



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(12): 105-107
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www.thepharmajournal.com
Received: 15-10-2020
Accepted: 27-11-2020

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Effect of integrated nutrient management practices on growth and yield of maize

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DOI: <https://doi.org/10.22271/tpi.2020.v9.i12b.5410>

Abstract

A field experiment was conducted in the Department of Agronomy, Hemvati Nandan Bahuguna Garhwal University, Uttarakhand to know the impact of nutrient management practices on growth and yield of maize. The experiment was conducted in Randomized block design with seven treatments and three replications. The variety of maize and spacing used in the trial was NK 6240 Hybrid Corn and 60 cm x 20 cm. The treatments were Control, 50% Recommended dose of fertilizer (RDF) + Farm yard manure (FYM) + Biofertilizer consortium, 75% RDF+ FYM + Biofertilizer consortium, 100% RDF + FYM + Biofertilizer consortium, 100% RDF, 125% RDF and FYM + Biofertilizer consortium. In this experiment it was witnessed that among the different integrated nutrient management practices, the application of 100% RDF + FYM + Biofertilizer consortium was found effective for better growth and yield of maize.

Keywords: Maize, integrated nutrient management, consortium

Introduction

Maize is one of the most important cereals in the world both as food for man and feed for animal. Maize popularly known as “corn” is one of the most versatile emerging cash crops having wider adaptability under varied climatic conditions. It is called “queen of cereals” globally. In India, maize or corn is the third most important food cash crops after wheat and rice. The maize is grown throughout the year in all states of the country for various purposes including fodder for animals, food grain, sweet corn, baby corn, green cobs and popcorn. Corn flour is consumed widely in Indian cooking (Gunjal *et al.*, 2017) ^[5, 6].

India, it is grown over 4 percent of the net area sown of the country and it is cultivated in an area 8.69 M ha with annual production and growth of 21.8 M t and 3.6%, respectively (Agricultural Statistics at a Glance, 2016) ^[1]. Furthermore, the fertilizer management is one of the most important factors that influence the growth and yield of maize crop. Maize is considered as most exhaustive crop after sugar cane and requires both micro and macro nutrients to obtain high growth and yield potentials. In this field experiment influence of different integrated nutrient practices on growth and yield of maize was studied.

Materials and Methods

A field experiment was conducted in the Department of Agronomy, Hemvati Nandan Bahuguna Garhwal University, Uttarakhand to know the impact of nutrient management practices on growth and yield of maize. The experiment was conducted in Randomized block design with seven treatments and three replications with a gross plot size of 5.0 m x 3.6 m and a net lot size of 4.0 m x 2.7 m. The variety of maize and spacing used in the trial was NK 6240 Hybrid Corn and 60 cm x 20 cm.

The treatments were Control, 50% Recommended dose of fertilizer (RDF) + Farm yard manure (FYM) + Biofertilizer consortium, 75% RDF+ FYM + Biofertilizer consortium, 100% RDF + FYM + Biofertilizer consortium, 100% RDF, 125% RDF and FYM + Biofertilizer consortium. Growth parameters like plant height and dry matter production and yield parameters like No. of cobs/plant, cob weight, cob length and cob girth were taken and analysed statistically using standard procedures given by Gomez and Gomez, 1984 ^[4].

Results and Discussion

Effect of integrated nutrient management treatments on growth parameters of maize

The different growth parameters (i.e. plant height, dry weight of plant) of maize differed significantly due to different treatments. The plant height was not influenced significantly due to different treatments at 30 DAS. The subsequent observation on plant population at harvest revealed slight increase in growth trend under all the treatments in comparison with crop duration, due to competition for space

nutrient and moisture. The plant height increased slowly during early stage of crop growth, particularly at 30 DAS thereafter, it increased sharply up to 60 DAS. Later on, the height of plant was again increased during 60 to 90 days stages. At harvest plant height showed slight increase in all the treatments (Table 1). Plants were significantly taller under the application of 100% RDF+ FYM + Biofertilizer consortium at all the growth intervals and at harvest, while minimum plant height was recorded under control.

Table 1: Effect of integrated nutrient management treatments on plant height of maize

Treatments	30 DAS	60 DAS	90 DAS	Harvest
T1: Control	16.3	126.2	147.5	149.3
T2:50% RDF + FYM + Biofertilizer consortium	17.1	134.4	153.1	157.6
T3:75% RDF + FYM + Biofertilizer consortium	19.4	144.3	159.2	163.6
T4:100% RDF + FYM+ Biofertilizer consortium	21.7	164.8	178.6	179.2
T5: 100% RDF	19.8	152.7	164.3	166.7
T6: 125% RDF	20.2	158.3	179.7	173.2
T7: FYM + Biofertilizer consortium	17.8	131.7	149.5	151.6
SEM	0.63	2.56	2.82	1.24
CD (5%)	1.28	5.4	6.7	2.6

Data pertaining to dry weight (g) per plant at successive growth stages of maize influenced by various treatments revealed that dry weight per plant orderly increased with the advancement in growth stages till harvest of the crop under all treatments (Table 2). Application of significantly higher 100% RDF + FYM + Biofertilizer consortium resulted in dry weight per plant followed by 125% RDF (Table 2). Similarly

to plant height the increase in dry weight per plant owing to increase in supply of nutrients through these treatments to the crop, as well as due to the indirect effect resulting from reduced loss of nutrients from organic sources. These results also supported by Athokpam *et al.*, (2017) ^[2], Gunjal *et al.*, (2017) ^[5, 6], Choudhary and Kumar (2013) ^[3, 11], Jat *et al.*, (2013) ^[8].

Table 2: Effect of integrated nutrient management treatments on dry matter production of maize

Treatments	30 DAS	60 DAS	90 DAS	Harvest
T1: Control	16.2	176.3	318.7	409.3
T2: 50% RDF + FYM + Biofertilizer consortium	20.8	184.4	326.4	418.5
T3:75% RDF + FYM + Biofertilizer consortium	23.1	191.6	331.6	427.7
T4:100% RDF + FYM + Biofertilizer consortium	25.5	210.2	363.2	448.4
T5: 100% RDF	21.3	193.4	343.7	429.1
T6: 125% RDF	23.4	198.7	352.4	434.2
T7: FYM + Biofertilizer consortium	28.3	181.4	322.3	415.6
SEM	1.12	3.8	5.54	4.3
CD (5%)	4.06	11.7	17.08	13.42

Effect of integrated nutrient management treatments on yield parameters of maize

The significant increase in yield attributes was observed under the application of 100% RDF + FYM + Biofertilizer consortium *viz.* number of cob per plant, cob weight (g), cob length, cob girth and number of grain row per cob (Table 3). This might be due to the sufficient amount of nutrient availability for the ultimately resulted better growth and development of the in the higher yield attributes. Secondly, plant which the increase yield attributing characters might be

due to rapid mineralization of N from organics which might have met the N requirement of the crop at critical stages. Improved physical and biological properties of the resulting in better supply of nutrients to plants and inoculation with microbial consortium secretes both organic and inorganic acids which solubilize insoluble form into available form and increases the growth of crop during entire growth period leading to higher yield attributing characters. These findings are in agreement with Pal *et al.*, (2017) ^[9], Singh *et al.*, (2017) ^[7, 8, 10, 11], Pandey *et al.*, (2000) ^[10], Hari *et al.*, (2014) ^[7].

Table 3: Effect of integrated nutrient management treatments on dry yield parameters of maize

Treatments	Cobs/plant	Cob weight (g)	Cob length (cm)	Cob girth (cm)
T1: Control	1.1	158.3	15.2	3.3
T2:50% RDF + FYM + Biofertilizer consortium	1.17	176.4	16.1	3.7
T3:75% RDF + FYM + Biofertilizer consortium	1.2	181.6	16.5	4.1
T4:100% RDF+ FYM+ Biofertilizer consortium	1.3	192.7	17.8	4.4
T5: 100% RDF	1.13	178.5	16.4	3.9
T6: 125% RDF	1.2	186.4	17.1	4.2
T7: FYM+ Biofertilizer consortium	1.1	163.9	15.7	3.5
SEM	0.02	0.79	0.62	0.34
CD (5%)	0.07	20.94	1.9	1.05

Conclusion

The study on different integrated nutrient management treatments on maize revealed that among the different INM treatments the applications of 100% RDF + FYM + Biofertilizer consortium was found effective for better growth and yield of maize. So the application of 100% RDF + FYM + Biofertilizer consortium was found more remunerative and profitable among different treatments.

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