Study the quantitative characters effect of zinc application on Soybean, *Glycine max* L.,Merillcrop

ABSTRACT

- The abstract lacks brain storming sentence.
- Aim or objective of the study was not included. First hand recommendation was not properly mentioned.

An experiment conducted an experimental unit research farm, School of Agriculture, Eklavya University, Damoh, Madhya Pradesh in *Kharif* Session 2022-23. The plant height increased with the increasing levels of Zn at 30, 45, and 90 DAS over control. The higher Zn levels *i.e.* 2.5, 5.0, 7.5 and 10 kg Zn ha^{-1} was statistically at par. Lowest height was observed at control and highest at 10 kg Zn ha^{-1}.The highest stover yield of 3.78 t ha^{-1} was observed with 5.0 kg Zn ha^{-1} and higher levels were found statistically at par.

Key words: Zn at 45 DAS, 5.0 kg Zn ha^{-1}, lowest height, levels of DAS and plant height.

Introduction

- Introduction is too shallow, and it lacks sources or citation.
- Objectives of the investigation was not present

Soybean (*Glycine max*(L.)Merill) belongs to family *Leguminosae*syn. *Fabaceae*, sub family *Papilionaceae*, is an important global crop and known as the "GOLDEN BEAN". In Madhya Pradesh the area under Soybean cultivation during *Kharif*2014 is 55.462 lac hectare as compared to 62.605 lac hectare during *Kharif* 2013 showing a decrease of 11.40 percent (SOPA, 2014). The productivity of soybean in Madhya Pradesh is decreasing which might be due to wide spread deficiency of Zn. Khampariа*et al.*(2010) reported 71% Zn deficiency in soil of Madhya Pradesh. Zinc occurs in soil in a number of discrete chemical pools differing in their solubility *viz.*, primary and secondary minerals; insoluble inorganic and organic precipitates; soluble organic complexes; exchangeable and adsorbed forms; and soil solution.These forms are in a state of dynamic equilibrium. These pools differ in strength (or reversibility) and therefore in their susceptibility to

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plant uptake, leaching and extractability.The amount and rate of transformation of these forms determine the size of the labile Zn pools. Adequate supply of soil Zn toplants depends upon the relative abundance of these different pools and their equilibrium which is greatly influenced by crop growth stage and environmental conditions. Plants absorb Zn from soil solution which is replenished byvarious Zn fractions. The availability of Zn to plants has been observed to vary with different Zn fractions.

MATERIAL AND METHODS

Main treatments (3)

M_1-Single year application; M_1- Alternate year application; M_2- Each year application

Sub-treatment (5) [Zinc level (Kg ha^{-1})]

T_1: 0.0 kg Zn ha^{-1} + N P_2O_5 K_2O (20:80:20); T_2: 2.5 kg Zn ha^{-1} + N P_2O_5 K_2O (20:80:20); T_3 : 5.0 kg Zn ha^{-1} + N P_2O_5 K_2O (20:80:20); T_4: 7.5 kg Zn ha^{-1} + N P_2O_5 K_2O (20:80:20) and T_5: 10.0 kg Zn ha^{-1} + N P_2O_5 K_2O (20:80:20)

Detail of the experiment

Variety: JS 97-52; plot size:4.0 mx4.0 m; distance between replication:1.5m; row to row distance: 40 cm; fertilizer dose: 20-80-20(N-P_2O_5-K_2Okg ha^{-1}) and seed rate: 100 kg ha^{-1}

Plant height

Periodical measurement of plant height was done in three tagged soybean plants in net plot area at 30, 45 and 90 days after sowing (DAS) from the base of the plant to the tip of the top leaf with the help of measuring scale. The plant height was expressed as average plant height in cm.

Number of pods per plant

The number of pods per plant was counted in each plots from the previously tagged three plants and mean was calculated for statistical analysis.

Number of seeds per pod

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The number of seeds per pod was counted from three tagged plants from each plot and mean was calculated for statistical analysis.

Test weight (1000 (g))

Thousand seeds from each plot were counted and weighed accurately on electronic balance after drying in sunshine at about 10% moisture content.

Seed/grain and stover/straw yield

After threshing and winnowing, seed/grain and stover/straw yield of soybean of each plot was recorded and converted into t ha^{-1}.

RESULTS AND DISCUSSION

#Results and discussion

- **Result and discussion was not clearly presented;**
- **It was too shallow, most parameter were not discussed.**
- **It lacks supportive evidence (citation).**
- **Thus, this section needs detail revision as follow**
    - **Discuss all parameter at least in separate paragraphs wit detail evidence.**

Plant height

The application of 10.0 kg Zn ha^{-1} significantly increased the plant height by 17.00, 20.74 and 25.08 percent at 30,45 and 90 DAS respectively over control while higher level of zinc *i.e.* 2.5, 5.0,and 7.5 kg Zn ha^{-1} was statistically at par with that of 10 kg Zn ha^{-1}.The periodicity of each year Zn application increased the plant height by 20.82,11.10 and 12.64 percent over single year. Each year and alternate year Zn application was found statistically at par. This might be due to more availability and absorption of Zn from soil solution which caused more seed respiration rate, oxygen carrier, auxin metabolism, synthesis of cytochrome and stabilization of ribosomal fraction, faster cell division and cell elongation and root and shoot development ultimately increased plant height of soybean. However, increasing the rates of photosynthesis and chlorophyll formation due to the Zn, accelerated the meristem activity of plant that led to progressive increase in internode length (Maurya *et al.*, 2010). Kulhareet *al.* (2014) have also observed significant increase in plant height with the application of Zn. These results are in conformity with those of Chaudhary *et al.* (2014).

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Table 1. Effect of different levels of zinc on qualitative and yield attributing of soybean

Treatment (kg Zn ha^{-1})	Plant height (cm)			Number of pods plant^{-1}	Number of grain Pod^{-1}	1000-grain Weight (g)	Soybean yield (t ha^{-1})	
	30DAS	45 DAS	90 DAS				Grain	Straw
0.0	24.70	30.08	35.24	57.78	2.78	69.49	1.50	2.33
2.5	27.15	33.40	39.72	67.67	3.10	77.98	1.74	3.15

5.0	28.32	35.41	43.31	80.78	3.37	83.85	2.06	3.78
7.5	28.62	36.15	44.04	78.56	3.32	82.20	2.03	3.77
10.0	28.90	36.32	44.08	74.78	3.13	81.20	1.86	3.50
SEm+	0.86	0.84	0.76	2.47	0.13	2.96	0.08	0.23
CD (P=0.05)	2.47	2.40	2.19	7.06	0.36	8.47	0.23	0.66

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Yield attributing components

The number of seed pod^{-1} ultimately reflects the total economic yield which was highest (3.37 seed pod^{-1}) under 5.0 kg Zn ha^{-1} which was 21.22 percent higher over control. The test weight was highest (83.85 g) under 5.0 kg Zn ha^{-1} level and significantly superior over control (69.49 g) which was 20.66 percent higher over control.The periodicity of each year Zn application increased by 22.91, 9.76 and 21.50 percent in number of pods per plant ,number of grain per pod and test weight respectively over single year. Each and alternate year Zn application was found statistically at par.Such effects of Zn application might be due to pivotal role of Zn in crop growth, involving in photosynthesis processes, respiration and nitrogen metabolism-protein synthesis. Zn plays a key role in biosynthesis of IAA, regulating the auxin concentration in plant and other biochemical and physiological activities and initiation of primordial for reproductive parts and thus ascribed the beneficial effect of to better translocation of desired metabolites to the yield contributing parts of plant. Similar results have been reported by Chaudhary *et al* (2014), Nagajyothi*et al.* (2013) and Singh *et al.* (2001).

Grain and straw yield

Zn fertilization @ 5.0 kg ha^{-1} enhanced both grain and straw yields significantly by 37.33 and 62.23 percent, respectively, as compared to control. However the application of increasing level 5 and 7.5 kg Zn ha^{-1} were statistically at par. The periodicity of each year Zn application increased by 26.11 and 29.49 percent in grain and straw yield respectively over single year Zn application. However each and alternate year Zn application was found statistically at par. This was perhaps due to abundant supply of Zn nutrition, which increased the protoplasmic constituents, accelerates the process of cell division and elongation, photosynthesis processes, respiration other biochemical and physiological activities (Maurya *et al.*, 2010).This increases the values of all growth and yield attributing parameters, which finally reflected in increased both grain and straw yield. Nandanwar *et al.* (2007) reported that grain and straw yield of soybean increased significantly with Zn 5.0 kg Zn application as compared to control. Pable *et al.* (2010) reported that zinc application increased the grain and straw yield of soybean over control. Similar result also has been also reported by Kanase*et al.* (2008).

CONCLUSION

Among the application of 5.0 kg Zn ha^{-1} significantly increased the seed yield of soybean over 2.5 kg Zn ha^{-1} and control but the higher Zn levels were found statistically on par. The application of increasing levels of Zn significantly increased the stover yield over control. The highest stover yield of 3.78 t ha^{-1} was observed with 5.0 kg Zn ha^{-1} and higher levels were found statistically at par.

References

Chaudhary P, Jhajharia A and Kumar R. 2014. Influence of Sulphur and Zinc Fertilization on Yield, Yield component and Quality Traits of Soybean (*Glycine Max.*L.*)* The Bioscane 9(1):137-142.

Jackson ML. 1965. Soil chemical analysis. Prentice Hall Inc. Englewood cliffs New Jersey.

Kanase N, Jadhao SM, Konde NM and Patil JD. 2008. Response of soybean to application of Zn. Agric. Sci. Digest, 28: 63-64.

Khamparia RS, Singh MV, Sharma BL, Kulhare PS and Sharma GD. 2010. Four decades of research on micro and secondary nutrients and pollutant elements in soil of M.P. Research publication No. 9 AICRP micro and secondary nutrients and pollutant elements in soil and plant. IISS Bhopal 6:1-113.

Kulhare PS, Chaudhary MK, Uike Y, Sharma GD and Thakur RK. 2014. Direct and Residual Effect of Zn alone and lncubated with Cow Dung on Growth Characters, Zn Content, Uptake and Quality of Soybean [*Glycine max* (L.) Merrill] -Wheat (*Triticum aestivum* L.) in a Vertisol. Soybean Research 12 (2). .

Maurya BM, Dekate J and Upadhyay VB. 2010.Integrated nutrient management in rice wheat cropping system. JNKVV Res. J., 44:39-43.

Nandanwar SB, Nandanwar VB, Jadhao VO and Mangre PN. 2007. Quality of soybean and fertility status of soil as influenced by N P Zn fertilization and PSB with FYM. Crop prod., 4: 77-78.

Pable D, Patil DB and Deshmukh PW. 2010. Effect of sulphur and zinc on yield and quality of soybean. Asian J. Soil Sci. 5: 315-317.

Singh G, Singh H, Kalar HJS, Singh G and Singh H. 2001. Response of soybean (*Glycine max.* L. Merril) to nitrogen, phosphorus, potassium and zinc fertilization. J. Res., PAU, 38:14-16.

SOPA. 2014. Revised Soybean crop estimate for 2014 (www.sopa.org.).