E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(1): 320-321
Received: 02-11-2023
Accepted: 05-12-2023

Gouri More
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

PS Sawant
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

NH Khobragade
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

NA Meshram
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

VA Rajemahadik
Department of Agronomy, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

SV Pawar
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

Corresponding Author:
Gouri More
Department of Soil Science and Agricultural Chemistry, Dr. B.S.K.K.V, Dapoli, Ratnagiri, Maharashtra, India

Effect of different sources of phosphorus on soil properties, growth, yield, quality and nutrient content in green gram (*Vigna radiata* L.)

Gouri More, PS Sawant, NH Khobragade, NA Meshram, VA Rajemahadik and SV Pawar

DOI: https://doi.org/10.33545/2618060X.2024.v7.i1e.233

Abstract
A study was conducted to examine the effect of different sources of phosphorus on soil properties, growth, yield, quality and nutrient content in green gram (*Vigna radiata* L.) in the soil at Department of Agronomy, College of Agriculture, Dapoli during *Summer* season of 2022 in Randomized Blok Design comprising eight treatments replicated thrice. It was found from the study that the growth parameters, yield contributing characters, seed and Stover yield, quality parameter *viz*., protein content, nutrient content and uptake had recorded the highest favourable parameters and there was a significant increase in soil organic carbon, available macronutrients (N, P and K), micronutrients (Fe, Mn, Zn and Cu) contents and optimum net return with good B:C ratio, with the application of 80% N and 100% P_2O_5 through DAP (with 20% N through Urea), followed by the application of N (100%) through Urea and P_2O_5 (100%) through SSP. Thus, the effectiveness of P fertilizers with regard to seed yield follow the order: DAP > SSP > RP.

Keywords: Green gram, Rockphosphate, Single superphosphate, Diammonium phosphate

1. Introduction
Green gram (*Vigna radiata* L.) or Mung bean which belongs to family Fabaceae is one of the important pulse crop grown in summer as well as in rainy season. It is the third important pulse crop (after chickpea and pigeon pea) grown throughout India for its multipurpose uses as vegetable, pulse, fodder and green manure crop. It contains protein, carbohydrates, fat and fibres in range of 21-25%, 60-65%, 1-1.5%, respectively. Its seeds are more palatable, nutritive, digestible and non-flatulent than other pulses. It occupies a good position due to its high seed protein content and ability to store the soil fertility through symbiotic nitrogen fixation.
In India mung bean is grown on 4.5 million ha with total production of 2.5 million tonnes with a productivity of 548 kg ha^{-1}. The average yield of mung bean is quite low. Mung bean grown in summer gives better yield than in rainy season, as summer crop is almost free from infestation of insects, pests and diseases. However, the productivity of mung bean in summer is low due to the main constraint of nutrient availability.
The main reason of low productivity of mung bean agrology is due to improper use of fertilizer doses. Phosphorus (P) is an essential nutrient next to nitrogen for plant growth. Indian soils are poor in available phosphorus. So, the role of P in pulses is more important than any other nutrient. Phosphorus has been identified as one of the most limiting nutrient in crop production which results in reduced vegetative growth, secondary branches, leaf development and finally the yield of mung beans in all types of soil.
Additional supply of phosphorus is necessary for maintaining the crop growth and improving the nutritional profile of dry matter and potential benefits from biological nitrogen fixation. Phosphorus applications increase the plant biomass and improve its protein contents.

2. Material and methods
The field experiment was conducted at Farm of Department of Agronomy, College of Agriculture, Dapoli, Dist. Ratnagiri during summer 2022. The field experiment during Summer

2022 was laid out in Randomized Block Design with four treatments combinations replicated thrice. Nitrogen and phosphorus were supplied to the green gram crop through the RDF (25:50:00 NPK kg ha^{-1}). Nitrogen was supplied through Urea. Three different sources of phosphorus were supplied *i.e.*, Rock phosphate, Single Super Phosphate and Diammonium Phosphate respectively. No dose of potassium was applied. Different treatments were T_1 absolute control, T_2 PSB (seed treatment), T_3 N (100%) through Urea and P_2O_5 (100%) through SSP, T_4 N (100%) through Urea and P_2O_5 (100%) through SSP + PSB, T_5 N (100%) through Urea + P_2O_5 (100%) through rock phosphate, T_6 N (100%) through Urea + P_2O_5 (100%) through rock phosphate + PSB, T_7 N (80%) and P_2O_5 (100%) through DAP + N (20%) through Urea and T_8 N (80%) and P_2O_5 (100%) through DAP + N (20%) through Urea + PSB. The fertilizers namely urea, di-ammonium phosphate, rock phosphate and single super phosphate were purchased from the market. The green gram variety TMB 37 sown by dibbling the seeds at a spacing of 30 x 15 cm by using seed rate @ 15 kg ha^{-1}.

Tr. No.	Treatment	No. of Pods plant^{-1}	Grain Yield (kg ha^{-1})	Stover Yield (kg ha^{-1})
T_1	Absolute control (no fertilizers)	22.03	364.00	549.93
T_2	PSB (seed treatment)	24.47	400.33	680.60
T_3	N (100%) through Urea and P_2O_5 (100%) through SSP	27.23	614.00	900.50
T_4	N (100%) through Urea and P_2O_5 (100%) through SSP + PSB	28.37	639.67	947.00
T_5	N (100%) through Urea + P_2O_5 (100%) through rock phosphate	26.50	468.67	636.67
T_6	N (100%) through Urea + P_2O_5 (100%) through rock phosphate + PSB	27.00	503.67	705.33
T_7	N (80%) and P_2O_5 (100%) through DAP + N (20%) through Urea	28.40	629.00	913.97
T_8	N (80%) and P_2O_5 (100%) through DAP + N (20%) through Urea + PSB	30.33	647.00	952.17
SE (m) ±		0.98	27.32	72.81
CD 5%		2.99	82.87	220.86

Result and Discussion

Growth and Yield of green gram

In the current experiment, the application of inorganic phosphatic fertilizers significantly affected the morphological features and plant height. Analysis of the data showed that the height of the green gram plant gradually increased from the time of flowering until the time of harvest. The application of various phosphorus sources has a major impact on the yield of seeds. The data showed that the lowest grain yield was observed in treatment T_1 (absolute control), where no fertilizers. Application of different sources of phosphorus significantly affected the seed yield of green gram over control (T_1). The application of SSP, rock phosphate and DAP displayed a significant increase in growth characteristics over various treatments. It appears that greater translocation of photosynthates from source to sink might have increased seed yield (Lokhande *et al*., 2019) [5]. The superior performance due to the application of DAP fertilizer with respect to pod plant^{-1} in the present study has got the similarity with the findings of Kumawat *et al*. (2013) [4] who compared the performance of P sources *viz.*, DAP, SSP and Phosphate rich organic manure in black gram. The marked improvement in yield attributes of green gram due to the significant improvement in growth parameters with the application of RDF along with biofertilizers in lateritic soils of Konkan was also noticed by Gorade *et al*. (2014) [3].

The improvement in straw yield might be because phosphorus tends to increase growth and development in terms of plant height, branches and dry matter by improving nutritional environment of rhizosphere and plant system leading to higher plant metabolism and photosynthetic activity (Yadav *et al*., 2017) [6].

Quality of greengram

The significantly highest protein content (21.88%) was observed in treatment T_7 consisting of N (100%) through Urea and P_2O_5 (100%) through DAP. According to Dekhane *et al*. (2011) [2], increased phosphate and nitrogen availability may be the cause of the protein increase brought about by seed inoculation.

Nutrient content of green gram

Application of different sources of phosphorus significantly affected the nutrient content in greengram. The data indicated the maximum nutrient content in stover due to the application of DAP fertilizer over SSP and rock phosphate. By and large, the effectiveness of P fertilizers with regard to plant N content follow the order: DAP > SSP > RP. Gorade *et al*. (2014) [3] recorded the increased N, P and K content by green gram was due to increase in grain, stover yields of green gram components under the application of these nutrients through inorganic fertilizers with or without biofertilizers.

References

1. Biswas DR, Subba Rao A, Ganeshamurthy AN. Mobilization of rock phosphate P using fresh cow dung and pyrite. Indian Journal of Agricultural Science. 1996;66:86-90.
2. Dekhane SS, Khafi HR, Raj AD, Parmar RM. Effect of biofertilizer and fertility levels on yield, protein content and nutrient uptake of cowpea. Legume Research. 2011;34(1):51-54.
3. Gorade VN, Chavan LS, Jagtap DN, Kolekar AB. Response of green gram (*Vigna radiata* L.) varieties to integrated nutrient management. Agricultural Science Digest. 2014;34(1):36-40.
4. Kumawat P, Tiwari RC, Golada S, Godara AS, Garhwal R, Choudhary R. Effect of phosphorus sources, levels and biofertilizers on yield attributes, yield and economics of black gram. Legume Research. 2013;36(1):70-73.
5. Lokhande PB, Indulkar BS, Padghan AD, Jadhav LS, Ingole AJ, Patil NM. Effect of phosphorus and zinc on yield and quality parameters of green gram (*Vigna radiata* L.) in Inceptisol. Journal of Pharmacognosy and Phytochemistry. 2019;8(5):899-901.
6. Yadav M, Yadav SS, Kumar S, Yadav HK, Tripura P. Effect of phosphorus and biofertilizers on yield, nutrient content and uptake of urban [*Vigna mungo* (L.) Hepper]. International Journal of Current Microbiology and Applied Sciences. 2017;6(5):2144-2151.