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EFFECT OF NUTRIENT MANAGEMENT ON THE PRODUCTIVITY AND PROFITABILITY ENHANCEMENT OF MAIZE

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Abstract:-
A field experiment was conducted to study the productivity and profitability enhancement of maize (Zea mays L.) through nutrient management during summer, 2016 at the experimental farm, Department of Agronomy, Faculty of Agriculture, Annamalai University. The experiment was laid out at randomized block design (RBD) having three replications. The result revealed that highest green cob yield of 9579 kg ha^{-1} was recorded in the treatment T_6 (150% RDF + Micronutrient mixture soil application @ 25 kg ha^{-1}) and it was superior to other treatments. The result also revealed that highest net return was recorded in the treatment T_6 (150% RDF + Micronutrient mixture soil application @ 25 kg ha^{-1}) and it was superior than other treatments. This treatment also significantly recorded higher gross return and benefit cost ratio of maize.

Keywords:-*Productivity, profitability, green cob yield, micronutrient.*

INTRODUCTION

In cereals, maize is grown throughout the year mainly due to photo-thermo-insensitive character, hence called 'Queen of cereal'. There are several factors that affect the productivity of maize; however, the fertilizer management is one of the most important factors that affect the growth and yield of maize. Another factor time of application is a non-monetary input which plays significant role in production and productivity of any crop. Maize is an exhaustive crop requires all types of macro and micro nutrients for better growth and yield potential (Ding *et al,* 2005). Effective supply of nutrients (macro and micro) fertilizers may increase the production of maize as well as improve the quality of food grains. Micronutrients are an important and essential plant nutrients taken up and utilized by crops in very small quantities. Micronutrients often act as co-factors in enzyme system in addition to having several other vital functions in plants (Mohammadi Ghohsareh and Kamran, 2010). Boron (B) is one of the most important elements that maize requires for sugar transport, cell division and amino acid production. Zinc is one of the first micronutrients recognized as essential for plants. It is the micronutrient that is most commonly limiting crop yield in Indian soils. Zinc is the micronutrient with significant effect on maize (Kanwal *et al.,* 2010). Iron (Fe) is important component of enzymes, essential for chlorophyll synthesis and photosynthesis. Keeping these in view the study was undertaken to find out the productivity and profitability enhancement of maize through nutrient management.

MATERIALS AND METHODS

Field experiment was conducted in the Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalainagar, during summer 2016 with three replications. The treatments comprises of T_1 (100% Recommended Dose Of Fertilizers (RDF) (250:75:75 kg NPK ha^{-1})), T_2 (125% RDF), T_3 (150% RDF), T_4 (100% RDF + Micronutrient mixture soil application @ 25 kg ha^{-1}),T_5 (125% RDF + Micronutrient mixture soil application @ 25 kg ha^{-1}),T_6 (150% RDF + Micronutrient mixture soil application @ 25 kg ha^{-1}), T_7 (control). The fertilizers were applied to the experimental field as per the treatment details. The recommended fertilizer schedule of 250:75:75 kg N, P_2O_5 and K_2O ha^{-1} suggested by State Department of Agriculture was adopted. Micronutrient mixture @ 25 kg ha^{-1} was applied basally to the respective treatment plots. The nutrient composition of the micro nutrient mixture is (Cu0.40 %, Fe-1.60 %, Mg-4.00 %, Mn-0.30%, B-10.0 %, Zn-0.20 %). The following observation were taken to study the impact of nutrient management practices on the yield components and yield of maize viz., cob length.cob diameter, number of seeds per row, green cob yield and stover yield. The data's are statistically analysed and the following interpretations are arrived.

RESULTS AND DISCUSSION

Among the various treatments imposed in the study, application of 150 percent recommended dose of fertilizers along with micronutrient mixture @ 25 kg ha^{-1}, recorded the maximum green cob yield (9579 kg ha^{-1}). The same treatments recorded the highest value on cob length (24.14 cm), cob diameter (6.47 cm), number of grains cob^{-1}(563) and stover yield (9997 kg ha^{-1}).(Table 1).This could be due to better nutrient uptake and efficient assimilation of applied nutrients resulted in cob length, cob diameter and number of grains cob^{-1} and thus more grain yield. Similar findings were reported by Grazia *et al.* (2003), Aziz *et al.* (2012) and Shivran *et al*. (2013).

Higher grain yield with higher nutrients level favoured for better growth which might have resulted in better utilization of solar energy and inturn lead to enhanced values on yield – attributing characters, which cumulatively resulted in realizing higher green cob yield of maize. Adequate supply of nitrogen and micronutrients increase the crop growth, photosynthesis process, respiration and other biochemical and physiological activities which helps in achieving high yield attributes. Similar result was reported by Zeidan *et al.* (2010).

The source - sink relationship and the rate at which translocation takes place from source during the reproduction stage largely determine grain yield. Maize yield is a function of different yield components such as the number of cobs ha^{-1}, length and girth of cob, number of grain per row of cob, 100 grain weight and shelling percentage. The nutrients supplied are effectively utilized by maize plants which increased the sink capacity which increase the protein content due to increased nutrients uptake by the crop. The findings are in line with the findings of Maddoni *et al.* (2006) and Wadile *et al*. (2016).

Table 1: Effect of nutrient management on yield of maize crop

Treatments	Cob length (cm)	Cob diameter (cm)	Number of grains Cob^{-1}	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Harvest Index
T_1	16.95	4.52	466	6467	8576	42.99
T_2	19.52	4.94	489	6910	8923	43.64
T_3	21.37	5.34	514	7743	9413	45.13
T_4	22.21	5.73	534	7969	9605	45.34
T_5	23.70	6.10	552	8536	9798	46.55
T_6	24.14	6.47	563	9579	9997	48.93
T_7	13.61	3.96	397	4273	6477	39.74
S.Ed	0.17	0.04	3.97	64.17	91.06	0.09
CD (p=0.05)	0.37	0.09	8.62	139.27	191.62	0.20

Among the various fertilizers levels, 150 per cent recommended dose of NPK produced higher stover yield could be due to better nutrient uptake and efficient assimilation of applied nutrients resulted in more leaf area, DMP, cob length, cob diameter and number of grains cob^{-1} and thus more green cob yield confirming the findings of Gajendra Singh *et al.* (2012), Keerthi *et al.* (2013), Abel Daikho (2015) and Gul *et al.* (2015). Apart from this treatments combination applications of 150 per cent RDF + Micronutrient mixture soil application @ 25 kg ha^{-1} (T_6) registered the higher net return of 55186 Rs. ha^{-1} and benefit cost ratio of 2.21 (Table 2). This might be due to the production of higher yield with respective levels of NPK and Micronutrients applications.

Table 2: Effect of nutrient management on economics of maize crop

Treatments	Cost of cultivation (Rs. ha^{-1})	Gross income (Rs. ha^{-1})	Net income (Rs. ha^{-1})	BCR
T_1	38100	68958	30858	1.80
T_2	40200	73562	33362	1.82
T_3	44403	82136	37733	1.84
T_4	39300	84495	45195	2.15
T_5	41400	90259	48859	2.18
T_6	45603	100789	55186	2.21
T_7	29689	45968	16279	1.54

CONCLUSION:-

In the light of the above facts, it may be concluded that application of150 per cent recommended dose of NPK + micronutrient mixture soil application @ 25 kg ha^{-1} (T_6) is an effective practice for augmenting higher maize yield and registered the higher net returns of Rs. 55186 ha^{-1} and benefit cost ratio of 2.21.

REFERENCES

[1]. Abel Daikho, U.K. Hulihalli, G.B.,Tuppad and C.B. Kabadagi. 2015. Productivity and economics of maize hybrids as influenced by fertilizer levels under changing climatic conditions.**Karnataka J. Agric. Sci., 28**(5): 817-821.

[2]. Gajendra Singh, G.L. Sharma, S. L. Golada and Ramnivas Choudgary. 2012. Effect of FYM enriched with fertilizers on growth, yield and economics of quality protein maize (*Zea mays* L.). **Res. Crop., 13**(3):1147-1151.

[3]. Gul, S., M.H. Khan, B.A. Khanday and Sabeena Nabi. 2015. Effect of sowing methods and NPK levels on growth and yield of rainfed maize (*Zea mays* L.). **Scientifica.,** Article ID 198575: 6.

[4]. Keerthi, S., A. Upendra Rao, A. V. Ramana and K. Tejeswara Rao. 2013. Effect of nutrient management practice on cob yield, protein content, NPK uptake by sweet corn and post harvest N, P_2O_5 and K_2O. **Int. J. Adv. Bio. Res., 3**(4): 553-555.

[5]. Kanwal, S., Rahmatullah, A.M. Ranjha and R. Ahmad. 2010. Zinc partitioning in maize grain after soil fertilization with zinc sulphate. **Int. J. Agric and Biology., 12**: 299-302.
[6]. Mohammadi Ghohsareh and Kamran. 2010. The effect of microelements spraying on growth, qualitative and quantitative grain corn in Iran. **Int. Res. J. Appl and Basic. Sci., 3**: 27802784.
[7]. Ding, L., K.J. Wang, G.M. Jiang, D.K. Biswas, H. Xu, L.F. Li and Y.H. Li. 2005. Effects of nitrogen deficiency on photosynthetic traits of maize hybrids released in different years. **Annals Bot., 96**(5): 925-930.
[8]. Maddoni , G.A., M. E. Otegui and A. G. Cirilo. 2006. Row width and maize grain yield. **Agron. J., 98**: 1532-1543.
[9]. Aziz, M. A., Abou-Elela, A. Usama, A. El-Razek and H. K. Khalil. 2012. Yield and its components of maize/soybean intercropping *sy*stems as affected by planting time and distribution. **Australian J. Basic and Appl. Sci., 6**(13), 238-245.
[10]. Grazia, J.D., P.A. Tittonell, D. Germania, A. Chiesa, J. De-Grazia. 2003. Phosphorous and nitrogen fertilization in sweet corn (*Zea mays* L. var. *saccharata* Bailey). **Spanish J. Agric. Res., 1**(2):103-107.
[11]. Shivran, R.K., Rakesh Kumar and Anupama Kumari. 2013. Influence of sulphur, phosphorus and farm yard manure on yield attributes and productivity of maize in humid south eastern plains of Rajasthan. **Agriculture Sci and Digest., 33**(1): 9-14.
[12]. Wadile, S.C., P.P. Pawar, S.S. Iihe and V.M. Rathod. 2016. Nutrient management on growth, yield and quality of sweet sorn, baby corn and maize. **Bioinfolet., 13**(1): 67-69.
[13]. Zeidan M.S., M.F. Mohamed and H. A. Hamouda. 2010. Effect of foliar fertilization of Fe, Mn and Zn on wheat yield and quality in low sandy soils fertility. **World J.Agric., Sci. 6**(6): 696 - 699.