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Nutrient uptake and yield of hybrid maize (*Zea mays* L.) and soil nutrient status as influenced by plant density and fertilizer levels

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ABSTRACT

A field experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during *kharif* 2007 to study the effect of plant density and fertilizer levels on yield and nutrient uptake of hybrid maize and soil nutrient status under irrigated condition. Two spacings *viz.*, 60 x 20 cm and 75 x 20 cm accommodating 83, 333 and 66, 666 plants ha^{-1} were assigned to the mainplot. Three fertilizer levels *viz.*, 150:75:75, 200:100:100 and 250:125:125 NPK kg ha^{-1} constituted the subplot treatments. The experiment was laid out in a split plot design with four replications. The results of the experiment revealed that the grain yield was higher under plant spacing of 75 x 20 cm. Grain yield increased with increasing levels of NPK upto 250:125:125 NPK kg ha^{-1} but the statistical disparity was not observed beyond 200:100:100 NPK kg ha^{-1}. Wider spacing and increased NPK levels resulted in higher NPK uptake and recorded higher soil available NPK.

Key words : Hybrid maize, Spacing, Fertilizer levels, Yield, Nutrient uptake, Nutrient level.

INTRODUCTION

Maize (*Zea mays* L.) is one of the most versatile crops and can be grown in diverse environmental conditions and has diversified uses in human food and animal feed. Besides its use as food and fodder, maize is now gaining increased importance on account of its potential uses in manufacturing of starch, plastic, rayon, textile, adhesive, dyes, resins, boot polish, syrups, ethanol, etc. It has got immense potential and is, therefore, called as “miracle crop” and also “queen of cereals”. Maize, being a C_4 plant is an efficient converter of absorbed nutrients into food.

Maize is cultivated both in tropical and temperate regions of the world. In India, it occupies third place among the cereals after rice and wheat and is cultivated in an area of 7.59 million ha with a production of 14.71 million tonnes and the average productivity is 1938 kg ha^{-1} (Anonymous, 2007).

The productivity of any crop is the ultimate result of its growth and development. Plant population is the prime factor for getting maximum yield. Plant population is decided by the inter and intra row spacing of crops. Optimum plant population for any crop varies considerably due to environment under which it is grown.

Among the plant nutrients primary nutrients such as, nitrogen, phosphorus and potassium play a crucial role in deciding the growth and yield. Nitrogen is the most deficient primary nutrient in Indian soils. The response of crops to nitrogen varies widely from place to place, depending upon the fertility level of soil and other environmental conditions. This necessitates the study on the response of crop to different levels of fertilizer. The use efficiency of applied nitrogen is only about 30 - 40 per cent (Parthipan, 2000). The nitrogen use efficiency can be improved with the use of hybrids, optimum plant population and application of nitrogen coinciding with peak need by the crop. Optimum nitrogen requirement will vary with plant population. Phosphorus is known to stimulate early and extensive development of root systems, which enables rapid maize growth and to mature early (Sankaran *et al.*, 2005). Maize has high yield potential and responds greatly to potassium fertilizer. Therefore, proper management of potassium nutrient is essential to realize maximum potential of the crop because it plays an important role in activating various enzymes (Tisdale *et al*., 1990). Hence, with these ideas in view, an attempt was, therefore, made to study the effect of different spacing and fertilizer levels on nutrient uptake and yield of hybrid maize during *kharif* season.

MATERIALS AND METHODS

An experiment was conducted during *kharif*, 2007 at Tamil Nadu Agricultural University, Coimbatore to study the effect of different spacing and fertilizer levels on nutrient uptake and yield of hybrid maize. The experiment was laid out in a split plot design with four replications. Two spacings *viz*., 60 x 20 cm (S_1) and 75 x 20 cm (S_2) accommodating 83, 333 and 66, 666 plants ha^{-1} were assigned to the mainplot. Three fertilizer levels *viz*., 150:75:75 (F_1), 200:100:100 (F_2) and 250:125:125 (F_3) NPK kg ha^{-1} constituted the subplot treatments.

The soil of the experimental field was sandy clay

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