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Effect of different sources of phosphorus with and without PSB on soil properties, growth, yield, quality and nutrient content in green gram (*Vigna radiata* L.)

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Abstract
An investigation was undertaken to study 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 favorable 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 biological properties microbial count (bacteria, fungi and actinomycetes) of the soils indicating build-up of soil fertility, 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: Phosphate solubilizing bacteria, Rock phosphate, single super phosphate, diammonium phosphate

1. Introduction
India is one of the major pulses producing countries contributing about 25% to the global pulse production. Pulses are also an important component of Indian agricultural economy next to foodgrains and oilseeds in terms of acreage, production and economic value (Choudhary 2009) [2]. Pulses are an integral part of vegetarian diet of a large population in India. Besides being a rich source of proteins and essential amino acids; they also maintain soil fertility through biological nitrogen fixation in symbiotic association with Rhizobium bacteria present in their root nodules. Thus, pulses play a vital role as nitrogen fixation, which help in sustaining crop productivity and soil health. Pulses are rich sources of protein and energy but in India, these are largely cultivated under energy starved conditions, mostly on marginal and sub-marginal land and more than three-fourth of the area under pulses is still rainfed resulting in poor crop productivity (Choudhary 2013) [3].
Rock phosphate deposits are found in different parts of the country in India. The total reserves estimated by various agencies are about 260 million tonnes (Biswas *et al*., 1996) [4] but most of the deposits are low grade material unacceptable to the phosphatic industry. Thus, in view of the escalating prices of phosphatic fertilizers and high rate of fixation in soils, attempts are being made to utilize the indigenous low grade rock phosphate as cheap alternate source to more expensive chemically processed water soluble phosphatic introduction fertilizers for direct application for different crops. Rock phosphate has been a good source of phosphorus for acid soils (Marwaha *et al.*, 1984 and Marwaha, 1986) [8, 7] whereas, it has been found to be practically ineffective in neutral and alkaline soils due to its extremely low solubility (Khasawnath and Doll, 1978) [9].

2. Materials and Methods
The field experiment was conducted at the 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}.

3. Results and Discussion

3.1 Growth and Yield of greengram

Application of inorganic phosphatic fertilizers in conjunction with PSB had significant effects on morphological traits on plant height in the current experiment. 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. Application of different sources of phosphorus with and without PSB significantly affected the seed yield. 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. Resulted that application of DAP produced significantly higher pod plant $plant^{-1}$ grains pod^{-1}, which result in concomitant increase in seed, haulm and biological yield ha^{-1}. It appears that greater translocation of photosynthates from source to sink might have increased seed yield (Lokhande *et al*., 2019) [6]. The beneficial effect of phosphorus on fruiting of plants and better translocation of desired metabolites to the yield contributing parts of the plant might attributed to more grain yield (Yadav *et al*., 2017) [10]. Similar findings of reduction in soil pH with the period of crop growth was also reported by Abbasi *et al.* (2015) [1] with SSP, DAP and rock phosphate application.

3.2 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. Dekhane *et al.* (2011) [5] stated that increase in protein by seed inoculation may be attributed to increase availability of nitrogen and phosphorus.

3.3 Nutrient content of greengram

The perusal of data indicated that the inoculation of PSB biofertilizer along with fertilizers application (in treatment T_4, T_6 and T_8) increased the nutrient content over the sole application of fertilizers (in treatment T_3, T_5 and T_7). Increased in nitrogen content with rhizobium might be attributed to higher nodulation which maintained greater supply of nitrogen to the crop. Seed inoculation with these microorganisms increased the availability of phosphorus which was reflected into profuse root growth and there by greater absorption of phosphorus from the soil. The reason for increase in nitrogen content of grain and stover with fertilizer application may be attributed to greater availability of nitrogen and its efficient absorption by the roots (Dekhane *et al*. 2011) [5]. Application of different sources of phosphorus significantly affected the nutrient content in green gram. 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.

4. Conclusion

Thus, considering the grain yield of green gram; nutrient content and uptake by plant, available nutrient status and optimum net returns or B:C ratio, application of 80% N and 100% P_2O_5 through DAP + PSB (with 20% N through Urea) to green gram during *summer* season found to be beneficial to enhance green gram production in lateritic soils of Konkan with increased profit.

5. References

1. Abbasi MK, Musa N, Manzoor, M. Mineralization of soluble P fertilizers and insoluble rock phosphate in response to phosphate-solubilizing bacteria and poultry manure and their effect on the growth and P utilization efficiency of chilli (*Capsicum annuum* L.). Bio geosciences. 2015;12:4607-4619.
2. Choudhary AK. Role of phosphorus in pulses and its management. Indian Farmers' Digest. 2009;42(9):32-4.
3. Choudhary AK. Technological and extension yield gaps in pulses in Mandi district of Himachal Pradesh. Indian Journal of Soil Conservation. 2013;41(1):88-97.
4. 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.
5. Dekhane SS, Khafi HR, Raj AD, Parmar RM. Effect of bio fertilizer and fertility levels on yield, protein content and nutrient uptake of cowpea. Legume Research. 2011;34(1):51-54.
6. 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.
7. Marwaha BC. Direct and residual effect of MRP on soybean grown in sequence with wheat in acid Alfisol. Indian J Agric. Sci. 1986;56(2):101-106.
8. Marwaha BC, Kanwar BS, Tripathi BR. Effectiveness of Mussoorie rock phosphate in an Alfisol as measured by changes in some soil properties under field conditions. Journal of Indian Soc. Soil Sci. 1984;32:381-383.
9. Khasawnath FE, Doll EC. The use of phosphate rock for direct application to soils. Adv. Agron. 1978;30:169-206.
10. Yadav M, Yadav SS, Kumar S, Yadav HK, Tripura P. Effect of Phosphorus and Bio-fertilizers 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.