



# EFFECT OF NUTRIENT MANAGEMENT PRACTICES ON YIELD AND NUTRIENT UPTAKE IN MAIZE (*ZEA MAYS* L.)

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## Abstract

Field experiment was conducted during, summer season of 2018 at Kalaivalli Village, Dharmapuri District, Tamil Nadu 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 experiment was laid out in Randomized Block Design with nine treatments and three replications. The application of organic manures (vermicompost, poultry manure) along with various fertilizer levels of NPK and biofertilizer significantly influenced the plant growth, yield components and yield of maize. Among the nutrient management practices evaluated, 125% RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup> (T<sub>5</sub>), resulted in the enhanced values of green cob yield (9468 kg ha<sup>-1</sup>), stover yield (9876 kg ha<sup>-1</sup>) and harvest index. The same treatment also recorded the maximum values of nutrient uptake N (170.45 kg ha<sup>-1</sup>), P (32.45 kg ha<sup>-1</sup>) and K (144.35 kg ha<sup>-1</sup>).

## Introduction

Maize (*Zea mays* L.) is the most 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. Maize grain contain about 72% starch, 10% protein, 4.85% oil, 5.8% fibre and 3.0% sugar. Maize is also used as food, feed, provides the cheapest fodder for livestock, feed for poultry and industries for the production of starch, syrup, alcohol, lactic acid and most valuable food for human beings.

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<sup>-1</sup>. 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<sup>-1</sup> (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<sup>-1</sup> and also it occupies fourth position in Indian maize production (Annual maize report, AICRP, 2016).

Maize being a C<sub>4</sub> plant, it is very efficient in converting

solar energy into dry matter. As heavy feeder of nutrients, maize productivity is largely dependent on nutrient management. Therefore, it needs fertile soil to express its yield potential. Ideal soils are rarely found in nature. Hence, soils have to be improved to suit the rip not only by adding nutrients, but also by other soil amendments, like organic matter maintain the activity of soil life (Fink, 1998). The productivity of maize is largely dependent on its nutrient management. Organic manures and biofertilizer 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 organic manures and chemical fertilizers need to be developed for particular cropping system and soil.

## Materials and Methods

Field experiment were 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 potassium. The experiment comprising of nine treatments three replication viz., T<sub>1</sub> - Control, T<sub>2</sub> - RDF (250 : 75 : 75 kg NPK ha<sup>-1</sup>) + azophos 10 kg ha<sup>-1</sup>, T<sub>3</sub> - RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>4</sub> - 75% RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>5</sub> -

**Table 1:** Effect of nutrient management practices on yield and nutrient uptake ( $\text{kg ha}^{-1}$ ) in maize.

Treatment	Green cob yield ( $\text{kg ha}^{-1}$ )	Stover yield ( $\text{kg ha}^{-1}$ )	Harvest index (%)	N	P	K
T <sub>1</sub>	3156.00	6000.00	34.46	112.71	12.36	87.10
T <sub>2</sub>	3975.00	6820.00	36.82	120.56	15.00	95.06
T <sub>3</sub>	6737.00	8545.00	44.08	149.34	24.96	123.55
T <sub>4</sub>	5510.00	7715.00	41.66	134.78	19.88	109.51
T <sub>5</sub>	9468.00	9876.00	48.94	170.45	32.45	144.35
T <sub>6</sub>	6043.00	8163.00	42.53	142.26	22.07	116.64
T <sub>7</sub>	4526.00	7248.00	38.44	127.80	17.40	102.48
T <sub>8</sub>	7859.00	9007.00	46.59	163.14	30.34	137.80
T <sub>9</sub>	8624.00	9460.00	47.68	156.27	27.37	130.93
S.Ed	146.29	173.41	0.26	3.09	0.56	2.54
CD (P = 0.05)	310.13	367.63	0.55	6.57	1.20	5.39

125% RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>6</sub> - RDF + poultry manure 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>7</sub> - 75% RDF + poultry manure 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>8</sub> - 125% RDF + poultry manure 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>, T<sub>9</sub> - RDF + vermicompost 2 t ha<sup>-1</sup> + poultry manure 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup>. The trial was laid out in a randomized block design with plot size was 5 × 4m for maize hybrid NK6240 with seed rate is 5 kg ha<sup>-1</sup>. 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<sup>-1</sup> 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

The effect of different treatments imposed in the study revealed that the treatment 125% RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup> (T<sub>5</sub>) registered significantly higher N, P and K uptake by maize than other due to higher uptake of nutrient and also recorded highest green cob yield, stover yield and harvest index. Similar finding was reported by Prathyusha (2013). The amount of fertilizer applied is responsible for the amount of nitrogen, phosphorus and potassium uptake in maize.

The increase in P and K uptake was due to the fact that nitrogen promotes phosphorus and potassium uptake by increasing shoot and root growth, altering plant metabolism and increasing P and K solubility and availability. Similar result was reported by Kafle *et al.*, (2016).

Besides they make unavailable form of macro and micronutrients into available form. Combined use of organic and chemical fertilizer increase the nutrient uptake, which recorded more yield. The findings are in line with the findings of Baradhan and Suresh Kumar, 2018. Azophos improved the organic carbon content of the rhizosphere soil which ultimately increased the nutrient availability that results in significant increase of maize yield parameters and yield. The findings are in line with the Wadile *et al.*, (2016).

## Conclusion

Application of NPK fertilizers, organic manures (vermicompost, poultry manure) and biofertilizer (azophos) registered the maximum values green cob yield, stover yield and harvest index of maize. In the light of the above facts, it may be concluded that application of 125% RDF + vermicompost 2 t ha<sup>-1</sup> + azophos 10 kg ha<sup>-1</sup> (T<sub>5</sub>) is an effective practice for augmenting higher nutrient uptake.

## References

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