml/liter of water at branching and flowering stage. Protein, N, P and K content in seed and P and K content in haulm did not affected significantly by spraying of organic liquid fertilizer, however, N content in haulm was found remarkably higher under the same treatment. The uptake of N (35.09 & 13.96 kg/ha), P (7.93 & 12.92 kg/ha) and K (23.43 & 13.96 kg/ha) by seed and haulm were registered significantly higher under the spraying of Novel liquid fertilizer @10 ml/liter of water at branching and flowering stage over control. Net return (₹ 52631/ha) and BC ratio (3.43) were also found maximum under the same treatment.

Introduction

Greengram is the third important pulse crops in our country after pigeon pea and chickpea and main sources of vegetable protein as far as an Indian dietary is concerned. Greengram is major sources of vitamins *viz.*, riboflavin, thiamine, niacin and minerals such as calcium, phosphorus, iron, sodium, potassium. It covers in area of 3.42 million hectares with 1.70 million metric tones and productivity of 497 kg/ha. Nutrient management is one of the important agronomic practices for increasing crop yield and maintaining soil fertility. Growth and development of crops depend largely on the development of root system. Phosphorus (P) is one of the most important elements among

the three macronutrients that plants must require for the better growth and development. Addition of P fertilizer enhances root development, which improves the supply of other nutrients and water to the growing parts of the plants, resulting in an increased photosynthetic area and thereby more dry matter accumulation. Non-addition of P in soil leads to decreasing the yield and quality of the crop.

Foliar application of major plant nutrients like nitrogen and potassium was found to be as good as soil application (Subramanian and Palaniappan, 1981). Foliar application of nutrients is one of the possible ways to avoid such loss of fertilizer. It has been well established that most of the plant nutrients are absorbed through the leaves and absorption would be remarkably rapid and nearly complete. Moreover, foliar feeding practice would be more useful in early maturing crops which could be combined with regular plant protection programs. If foliar nutrition is applied, it reduces the cost of cultivation which in turn reduces the amount of fertilizer thereby reducing the loss and also economizing crop production. Foliar nutrition can be adopted wherever possible except for unavailable circumstances where soil application is only feasible. There is little research work has been done on foliar application with phosphorus level of nutrients on summer greengram variety Meha under south Gujarat condition.

Materials and Methods

A field experiment was conducted during *summer* season of 2016 at the college farm, Navsari Agricultural University, Navsari in factorial randomized block design with four replications. The soil of the experimental field was clayey in texture having medium to poor drainage EC 0.36 dS/m and soil pH 8.14. The soil is low in organic carbon (0.35%) and available nitrogen (150.23 kg/ha), medium in available phosphorus (46.16 kg/ha) and fairly rich in available potassium (307.81kg/ha) content. Total nine treatment combination compressing of three levels of phosphorus *viz*., P_0 (0 kg P_2O_5/ha), P_1 (20 kg P_2O_5/ha) and P_2 (40 kg P_2O_5/ha) and three levels of spraying of organic liquid fertilizer *viz*., O_1 (Spraying of Novel liquid fertilizer @10 ml/liter of water at branching), O_2 (Spraying of Novel liquid fertilizer @10 ml/liter of water at flowering) and O_3 (Spraying of Novel liquid fertilizer @10 ml/liter of water at branching and flowering) were applied to crop. Greengram variety "Meha" seeds were sown at 30 cm x 10 cm spacing. The entire dose of recommended nitrogen and phosphorus applied at basal application just before sowing as well as spraying of organic liquid fertilizer were applied as per the treatments. Urea and single super phosphate were taken as fertilizer sources for N and P, respectively. For estimation of nitrogen, phosphorus and potash content in seed and plant representative sample was drawn from the produce of each plot. The samples were oven dried at 65^0c for 24 hours, powered by mechanical grinder and nutrients were estimated using the following methods for nitrogen (Modified Kjeldahl's method), phosphorus (Vanadomolybdo phosphoric acid yellow colour method) and potash (Flame photometric method) suggested by Jackson (1967). Uptake of nutrients by seed and plant was calculated by using following formula:

$$\text{Nutrient uptake (kg/ha)} = \frac{\text{Nutrient content (\%) x seed / haulm yield (kg/ha)}}{100}$$

Results and Discussion

Effect of phosphorus

It is evident from the results presented in Table 1 that successive increased in graded

dose of phosphorus had significant differences on seed yield, haulm yield, protein content and protein yield. An application of 40 kg P_2O_5/ha was produced significantly the highest seed yield (1168 kg/ha) and haulm yields (2475 kg/ha) as compared to control, but it was at par with 20 kg P_2O_5/ha in case of seed yield (1081kg/ha). The magnitude of increased in green gram seed yield of 30.80 per cent and haulm yield of 17.68 per cent under the application of 40 kg P_2O_5/ha over control. The increases in seed and haulm yield with increased in the levels of phosphorus were mainly due to cumulative effect of improvement in the growth and yield attributing characters. The results were supported by the findings of Gupta *et al.,* (2006), Ghanshyam *et al.,* (2010), Patel *et al.,* (2013), Bairwa *et al.,* (2014). Phosphorus applied @ 40 & 20 kg/ha being at par but produced significantly the highest protein content of 19.34 and 19.17 per cent and protein yield of 226.20 & 207.59 kg/ha over control (18.29 % and 163.02 kg/ha), respectively. The increase in protein content with increased phosphorus levels was probably due to efficient and effective root system develop, which helps in more fixation of atmospheric N in soil. Moreover, increasing in the availability of phosphorus might have favorably influenced nitrogen uptake by plants and ultimately accumulated in seeds as protein. The increase in protein yield was mainly due to higher seed yield coupled with higher protein content under same treatment. Similar type of results was also found by Gangaihah and Ahlawat (2008), Kumawat *et al.,* (2009), Wagadre *et al.,* (2010), Chesti *et al.,* (2012), Patel *et al.,* (2013), Yadav *et al.,* (2013), Nyekha *et al.,* (2015) and Rathour *et al.,* (2015).

The concentration of K in seed and haulm was not affected significantly. While, N and P content in seed and haulm were significantly influenced by the different level of phosphorus (Table 2). Significantly higher nitrogen and phosphorus content in seed (3.09 % and 0.71 %) and haulm (0.59 % and 0.58 %) of greengram were recorded with an application of 40 kg P_2O_5/ha over control, respectively, which was at par with application of 20 kg P_2O_5/ha. Non significantly, but numerically higher K content in seed (2.04 %) and haulm (0.62 %) were found under the same treatment. This might be due to the fact that plant absorbed proportionately high amount of N and P as the pool of available phosphorus increased in the soil by adding higher doses of phosphorus. These findings are substantiated with those reported by Kumawat *et al.,* (2009), Yadav *et al.,* (2013), Kumar *et al.,* (2014) and Patel *et al.,* (2014) with respect to N, P_2O_5 and K_2O content in seed and haulm.

However, the difference in uptake of all these nutrients by seeds and haulm were remarkably differed with different levels of phosphorus (Table 2). An application of 40 kg P_2O_5/ha showed significantly superior in case of uptake of N, P and K by seed and haulm over rest of the treatments, except the N and K_2O uptake by seed and K_2O uptake by haulm under the treatments P_1. The higher uptake of these nutrients by seed and haulm might be due to increasing the yield of seed and haulm coupled with increase in concentration of these nutrients under the same treatment. Similar trend was also observed in case of total uptake of nitrogen, phosphorus and potassium by crop. These results are in accordance with Gangaiah and Ahlawat (2008), Ghanshyam *et al.,* (2010), Singh and Singh (2012), Singh *et al.,* (2013), Bairwa *et al.,* (2014) and Nyekha *et al.,* (2015).

The net realization and benefit cost ratio increased with successive increase in phosphorus levels. An appraisal of data given in Table 1 revealed that the maximum gross

realization of 76268 ₹ /ha, net realization of 55302 ₹ /ha and BCR of 3.64 were secured with phosphorus application @ 40 kg P_2O_5/ha. This might be due to the highest grain and haulm yields were recorded under same treatment (P_2) as compared rest of treatments. The results confirm the findings of Bairwa *et al.,* (2012), Kumawat *et al.,* (2013), Gajera *et al.,* (2014) and Rathour *et al.,* (2015).

Effect of organic liquid fertilizer

The variation in seed yield was significantly differed due to various treatments of spraying of organic liquid fertilizer whereas, haulm yield did not differed significantly by the spraying of organic liquid fertilizer (Table 1). Significantly the highest seed yield (1139 kg/ha) was obtained under treatment O_3 (Spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage) over treatment O_1 (975 kg/ha), but it was at par with treatment O_2 (Spraying of novel liquid fertilizer @ 10 ml/liter of water at flowering stage). Haulm yield (2368 kg/ha) of greengram was observed maximum under the same treatment of O_3. The per cent increasing in the seed yield of 16.82 % and haulm yield of 9.48 % were noticed due to the spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage over treatment O_1. The increases in seed yield might be due to adequate supply of nutrients with easy availability to plant at most critical growth period resulted into better growth. The better growth of crop ultimately diverted more energy under sink source relationship which helped in providing more yield. Similar results were also reported by Titare *et al.,* (2005), Choudary and Yadav (2011), Verma *et al.,* (2011), Kumar *et al.,* (2013) and Sengupta and Tamang (2015).

Protein content of greengram did not affected significantly by any treatments, but protein yield had remarkable variation due to spraying of organic liquid fertilizer (Table 1). Significantly the highest protein yield (219.30 kg/ha) was recorded due to spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage (O_3) over rest of the treatments.

Similarly, protein content was also found maximum under the treatments O_3. The improvement in protein yield might be due to higher seed yield of greengram couple with protein content under the treatment of spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage. These finding are in agreement with the experimental results reported by Verma *et al.,* (2011), Choudary and Yadav (2012), Doss *et al.,* (2013) and Tahir *et al.,* (2014).

The spraying of organic liquid fertilizer at different crop stages failed to exert any significant variation in nitrogen, phosphorous and potassium content in seed and haulm of greengram, except the N content in haulm (Table 2). Nitrogen content in haulm (0.59%) was found significantly higher with the spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage over other treatment O_1 (0.50 %), which was remained at par with the treatment O_2. None significantly but numerically higher value of N (3.07%), P (0.69%) and K (2.05%) content in seed and P (0.54%) and K (0.66%) content in haulm were also found under the same treatment of O_3. The increase in nitrogen content in haulm might be attributed due additional application of nutrients through foliar application of novel liquid fertilizer at critical crop growth stage of crop resulted in accumulation of more nitrogen in haulm.

These findings are in agreement with the experimental results reported by Verma *et al.,* (2011) for greengram and Yadav and Choudhary (2012) for cowpea.

Table.1 Effect of phosphorus and Novel liquid fertilizer on seed and haulm yield, protein content and economics of green gram

Treatment	Seed yield (kg/ha)	Haulm yield (kg/ha)	Protein content (%)	Protein yield (kg/ha)	Gross realization (₹ /ha)	Cost of production (₹ /ha)	Net realization (₹ /ha)	BCR
Phosphorus application (P_2O_5) kg/ha								
P_0 – 0	893	2103	18.29	163.02	58838	20019	38819	2.94
P_1 – 20	1081	2210	19.17	207.59	70385	20492	49893	3.43
P_2 – 40	1168	2475	19.34	226.20	76268	20965	55302	3.64
S. Em. ±	37.39	60.75	0.26	7.59				
C.D. (P=0.05)	109.13	177.34	0.77	22.16				
Spraying of Novel liquid fertilizer								
O_1 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at branching	975	2163	18.63	182.10	63908	20985	42923	3.05
O_2 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at flowering	1028	2256	18.96	195.40	67320	20985	46335	3.21
O_3 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at branching and flowering	1139	2368	19.20	219.30	74260	21629	52631	3.43
S. Em. ±	37.39	60.75	0.26	7.59				
C.D. (P=0.05)	109.13	NS	NS	22.16				
CV%	12.37	9.30	4.84	13.22				

Table.2 Effect of phosphorus and organic liquid fertilizer on nutrient content and uptake in seed & haulm and total uptake of Greengram

Treatment	N content (%)		N uptake (kg/ha)		Total N uptake (kg/ha)	P content (%)		P uptake (kg/ha)		Total P uptake (kg/ha)	K content (%)		K uptake (kg/ha)		Total K uptake (kg/ha)
	Seed	Haulm	Seed	Haulm		Seed	Haulm	Seed	Haulm		Seed	Haulm	Seed	Haulm	
Phosphorus application (P_2O_5) kg/ha															
P_0 – 0	2.93	0.51	26.08	10.71	36.79	0.61	0.46	5.47	9.75	15.22	1.96	0.60	17.51	12.63	30.15
P_1 – 20	3.07	0.53	33.21	11.77	44.98	0.65	0.51	7.10	11.18	18.28	2.03	0.62	22.04	13.65	35.69
P_2 – 40	3.09	0.59	36.19	14.64	50.84	0.71	0.58	8.34	14.44	22.79	2.04	0.62	23.84	15.40	39.23
S. Em. ±	0.04	0.02	1.21	0.54	1.31	0.02	0.02	0.32	0.62	0.72	0.04	0.03	0.94	0.60	1.19
C.D. (P=0.05)	0.12	0.06	3.55	1.59	3.83	0.06	0.07	0.93	1.80	2.11	NS	NS	2.76	1.75	3.48
Spraying of Novel liquid fertilizer															
O_1 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at branching	2.98	0.50	29.14	10.74	39.88	0.62	0.48	6.08	10.52	16.60	1.97	0.58	19.24	12.47	31.71
O_2 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at flowering	3.03	0.55	31.26	12.42	43.68	0.67	0.52	6.90	11.92	18.82	2.01	0.60	20.72	13.64	34.36
O_3 – Spraying of Novel liquid fertilizer @ 10 ml/liter of water at branching and Flowering	3.07	0.59	35.09	13.96	49.05	0.69	0.54	7.93	12.92	20.86	2.05	0.66	23.43	15.58	39.00
S. Em. ±	0.04	0.02	1.21	0.54	1.31	0.02	0.02	0.32	0.62	0.72	0.04	0.03	0.94	0.60	1.19
C.D. (P=0.05)	NS	0.06	3.55	1.59	3.83	NS	NS	0.93	1.80	2.11	NS	NS	2.76	1.75	3.48
CV%	4.84	13.86	13.22	15.25	10.27	11.40	15.86	15.88	18.16	13.35	6.90	14.22	15.49	14.94	11.78

The remarkable variations in uptake of all major nutrient viz. N, P and K by seed and haulm as well as total uptake of all these nutrients by plant were observed due to spraying of organic liquid fertilizer. The uptake of N (35.09 & 13.96 kg/ha), P (7.93 & 12.92 kg/ha) and K (23.43 & 15.8 kg/ha) by seed and haulm of greengram were found significantly higher under treatment O_3 (spraying of novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage) over treatment O_1, respectively. Foliar fertilization also stimulates plant metabolism which enhances total nutrient uptake by the plant. Further, seed and haulm yield of crop improved couple with the content of nutrients resulted in uptake of nutrients. Total uptake of nitrogen, phosphorus and potassium by crop were also registered significantly higher under the same treatment (O_3) over the treatment O_1. Almost similar types of results were also reported by Upperi *et al.,* (2011) and Kuttimani and Velayutham (2011) in greengram and Yadav and Choudhary (2012) in cowpea.

A perusal of data presented in Table 1 revealed that spraying of novel liquid fertilizer @10 ml/liter of water at branching and flowering stage recorded maximum gross realization of ₹ 74260 ha^{-1}, net realization of ₹ 52631 ha^{-1} with BCR of 3.43, which was followed by gross realization of ₹ 67320 ha^{-1}, net realization of ₹ 46335 ha^{-1} with BCR of 3.21 under treatment O_2. Similar views in direction of present finding were also expressed by Ganiger *et al.,* (2003), Chandrasekhar and Bangarusamy (2003).

Base on the result of the experiment, it can be concluded that for getting more profitable yield and net monetary returns of greengram, it should fertilized with application of 20 kg P_2O_5/ha and spraying of Novel liquid fertilizer @ 10 ml/liter of water at branching and flowering stage in *summer* season under South Gujarat condition.

References

Bairwa, R. K., Nepalia, V., Balai, C. M., Jalwania, R. and Meena, H. P. 2014. Yield and nutrient uptake of *summer* greengram (*Vigna radiata* L.) under different levels of phosphorus and sulphur fertilizations. *SAARC Journal of Agriculture*, 12(1): 162-172.

Bairwa, R. K., Nepalia, V., Balai, C. M. and Upadhyay, B. (2012). Effect of phosporus and sulphur on yield and economics of *summer* greengram (*Vigna radiata* L.). *Madras Agricultural Journal*, 99(7-9): 523-525.

Chandrashekhar, C. N. and Bangarusamy, U. (2003). Maximizing the yield of mungbean by foliar application of growth regulating chemicals and nutrients. *Madras Agricultural Journal*, 90(1-3): 142-145.

Chesti, M. H., Tahir Ali and Bhat, M. A. 2012. Effect of organic and inorganic phosphorus sources on quality of greengram (*Vigna radiatus*) under temperate condition of Jammu and Kashmir. *Legume Research*, 35(1): 47-49.

Choudhary, G. L. and Yadav, L. R. 2011. Effect of fertility levels and foliar nutrition on cowpea productivity. *Journal of food Legumes*, 24(1): 67-68.

Doss, A., Anand, S. P. and Keerthiga, M. (2013). Effect of foliar application of diammonium phosphate (DAP), potash (K) and naphthalene acidic acid (NAA) on growth, yield and some biochemical constituents of black gram. *Woodpecker Journal of Agricultural Research*, 2(7): 206-208.

Gajera, R. J., Khafi, H. R., Raj, A. D., Yadav, V. and Lad, A. N. (2014). Effect of phosphorus and bio-fertilizers on growth yield and economics of *summe*r green gram (*Vigna radiatus* (L.) Wilczek). *Agriculture Update*, 9(1): 98-

102.

Gangaiahe, B. and Ahlawat, I. P. S. 2008. Response of chickpea (*Cicer arietinum*) to seedling time and phosphorus and their effects on succeeding baby corn (*Zea mays*). *Indian Journal of Agronomy*, 53(1): 42-46.

Ganiger, T. S., Kareekatti, S. R. and Patil, B. S. 2003. Economics use of plant growth regulators and urea in cowpea. *Karnataka Journal of Agricultural Science*, 16(1): 35-38.

Ghanshyam., Kumar, R. and Jat, R. K. 2010. Productivity and soil fertility as affected by organic manures and inorganic fertilizers in greengram (*Vigna radiatus*) – wheat (*Triticum aestivum)* system. *Indian Journal of Agronomy*, 55(1): 16-21.

Jackson, M. L. (1967). Soil Chemical Analysis. Prentice Hall of India Pvt. Ltd., New Delhi. pp: 205.

Kumar, C. V., Vaiyapuri, K. V., Mohamedamanullah, M. and Gopalaswamy, G. 2013. Influence of foliar spray of nutrients on yield and economics of soybean (*Glycine Max* L. Merill). *Journal Biological Sciences*, 13(6): 563-565.

Kumar, S., Kumar, S., Singh, O. and Singh, B. P. 2014. Effect of phosphorus and sulphur fertilization on productivity and nutrient uptake of pigeonpea (*Cajanus cajan* L.). *Annals of Agricultural Research New Series*, 35(1): 54-57.

Kumawat, N., Kumar, R. and Sharma, O. P. 2009. Nutrient uptake and yield of mungbean (*Vigna radiatus* (L.) Wilczek) as influenced by organic manures, PSB and phosphorus fertilization. *Environment & Ecology*, 27(4B): 2002-2005.

Kumawat, P. K., Tiwari, R. C., Golada, S. L., Godara, A. S., Garhwal, R. S. and Choudhary, R. (2013). Effect of phosphorus sources, levels and biofertilizers on yield attributes, yield and economics of blackgram. *Legume Research,* 36(1): 70-73.

Kuttimani, R. and Velayutham, A. 2011. Foliar application of nutrients enhance the yield attributes and nutrient uptake of greengram. *Agricultural Science Digest*, 31(3): 202-205.

Meena, L. R., Singh, R. K. and Gautam, R. C. 2006. Effect of moisture conservation practices, phosphorus levels and bacterial inoculation on growth, yield and economics of chickpea. *Legume Research*, 29(1): 68-72.

Nyekha, N., Sharma, Y. K., Sharma, S. K. and Gupta, R. C. 2015. Influence of phosphorus and phosphorus solubilising bacteria on performance of green gram and soil properties. *Annals of Plant and Soil Research,* 17(3): 323-325.

Patel, H. K., Patel, P. M., Suthar, J. V. and Patel, M. R. 2014. Yield, quality and post harvest nutrient status of chickpea as influence by application of sulphur and phosphorus fertilizer management. *International Journal of Scientific and Research Publication,* 4(7): 1-3.

Patel, H. R., Patel, H. F., Maheriya, V. D. and Dodia, I. N. 2013. Response of *kharif* greengram (*Vigna radiatus* L. Wilczek) to sulphur and phosphorus fertilization with and without bio-fertilizer application. *The Bioscan*, 8(1): 149-152.

Rathour, D. K., Gupta, A. K., Choudhary, R. R. and Sadhu, A. C. 2015. Effect of integrated phosphorus management on growth, yield attributes and yield of *summer* green gram (*Vigna radiatus* L.). *The Bioscan*, 10(1): 05-07.

Sengupta, K. and Tamang, D. 2015. Response of greengram to foliar application of nutrients and berassinolide. *Journal of crop and weed*, 11(1): 43-45.

Singh, A. K. and Singh, R. S. 2012. Effect of phosphorus and bio inoculants on yield, nutrient uptake and economics of long

duration pigeon pea (*Cajanus cajan* L.). *Indian Journal of Agronomy*, 3(1): 194-196.

Singh, R., Malik, J. K., Thenua, O. V. S. and Jat, H. S. 2013. Effect of phosphorus and bio-fertilizer on productivity, nutrient uptake and economics of pigeonpea (*Cajanus cajan*) + mungbean (*Phaseolus radiatus*) intercropping system. *Legume Research*, 36(1): 41-48.

Subramanian, A. and Palaniappan, S. P. 1981. Effect of methods of planting, plant density and fertilization on yield of blackgram in irrigated system. *Madras Agricultural Journal*, 68(2): 96-99.

Tahir, M., Maqbool, R., Majeed, A., Rehman, A. and Zafar, M. A. (2014). Potential of foliar applied diammonium phosphate (DAP) and potassium (K) in achieving maximum productivity and quality of mash bean (*Vigna mungo* L.). *Scientia Agriculturae*, 7(3): 147-149.

Titare, P. S., Deotale, R. D., Chore, C. N. and Balachandran, S. 2005. Effect of nutrients and hormones on yield and yield contributing parameters of greengram. *Journal of Soils and Crops*, 15(2): 419-423.

Upperi, S. N., Anand, S. R., Ashoka, P., Sanjey, M. T., Priya, P. and Sunitha, N. H. 2011. Long term effect of organic and inorganic sources of nutrients on soil properties and uptake of nutrients on greengram. *Journal of Environment and Ecology*, (29): 428-431.

Verma, C. K., Yadav, D. D. and Singh, V. 2011. Effect on yield and quality of greengram (*Vigna radiatus* L.) varieties by foliar spray of urea and seed rates. *Plant archives*, 11(1): 289-291.

Wagadare, N., Patel, M. V. and Patel, H. K. 2010. Response of *summer* greengram (*Vigna radiatus* L.) to vermicompost and phosphorus with and without PSB inoculation. State level seminar on organic farming, Navsari, Gujarat. Pp-111-114.

Yadav, H., Shekh, M. A., Takar, S. S., Kherawat, B. S., Shivran, A. and Agrawal, M. C. 2013. Effect of phosphorus and sulphur on content, uptake and quality *summer* soybean. *International Journal of Agricultural Science*, 9(1): 91-94.

Yadav, L. R. and Choudhary, G. L. 2012. Effect of fertility levels and foliar nutrition on profitability, nutrient content and uptake of cowpea [*Vigna unguiculata* (L.) Walp]. *Legume Research*, 35(3): 258-260.

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