The Pharma Innovation Journal 2022; 11(7): 2967-2969

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 2967-2969

www.thepharmajournal.com
Received: 26-04-2022
Accepted: 11-06-2022

Joy Samuel Mecarty
M.Sc. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Joy Dawson
M.Sc. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

C Lalrammawii
M.Sc. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Joy Samuel Mecarty
M.Sc. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of micronutreints on growth and yield of Green gram (*Vigna radiata* L.)

Joy Samuel Mecarty, Joy Dawson and C Lalrammawii

Abstract
The experiment was conducted during the *Zaid* season 2020, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) The soil of the experimental field is sandy loam in texture, nearly neutral in soil reaction (pH 7.1), the available N, P, K fertilizer is applied along with micronutrients of Zinc, Molybdenum, Cobalt and Boron. The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. The treatment with RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application) found significantly higher in Plant height (15.75 cm), number of branches (5.66) and crop growth rate (4.76 g/m^2/plant), as compared to other treatments. Maximum number of pods/plant (22.89), seed yield (788.20 kg/ha), seeds/pod (9.88), stover yield (1.82 t/ha) and test weight (4.39 g) were found significantly higher with the application of treatment RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application) and dry weight (9.14 g/plant) were found significantly higher with the application of treatment RDF + Co at 1 g/kg (Seed treatment) as compared to other treatments.

Keywords: $ZnSO_4$, B, Co, N, P, K

Introduction
Green gram also known as moong is one of the main pulse crop of India. It is a rich source of Protein along with fibre and iron. It can be cultivated as summer crop. Cultivated mung beans later spread from India to China and Southeast Asia. Archaeobotanical research at the site of Khao Sam Kaeo in southern Thailand indicates that mung beans had arrived in Thailand by at least 2,200 years ago. Optimum time for kharif sowing is first fortnight of July. Optimum time for summer moong cultivation is from March to April. Use row spacing of 30 cm and plant to plant spacing of 10 cm for Kharif sowing. sowing use row spacing of 22.5 cm and plant to plant spacing of 7 cm. Sow seeds at depth of 4-6 cm. Green gram is low in Saturated Fat and Sodium, and very low in Cholesterol. It is also a good source of Protein, Thiamin, Niacin, Vitamin B6, Pantothenic Acid, Iron, Magnesium, Phosphorus and Potassium, and a very good source of Dietary Fiber, Vitamin C, Vitamin K, Riboflavin, Folate, Copper and Manganese. 100 grams of dry seeds contain 347 calories, and 23.86 g or 43% of recommended daily values of protein. Whole mung beans carry higher concentration of dietary fiber for their size; provide 16.3 g or 43% of fiber per 100 grams. Dietary fiber works as a bulk laxative, which thereby protect the colon mucosa by decreasing its exposure time to toxic substances as well as by binding to cancer-causing chemicals in the colon. Whole dry seeds carry 625 µg or 156% of daily required value folate. Folate, together with vitamin B-12, is one of the essential co-factor for DNA synthesis and cell division. Adequate folate in the diet around conception and during the pregnancy may help prevent neural-tube defects in the babies. While dry mungbeans hold 4.8 mg or 8% of DV of vitamin-C, sprouts carry many times more of this vitamin. Vitamin-C is a water soluble antioxidant which helps in boosting immunity, and fight against the oxygen-induced free radicals in the human body.Furthermore,100 g of dry mungbeans hold copper-104.5%, iron-84%, manganese-45%, phosphorus-52%, selenium-15%, calcium-13%, and zinc-24%. There are estimates that more than 30% of agricultural soils globally cause Zn deficiency in crops (Alloway, 2008) [5] and 48 % soils in India are Zn deficient. In Haryana, about 28.27 % area fall under low to moderately low Zn status. Alkaline reaction, low organic matter, high calcium carbonate, low soil moisture and coarse texture nature of soilscreate such limiting conditions (Malik *et al.* 2008). Under these Zn limiting condition crops show stunted growth along with very low Zn concentrations, particularly in edible parts (Singh, 2009; Graham *et al*., 1992). Low intake of Zn through diet is a major reason for the widespread Zn deficiencies in human populations (Cakmak, 2008) [12]. Enrichment of widely applied fertilizers with Zn

(Cakmak, 2009) [13] or enrichment of cultivars with Zn (Palmgren *et al*., 2008) as well as screening of efficient cultivars would be an important strategy for Zn enrichment of food grain as well as to increase crop production. Although major emphasis is on proteinenergy malnutrition but WHO (2002) data shows that deficiency of micronutrient is far more severe. Zn deficiency affects, on an average, one third of the world's human population, ranging from 4 to 73% in different parts of the world (Hotz and Brown, 2004). Greengram (*Vigna radiata* L.) when grown under Zn deficient soils suffers yield loss. Soil application of Zn is efficient in combating their deficiencies but may be less efficient to increase its concentration in edible parts, the prime target in combating micronutrient malnutrition (Cakmak, 2008) [12].

Materials and methods

The investigation was conducted during the *Zaid* season of 2020 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Science (SHUATS), Prayagraj (UP). The Crop Research Farm is situated at 25.57° N latitude, 87.19° E longitude and at an altitude of 98m above mean sea level. The investigation was laid out in Randomized block design, which was replicated three times. The treatment comprised of Mo at 5 g/kg (Seed treatment), Co at 1 g/kg (Seed treatment), B at 10 kg/ha (Soil application), $ZnSO_4$ at 20 kg/ha (Soil application), $ZnSO_4$ at 0.5% (Foliar spray), B at 0.25% (Foliar spray), $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application), $ZnSO_4$ at 0.5% + B at 0.25% (Foliar spray). During the developing season, the mean week by week most extreme and least temperature, relative humidity and rainfall were 36.60 °C, 24.90°C, 76.40 %, 48.48 % and 4.72 mm, respectively. Sowing of Green gram was done at a spacing of 30 cm X 10 cm using seed rate of 5 kg ha^{-1}. The field was uniformly irrigated one day before sowing on each of the sowing dates. The RDF i.e. Nitrogen (20 kg ha^{-1}) was applied in the form of Urea, dose of Phosphorous (40 kg ha^{-1}) and dose of Potassium (20 kg ha^{-1}) were applied through DAP and MOP. Observations on growth parameters, yield attributes, was recorded and their significance was tested by the variance ratio and F-value at 5% level of significance (Gomez and Gomez, 1984). Relative economics was calculated as per the prevailing market prices of the inputs and produced during *Zaid* season.

Result and discussion

Growth parameters and Yield parameters

Growth parameters of Green gram, *viz.* plant height (cm), Dry weight (g), Crop Growth Rate ($g/m^2/day$), Relative growth rate ($gg^{-1}day^{-1}$) are presented in Table 1 and yield parameters Pods/plant (No.)**,** Seeds/pod (No.)**,** Test weight (g)**,** Seed yield (kg/ha)**,** Stover yield (kg/ha) such as. The results revealed that increase in growth attributes of greengram. The treatment with RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application) was found significantly higher in Plant height (15.75 cm), number of branches (5.66), pods/plant (22.89), seed yield (788.20 kg/ha), seeds/pod (9.88), stover yield (1.82 t/ha), dry weight (5.13 g/plant) and test weight (4.39 g)as compared to other treatments.

Table 1. Influence of micronutrients on plant height of green gram

Treatment	At Harvest		45 DAS- 60 DAS	
	Plant Height (cm)	**Dry weight (g $plant^{-1}$)**	**No. of branches/ Plant**	**CGR ($g/m^2/day^1$)**
RDF(Control)	13.14	3.90	4.89	3.87
RDF + Mo at 5 g/kg (Seed treatment.)	13.58	3.47	4.88	4.05
RDF + Co at 1 g/kg (Seed treatment)	15.11	4.43	5.33	4.93
RDF + B at 10 kg/ha (Soil application)	13.59	3.63	4.78	3.39
RDF + $ZnSO_4$ at 20 kg/ha (Soil application)	13.36	3.67	4.89	4.00
RDF + $ZnSO_4$ at 0.5% (Foliar spray)	13.56	3.80	4.89	3.96
RDF + B at 0.25% (Foliar spray)	13.44	3.93	4.89	3.79
RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application)	15.75	5.13	5.66	4.76
RDF + $ZnSO_4$ at 0.5% + B at 0.25% (Foliar spray)	12.97	3.77	5.22	3.68
SEd (+)	S	S	S	S
CD. (5%)	0.28	0.29	0.20	0.40

Yield attributes

Yield attributes such as Pods per plant, Seed yield (kg/ha), seeds per pods exhibited significant variation during the experimental period due the applications of RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application) (Table 2). Zinc improved translocation of photosynthates towards reproductive system and thereby enhancing the yield of the crop. Better photosynthetic activity also may have resulted in better translocation of photosynthates from source to sink due to congenial weather conditions where optimum temperature and mean sunshine hours prevailed during crop growth, might have lead to higher yield attributes same as for stover and Test weight These finding are similar to those reported by Prasad *et al*. (2014), Choudhary *et al*. (2005) and Jan *et al*. (2015) [20, 18, 19].

Table 2: Influence of micronutrients on post-harvest yield of greengram

S. No	Treatments	Pods/plant	Seed yield (kg/ha)	Seeds/pods	Stover yield (t/ha)	Test weight (g)
1	RDF (Control)	16.33	604.17	8.44	1.48	2.89
2	RDF + Mo at 5 g/kg (Seed treatment.)	18.55	592.33	8.00	1.47	3.10
3	RDF + Co at 1 g/kg (Seed treatment)	21.89	736.00	9.33	1.68	3.99
4	RDF + B at 10 kg/ha (Soil application)	19.33	636.00	8.11	1.57	2.92
5	RDF + $ZnSO_4$ at 20 kg/ha (Soil application)	18.11	632.00	8.11	1.54	3.01

6	RDF + $ZnSO_4$ at 0.5% (Foliar spray)	17.22	618.00	7.67	1.51	3.06
7	RDF + B at 0.25% (Foliar spray)	17.55	614.00	7.66	1.51	3.13
8	RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application)	22.89	788.20	9.88	1.82	4.39
9	RDF + $ZnSO_4$ at 0.5% + B at 0.25% (Foliar spray)	18.33	634.00	7.99	1.56	3.11
	F-test	S	S	S	S	S
	S.Ed (±)	0.96	28.69	0.41	0.04	0.14
	CD at 5%	2.04	60.83	0.87	0.09	0.29

RDF = 20:40:20 kg NPK/ha

Conclusion

On the basis of one *Zaid* season experimentation it was concluded that the application of treatment No.8 RDF + $ZnSO_4$ at 20 kg/ha + B at 10 kg/ha (Soil application) was found more productive. The conclusions drawn are based on one season data only which requires further confirmation for recommendation.

Acknowledgments

I express gratitude to my advisor Dr. Joy Dawsson and all the faculty members of Department of Agronomy for constant support and guidance to carry out the whole experimental research study.

References

1. Aery NC, Jagetiya BL. Effect of cobalt treatments on dry matter production of wheat and DTPA extractale cobalt content in soils. Communication in Soil Science and Plant Analysis. 2000;31(9-10):1275-1286.
2. Alam MR, Ali MA, Rafiquzzaman S, Ahmed B, Bazzaz M. Effect of phosphorus and boron on the performance of summer mungbean in high Ganges river floodplain soil. Indian Journal Agro forest Environment. 2010;3(2):183-186.
3. Ali AAG, Mowafy Soil application E. Effect of different levels of potassium and phosphorus fertilizer with the foliar application of zinc and boron on greengram in sandy loam. Zigzag J Agric Res. 2003;30(2):335–358.
4. Ali B, Hayat S, Hayat Q, Ahmad A. Cobalt stress affects nitrogen metabolism, photosynthesis and antioxidant system in chickpea (*Cicerarietinum L.*). Journal of Plant Interaction. 2010;5(3):223-231.
5. Alloway BJ. Zinc in Soils and Crop Nutrition. 2 Edn, published by IZA and IFA Brussels, Belgium and Paris, France, 2008, 135.
6. Arora AS, Umer S, Mishra SN. Boron and zinc response on growth in *Vigna radiata* L. Wilczek var. Pusa Vishal under salinity. Int. J. Plant Anim. Environ. Sci. 2012;4(2):131-136.
7. Ashraf MY, Mahmood K, Ashraf M. Optimal supply of Micronutreints improves drought tolerance in legumes. Indian journal of agronomy. 2012;63(4):639-641.
8. Awomi TA, Singh AK, Kumar M, Bordoloi LJ. Effect of phosphorus, molybdenum andcobalt nutrition on yield and quality of mungbean (*Vigna radiata* L.) in acidicsoil of Northeast India. Indian Journal of Hill Farming. 2012;25(2):22-26.
9. Azam HB, Rauf S, Rafiq CM, Mohsin AU, Shahbaz U, Sajjad M. Genetic variability and zinc levels for yield contributing traits in mungbean (*Vigna radiata* L.). J Glob. Innov. Agric. Soc. Sci. 2010;2(2):52-54.
10. Bhattacharya SS, Debkanta M, Chattopadhyay GN, Majumdar K. Effect of balanced fertilization on pulse crop production in red and lateritic soils. Better Crops, Indian journal of agronomy. 2004;88:126-128.
11. Bhoya L, Sundararmoorthy ALA. Chidambaram, KS Ganesh. Growth and physiological activity influenced by zinc application of greengram (*Vigna radiata* L. Wilczek) under effluent stress. Indian journal of agronomy. 2014;2:107-114.
12. Cakmak I. Enrichment of cereal grains with zinc: agronomic or genetic biofortification Plant Soil. 2008;302:1-17.
13. Cakmak I. Enrichment of fertilizers with zinc: An excellent investment for humanity and crop production in India. J. Trace Elem. Medi. Biol. 2009;23:281-289.
14. Debnath S, Pachauri SP, Srivastava PC. Effect of zinc fertilization on the utilization efficiency of phosphatic fertilizer in rice. 44th Annual convention of ISAC and national symposium on balanced fertilizer to sustainable soil health, crop production and food security during Nov. 25-26, 2011, Dept. of Soil Science, G.B.P.U.A. & T, Pantnagar, 2011, 128.
15. Dilworth MJ, Bisseling. Cobalt and nitrogen fixation in DNA and methionine in-oacterio OS: New phytologist. 1984;98:311-316.
16. Ghasal Kumar R, Jat RK. Productivity and soil fertility as affected by organic manures and zinc fertilizers in greengram *(Vigna radiata)*-wheat (*Triticum aestivum*) system. Indian Journal of Agronomy. 2015;55(1):16-21.
17. Goswami MB. Effect of planting and different intercropping systems on the productivity of greengram. (*Vigna radiata* L.) under irrigated conditions of Faisalabad. International Journal of Agricultural Biology. 2007;3:432-5.
18. Choudhary BR, Keshwa GL, Parihar CM. Effect of thiourea and Zinc on productivity of Pearl millet. Annals of Agricultural Research. 2005;26(3):424-427.
19. Jan Khan A, Imran Shahzad A, Sohail A. Sowing dates and sowing methods influenced on growth yield and yield components of Pearl millet. J. of Env. and Earth Sci. 2015;5(1):105-109.
20. Prasad SK, Singh MK, Singh R. Effect of Nitrogen and Zinc on growth, yield and uptake of Pearl millet (*Permisetumglaucum* L.). Underrainfed conditions. J. Envir. Earth Sci. 2014;5(1):105-109.