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Influence of rock phosphate and P solubilizers on yield, quality and P uptake in green chilli

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Abstract : Field experiments were conducted during 1997 and 1998 at Kittur Rani Channamma college of Horticulture Farm, Arabhavi in Belgaum district of Karnataka to study the influence of rock phosphate and P solubilizers on yield and quality of green chilli. The results revealed that recommended dose of P_2O_5 (30 kg/ha) applied through rock phosphate along with *Bacillus polymyxa* and vermicompost recorded highest mean fruit yield (74.2 q/ha), ascorbic acid, TSS and P uptake in green chillies over treatments comprising of rock phosphate with or without *Bacillus polymyxa* or vermicompost.

Additional key words : Mussorie rock phosphate, inoculation, P uptake in chilli.

Introduction

Rock phosphate being a cheap and indigenously available source of phosphorus is frequently used along with P solubilizers, organic and chemical amendments (Subehia amd Minhas 1993; Ramamoorthy and Arokiaraj 1997; Dubey 2000) for the dissolution of immobile forms of phosphorus which in turn increased the yield of crops (Thiyageshwari and Rani Perumal 2000). Jagdish-Prasad *et al.* (1998) found that by using bio-organics, the yield of soybean was substantially increased and reduced dependency on inorganic P fertilizer. Through present paper, an attempt has been made to evaluate the effectiveness of rock phosphate and P-solubilizer (*B.ploymyxa*) and vermicompost on yield, ascorbic acid, TSS and P uptake in green chilli.

Materials and Methods

Field experiments were conducted during *Kharif* 1997 and 1998 in medium deep clay loam soil at K.R.C. college of Horticulture, Arabhavi. The soil had pH 8.4, EC 0.38 dsm^{-1}, available N 295 kg/ha, P 19.80 kg/ha and K 906 kg/ha. There were 8 treatments comprising of (T_1): recommend dose of fertilizers (RDF) without

P *ie.*, N and K_2O @ 60, and 30 kg ha^{-1}; (T_2): recommend dose of fertilizers *ie.*, N,P_2O_5 (single super phosphate) and K_2O @ 60,30 and 30 kg ha^{-1}; (T_3): T_2 but P source was rock phosphate; (T_4): T_3 + *B.polymyxa;* (T_5): T_3 + vermicompost @ 1t ha^{-1}; (T_6): T_1 + *B.polymyxa* ; (T_7): T_1 + vermicompost ; (T_8): T_3 + *B.polymyxa* + vermicompost. The treatments were replicated thrice in plot size of 7.5 m X 7.5 m. Vermicmpost had 1.6, 2.2 and 0.67 per cent N, P_2O_5 and K_2O respectively whereas Mussorie rock phosphate had 27.2 per cent total P_2O_5.

Forty days old chilli seedlings (uninoculated and inoculated) were transplanted in the month of July with a spacing of 75cm X 75cm (*cv.* Pusa Jwala). Green chillies were harvested in six pickings. Ascorbic acid and TSS in green chilli were estimated in each picking of both the years by standard method (Ranganna 1991) and the mean values are reported here. Chilli samples from all the pickings were pooled and used for nutrient analysis. Chilli samples were digested with diacid mixture of HNO_3 and $HClO_4$ (10:4 ratio) and phosphorus in the digest was estimated by Vanado Molybdo Phosphoric Yellow Colour Method (Jackson 1967).

Results and discussion

The yield of green chilli ranged from 36.6 to 78.1 q/ha in 1997 and 32.9 to 70.3 q/ha (1998) in different treatments. The decrease in yield in 1998 was the reflection of heavy rainfall which have adversely affected the soil drainability. Use of rock phosphate with P-solubilizer (*Bacillus polymyxa*) and vermicompost significantly increased the green chilli yield over T_1 treatment. The effect of treatments comprising of without rock phosphate with *Bacillus polymyxa* or vermicompost were at par with T_2 treatment and that reflect the role of these components in bringing more soluble P from rock phosphate and/or native soil in the root zone of chilli. The results are in conformity with those of Gaur (1990) and subehia and Minhas (1993). It was observed that the effect of T_2 treatment was larger over T_1 regarding ascorbic acid, TSS and P uptake in green chilli, however treatment T_8 had highest values for these parameters (Table1).

The data further substantiate that vermicompost seems to be more effective than *Bacillus polymyxa* towards yield and quality of green chilli. It seems that vermicompost, apart from its P solubilising effect, must have improved physical condition of soil, increased the availability of nutrients and biological activity of soil.

Thus, it may be concluded that using bio and organic P solubilizers, rock phosphate can efficiently be used as a source of P for chill even in semi- arid environment of Belgaum district of Karnataka.

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Table 1. Influence of rock phosphate and P solubilizers on yield, ascorbic acid. T.S.S and Puptake in green chilli

Treatments	Green chilli yield (q/ha)			Ascorbic acid (mg/100g)			T.S.S. (Brix %)			P uptake (kg/ha)		
	1997	1998	Mean	1997	1998	Mean	1997	1998	Mean	1997	1998	Mean
T_1	36.6	32.9	**34.8**	162.6	160.9	**161.7**	5.6	5.4	**5.5**	11.5	10.7	**11.1**
T_2	65.9	59.3	**62.6**	181.3	179.4	**180.3**	6.7	6.6	**6.7**	28.5	28.3	**28.4**
T_3	47.5	42.7	**45.1**	177.1	175.1	**176.1**	5.9	5.7	**5.8**	11.6	15.1	**13.4**
T_4	66.5	59.8	**63.1**	177.2	175.3	**176.2**	6.4	6.3	**6.4**	30.8	26.2	**28.5**
T_5	69.6	62.6	**66.1**	187.3	179.4	**183.4**	6.6	6.7	**6.6**	35.5	26.2	**30.9**
T_6	52.4	47.6	**50.0**	177.1	175.3	**176.2**	6.8	6.0	**6.4**	17.8	17.8	**17.8**
T_7	57.8	52.0	**54.9**	179.3	177.5	**178.4**	6.3	6.3	**6.3**	21.5	22.3	**21.9**
T_8	78.1	70.3	**74.2**	187.5	194.5	**191.0**	6.6	7.1	**6.9**	41.4	35.1	**38.3**
S.Em ±	4.3	1.6		8.1	6.5		0.4	0.2		1.1	1.50	
CD. 5%	12.8	7.8		24.2	NS		1.0	0.5		3.3	4.70	
CV	12.9	8.3		8.5	6.4		9.5	4.5		7.3	11.6	

carrier based culture of *Bacillus polymyxa.*

References

Dubey, S.K. (2000). Effectiveness of rock phosphate amended with phosphate solubilizing microorganisms in soybean grown on Vertisol. *Journal of the Indian Society of Soil Science* **48**, 71-75.

Gaur, A.C. (1990). *Phosphate solubilising microorganisms as Bio-fertilizers.* Omega scientific publications, New Delhi, p. 176.

Jackson, M.L. (1967). 'Soil Chemical Analysis' Prentice Hall Pvt. Ltd., New Delhi.

Jagdish- Prasad, Hajare. T.N. and Mandal, D.K. (1998). Effect of P solubilizers on soybean grain yield in swelling clay soils. *Journal of the Indian Society of Soil Science* **46**, 368-369.

Ramamoorthy, K. and Arokiaraj,A. (1997). Agronomic effectiveness of organic source and mussoorie rock phosphate to phosphorus economy in rainfed greengram. *Madras Agricultural Journal* **84**, 539-595.

Ranganna, S.(1991). *Handbook of analysis and quality control for fruits and vegetable products.* Tata McGraw Hill Pvt. Ltd., New Delhi.

Subehia, S.K. and Minhas, R.S. (1993). Phosphorus availability for Udaipur rock phosphate as influenced by different organic amendments. *Journal of the Indian Society of Soil Science* **41**, 96-99.

Thiyageshwari, S. and Rani Perumal. (2000) Changes in available phosphorus and grain yield of blackgram (*Vigna mungo*) under intigrated nutrient management in Inceptisol. *Agropedology* **10**, 40-43.

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