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Short Communication

Effect of Phosphorus and Zinc Levels on Yield and Quality of Chickpea

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Micronutrients play a significant role in improving legume yield through their effects on plant growth, on the effective use of the essential nutrients and on the nitrogen-fixing symbiotic process, producing high legume yields. Zinc (Zn) is the leading micronutrient that limits chickpea productivity. Zinc deficiency is perhaps the most widespread, among the micronutrients (Roy et al. 2006). Generally, chickpea is considered sensitive to micronutrient deficiency specially zinc, although there are variations among varieties (Khan. 2010). It has been found that more than 95 per cent of soil zinc residues in mineral fraction and contributes very little to plant uptake. The remaining less than 5 per cent of soil Zn is present in water soluble, exchangeable and complexed fractions but these fractions contribute maximum to the plant uptake. Application of phosphorus and micronutrient like zinc are an established fact to increase the pulse production. Keeping in view the present experiment was conducted to identified the suitable dose of phosphorus, zinc and their combination

A field experiment was conducted during the *rabi* 2010 - 2011 at Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidhyalaya Farm, Chirakoot, Satna (MP). The treatment comprises 4 levels of zinc [0, 10, 20 and 30 kg Zn/ha] and five levels of phosphorus [0, 25, 40, 55 and 70 kg P/ha]. The experimental soil was sandy clay loam in texture, slightly alkaline in reaction, having electrical conductivity 0.3 dS/m at 25^0C. Soils was poor in available nitrogen (168 kg/ha), phosphorus (20 kg/ha), rich in available potash (370 kg/ha), DTPA Zn (0.45 mg/kg) and organic carbon (0.45 %). The experiment was laid out in factorial randomized block design replicated three times. Before and after experiment, the soils samples were collected and analyzed for pH, electrical conductivity, and organic carbon, available N, P_2O_5, K_2O and DTPA-Zn were analyzed. After harvest of crop yield were recorded and protein content in seed was also determined as per standard procedure.

The seed and straw yield of chickpea were significantly influenced by the dose of zinc and phosphorus. Increasing dose of zinc increases the yield characters and yield up to 30 kg zinc/ha. However, significant response was noted up to 20 kg zinc/ha. Similarly, application of phosphorus increases the characters up to 70 kg P_20_5/ha but the significant response was noted up to 55 kg/ha. There was no significant difference between 20 and 30 kg zinc/ha and 70 and 55 kg P_20_5/ha (Table 1). It might be the due to supply of both nutrient in soil and their synegestic effect on other nutrients increases the growth character and yield. The results confirm the findings of Karwasra and Kumar (2007).

Table 1 Yield and quality of chickpea as affected by different levels of zinc and phosphorus

Treatment	Yield characters		Yield		Protein content (%)
	Pods /plant	Test weight (g)	Seed yield (q/ha)	Straw yield (q/ha)	
Zinc levels (kg/ha)					
0	62.9	15.0	18.0	33.2	20.7
10	65.0	15.5	18.6	34.3	21.3
20	67.0	16.0	19.2	35.4	22.0
30	68.2	16.2	19.5	36.0	22.4
CD (P=0.05)	**1.71**	**0.41**	**0.49**	**0.89**	**0.57**
Phosphorus levels (kg/ha)					
0	62.1	14.8	17.7	32.8	20.4
25	64.2	15.3	18.3	33.9	21.1
40	66.0	15.7	18.9	34.9	21.7
55	67.7	16.1	19.4	35.8	22.3
70	68.8	16.4	19.7	36.4	22.6
CD (P=0.05)	**1.64**	**0.39**	**0.47**	**0.87**	**0.53**

Protein content was significantly influenced by different doses of zinc and phosphorus (Table 1). Highest protein content was recorded at with 30 kg Zn/ha but it was at par with 20 kg Zn/ha. Similarly, highest protein content was recorded under 70 kg P/ha and it was at par with 55 kg P/ha. The beneficial effect of zinc and phosphorus levels on protein content may be due to the increase in cation exchange capacity of the roots which would enable to plant extracts more nutrients from soil. Pathak *et al.* (2003) reported similar findings.

References

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