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Response of Soybean [*Glycine max* (L.) Merrill] to Lime Based Integrated Nutrient Management and Mulching on Nodulation, Nutrient Contents and Yield in Clay Loam Soil

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ABSTRACT

The present experiment was laid out in a randomized block design consisted of 6 treatments viz. (T_1)-Absolute control,(T_2)-Farmer practice (50kg DAP/ha),(T_3) RDF+ $ZnSO_4$@25 kg/ha+ Ammonium Molybdate 1.0g/kg seed+ slacked lime@25Kg $Ca(OH)_2$ /ha,(T_4)-RDF+ $ZnSO_4$@25 kg/ha+ slacked lime@25Kg $Ca(OH)_2$ /ha +*Rhizobium*+PSB (@Each 5g/kg seed) +Ammonium Molybdate 1.0g/kg seed,(T_5)-50%RDF+ $ZnSO_4$@25 kg/ha +FYM 2.5 t/ha+ slacked lime@25Kg $Ca(OH)_2$ /ha + *Rhizobium*+PSB (@Each 5g/kg seed) + Ammonium Molybdate 1.0g/kg seed + Mulching and(T_6)-50% RDF + $ZnSO_4$@25 kg/ha+ slacked lime@25 Kg $Ca(OH)_2$ + Vermicompost 1.5t/ha + *Rhizobium* + *PSB (@Each 5g/kg seed) + Ammonium Molybdate1.0g/kg seed + Mulching. Variety JS 95-60 was used under experimentation which was conducted in clay loam soil during kharif seasons of 2010, 2011 and 2012 at ZARS Khargone (M.P), The effect of lime based integrated nutrient management and mulching on nodulation, its dry weight, nutrient contents in straw & seed at maturity and grain yield(kg/ha) were found to increase significantly and beneficial due to the application of 50% RDF + $ZnSO_4$@25 kg/ha+ slacked lime@25Kg $Ca(OH)_2$ /ha + V.C. 1.5t/ha + B.F.+ A.M. + Mulching(T_6) followed by treatment T_4 and T_5 (Table 1) over other treatments.

Key words: Growth, Yield, Clay loam, Integrated nutrient management.

INTRODUCTION

Soybean being a high protein and energy crop and its productivity is often limited by the low availability of essential nutrients or imbalanced nutrition farming is one of the important constraints to soybean productivity in India. Hence a balanced nutrients application is must to harness the potential productivity of the crop. Integrated nutrient management (INM) involves the use of manures, bio-fertilizers and chemical fertilizers to achieve sustained crop production and maintain better soil health. INM is best approach for better utilization of resources and to produce crop with less expenditure. Considering these points in view, the present study was initiated to know the "Response of soybean [*Glycine max* (L.) Merrill] to lime based integrated nutrient management and mulching on nodulation, nutrient contents and yield in clay loam soil.

MATERIALS AND METHODS

The present experiment was laid out in a randomized block design consisted of 6 treatments viz. (T_1)-Absolute control,(T_2)-Farmer practice (50kg DAP/ha),(T_3) RDF+ $ZnSO_4$@25 kg/ha+ Ammonium Molybdate 1.0g/kg seed+ slacked lime@25Kg $Ca(OH)_2$ /hac,(T_4)-RDF+ $ZnSO_4$@25 kg/ha+ slacked lime@25Kg $Ca(OH)_2$ /hac +*Rhizobium*+PSB (@ Each 5g/kg seed) +Ammonium Molybdate 1.0g/kg seed,(T_5)-50%RDF+ $ZnSO_4$@25 kg/ha +FYM 2.5 t/ha+ slacked lime@25Kg $Ca(OH)_2$ /hac + *Rhizobium*+PSB (@Each 5g/kg seed) + Ammonium Molybdate 1.0g/kg seed + Mulching and(T_6)-50%

Table 1: Response of soybean [*Glycine max* (L.) Merrill] to Lime based integrated nutrient management and mulching on nodulation, nutrient contents and yield in clay loam soil

S. No.	Treatments	Nodulation ,nutrient contents and yield of soybean (mean of 3 years data)											
		NN/ plant at 45DAS	NDW/ plant at(mg) 45DAS	N content (%) straw	CEC of soil (cmol /kg)	N content (%) in seed	P- content straw (%)	P- content Seed (%)	K- content straw (%)	K- content seed (%)	S- contentin straw (%)	S- content in seed (%)	Grain yield (kg/ha)
T_1	Absolute control	20.36	61.22	1.40	14.2	5.65	0.23	0.57	1.26	1.68	0.11	0.22	658.00
T_2	Farmer's practice(50kgDAP/ha)	22.23	66.38	1.40	14.6	5.90	0.25	0.66	1.48	1.88	0.13	0.32	896.00
T_3	RDF+ $ZnSO_4$@25 kg/ha+ slacked lime@ 25Kg $Ca(OH)_2$ /hac + A M. (1.0g/kg seed)	25.35	73.93	1.50	15.2	6.12	0.30	0.70	1.58	1.94	0.15	0.35	2067.00
T_4	RDF+ $ZnSO_4$@25 kg/ha+ slacked lime@ 25Kg $Ca(OH)_2$ /hac.+B F.+ AM	37.20	103.45	1.60	16.5	6.31	0.35	0.80	1.68	2.00	0.17	0.38	2120.00
T_5	50%RDF+ $ZnSO_4$@25 kg/ha+ slacked lime @25Kg $Ca(OH)_2$ /hac.+FYM 2.5 t/ha + BF+ A.M. + Mulching	36.35	101.52	1.58	20.5	6.35	0.33	0.80	1.65	2.00	0.15	0.33	2091.00
T_6	50% RDF + $ZnSO_4$@25 kg/ha+ slaked lime@25Kg $Ca(OH)_2$ /hac + V.C. 1.5t/ha + BF+ AM. + Mulching.	38.10	105.35	1.64	25.5	6.40	0.35	0.82	1.68	2.00	0.20	0.40	2364.00
	SEm±	1.14	2.57	0.02	-	0.09	0.01	0.01	0.01	0.02	0.01	0.01	90.60
	CD at 5%	3.44	7.73	0.07	-	0.26	0.03	0.04	0.04	0.06	0.02	0.04	273.00

*BF = Bio fertilizers (*Rhizobium* and PSB each 5g/kg seed)

**RDF = Recommended dose of fertilizer

AM = Ammonium Molybdate 1.0g/k VC = Vermicompost

RDF + $ZnSO_4$@25 kg/ha+ slacked lime@25 Kg $Ca(OH)_2$ + Vermicompost 1.5t/ha + *Rhizobium* + *PSB (@Each 5g/kg seed) + Ammonium Molybdate1.0g/kg seed + Mulching. Variety JS 95-60 was used under experimentation which was conducted in clay loam soil during kharif seasons of 2010, 2011 and 2012 at ZARS Khargone (m.p.) .

RESULTS AND CONCLUSION

The effect of lime based integrated nutrient management and mulching on nodulation, its dry weight, nutrient contents in straw & seed at maturity and grain yield(kg/ha) were found to increase significantly and beneficial due to the application of 50% RDF + $ZnSO_4$@25 kg/ha+ slacked lime@25Kg $Ca(OH)_2$ /hac + V.C. 1.5t/ha + B.F.+ A.M. + Mulching(T_6) followed by treatment T_4 and T_5 (Table 1) over other treatments. The enhancement in different parameters may be attributed due to the increase in the availability of nutrients with the application of inorganic fertilizer together with continuous supply of macro and micro nutrients from vermicompost which helped in acceleration of CEC of the soil and various metabolic processes viz., photosynthesis, energy transfer reaction and symbiotic biological N–fixation process. These results are also in close agreement with the findings of Singh and Kumar (2012), and Konthoujam *et al.* (2013)

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REFERENCES

1. Chesnin, L. and Yien, C. Turbidimeteric determination of available sulphates. *Soil Sci. Soc. of America Proceedings* **15**, 149-151 (1951).
2. Jackson, M. L. , Soil Chemical Analysis, *Prentice Hall of India Pvt. Ltd*., New Delhi (1973).
3. Konthoujam, N. D; Tensubam, B. S; Athokpam, H.S; Naorem, B.S. and Diana Shamurailatpam1, Influence of inorganic, biological and organic manures on nodulation and yield of soybean (*Glycine max* L. Merrill) and soil properties. *Australian J. Crop Sci.* **7**(9): 1407-1415 (2013).
4. Olsen, S.R., Cole, C.V. Watanabe F.S. and Dean ,L.A. Estimating of available phosphorus in soil by extraction with sodium bicarbonate *USDA* Circular., **939** (1954).
5. Singh M., and Narendra Kumar, Effect of FYM, vermicompost, vermiwash and NPK on growth, microbial biomass and yield of soybean. *Soybean Res*. **10**:60-66 (2012).
6. Subbiah, B.V. and G.L. Asija, A rapid method for the estimation of available nitrogen in soil. *Current Sci. (***25**): 259-260 (1956).
7. Toth, S.J. and Prience, A.L. Estimation of CEC and exchangeable calcium , potassium and sodium contents of soil by flame photometer techniques .*Soil Sci.* **67**:439-445 (1949).
8. Walkley, A. and Black C.A., Estimation of soil organic carbon by the chromic acid titration method. *Soil Sci.* **37** (1): 29-38 (1934).