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Effects of N, P and K on productivity and soil fertility in maize (*Zea mays*)- wheat (*Triticum aestivum*) cropping system

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ABSTRACT

A field experiment was conducted on cultivators' field for two years i.e. during *kharif* and *Rabi* seasons of 2004 to 2006 on medium black soils in the plain zone area of Nasik district of Maharashtra in order to study the effect of fertilizer levels on yield and uptake of nutrients in Maize *(Zea mays*) + Wheat (*Triticum aestivum*) cropping sequence. The field experiment was laid out on permanent site in Randomized Block Design with six replications and five treatments. The fertility level increased the yield and up take of nutrients by Maize-Wheat cropping sequence. The grain yields of Maize and wheat with combined use of fertilizers were high during both years. The maximum productivity and net returns, improvement in fertility status and chemical properties of soil could be possible from Maize + Wheat cropping with application of 100 % RDF in the respective crops. A significant increase in the grain yield of Maize-Wheat cropping sequence was observed with increase in nitrogen level from 0 to 120 kg /ha., whereas an increase was significant up to 120kg N/ha. Level in maize + wheat yield. The highest net return was brought about with 120,60 and 40 N, P_2O_5, and K_2O kg/ha respectively with adequate supply of irrigation water. The productivity and net monetary returns were recorded highest with the application of recommended dose of nutrients (N, P & K) to Maize – wheat cropping sequence.

Key words: Soil fertility, Productivity, Levels of NPK

INTRODUCTION

Maize-Wheat cropping sequence has gained popularity in semi-arid agro climatic condition of plain zone area of Maharashtra with high yielding and fertilizer responsive cultivators of these two staple food crops. There has been growing interest in cropping sequence as a potential tool in improving and sustaining soil health as well as productivity. Cropping sequence is traditionally a low cost input agriculture system. Information on nutrient management on individual crops is available, while cropping system, it is lacking. Moreover, the single nutrient approach has been replaced by multinutrient to proved balanced nutrients to boost up crop productivity and nutrient use efficiency. Beside nutrient management in cropping system is more efficient and judicious than individual crop, as following crop take care of the residual effects of nutrients, N, P and to some extent K. Keeping these considerations in view, the present field investigation was undertaken.

MATERIALS AND METHODS

A field experiment was conducted for three consecutive seasons (2004-05 to2005-06) on medium black soil in plain zone area of Maharashtra. The soil low in organic carbon (0.59) and nitrogen (223.60 kg/ha) low to medium in available phosphorus (14.56 kg/ha) and high in available potassium (548.60kg/ha). The field experiment was laid out on permanent site in Randomized Block Design with six replications and five treatments as detailed in Table 2. The treatment consisted equal levels, each of N (120Kg/ha.) and P2O5 (60Kg/ha.) and K2O (40kg/ha.) along with control. half dose of N and full dose of P and k were applied as basal to both the crop at the time of sowing. The remaining half dose of N was applied at top dressing 25-30 days after sowing to both the crops. Maize variety cv. " Super 900 M' was sown at the onset of monsoon in the second week of July followed by Wheat variety cv. "NIAW-301' in the third week of November during each season. Dibbling was carried out at 75x25-cm row spacing of maize and wheat of 22.5cm by drilling. The recommended dose for maize and wheat was120.60.40 and 120.60.40kg N: P: K/ha, respectively. Biofertilizers viz. Azotobactor and PSB were used for seed treatment wherever applicable as per treatments.

RESULTS AND DISCUSSION

Response of maize to N, P and K

The grain yield of maize increased significantly with increasing levels of N up to 120kg/ha. In 2004-05and 2005-06 on an average, application of 120kg/ha N increased the grain yield by 9.65 q/ha. over absolute control. These findings were confirmed with the results of Patel *et al.* (1991) and Varma *et al.* (1999). Application of P was effective however marked response was

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