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Effect of Soil Conditioner and INM on Yield of Mungbean (Co: 4) Grown on Partially Reclaimed Coastal Salt Affected Soil of South Gujarat, India

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A B S T R A C T

A field experiment was conducted at Coastal Soil Salinity Research Station, Navsari Agricultural University, Danti-Umbharat during *rabi* season of the year 2015-16 on "Effect of soil conditioner and INM on yield of mungbean (var Co: 4) grown on partially reclaimed coastal salt affected soil of South Gujarat". In all 10 treatment combinations consisting of two levels of soil conditioner (G_1= Control, G_2= Gypsum application @ 2 t ha^{-1}), and five levels of INM (Integrated Nutrient Management) (F_1: 100% RDF(20:40:00 NPK kg ha^{-1}), F_2: 100% RDF+ Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB),F_3: 75% RDF+ Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB), F_4: 50% RDF+ Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB) and F_5: Bio-compost @ 5t ha^{-1}) were tried in FRBD (Factorial Randomized Block Design) with four replications. The results revealed that soil conditioner and INM significantly influenced the yield and yield attributes of mungbean. Application of gypsum @ 2 t $ha^{-1}$was found significantly superior over control (G_1: No gypsum) by recording higher values of number of pods per plant (33.1), number of seeds per pod (10.15), seed yield (1130kg ha^{-1}) and stover yield (3829kg ha^{-1}) as compared to rest of the INM levels. The G × F interaction was also found to be significant for all the above characters. In all the cases, treatment G_2F_2recorded 34.90, 10.62, 4065 kg $ha^{-1}$and 1185 kg ha^{-1} values of number of pods per plant, number of seeds per pod, stover yield and seed yield, respectively, which were significantly superior over rest of the treatments. However G_2F_2 in most of the cases remained at par with treatment G_2F_3. The net return as well as a BCR value was also higher with the treatment G_2F_2

Introduction

Mungbean (*Vignaradiata* L. Wilczek) occupies prime position among pulses by virtue of its short growth period and outstanding nutrient value as food, feed and forage. The average yield of mungbean in India is very low because it is generally cultivated on marginal land with poor management practices. There is always short supply of pulses in our country as a result of which there is wide spread prevalence of protein malnutrition in Indian population. In order to resolve this problem, it is rather imperative to increase production of pulses through either enhancing productivity or area expansion by bringing partially reclaimed/marginally salt affected coastal land under pulses cultivation. However, for achieving economically viable yield level of pulses under such situations, special soil and nutrient management practices are required to

be adopted. As the information related to these aspects is lacking, a study on the effect of gypsum and INM on growth and yield of mungbean grown on partially reclaimed coastal salt affected soils of South Gujarat was taken up and the results are presented here.

Materials and Methods

A field experiment was conducted at Coastal Soil Salinity Research Station, Navsari Agricultural University, Danti-Umbharat (Gujarat) during *rabi* season of the year 2015-16. The experimental soil is clayey in texture with low in organic carbon (0.31 g/kg), available N (207kg ha^{-1}) and available P (27.1kg ha^{-1}) but high in available K (2465kg ha^{-1}). In all 10 treatment combinations consisting of two levels of soil conditioner (G_1: Control and G_2: Application of gypsum @ 2t ha^{-1})and five levels of INM (F_1:100% RDF (20:40:00 NPKkg ha^{-1}), F_2:100% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB), F_3= 75% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB),F_4= 50% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB) and F_5= Bio-compost @ 5t ha^{-1}) were tested in Factorial RBD with four replications. Treatment wise gypsum and biocompost were applied a week before sowing, while the chemical fertilizers were applied just before sowing in previously opened furrow. Mungbean cultivar Co: 4 was sown on 22th November on raised bed at 30 cm×75 cm (paired row) spacing. Crop was fertilized as per treatments. Two hand weeding and one interculturing were carried out during the early crop growth stages. Observations related to growth characters *viz.,* plant height, number of branches per plant at 20, 40 and 60 DAS and yield attributes (number of pods per plant and seed per pods) at harvest stage were recorded from pretagged plants. Seed and stover yields from net plot area were recorded. The data obtained were statistically analyzed by the method suggested by Panse and Sukhatme (1967).

Results and Discussion

Yield

Effect of soil conditioner

The results given in table 1 revealed that yield attributes as well as seed and stover yields were significantly influenced by soil conditioner treatment. Application of gypsum @ 2 t ha^{-1} (G_2) increased number of pods $plant^{-1}$ and number of seeds pod^{-1} by 6.52 and 6.38 per cent, respectively over control. The increase in different yield attributing characters might be due to improvement in the physical conditions of the soil along with more availability of sulphur through gypsum during vegetative and reproductive stages of the crop. Sulphur helps in chlorophyll formation, photosynthetic process, and activation of enzymes and grain formation. Similar beneficial effects of application of soil conditioner on the yield attributes of mungbean have also been reported by Jat and Rathore (1994) and Patil*et al.,* (2011) in mungbean.

Further, the results revealed that treatment G_2 (Gypsum application @ 2t ha^{-1}) recorded significantly higher seed (1038 kg ha-1) and stover yields (3590 kg ha-1) as compared to control. The per cent increase in seed and stover yields due to gypsym application @ 2 t ha^{-1} (G_2) was to the extent of 11 and 15, respectively, over control (G_1). Favorable effect of gypsum application on yield attributes of greengram had ultimately resulted into significantly higher seed and stover yields. The results are in conformity with those reported by Patel *et al.,* (2010), Patil *et al.,* (2011) and Bairwa *et al.,* (2012) for mungbean crop.

Effect of INM

The yield attributes *viz.,* number of pods plant^{-1}, number of seeds pod-1, seed yield and stover yield (Table 1) were affected significantly due to INM treatments. Application of 100 % RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB) (F_2) remarkably increased the number of pods plant^{-1}(33.1) and number of seeds pod^{-1} (10.15) followed by treatment F_3 and F_1.

Significantly the lowest values of all the above mentioned yield attributes were registered under treatment F_5 [Bio-compost @ 5t ha^{-1}]. The percentage increase in number of pods plant^{-1} and number of seeds pod^{-1} were to the tune of 10, 20 and 1.4, 12 per cent, respectively, with treatment F_2 as compared to treatment F_1 and F_5,. This might be due to adequate supply of nutrient from inorganic fertilizers and organic manure applied together. These findings are in agreement with those reported by and Sushil Vitnor *et al.,* (2015) for greengram crop.

Among the INM treatments, application of 100 % RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB) (F_2) recorded significantly higher seed yield (1130 kg ha^{-1}) and stover yield (3829 kg ha^{-1}) which remained at par with treatment F_3 (75% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* + PSB). Higher seed yield of mungbean obtained under combined application of fertilizer and organics along with biofertilizer seems to be due to improvement in soil conditions and nutrient availability. These findings related to mungbean crop are in close conformity with those earlier reported by Kundu *et al.,* (2013), Gorade *et al.,* (2014), Singh *et al.,* (2015), Tyagi and Upadhyay (2015) and Sushil Vintor *et al.,* (2015).

Table.1 Yield attributes and yield of mungbean as influenced by different treatments

a. Number of pods per plant

Soil conditioner(G)	INM (F)					Mean (G)
	F_1	F_2	F_3	F_4	F_5	
G_1	27.90	31.30	30.10	27.90	28.40	29.1
G_2	32.10	34.90	32.50	28.60	27.00	31.0
Mean (F)	30.0	33.10	31.30	28.30	27.70	
Source		S.Em±		C.D.		C.V (%)
G		0.43		1.24		6
F		0.67		1.95		
G×F		0.95		2.76		

b. Number of seeds per pod

Soil conditioner(G)	INM (F)					Mean (G)
	F_1	F_2	F_3	F_4	F_5	
G_1	9.36	9.65	10.25	8.49	9.23	9.40
G_2	10.45	10.65	9.90	10.09	8.90	10.0
Mean (F)	9.91	10.15	10.08	9.29	9.07	
Source		S.Em±		C.D.		C.V (%)
G		0.12		0.34		5
F		0.18		0.53		
G×F		0.26		0.75		

c. Stover yield (kg ha^{-1})

Soil conditioner(G)	INM (F)					Mean (G)
	F_1	F_2	F_3	F_4	F_5	
G_1	2916	3593	3426	3287	2398	3124
G_2	3120	4065	4037	3370	3357	3590
Mean (F)	3018	3829	3732	3329	2878	
Source		S.Em±		C.D.		C.V (%)
G		66		191		9
F		104		303		
G×F		147		428		

d. Seed yield (kg ha^{-1})

Soil conditioner(G)	INM (F)					Mean (G)
	F_1	F_2	F_3	F_4	F_5	
G_1	949	1074	1019	972	676	938
G_2	940	1185	1176	963	924	1038
Mean (F)	945	1130	1097	968	800	
Source		S.Em±		C.D.		C.V (%)
G		20		58		9
F		32		92		
G×F		45		130		

Table.2 Economics of different treatment combinations of soil conditioner and INM

Treatment	Yield (kg ha^{-1})		Cost of cultivation (₹ha^{-1})	Gross return (₹ha^{-1})	Net return (₹ha^{-1})	BCR
	Seed	Stover				
G_1F_1	949	2916	29473	68602	39129	2.3:1
G_1F_2	1074	3593	32624	78810	46186	2.4:1
G_1F_3	1018	3426	32543	74814	42271	2.2:1
G_1F_4	972	3287	32462	71483	39021	2.2:1
G_1F_5	676	2398	32151	50167	18016	1.5:1
G_2F_1	940	3119	30683	68878	38195	2.2:1
G_2F_2	**1185**	**4065**	**33834**	**87360**	**53526**	**2.5:1**
G_2F_3	**1176**	**4037**	**33753**	**86693**	**52940**	**2.5:1**
G_2F_4	963	3370	33672	71261	37589	2.1:1
G_2F_5	924	3357	33361	68868	35507	2.0:1

Note: Selling price of Mungbean seed = 60 (Rs./kg) and stover = 4.0 (Rs./kg)

Interaction

In the case of pods per plant, seeds per pod, seed and stover yields (Table 1) G × F interaction effect was found to be significant. Application of gypsum @ 2 t ha^{-1} and 100% RDF + Bio-compost 5 t ha^{-1} + bio fertilizer *(Rhizobium* + PSB) resulted into significantly higher seed yield (1185 kg ha^{-1}), stover yield (4065 kg ha^{-1}), pods per plant (34.9),and seeds per pod (10.65). However, treatment G_2F_3 remained at par with treatment G_2F_2 in all the cases.

These results are in line with those published by Teotia *et al.,* (2000) in mungbean, Ijgude and Kadam (2008) in soybean, Nawange *et al.,* (2011) in chickpea and Nadan *et al.,* (2012) in greengram.

Economics

As the interaction effect on seed and stover yields was significant, the economics was computed for combination. Among the different combinations, maximum net return of ₹ 53526 ha^{-1} and BCR value of 2.5:1 were recorded under the treatment of G_2F_2(gypsum @ 2 t $ha^{-1}$and 100% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer *(Rhizobium* + PSB)) which was followed by G_2F_3(gypsum s@ 2 t $ha^{-1}$and 75% RDF + Bio-compost @ 5 t ha^{-1}+ bio fertilizer *(Rhizobium* + PSB) with net return of ₹52940 ha^{-1} and identical BCR 2.5:1.

For obtaining higher seed yield of *rabi* mungbean under South Gujarat conditions, application of gypsum @ 2 t ha^{-1}alongwith 100% RDF+ Bio-compost @ 5 t ha^{-1}+ bio fertilizer (*Rhizobium* +PSB) is necessary.

Similarly, application of 75% RDF + 5t BC/ha + bio fertilizer (*Rhizobium* + PSB) was also found equally economical that too with saving of 25 % fertilizer dose.

References

Bairwa, R. K., Nepalia, V., Balai, C. M., Chauhan, G. S. and Ram, B. 2012. Effect of phosphorus and sulphur on growth and yield of summer mungbean. *Journal of Food Legumes,* 25(3): 211-214.

Gorade V. N., ChavanL. S., Jagtap D. N. and Kolekar A. B. 2014. Response of greengram (*Vigna radiata* L.)Varieties to integrated nutrient management in summer season. *Agriculture Sciences Digest* 34(1): 36 – 40.

Ijgude, M. B., and Kadam, J. R. 2008. Effect of phosphorus and sulphur on nutrient uptake in soybean. *An Asian Journal of Soil Science*, 3(11): 194-196.

Jat, R. L., and Rathore, P. S. 1994. Effect of sulphur, molybdenum and Rhizobium inoculation on greengram (*Phaseolus radiatus* L.). *Indian Journal of Agronomy*, 39(4):651-654.

Kundu, R., Mandal, J. and Majumder, A. 2013. Growth and Production Potential of Greengram (*Vigna radiate* L.)Influenced by Rhizobium Inoculation with Different Nutrient Sources. *International Journal of Agriculture, Environment & Biotechnology*, 6(3):344-350.

Nawange, D.D., Yadav, A.S. and Singh, R.V. 2011. Effect of phosphorus and sulphur application on grwoth, yield attributes and yield of chickpea (*Cicer arietinum* L).*Legume Research*, 34(1): 48-50.

Nandan, Rajiv., Kaleem, Mohd. And Moinuddin. 2012. Rhizobium inoculation, phosphorus and sulphur fertilization and their effect on greengram (*Vigna radiata*). *International Agronomy Congress.*

Panse, V.G., and Sukhatme, P.V. 1967. Statistical Methods for Agricultural Workers. ICAR, New Delhi. pp. 187-197.

Patel, P.M., Patel, J.S., Patel, J.J., and Patel, H.K. 2010. Effect of levels and sources of sulphur on seed yield and quality of summer greengram. *International Journal Agriculture Science*, 6(1): 169-171.

Patil, S. C., Jagtap, D. N. and Bhale, V. M. 2011. Effect of phosphorus and sulphur on growth and yield of moongbean. *International Journal of Agricultural sciences*, 7(2): 348-351.

Rajkhowa, D. J., Saikia, M. and Rajkhowa, K. M. 2002. Effect of vermicompost with and without fertilizer on greengram. *Legume Research*, 15(2): 131-135.

Singh, S. P., Ram Bhasose, A. and Suresh Kumar (2015).Response of summer mungbean to phosphorus and biofertilizers in eastern Uttar Pradesh. *Annals of Plant and Soil Research*, 17(1): 104-105.

Teotia, U. S., Mehta, V. S., Ghosh, D. and Srivastava, P.C. 2000. Phosphorus-sulphur Interaction in moongbean on yield, phosphorus and sulphur contents. *Legume Research*, 23(1): 106-109.

Tyagi, P. K., and Upadhyay, A. K. 2015. Effect of integrated nutrient management on yield, quality, nutrients uptake and economics of summer greengram. *Annals of Plant and Soil Research*, 17(3): 242-247.

Vitnor, S., Lal, E. P. and Rao, K. P. 2015. Studies on Integrated Nutrient Management on Seed Yield and Quality of greengram (*Vigna radiata* L.).*International Journal of Recent Research in Life Sciences*, 2(2): 42-45.

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