

SHORT COMMUNICATION

Response of wheat to levels of zinc and potash in calcareous soil

Summary

A field experiment was conducted at Agricultural Research Institute, Dholi during Rabi 1976–77 in sandy loam soil to study the interaction between zinc and potash in wheat. Zinc and potash were applied to the soil in the form of $ZnSO_4$ and KCl respectively. Interaction between zinc and potash was found significant. Both the levels of zinc sulphate 12.5 kg/ha and 25 kg/ha being at par produced significantly higher grain yield over control. There was significant increase in grain yield with application of 40 kg and 80 K_2O /ha over control. Potash at the rate of 120 kg in combination with 25 kg Zinc sulphate/ha decreased the yield.

Introduction

Importance of zinc to wheat is being felt in calcareous alkaline soil with the growing of high yield wheat varieties. Zinc deficiency has been observed in calcareous alkaline soil of North Bihar. Potassium fixing capacity of Bihar soils has been found to vary from 10 to 50 per cent². Keeping in view of these facts, an experiment was designed to study the response of zinc and Potash and their interaction.

Materials and methods

An experiment was conducted in randomised block design with four replications at Agricultural Research Institute, Dholi. Three levels of zinc sulphate 0, 12.5 and 25 kg/ha and 4 levels of K_2O , 0, 40, 80 and 120 kg/ha in the form of potassium chloride were used. Nitrogen and phosphorus was applied at the rate of 120 kg N and 60 kg P_2O_5 per hectare respectively in the form of urea and single superphosphate. Wheat variety under study was HD 1553.

The soil of the experimental plot was sandy loam having pH 8.4, $CaCO_3$ 30.7%, E.C. 0.416 mmhos/cm, (1:2 soil water), organic carbon 0.456%, available P_2O_5 45 kg/ha and potash 250 kg/ha. Zinc status of soil was 0.56 ppm. Full dose of phosphate, potash and zinc sulphate and half the nitrogen were applied at the time of sowing. The remaining half nitrogen was applied after 21 days of sowing. Four irrigations were given to the crop.

Results and discussion

Both the levels of zinc sulphate 12.5 kg/ha and 25 kg/ha being at par pro-

TABLE 1

Interaction effect between levels of Zn and potash on grain and straw yield of wheat (kg/ha)

| Potash levels (kg K ₂ O/ha) | Zinc levels (kg ZnSO ₄ /ha) | | | | Zinc levels (kg ZnSO ₄ /ha) | | | |
|---|--|----------|------|------|--|------|------|------|
| | 0 | 12.5 | 25 | Mean | 0 | 12.5 | 25 | Mean |
| | Grain | | | | Straw | | | |
| 0 | 1667 | 2333 | 2667 | 2222 | 3833 | 4367 | 5267 | 4489 |
| 40 | 2500 | 2667 | 3367 | 2845 | 4967 | 4533 | 5500 | 5000 |
| 80 | 2833 | 3500 | 2500 | 2944 | 5667 | 5833 | 4500 | 5333 |
| 120 | 2500 | 2433 | 2500 | 2478 | 4131 | 4503 | 4800 | 4478 |
| Mean | 2375 | 2733 | 2759 | 2622 | 4650 | 4809 | 5017 | 4825 |
| L.S.D. at 5% | Zn | 273kg/ha | | | N.S. | | | |
| | K | 314kg/ha | | | 513 kg/ha. | | | |
| | Zn × K | 543kg/ha | | | 889 kg/ha | | | |

duced significantly higher grain yield over control (Table 1). Higher grain yield due to application of zinc is due to increase in yield attribution character. Similar results have also been reported by earlier workers^{1 4 5}.

There was significant increase in yield of wheat grain with the application of 40 and 80 kg K₂O/ha over control, both the levels being statistically at par. Highest levels of K₂O *i.e.* 120 kg/ha did not increase the yield over control, rather depressed the yield significantly as compared to K₂O 40 and 80 kg/ha. Response to potassium in presence of N and P was also observed by Mahapatra *et al.*³.

The interaction effect of zinc and potash was also found to be significant (Table 1). At 0 and 40 level of K, the effect of Zn 25 was superior to lower levels. At K 80, Zn 12.5 level proved to be significantly superior to other levels. At highest level of K, *i.e.* 120 kg/ha Zn application was not significant at all. Maximum yield was obtained when 80 kg K₂O + 12.5 kg ZnSO₄/ha were applied to the soil along with 120 kg and 60 kg P₂O₅/ha. However this interaction was at par with 40 kg K₂O + 25 kg ZnSO₄ in affecting grain yield.

K 40 and K 80 level of potash increased the straw yield significantly over control. Zinc application also increased straw yield but could not reach level of significance (Table 1).

The interaction effect of Zn and K on the yield of straw was found to be significant. Maximum straw yield was obtained when 80 kg K₂O and 12.5 kg ZnSO₄/ha was applied. However, this effect was at par with 40 kg K₂O + 25 kg ZnSO₄ (Table 1).

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RAMAN RAI and S. N. SINGH,

Department of Microbiology,
Rajendra Agricultural University,
Agricultural Research Institute,
Dholi (Muzaffarpur) INDIA

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