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Short Communication

Direct Application of Phosphate Rock with Ammonium Sulphate or Along With Organic Manure

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Abstract

The effect of high grade phosphate rock in fine size with ammonium sulphate (AS) or combination of both ammonium sulphate and organic manure with micro-organism (*Phanerochaete crysosporium*) was studied on the growth (biomass) of *Phaseolus vulgaris* L. It showed better Relative Agronomic Efficiency (RAE) than commercially available Di Ammonium Phosphate (DAP).

Key words : Phospate rock, ammonium sulphate, organic manure, DAP,

Introduction

It has been reported that high grade rock phosphate in fine size, along with organic manure shows agronomic efficiency comparable to diammonium phosphate[1, 2]. Interestingly, a treatment with rock phosphate and urea is also reported as efficient, which is conspicuous, for rock phosphate is inert and is not expected to react with urea. In the present study, we tested the effect of high grade phosphate rock in fine size along with ammonium sulphate and combination of ammonium sulphate with organic manure and organic manure alone on the growth of *Phaseolus vulgaris.*

Materials and Methods

Phaseolus vulgaris L (kidney bean*)* seeds used in this study were procured from a local super market in Visakhapatnam, India. Rock phosphate sample with 31. 5 % P_2O_5 was procured from Coromandel Fertilizers Limited, Visakhapatnam (origin Morocco). Sugar cane pressmud was collected from Bhimasinghi Sugar Factory (Vizianagaram south), fungus *Phanerochaete crysosporium* was collected from microbial type culture collection and gene bank (MTCC) and the commercial grade diammonium phosphate with 46% P_2O_5, used as fertilizer, was purchased from local market Visakhapatnam.

Prior to experiments, the diammonium phosphate was sized and sieved to particles lesser than 2.5 mm diameter. Ammonium sulphate from Hi Media Laboratories Limited, Mumbai, India was used without further purification. Double distilled water was used to prepare soil solutions for analysis of pH [3, 4].

The experiments were performed in plastic trays of dimensions 39 x 28 x 6 cm (length x breadth x height), filled with local soil. The temperature fluctuated between 22°C to 32°C, and stayed around 28°C most of the time. The soil was subjected with the following six treatments: (1) Rock Phosphate (31.5/74)@60 kg of P_2O_5 h^{-1} [2] Ammonium Sulphate@16 kg of nitrogen h^{-1} [3] Manure@4 metric tons h^{-1} [4] Di Ammonium Phosphate (DAP)@60 kg of P_2O_5 h^{-1} [5] Rock Phosphate (31.5/74))@60 kg of P_2O_5 h^{-1} + Ammonium Sulphate@16 kg of nitrogen h^{-1} [6] Rock Phosphate (31.5/74))@60 kg of P_2O_5 h^{-1} + Ammonium Sulphate@16 kg of nitrogen h^{-1} + Manure@4 metric tons h^{-1} [7] Normal Soil(Absolute control).

The fertilizers were thoroughly mixed with the soil in individual trays, and watered for two days before initiating the experiment. The trays were divided into six slots, and eighteen *Phaseolus vulgaris* L seeds were sown per slot at 2 cm depth. The plants were

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watered every day. It was ensured that all the trays were uniformly exposed to sunlight. The final biomass was weighed on the day of harvesting.

The sieved soil samples were analyzed for pH using the standard methods [3].

Results and discussion

The stems of the plants were harvested 25 days after sowing and the biomass produced was weighed for each treatment. The results are shown in table 1. The results clearly illustrate that high grade rock phosphate in fine size with ammonium sulphate is much efficient than diammonium phosphate. The efficiency is highest when rock phosphate is applied with ammonium sulphate and organic manure.

Conclusion

The present study shows that the direct application of high grade rock phosphate mineral along with ammonium sulphate is much efficient than diammonium phosphate. The efficiency is highest when rock phosphate is applied with ammonium sulphate and organic manure with micro-organism.

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Table 1: Bio mass production of *Phaseolus vulgaris L*. (kidney bean), after 25 days of sowing. Soil pH 7.56.

Treatment number	Treatment detail	Average biomass per plant (g)	*Relative Agronomic Efficiency (%)
1	Rock Phosphate (31.5/74)@60 kg of P_2O_5 h^{-1}	8.03	343.85
2	Ammonium Sulphate@16 kg of nitrogen h^{-1}	3.29	66.66
3	Manure@4 metric tons h^{-1}	8.28	358.47
4	Di Ammonium Phosphate (DAP)@60 kg of P_2O_5 h^{-1}	3.86	100
5	Rock Phosphate (31.5/74))@60 kg of P_2O_5 h^{-1} + Ammonium Sulphate@16 kg of nitrogen h^{-1}	6.08	229.82
6	Rock Phosphate (31.5/74))@60 kg of P_2O_5 h^{-1} + Ammonium Sulphate@16 kg of nitrogen h^{-1} + Manure@4 metric tons h^{-1}	8.80	388.88
7	Normal Soil(Absolute control)	2.15	Not Applicable

*Percentage (%) Relative Agronomic Efficiency = {(Treatment result- result of normal soil) / (result with DAP- result with normal soil)} X 100.

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