

Effect of sulphur with and without potassium on yield and nutrient uptake by pigeonpea in relay inter cropping system

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ABSTRACT

A field experiment was conducted on medium black calcareous clayey soils during *kharif* 2005 to 2007 at Pulse Research Station, J.A.U. Junagadh in factorial RBD having four replications and eight treatment combinations consisting of four levels of S (0, 20, 40 and 60 kg ha⁻¹) and two levels of K₂O (0 and 50 kg ha⁻¹). The varieties sown were *Vaishali* for pigeonpea and *GG-7* for groundnut. The grain (1189 and 1183 kg ha⁻¹) and fodder (2971 and 3024 kg ha⁻¹) yield of pigeonpea as well as pigeonpea equivalent yield (1761 and 1752 kg ha⁻¹) were obtained significantly higher under application of 40 kg S and 50 kg K₂O per hectare, respectively. The content and uptake of S and K by crop were increased significantly under irrespective application of sulphur and potash. Similarly, the soil availability of S and K was also increased significantly with increased respective levels of S and K.

Key words : Potassium, Sulphur, Pigeonpea-groundnut relay cropping, Nutrient content, Uptake and availability

Pulses have been grown in the multiple cropping systems for sustainable production. Pigeonpea being a deep rooted crop is capable of utilizing plant nutrients from deeper layers of soil and leaving them as crop residues in the upper layers. Now a day's groundnut and pigeonpea relay cropping has become popular in farmers' community of Saurashtra region in Gujarat. Generally farmers used concentrate fertilizers for applying nitrogen and phosphorus without use of organic manure and sulphur free fertilizer has accentuated sulphur. Imbalanced fertilizer use has a negative effect on food and fodder yield and crop resistance to pest and diseases. Therefore, the productivity of pigeonpea is reducing day by day due to imbalance nutrition. With the intensive cropping, favourable response of S has been observed in pulses (Singh and Ali, 1994). For maintaining sustainability of pigeonpea, the experiment was conducted for studying the effect of sulphur with and without potassium on yield and nutrient uptake by pigeonpea.

MATERIALS AND METHODS

A field experiment was conducted on medium black calcareous clayey soils during *kharif* 2005 to 2007 at Pulse Research Station, JAU, Junagadh in factorial RBD having four replications and eight treatment combinations consisting of four levels of S ($S_0=0$, $S_1=20$, $S_2=40$ and $S_3=60$ kg ha⁻¹ as elemental sulphur) and two levels of K₂O ($K_0=0$ and $K_1=50$ kg ha⁻¹) along with recommended dose of fertilizer for pigeonpea. The varieties sown were *Vaishali* for pigeonpea and *GG-7* for groundnut. The soil of experimental site was clayey (*Typic Ustochrepts*) with

a pH 7.9 and E.C. 0.36 dSm⁻¹. The available nutrients status was low for KMnO₄-N (199 kg ha⁻¹) and high for Olsen - P₂O₅ (75 kg ha⁻¹) and NH₄OAc - K₂O (340 kg ha⁻¹) and medium for available sulphur (8.2 ppm). At maturity the crop was harvested and grain and fodder yields were recorded from each plot. Simultaneously, the grain and fodder samples of pigeonpea and soil samples were also collected for analysis of K (Jackson, 1979) and S (Williams and Steinbergs, 1959). Pigeonpea equivalent yield was worked out by converting the yield of groundnut in to pigeonpea yield on the basis of prevailing market price of each crop.

RESULTS AND DISCUSSION

The experiment results revealed that the application of S @ 40 kg ha⁻¹ gave significantly highest average grain (1189 kg ha⁻¹) and fodder (2971 kg ha⁻¹) yield of pigeonpea as well as pigeonpea equivalent yield (1761 kg ha⁻¹). However, it was at par with S_{60} in respect of grain and pigeonpea equivalent yield and S_{20} and S_{60} in respect of fodder yield (Table 1). The improvement in grain and fodder yield might have resulted from favourable influence of S on growth attributes and greater partitioning of metabolites and adequate translocation of nutrients to develop reproductive structure. The results are in conformity with those of Shivran *et al.* (2000). The application of K₂O @ 50 kg ha⁻¹ gave significantly highest average grain (1183 kg ha⁻¹) and fodder (3024 kg ha⁻¹) yield of pigeonpea as well as pigeonpea equivalent yield (1752 kg ha⁻¹). The positive effect of potassium on yield might be due to pronounced role of potassium in production