

Effect of potassium and zinc on growth, yield, quality parameters and nutrient uptake by cotton

H.L. SAKARVADIA, K.B. POLARA, K.B. PARMAR, N.B.BABARIYA AND B.B. KUNJADIA

Accepted : March, 2009

ABSTRACT

A field experiment was conducted during 2004-05 and 2005-06 on medium black calcareous soil (*Typic Ustocrepts*) with cotton (G-cot-hy-10) using 5 levels of K (0, 90, 120, 150 and 180 kg ha⁻¹) and 3 levels of ZnSO₄ (0, 25 and 50 kg ha⁻¹). The significantly higher seed cotton (2345 kg ha⁻¹) and stalk (3679 kg ha⁻¹) yield of cotton were recorded with K₁₂₀ and K₁₈₀ treatments, respectively. Whereas the highest seed cotton yield (2269 kg ha⁻¹) and stalk yield (3540 kg ha⁻¹) were recorded with application of ZnSO₄ @ 50 kg ha⁻¹. The plant height (138.1 cm), boll weight (20.4 g) and oil content (18.52 %) were observed significantly higher with the application of potassium @ 120, 150 and 180 kg ha⁻¹, respectively. While, number of bolls per plant, ginning percentage and test weight did not influence by potassium application. Application of zinc did not influence quality parameters except boll weight. The maximum uptake of K and Zn by seed cotton as well as stalk yield was recorded under application of 120 kg K₂O and 50 kg ZnSO₄ ha⁻¹, respectively.

See end of the article for authors' affiliations

Correspondence to :

H.L. SAKARVADIA

Department of
Agricultural Chemistry
and Soil Science,
Junagadh Agricultural
University, JUNAGADH
(GUJARAT) INDIA

Key words : Potassium, Zinc, Growth, Seed cotton yield, Nutrient content and uptake

In the present era of economic liberalization and globalization, cotton crop is going to play a much more crucial role in the national economy in the coming decades. Cotton is one of the important cash crop, cultivated about 8.65 mha with seed cotton production of 20.18 lakh tons in India. The availability of potassium was depleted by 27 per cent in last decade In the Saurashtra region of Gujarat due to imbalanced fertilization and intensive cropping. Among the micronutrients, Zn deficiency is wide spread in Saurashtra region. The introduction of improved high yielding varieties of cotton changed the concept of fertilization. The yield and some quality parameters of cotton were positively influenced by K (Parmar, 2006) and Zn (Kashyap *et al.*, 1988) application.

MATERIALS AND METHODS

A field experiment was conducted in *kharif* 2004-05 and 2005-06 on medium black calcareous soil (*Typic Ustocrept*) with five level of K (0, 90, 120, 150 and 180 kg K₂O ha⁻¹) and three levels of ZnSO₄ (0, 25 and 50 kg ZnSO₄ ha⁻¹) in a factorial RBD having three replications. The experimental soil is low (197 kg ha⁻¹) in N, high in P (75 kg ha⁻¹) and K (381 kg ha⁻¹) and medium in DTPA extractable Zn (0.61 ppm). The seeds of cotton variety G-cot hy-10 were sown at a distance of 120 x 45 cm @ 4 kg seed ha⁻¹. The representative seed cotton and plant samples were collected at maturity from each plot and separated by ginning process and Zn and K content in plant samples as well as in soil were determined by standard methods.

RESULTS AND DISCUSSION

Effect of potassium:

The data (Table 1) indicated that the application of potassium at varying levels significantly influenced on the seed cotton and stalk yield of cotton in both the years as well as in pooled. The higher seed cotton yield was observed with K₁₈₀ (2598 kg ha⁻¹), K₁₂₀ (2094 kg ha⁻¹) and K₁₂₀ treatments (2345 kg ha⁻¹) during 2004-05, 2005-06 and pooled, respectively over rest of the treatments. Similarly, the stalk yield (4419, 2994, 3679 kg ha⁻¹) of cotton was observed significantly higher with K application @ 120, 150 and 180 kg ha⁻¹ during 2004-05, 2005-06 and pooled, respectively.

As far as the quality of seed cotton is concerned, plant height, boll weight and oil content were significantly influenced by potassium application. The highest plant height (138.1 cm), boll weight (20.4 g) and oil content (18.52 per cent) were observed with the application of potassium @ 120, 150 and 180 kg ha⁻¹, respectively (Table 2). It indicates that the potassium played very important role for harvest of good quality of seed cotton. The positive effect of potassium on yield and yield attributes might be due to pronounced role of potassium in transport of photosynthates, photosynthesis and cell elongation. Similar results were reported by earlier workers (Singh *et al.*, 1991 and Parmar, 2006).

Application of potassium significantly increased the concentration of Zn and K in cotton as well as Zn uptake by seed cotton and stalk (Table 3). Maximum content of K in seed cotton (1.01%) and in stalk (0.52%) was recorded with K₁₈₀ treatment. However, it was at par