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Effect of tillage and nutrient management practices on soil properties and yield of rainfed groundnut

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ABSTRACT

The effect of tillage and nutrient management practices on soil properties and yield of groundnut (*Arachis hypogaea* L.) under rainfed condition were evaluated on a sandy loam soil of University of Agricultural Sciences, GKVK, Bangalore during *Kharif* 2007. The study indicated that, mechanical tillage practices were found superior to conventional tillage. Mechanical tillage + two intercultivations at 25 and 45 days after sowing registered higher pod yield (1307 kg ha^{-1}), organic carbon, available N, available P_2O_5 and available K_2O and lower bulk density and penetration resistance (1.3 g cm^{-3} and 1.44 kg cm^{-2}, respectively) and higher water holding capacity and porosity (42.7 and 49.2%, respectively) were recorded with mechanical tillage + two intercultivations. Application of 50 per cent organic manure + 50 per cent inorganic fertilizers recorded highest pod yield of 1282 kg ha^{-1} and also noticed the better soil physico-chemical properties.

Key words : Bulk density, Tillage, Penetration resistance, Porosity

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is cultivated in tropical and sub-tropical countries. Brazil in South America is considered to be the country of its origin. Groundnut primarily cultivated in USA, Senegal, Sudan, China, West Africa, Indonesia and India. India is the largest producer of groundnut and it is predominantly grown in Royalseema area of Andhra Pradesh, Saurashtra in Gujarat, parts of Tamil Nadu, Karnataka, Orissa and Maharashtra, Madhya Pradesh and Rajasthan. These states contribute 96% of total area and production. Karnataka stands fourth with an area of 10.4 lakh ha with annual production of 6.71 lakh tonnes and average productivity of 679 kg ha^{-1} (Anonymous, 2007). The crop is mainly grown in *Kharif* under rainfed conditions. However in southern and western India, cultivation of *Rabi* groundnut is picking up. The groundnut seed is valued both for its oil and protein content. In India groundnut oil is popularly used for cooking purpose. Tilling of soil has been considered as one of the important soil management practice adopted for ensuring proper soil health. For optimum germination and growth, the soil must optimally supply water, oxygen, nutrients and heat, additionally the soil must be loose enough to allow root penetration and seedling emergence. Tillage helps to improve looseness, oxygen supplies and water intake among other things (Donahue *et al*., 1987). Tillage has major influence on soil bulk density, penetration resistance, water intake, storage and extraction of water from the soil by the plant roots and on the microbial activity which influences soil aeration, moisture and temperature (Tripathi *et al*., 2007).

India has made spectacular breakthrough in production and consumption of fertilizers during last four decades. Because of escalating energy cost, chemical fertilizers are not available at affordable prices to the farmers. Integrated use of both chemical fertilizers and organic manures is needed to check the depletion of soil and enhance the yield levels. The importance of organic manures in promoting soil health and better plant nutrition has started receiving much recognition in the world as a whole in recent years. The supplementary and complementary use of organic manures along with chemical fertilizers, besides improving physico-chemical properties also improves the use efficiency of applied fertilizers. Keeping these points in view, a field experiment was conducted to know the effect of tillage and nutrient management practices on soil properties and yield of groundnut (*Arachis hypogaea* L.) under rainfed condition.

MATERIALS AND METHODS

A field investigation was conducted during *Kharif* season of 2007 in red sandy loam (Alfisol) soil in Agronomy Field Unit, University of Agricultural Sciences, GKVK, Bangalore. The pH of the soil was 6.6, EC 0.15 dS m^{-1}, available N (189.6 kg ha^{-1}), available P_2O_5 (29.3 kg ha^{-1}), available K_2O (202.8 kg ha^{-1}) and organic carbon (0.56%). The experiment was laid out in a split plot design assigning four tillage practices to main plots *viz*., T_1: Conventional tillage (bullock drawn desi plough twice + bullock drawn cultivator twice) + one intercultivation @ 25 days after sowing (DAS), T_2: Conventional tillage +

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