

## Effect of phosphorus and sulphur on yield and nutrient uptake by groundnut in inceptisols

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### ABSTRACT

The effect of different levels of phosphorus and sulphur on yield and nutrient uptake by groundnut variety Patap-1 in Inceptisols was evaluated in a pot experiment, conducted in green house of the Department of Agricultural Chemistry and Soil Science, Rajasthan College of Agriculture, Udaipur during *kharif* season 2005-06. The experiment was laid out in complete randomized design with three replications. The experiment consisted of 16 treatment combinations comprising four levels of phosphorus (0, 20, 40, 60 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>) applied in the form of DAP in integration with four levels of sulphur (0, 20, 40, 60 kg S ha<sup>-1</sup>) applied in the form of mineral sulphur. The study concluded that application of 60 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> proved beneficial in increasing growth characters, yield attributes, yield of kernel and uptake of N,P,K,S, and micronutrients like, Fe, Mn, Zn and Cu. In addition to this, Zn and Cu uptake significantly increased at 40 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> in kernel and haulm both. Similarly, supplementation of 60 kg S ha<sup>-1</sup> also proved beneficial in increasing growth, yield attributes, yield and uptake of nutrients.

**Key words :** Phosphorus, Sulphur, Yield, Nutrient uptake, Groundnut, Inceptisols.

**G**roundnut (*Arachis hypogaea* L.) is one of the most important oilseed crops of the world. It is mainly cultivated in *kharif* and summer seasons. However, groundnut productivity is low in *kharif* due to vagaries of monsoon rain and epidemic of foliar diseases. The low level of productivity has been ascribed to several constraints due to low permeability, poor aeration and low availability of nutrients, particularly phosphorus and sulphur. The phosphorus is involved in root development, nodulation, energy transfer consequently, stimulate pod setting and improve the yield (Dart, 1977 and Samtana *et al.*, 1994). In addition to this, phosphorus plays a significant role in sustaining and building up of soil fertility. Though the uptake of phosphorus by groundnut plant is relatively small, it is essential in the early stages as it promotes root growth, nodulation, flowering and paging and thereby stimulates the setting of pods, decreases number of unfilled pods and hastens maturity of the crop (Enyi, 1977 and Anonymus, 1987). The importance of sulphur particularly in oil seed crop has never been in greater evidence than today. The increased cropping intensity, crop yields and use of S-free fertilizer have magnified S-deficiency in many parts of the country which was marked in past due to use of S containing fertilizer. It has been estimated that soils of 90 districts covering 23 to 30 million ha are deficient in S (Tandon, 1986). Sulphur is dispensable

for synthesis of certain amino-acids and involved in various metabolic enzymatic processes in plants, consequently effect productivity not only quantitatively but qualitatively too. It has been reported that requirement of sulphur is comparable with phosphorus and can be equated with potassium in terms of economics (Randhawa, 1984). Optimal production requires balanced fertilization. Keeping these points in view the present investigation was undertaken to determine the optimum phosphorus and sulphur levels for groundnut.

### MATERIALS AND METHODS

A pot experiment on groundnut variety Pratap-1 was conducted with four levels of phosphorus (0, 20, 40, 60 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>) applied in the form of DAP in integration with four levels of sulphur (0, 20, 40, 60 kg S ha<sup>-1</sup>) applied in the form of mineral sulphur. The soil used under pot experiment was medium in available nitrogen (293.2 kg ha<sup>-1</sup>), phosphorus (40.47 kg ha<sup>-1</sup>) and low to medium in sulphur (13.02 ppm) content with mildly alkaline in reaction. Seven-eight seeds of groundnut were sown in the month of July by wooden dibber at equal distance. After 10 days of emergence of seedlings, five seedling were maintained in such a way that all seedlings get equal distance. As the experiment was conducted in pots, irrigation was given as and when required and special care has been taken at the time of flowering and pod filling stage of the crop. Pots were regularly rotated in the green-house in order to avoid environmental effect