



STUDIES ON INTEGRATED NUTRIENT MANAGEMENT PRACTICES ON IRRIGATED MAIZE

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Abstract

A Field experiment was conducted during, *kharif* season of 2018 at Kalaivalli village, Dharmapuri district to study the effect of nutrient management practices on growth and yield enhancement in maize (*Zea mays* L.) NK 6240 to various nutrient management practices. The treatments are T1 - Control, T2 – RDF (250 : 75 : 75 kg NPK ha⁻¹) + azophos 10 kg ha⁻¹, T3 - RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T4 – 75% RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T5 – 125% RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T6 - RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T7 – 75% RDF + poultry manure 2t ha⁻¹ + azophos 10kg ha⁻¹, T8 – 125% RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T9 - RDF + vermicompost2t ha⁻¹ + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹ laid out in randomized block design. The treatment consist nine combinations with three replications through organics (vermicompost, poultry manure and azophos) and inorganic (RDF) sources to increase cob yield and its components with resilient performance under irrigated condition. The result revealed that overall combined analysis of various effect of nutrient management practices to depicted significant results for all the yield contributing characters. The highest plant height (94.00 cm), green cob yield (4850 kg ha⁻¹) and stover yield (8723 kg ha⁻¹) of maize were recorded in this treatment T5– 125% RDF + vermicompost2t ha⁻¹ + azophos 10kg ha⁻¹ involving package of practices, which received nutrient levels in the form of organics and inorganics from the treatment compared to other treatments, they differ significantly with each other in respect of yield and productivity.

Key word: Nutrient Management, vermicompost, poultry manure, azophos and green cob yield.

Introduction

Maize (*Zea mays* L.) is the third important cereals crop next to rice and wheat in the world. Maize has becoming very popular cereals crop in India because of the increasing market price and high production potential of hybrid varieties in both irrigated as well as rainfed conditions, and also because of its high production potential compared to any other cereals crop and adaptability to wide range of environment. Hence it is called as ‘miracle crop’ and also as ‘queen of cereals’.

Worldwide maize is grown over an area of 185.54 million hectares with a production of 1074.76 million tonnes and with the productivity of 5.79 t ha⁻¹. In India, maize occupies an area of 9.60 million hectares with a production of 26.26 million tonnes and the productivity of 2.74 t ha⁻¹ (USDA, Feb 2017). In Tamil Nadu, it is cultivated in an area of 0.36 million hectares with production of 2.38 million tonnes and a productivity of 6.5 t ha⁻¹ and also it occupies fourth position in Indian maize production (Annual maize report, AICRP, 2016).

Intensive cultivation, growing of exhaustive crops,

use of unbalanced and inadequate fertilizers accompanied by restricted use of organic manures and biofertilizers have made the soils not only deficient in the nutrients, but also deteriorated the soil health resulting in decline in crop response to recommended dose of NPK fertilizers, integrated plant nutrient system (IPNS) has assumed a great importance and has vital significance for the maintenance of soil productivity. Organic manures, particularly vermicompost, poultry manure and biofertilizers like azophos, not only supply macronutrients but also meet the requirements of micronutrients, besides improving soil health. Boosting yield, reducing production cost and improving soil health are interlinked components. Therefore suitable combination of chemical fertilizer and organic manures cultures need to be developed for particular cropping system and soil.

Materials and Methods

Field experiment was conducted at Kalaivalli village, Dharmapuri district. The soil of the experimental field is red sandy loam in texture with low in available nitrogen, medium in available phosphorus and high in available

Table 1: Studies on integrated nutrient management practices on irrigated maize.

Treat ment	Plant height 30 DAS (cm)	LAI 60 DAS	DMP at harvest	Green cob yield kg ha ⁻¹	Straw yield kg ha ⁻¹
T ₁	59.5	2.53	9683	3156.00	6000.00
T ₂	70.6	3.65	10218	3975.00	6820.00
T ₃	85.3	4.56	13568	6737.00	8545.00
T ₄	77.8	4.12	12965	5510.00	7715.00
T ₅	94.0	4.92	14378	9468.00	9876.00
T ₆	81.4	4.34	13218	6043.00	8163.00
T ₇	74.3	3.90	12582	4526.00	7248.00
T ₈	88.4	4.59	13814	7859.00	9007.00
T ₉	91.7	4.77	14156	8624.00	9460.00
S.Ed	1.23	0.08	106	146.29	173.41
CD(0.05)	2.46	0.18	214	310.13	367.63

potassium. The experiment comprising of nine treatments three replication *viz.*, T₁ - Control, T₂ - RDF (250 : 75 : 75 kg NPK ha⁻¹) + azophos 10 kg ha⁻¹, T₃ - RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₄ - 75% RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₅ - 125% RDF + vermicompost 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₆ - RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₇ - 75% RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₈ - 125% RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹, T₉ - RDF + vermicompost 2 t ha⁻¹ + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹. The trial was laid out in a randomized block design with plot size was 5 x 4m for crops seed rate is 5 kg ha⁻¹ (*Zea mays* L.) Hybrid NK 6240. N, P and K were applied in the form of urea, single super phosphate and muriate of potash at 250 : 75 : 75 kg NPK ha⁻¹ respectively was followed as RDF with combined application of organic manures (vermicompost, poultry manure) and biofertilizer like azophos in specified plots as per the treatments schedule. All the agronomic practices were carried out uniformly to raise the crop.

Results and Discussion

Application of 125% RDF + vermicompost 2t ha⁻¹ + azophos 10 kg ha⁻¹ recorded maximum plant height, green cob yield, stover yield and harvest followed by 125% RDF + poultry manure 2t ha⁻¹ + azophos 10 kg ha⁻¹. This might be due to combined use of organic and inorganic fertilizers which recorded increased plant growth. Similar findings are in line with the findings of Suresh Kumar *et al.*, (2018). N significantly increase the plant growth, stem girth, leaf area and dry matter accumulation in maize

crop. The findings were reported by Yadav *et al.*, (2017), LalitaVerma and Vijaya kumar (2018). Thus, readily available NPK and micro nutrients available in organic nutrient sources have influenced the yield attributes of the crop. Maximum grain yield (4850 kg ha⁻¹) was recorded with combined application of 125% RDF + vermicompost 2t ha⁻¹ + azophos 10 kg ha⁻¹ followed by 125% RDF + poultry manure 2 t ha⁻¹ + azophos 10 kg ha⁻¹ which resulted in better crop growth like plant population, plant height, leaf area index and that leads to more dry matter accumulation and yield. Kaur *et al.*, (2018). Organic manures like vermicompost, poultrymanure and biofertilizer like azophos supply nutrients beneficial to the crop growth and productivity. Organic manures act as nutrient reservoir and upon decomposition produces organic acids, thereby absorbed ions are released slowly for the entire growth period leading to higher yields as reported by Wadile *et al.*, (2016), Zaremanesh *et al.*, (2017).

Conclusion

The study of integrated nutrient management of maize using (NPK, vermicompost, poultry manure and azophos) strategy revealed that application of 125% RDF + vermicompost 2t ha⁻¹ + azophos 10 kg ha⁻¹ is an effective practice for recorded increased values of growth components and enhanced the yield of maize.

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