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ARTICLES

Research Articles

- Effect of farm nutrient resources along with inorganic phosphorus (P) supplying fertilizers on high quality maize production** 1
M. Manimaran

Short Communication

Effect of farm nutrient resources along with inorganic phosphorus (P) supplying fertilizers on high quality maize production

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In order to evaluate the effect of organic and inorganic phosphorus (P) sources on quality attributes of maize crop, a field experiment was conducted in a neutral normal soil during June 2007. The experimental plot was located at Madurai District, Tamil Nadu, India. The experimental soil has the pH of 7.2, EC 4 dSm⁻¹ and the available phosphorus content is 8 kg ha⁻¹. There were nine treatments imposed in randomized block design (RBD) with three replications with the plot size of 5 × 4 m. The treatments comprised the farm nutrient resources such as green manure, farmyard manure and vermicompost along with inorganic phosphate sources such as single super phosphate and di-ammonium phosphate. The different combinations included here were Control (T₁), SSP alone (T₂), SSP + GM at 10 t ha⁻¹ (T₃), SSP + FYM at 12.5 t ha⁻¹ (T₄), SSP + VC at 0.5 t ha⁻¹ (T₅), DAP alone (T₆), DAP + GM at 10 t ha⁻¹ (T₇), DAP + FYM at 12.5 t ha⁻¹ (T₈) and DAP + VC at 0.5 t ha⁻¹ (T₉). The recommended dose of phosphorus for maize crop is 62.5 kg ha⁻¹. The treatments were replicated thrice in a randomized block design with the plot size of 5 × 4 m. The results of the experiment showed that the application of SSP + GM at 10 t ha⁻¹ registered significant improvement in the quality parameters such as starch (60.25%), total sugars (4.41%) and crude protein content (8.03%) over other treatments.

Key words: Maize, starch, total sugars, crude protein.

INTRODUCTION

Maize is globally the top ranking cereal in potential grain productivity. Among the cereals grown in India, it ranks fifth in area (6.42 mha), fourth in production (11.47 mt), third in productivity with 1790 kg ha⁻¹ (Statistical Abstract of India, 2000). The average yield of maize in India is less than 25%. Maize has also occupied a wide range of utility

as a value based product in the industries of corn oil, starch, glucose, cosmetics, fermentation products like alcohol and syrup, baby food, edible oil, poultry, live stock, fish feed, etc., India has a vast scope for utilization of organic manures such as green manures, farmyard manure, vermicompost and other industrial by-products.

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Table 1. Effect of farm nutrient resources along with inorganic p fertilizers on quality parameters of maize crop.

Treatments	Starch (%)	Total sugars (%)	Crude protein (%)
T ₁ - Control	52.16	3.36	5.95
T ₂ – SSP alone	53.82	3.66	6.63
T ₃ – SSP + GM	60.25	4.41	8.03
T ₄ – SSP + FYM	60.20	4.34	7.95
T ₅ – SSP + VC	59.15	4.20	7.71
T ₆ – DAP alone	52.24	3.40	6.23
T ₇ – DAP + GM	58.00	4.05	7.45
T ₈ – DAP + FYM	56.72	3.92	7.20
T ₉ – DAP + VC	55.53	3.80	6.91
SED	0.49	0.06	0.11
CD (p= 0.05)	0.98	0.13	0.22

Utilization of organic materials in conjunction with inorganic fertilizers leads to improved crop productivity. As far as Tamil Nadu is concerned, the area under maize is increasing due to escalation in broiler feed production and various food processing industries. Keeping these points in view the present investigation was taken up.

MATERIALS AND METHODS

A field experiment was conducted in a neutral normal soil during June 2007. The experimental plot was located at Madurai District, Tamil Nadu, India. The experimental soil has the pH of 7.2, EC 4 dSm⁻¹ and the available phosphorus content is 8 kg ha⁻¹. There were nine treatments imposed in randomized block design (RBD) with three replications with the plot size of 5 × 4 m. The treatments comprised the farm nutrient resources such as green manure, farmyard manure and vermicompost along with inorganic phosphate sources such as single super phosphate and diammonium phosphate. The different combinations included here were Control (T₁), SSP alone (T₂), SSP + GM at 10 t ha⁻¹ (T₃), SSP + FYM @ 12.5 t ha⁻¹ (T₄), SSP + VC at 0.5 t ha⁻¹ (T₅), DAP alone (T₆), DAP + GM at 10 t ha⁻¹ (T₇), DAP + FYM at 12.5 t ha⁻¹ (T₈) and DAP + VC at 0.5 t ha⁻¹ (T₉). The recommended dose of phosphorus for maize crop is 62.5 kg ha⁻¹. The maize crop was grown upto harvest and the cobs were thrashed, grains were extracted and induced for biochemical analysis. The protein is estimated by Micro Kjeldahl method (Humphries, 1956), starch is estimated by Anthrone method (Clegg, 1956) and total sugar is estimated by Shaffer Somogyi Micro method (Mc Donald and Foley, 1960).

RESULTS AND DISCUSSION

The results of the experiment showed that the application of SSP + GM at 10 t ha⁻¹ registered significant improvement in the quality parameters such as starch (60.25%), total sugars (4.41%) and crude protein content (8.03%) over other treatments (Table 1). Comparable results regarding quality parameters of wheat were reported by Patil et al. (2008). Although all quality characteristics of maize crop are genetically controlled, it had long been known that the cultivation environment is

also important as a modifier. Application of single super phosphate along with organic manures improved the nutrient uptake of the crop that might have resulted in the enrichment of the quality parameters of the maize crop. An adequate supply of phosphorus at early stages of plant life is important for the development of reproductive parts of plants (Meena et al., 2008). This in turn improved the starch, total sugars and the crude protein content in the economic part while harvesting of crop. It might be due to the reason that the organo – inorganic fertilizer combination supplies adequate amount of macro and micro nutrients. This might have favoured the accumulation of starch, total sugars and crude protein content in maize crop. Majumdar et al. (2007) reported that the application of P along with green manures significantly increased the protein and oil content of soybean which might be due to higher N and P uptake. Addition of diammonium phosphate alone and its combination with organic manures in all the soils recorded the lower amount of starch, total sugars and the crude protein content in maize crop compared to SSP and its combinations. The minimal response of DAP compared to SSP might be due to the low release of nutrients from DAP, the lower accumulation of secondary metabolites such as starch, total sugars and crude protein in the reproductive part of the maize crop. Besides, SSP contains small amount of Ca and sulphur in its composition that might have also involved in the improvement in starch, total sugars and crude protein content in maize crop.

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The background of the cover is a close-up photograph of dark, round oilseeds. A white plastic scoop is positioned in the lower-left quadrant, filled with several of these seeds. The text is overlaid on this image.

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