J. Agronomy & Crop Science **179**, 107—114 (1997)

ISSN 0931-2250

National Research Centre for Groundnut, Junagadh, India

Sulphur and Micronutrient Nutrition of Groundnut in a Calcareous Soil

A. L. Singh and V. Chaudhari

Authors' address: Dr A. L. Singh (corresponding author) and V. Chaudhari, National Research Centre for Groundnut, P.B. 5, Junagadh 362001, India

With 5 tables

Received August 14, 1996; accepted February 21, 1997

Abstract

Field experiments conducted on a calcareous soil have shown that application of elemental sulphur reduced the chlorosis of groundnut leaves and increased the dry matter, nodule biomass, pod, haulms, and oil yields, and concentration of nutrients in leaf tissue and their uptake by groundnut. The application of iron (Fe), zinc (Zn) and manganese (Mn) further helped in recovering the chlorosis of groundnut and increased the above parameters. On average, application of 20 kg S ha^{-1} as elemental sulphur (S) increased pod yield by 8.6–9.8% and oil yield by 8.8–15%. However, application of 10, 2, and 4 kg ha^{-1} of Fe, Zn and Mn, increased pods by 19.5, 13.6, and 11.7% and oil yield by 20.1, 13.9 and 12.2%, respectively.

Elemental S increased the concentrations of N, P, K, S, Fe, Mn and Zn, but brought down the excess Ca levels of groundnut leaves, at pegging stage (45 DAE), from high to its sufficiency level. The uptake of all the macro- and micro-nutrients by groundnut, however, increased due to S application. Application of Fe, Mn and Zn reduced Ca and increased S concentrations in groundnut leaves, but increased the uptake of all the nutrients. Of the two varieties tested, JL 24 was found to be more efficient in mining the calcareous soil for nutrients and showed less chlorosis and lower Ca content in leaves, but higher pod, haulm and oil yields and nutrient uptake than J 11.

Key words: Calcareous soil — chlorosis — groundnut (*Arachis hypogaea* L.) — micronutrient — sulphur — yield

Introduction

Recently, sulphur has become a major limiting plant nutrient due to continuous use of high analysis NPK fertilizers (Biswas and Tewatia, 1986; Hilal and Abd-Elfattah, 1987; Singh and Chaudhari, 1995). Groundnut, due to its underground pod bearing habit, is mainly grown on light-textured soils generally deficient in sulphur and micronutrients (Kanwar et al., 1983; Dwivedi, 1988; Supakamnerd et al., 1990; Singh and Chaudhari, 1995). When grown on a calcareous soil, the groundnut shows chlorosis mainly due to the lime-induced deficiencies of sulphur and micronutrients such as Fe, Zn, and Mn causing considerable yield reductions (Hartzook, 1975; Houng, 1984; Singh and Dayal, 1992; Singh et al., 1990, 1993, 1995; Singh and Chaudhari, 1995). In groundnut, these deficiencies occur mainly in young and developing leaves as interveinal to complete leaf blade chlorosis which sometimes may turn pale yellow or white causing death of leaflets and plants (Hartzook, 1975; Hago and Salama, 1987; Dwivedi, 1988; Supakamnerd et al., 1990; Singh et al., 1990, 1995; Singh and Chaudhari, 1995). These deficiencies are so intermingled that it is very difficult to single them out in field-grown crops, especially in calcareous soil. However, they can easily be detected through their correction by applying S and those micronutrients either in soil, seed or through foliar applications (Hartzook, 1975; Singh et al., 1993, 1995). The soil application of sulphur-containing fertilizers is the main remedy to overcome chlorosis caused by S and micronutrients deficiencies and a number of sulphur-containing fertilizers have been tested for groundnut (Biswas and Tewatia, 1986; Hago and Salama, 1987; Singh and Chaudhari, 1995; Singh et al., 1990, 1993, 1995), but information on the mixed application of S and micronutrients and their effectiveness in fields in calcareous soils is scarce. Therefore, field experiments were conducted to study the effects of sulphur with and without application of Fe, Zn, and Mn on the growth, nodulation, pod, and haulm yields and nutrient concentrations and uptake by groundnut in calcareous soil.

Materials and Methods

Field experiments were conducted for two consecutive years during the wet season at the Research Farm of