

Subsoiling, land configuration and sulphur fertilization effects on soil physico-chemical properties, growth and yield of groundnut

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ABSTRACT

A field study was conducted during the rainy (*kharif*) seasons of 2002 and 2003 at Junagadh (Gujarat, India) to evaluate subsoiling, land configuration and sulphur fertilization effects on physico-chemical properties of clayey soils and yield of groundnut. The results expound that subsoiling significantly reduced bulk density and increased porosity. Between-row subsoiling and broad bed and furrow significantly increased moisture content of soil at 60 DAS, root volume, plant height, dry matter and yields of groundnut over flat bed control. The residual availability of N, P, K and S remained almost equal under subsoiling, broad bed and furrow and flat bed. Application of sulphur did not influence bulk density, porosity, moisture content and residual status of available N, P and K, however significantly increased the residual availability of sulphur. Sulphur fertilization @ 50 and 25 kg ha⁻¹ were found equally effective and increased root volume and dry matter in 2003 as well as plant height and pod yield during both the years. Sulphur nutrition significantly increased haulm yield over control in pooled results but it did not reach at the level of significance in individual years.

Key words : Subsoiling, Land configuration, Sulphur, Soil, Groundnut.

INTRODUCTION

A dense and compact layer in subsoil is characterized by high mechanical impedance for root growth and low water transmission in the soil matrix. Subsoiling breaks the hard pan and helps in sinking down of the rainwater in the lower layer of soil from where it is not easily lost by evaporation and aids to deeper rooting, which helps in better exploitation of stored soil moisture and applied nutrients from the profile. Land configuration like broad bed and furrow (BBF) can increase infiltration of rainwater and thus helps to improve moisture storage in soil profile. Sulphur as a plant nutrient is becoming increasingly important in dryland agriculture as it is the master nutrient of all oilseed crops and pulses and is rightly being called the “Fourth Major Nutrient”. With these points in view, the present experiment was undertaken to evaluate subsoiling, BBF and sulphur effects on physico-chemical properties of soil and yield of groundnut (*Arachis hypogaea* L.).

MATERIALS AND METHODS

A field investigation was carried out during rainy (*kharif*) seasons of 2002 and 2003 at Department of Agronomy, Junagadh Agricultural University, Junagadh. The soil was clayey in texture and slightly alkaline in reaction (pH 8.0 and EC 0.28 dS m⁻¹) with available N 258 kg ha⁻¹, available P₂O₅ 27.5 kg ha⁻¹, available K₂O 236 kg ha⁻¹ and available S 19.5 kg ha⁻¹. Field capacity

and permanent wilting point were 28.4 and 12.8%, respectively, whereas bulk density was 1.42 Mg m⁻³ with 45.3% porosity. There were 5 main plots assigned to moisture conservation practices viz., M₁- flat bed (FB), M₂- alternate between-row subsoiling (ABRS), M₃- between-row subsoiling (BRS), M₄- in-row subsoiling (IRS) and M₅- broad bed and furrow (BBF) and 3 sub-plots allocated to sulphur levels viz., 0, 25 and 50 kg ha⁻¹. The experiment was laid out in split plot design with 4 replications. Subsoiling to a depth of 30 cm was carried out by subsoiler, while a bed of 150 cm width with furrow of 30 cm width and 15 cm depth was formed by BBF former after preparatory tillage and before sowing. The crop was fertilized with 12.5 kg N and 25 kg P₂O₅ ha⁻¹. Sulphur in the form of gypsum was applied at sowing in furrows as per treatments. The groundnut variety ‘GG 20’ was sown at a row spacing of 60 cm on 1st July, 2002 and 20th June, 2003 and harvested on 22nd October, 2002 and 15th October, 2003. The total seasonal rainfall of 540 and 1275 mm was received in 22 and 42 rainy days during 2002 and 2003, respectively. Moisture content was estimated gravimetrically at 60 DAS. The residual availability of N, P₂O₅, K₂O and S was determined by alkaline KMnO₄ method, Olsen’s method, flame photometric method and turbidimetric method, respectively. The bulk density, total porosity, available nutrient status in soil, root and shoot growth and yields were recorded at harvest.

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