

## FOLIAR APPLICATION OF CHELATED AND NON-CHELATED METALS FOR SUPPLYING MICRONUTRIENTS TO WHEAT GROWN ON CALCAREOUS SOIL

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(Accepted 13 November 1996)

### SUMMARY

A field experiment was conducted from 1992 to 1994 to study the effect of supplying micronutrients to wheat (*Triticum aestivum* L., cv. Yecora rojo) grown on calcareous soil. Chelated and/or non-chelated forms of Fe, Mn, Zn and Cu were administered through a wide range of foliar applications, sprayed either individually or in combination. All the chelated micronutrients were applied in the form of EDTA with the exception of Fe (EDDHA). However, all the non-chelated elements were in the form of sulphate. The grain yield was significantly increased by the application of individual micronutrients either in the form of sulphate or chelate, but much higher amounts of sulphates were required. Application of micronutrient combinations either in chelated or non-chelated forms gave greater biological and grain yields than individual applications of the micronutrients. Wheat response to micronutrient applications followed in rank order: combined elements > Fe > Cu = Zn > Mn. Application of the micronutrients in sulphate form generally resulted in higher concentrations of these elements in grain than when the chelated forms were applied. Foliar application of the micronutrients in the form of sulphates at higher application rates may be more effective than the chelates due to lower cost despite the higher application rates.

### INTRODUCTION

In many countries situated in arid and semi-arid regions such as Saudi Arabia, soils are mostly lime-rich, light- to medium-textured and of low organic matter concentration, resulting in an inadequate nutrient supply. Under these circumstances foliar application of micronutrients is recommended.

Numerous studies have shown the usefulness of spraying micronutrients on grain crops (Agrawal, 1992; Abd-El-Hadi *et al.*, 1986; Schnappinger *et al.*, 1969). However, there is much debate concerning the effectiveness of micronutrient fertilizers in terms of their forms, elemental content and application rates. Some investigators have stressed the value of applying micronutrient in a chelated form (Schnappinger *et al.*, 1969; Francis *et al.*, 1979); others were not in favour of applying individual micronutrients but preferred mixtures (Abd-El-Hadi *et al.*, 1986). Most workers concur with the need to apply non-chelated forms at much higher rates than the chelated ones (Randall and Schulte, 1971; Boawn, 1973; Wells *et al.*, 1973). Furthermore, the cost of the sprayed material is a key factor and should be taken into account in micronutrient fertilization (Roy *et al.*, 1981).