

Effect of Inorganic and Organic Ameliorants on Nutrient Contents of Green Moong (*Phaseolus mungo*) Irrigated with Saline Water

F.M. Prasad, Jay Pal Singh and A.A. Jilani

Department of Chemistry, School of Chemical Science, St. John's College Agra 282 002, India

Abstract: A pot experiment was displayed in the department of chemistry St. John's College Agra during the year (2004-05) to study the effect of varying levels of inorganic and organic ameliorants on various parameters. The stress condition types of salinities on green moong decreased with rise in saline water irrigation. The increasing saline water $S_3P_0M_0$ levels @ 50 meG¹ saline water decreased significantly the protein, N, P, K and S contents in grain and straw of moong. Whereas, the applied inorganic and organic chemical ameliorants @ 15 g potG¹ achieved better results at $S_1P_1M_2$ treatments combinations levels uptake by plant, which may be ascribed to its role in improving soil physical properties.

Key words: Green moong % pyrite % molasses % saline water

INTRODUCTION

Green moong (*Phaseolus mungo*) can meet its nitrogen required by symbiotic fixation of atmospheric nitrogen. Pulse in general, poses low quality of protein due to deficiency of sulphur containing amino acids. Effects made in the past to improve the protein contents in grain legumes were found encouraging Dwivedi and Singh [1]. Poor quality of irrigation water in imparts further in reducing the growth and yield of plant and may have detrimental effect of many soil properties. The carbonate and bicarbonate of saline water in association with sodium creates the problem of saline water in soil. The present study was undertaken to evaluate the effect of saline water on the yield and nutrient contents of green moong.

MATERIALS AND METHODS

A green house experiment was conducted at St. John's College Agra during the year 2004-05. The experiment was conducted in Complete Randomized Block (CRD) design with the soil of the experimental site having sandy loam in texture with pH 8.6, E_c 2.7 (dS mG¹) and organic carbon 0.400%, organic matter 0.305%, carbonate were not found and bicarbonate was 0.48 meLG¹, the available N 156 kg haG¹, available P₂O₅ 16.60 kg haG¹ and available K 170 kg haG¹. The recommended dose was

applied to per pot pyrite (P) @ 0, 5, 10 and 15 g and molasses (M) @ 0, 5, 10 and 15g potG¹. The saline water (S) prepared in distilled water given at per pot 0, NaCl 30 mg, CaCl₂+MgCl₂ 40 mg (1:1) and CaSO₄+MgSO₄ 50 mg (1:1) respectively. Distilled water was used to avoid any contaminations of impurities. The treatments were laid out in the factorial combined randomized design with three replications; saline water irrigation was given per pot at various intervals as per the need of the crops. After harvesting the grain samples were dried in the oven at 65°C and ground to powder. The grain and plant extract was prepared in nitric acid and perchloric acid (2:1). The samples were analyzed for total N by Kjeldhal method, the Ca and Mg content by EDTA titration method, Na and K by Flame photometer and P colorimeter method of ammonium molybdate vanadate Chapman and Pratt [2].

RESULTS AND DISCUSSIONS

It is revealed from the data presented in (Fig. 1) that the maximum protein and nitrogen content in grain was recorded at $S_1P_1M_2$ levels and minimum at $S_3P_0M_0$ levels. These results are in agreement with the findings of Poonia and Bhumbra [3] who also observed the increase in N content while using pyrite levels. Application of molasses can improve the fertility of sterile soil of clayey characterized by increasing their N content and lowering their pH values from alkalinity to neutrality. The clearly

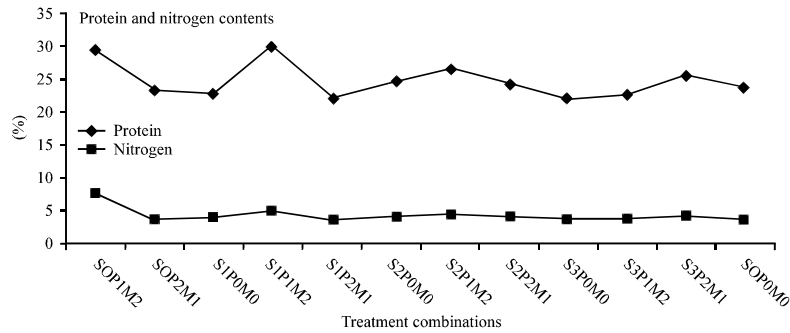


Fig. 1: Effect of inorganic and organic on nutrients composition in grain of green moong under saline water irrigation

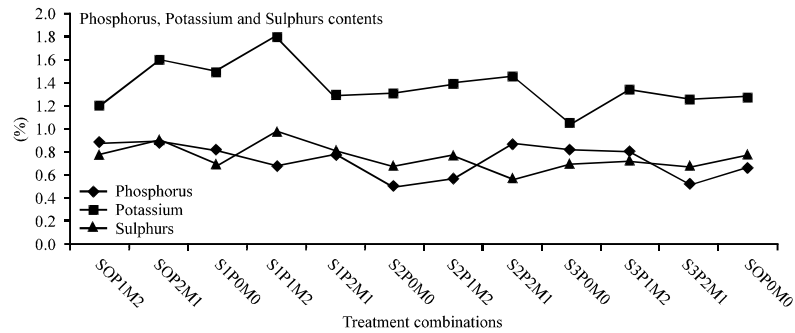


Fig. 2: Effect of inorganic and organic on nutrients composition in grain of green moong under saline water irrigation

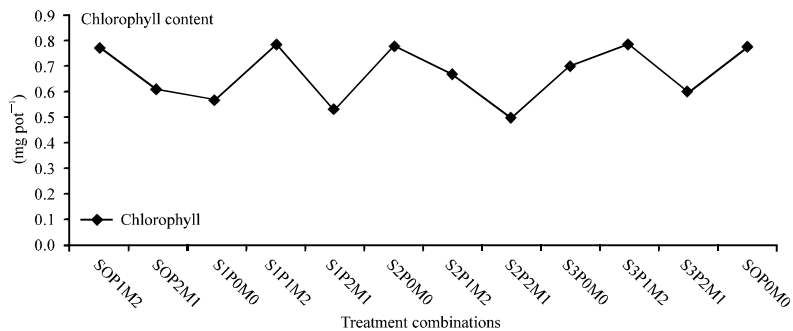


Fig. 3: Effect inorganic and organic on nutrients composition in plant of green moong under saline water irrigation

showed the (Fig. 2) maximum phosphorus and potassium contents in grain observed at S₀P₂M₁ and minimum at S₂P₀M₀ treatments levels of green moong. The absorption of P content in plant growth influenced by soil pH, several elements trend to become less available as the pH enhanced. Obviously, the saline water levels enhanced the pH of soil thereby the P become less available in soil solution, which caused low absorption by the plant from soil. These results are in agreement with the findings of by Chauhan *et al.* [4]. Whereas, the tissue K content also depressed with increasing level of saline water, the K content increased at lower saline water along with pyrite and molasses applied in crop respectively, which may be ascribed to less competition under sodic environment.

The sulphur content in grain indicated showed at (Fig. 2) maximum value was recorded at 0.98% while, the minimum value found 0.55%. It is interesting to the note that no particular trend could be observed in increasing and decreasing manner in S content in the green moong crop. Singh and Singh [5] have also reported that the S content in its uptake with application of pyrite and molasses level, this may due to the moderate alkalinity is more suppressed by the amount of pyrite and molasses. Besides, the incorporated pyrite and molasses in soil gets oxidized to ferrous oxide (Fe₂O₃) in sulphur, which further converted to ferrous sulphate and gives free sulphuric acid, which reacts with CaCO₃ and ferrous calcium sulphate. The CaSO₄ to further converted or reacts with

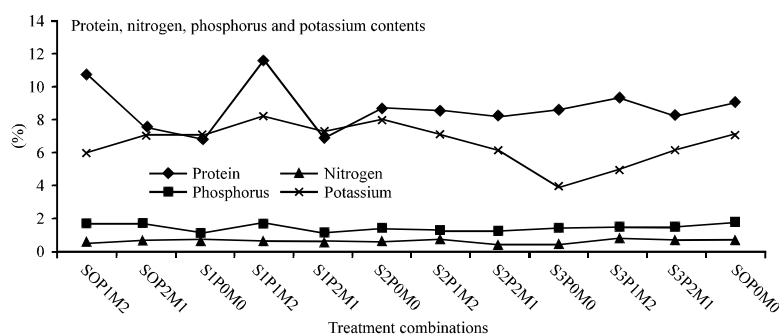


Fig. 4: Effect inorganic and organic on nutrients composition in plant of green moong under saline water irrigation

Na ion to form NaSO_4 or simultaneously is converted to sodium. It is revealed from the data indicated in (Fig. 3) the maximum chlorophyll percentage in leaves found at $S_1P_1M_2$ (0.790%) while, the minimum chlorophyll is observed at $S_3P_0M_0$ level of green moong. These observations are in consequence of Ghosh *et al.* [6]. It is concluded from the data showed in (Fig. 4) that an appreciable increase protein and nitrogen content in plant was recorded to the $S_1P_1M_2$ levels and minimum observed at $S_3P_0M_0$ levels. These results are in agreement with the findings of Kanwar and Kanwar [7]. The maximum and minimum phosphorus and potassium contents in plant found at $S_1P_1M_2$ and $S_3P_0M_0$ levels of green moong. These results are in conformity with the findings of Anonymous [8]. These results are in according to with the findings of and Sinha and Dev [9] who also observed the similar findings with results describing positive effect of combined use of pyrite and molasses amendment on contents and uptake by plant that may be ascribed to its role in improving soil physical properties.

REFERENCES

1. Dwivedi, G.K. and V.P. Singh, 1982. Effect of P and S application on the nutrition quality of different varieties of Bengal gram. *Ind. J. Agron.*, 27: 7-12.
2. Chapman, H.D. and P.E. Pratt, 1961. *Methods of analysis for soils, plants and waters*. University of California, Division of Agriculture Science, Riverside.
3. Poonia, S.R. B.R. Bhumla, 1973. Availability of Ca from CaSO_4 in a highly saline sodic Soil. *Plant Soil*, 38: 675-678.
4. Chauhan, R.P.S., C.P.S. Chauhan and V.P. Singh, 1989. Use of pyrite in minimizing the adverse effect of saline water. *Ind. J. Agric. Sci.*, 56: 717-721.
5. Singh, S. and R.S. Singh, 1972. Studies of south track of Bihar. *Ind. J. Agric. Sci.*, 20: 143-150.
6. Ghosh, A.K., K. Singh, A.K. Shrivastava and Y.R. Saxena, 1989. Yield of sugarcane as influenced by varying N and S ratio in fertilizer. *Ind. J. Soil Sci.*, 37: 183-185.
7. Kanwar, B.S. and J.S. Kanwar, 1971. Effect of residual carbonate in irrigation water on plant and soil. *Ind. J. Agric. Sci.*, 14: 54-56.
8. Anonymous, 1989. Annual progress report, PPCL research project on studies use of pyrite for growing forest species on sodic soil and minimizing the adverse effect of sodic water on soil and crops R.B.S. College Bichpuri, Agra.
9. Sinha, B.K. and G. Dev, 1972. Studies on Na water irrigation effect of addition of cation K, Ca or Journal of Research. PAU Ludhiana, 9: 40-43.