

Research Paper :

## **Influence of phosphorus and FYM on content and uptake of nutrients by groundnut and soil fertility of *Vertic ustochrepts* under rainfed conditions**

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### **ABSTRACT**

A field experiment was conducted during 1985 to 1996 on *Vertic ustochrepts* soils at Main Dry Farming Research Station, Targhadia (Gujarat) to study the effect of periodical application of phosphorus with and without FYM on content and uptake of nutrients by groundnut and soil fertility. The results revealed that the content of N, P and K in pod and haulm of groundnut and their total uptake as well as protein content were increased due to application of FYM and phosphorus. Significant positive effect of applied FYM was observed on status of organic carbon and available P, K and S in the soil. The organic carbon content and available status of potassium in the soil could not significantly alter due to periodical application of phosphorus. However, application of P was found beneficial in respect to available status of P and S in the soil.

**Key words :** Groundnut, FYM and phosphorus, Nutrient contents and uptake, Soil fertility

**A**ddition of FYM to the soil minimise P depletion and exhibit positive P balance and reduces P fixation by secreting some acids and increasing moisture content which enhance availability of phosphate to plant. Keeping these views in mind, a long term trial was carried out to study the influence of phosphorus application at different duration with and without FYM on content and uptake of nutrients by groundnut and soil fertility of *Vertic ustochrepts* under rainfed conditions.

### **MATERIALS AND METHODS**

The experiment was conducted in the Randomized Block Design with four replications during 1985 to 1996 for successive twelve years on *Vertic ustochrepts* soils at Main Dry Farming Research Station, Targhadia (Gujarat). Soil of the experimental field was clayey in texture, moderately alkaline (pH 8.0), non-saline (EC 0.31 dSm<sup>-1</sup>), medium in organic carbon (0.54 %), low in available phosphorus (18.3 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>) and high in available potash (346 kg K<sub>2</sub>O ha<sup>-1</sup>). There were 14 treatment combinations comprising of two levels of FYM (F<sub>0</sub>-0 and F<sub>1</sub>-10 t ha<sup>-1</sup> and seven durations of phosphorus application (P<sub>0</sub>-00 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>, P<sub>1</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> every year, P<sub>2</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> and P<sub>2</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> every alternate year, P<sub>3</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>, P<sub>3</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> and P<sub>3</sub>-20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> every third year. Phosphorus was applied through single super phosphate. Nitrogen was applied @ 10 kg/ha through urea to each plot. The crop was harvested at maturity, then dried in the sun light and weighed for yield. Representative samples of pod and haulm were collected from each plot and analyzed for

content of N, P, K and S as per standard procedure described by Jackson (1973). Soil samples, after harvesting of crop (1995), were collected plot wise and analyzed for organic carbon, available P, K and S status, following standard procedures (Jackson, 1973).

### **RESULTS AND DISCUSSION**

The results obtained from the present investigation are presented in Table 1 and 2 :

#### **Content and uptake of nutrients:**

Application of FYM significantly improved N, P and K content by 8.21, 7.13 and 9.26 per cent, respectively in pod and by 13.6, 20.4 and 9.3 per cent, respectively in haulm along with their total uptake by 20.2, 24.7 and 24.9 per cent over their respective control (Table 1). Nitrogen content in pod and haulm and its total uptake were significantly influenced due to duration of P application. Maximum content of N, P and K in pod (4.31, 0.43 and 0.59 %) and haulm (1.04, 0.12 and 1.17 %) as well as their total uptake were recorded when phosphorus applied @ 20 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> every year. The N, P and K content in pod and haulm along with their total uptake did not significantly affected due to combine effect of FYM and durations of phosphorus application (Table 1).

#### **Protein content:**

Protein content in kernel of groundnut was significantly improved to the tune of 8.4 % due to application of FYM 10 t ha<sup>-1</sup> over their control (Table 1). Similarly, it was also, remarkably influenced due to