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Research Paper

Effects of different levels of nitrogen, phosphorus and zinc on yield and yield attributes of maize (*Zea mays* L.)

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ABSTRACT : A field experiment was conducted during the *Rabi* season of the year 2009- 10 at Pulse Research Station, Anand Agricultural University, Model Farm, Vadodara, Gujarat. Results revealed that grain and stover yield (kg ha^{-1}) was found to be significantly higher under application of N_3 (160 kg N ha^{-1}) and N_2 (120 kg N ha^{-1}) over N_1 (80 kg N ha^{-1}). The grain yield showed increase under the levels of N_2 (120 kg N ha^{-1}) and N_3 (160 kg N ha^{-1}) were 11.35 and 18.64 per cent over treatment N_1 (80 kg N ha^{-1}). The grain yield of maize increased steadily with increase in phosphorus levels. Intermediate dose of phosphorus P_2 (60 kg P_2O_5 ha^{-1}) produced significantly higher yield 8.97 per cent as compared to lower dose of P_1 (40 kg P_2O_5 ha^{-1}). The higher dose of P_3 (80 kg P_2O_5 ha^{-1}) increased 10.12 per cent in grain yield over P_1 (40 kg P_2O_5 ha^{-1}). Increased grain yield with application of Z_2 (5 kg Z ha^{-1}) was 10.21 per cent over no application *i.e.* Z_1 (0 kg Z ha^{-1}).

Key Words : Nitrogen, Phosphorus, Zinc, Maize, Yield

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Maize (*Zea mays* L.) the 'queen of cereals', popularly known as corn, is one of the most important cereals of the world, ranking third among the food crop, next to rice and wheat, both in respect of area and production. An increase in the yield of crop can be brought forward either by increasing the area under cultivation or by increasing the productivity per unit area. Since the area is limited, yield level per unit area has to be increased. Maize has been widely cultivated as a rain fed crop in India. Recent studies have shown that maize can be successfully grown during *Rabi* in many part of the country due to evolution of new genotypes. The yield level of maize during *Rabi* season is considerably higher than that of *Kharif* due to its timely water availability and higher fertilizer use efficiencies (Singh, 1974). Nitrogen is the key element in crop growth and is the most limiting nutrient in Indian soil. The paramount importance of nitrogen for increasing the yield has been widely accepted. Nitrogen influences the quality of product by improving the level of protein, succulence and palatability.

Nitrogen plays an important role in synthesis of chlorophyll as well as several amino acids. Corn is heavily consumer of plant nutrient (Bar-Yosef *et. al.*, 1989). Corn responds well to phosphatic fertilizers in almost all the soil types. It plays vital role in plant nutrition. The deficiency of phosphorus in soil severely limits root and shoot growth and thereby affecting the yield. It has been observed that application of phosphorus increases growth and yield, along with dry matter production (Bar-Yosef *et.al.*, 1989). It is associated with several vital physiological, metabolic and biochemical functions such as utilization of sugars and starch, photosynthesis, cell division, fat and albumin formation. Application of micronutrient also plays significant role in improvement of grain yield of maize. Among, micronutrient zinc plays an important role in photosynthesis, nitrogen metabolism and regulates auxin concentration in the plant.

Research Procedure

A field experiment was conducted at Pulse Research Station, Model Farm, Anand Agricultural University, Vadodara, Gujarat during the *Rabi* season of the year 2009- 10. Soil of the experimental field was sandy loam with pH 7.5. It was very deep and fairly moisture retentive, low in available nitrogen, zinc and organic carbon and high in available phosphorus and potash. Eighteen treatment combinations consisted of three levels of nitrogen (80, 120 and 160 kg N ha^{-1}), three levels of phosphorus (40, 60 and 80 kg P_2O_5 ha^{-1}) and two levels of zinc (0 and 5 kg Z ha^{-1}) were tested in factorial randomized block