Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(5): 1855-1856
Received: 25-07-2018
Accepted: 27-08-2018

Choudary Pradeep Kumar
Department of Agronomy
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Rajesh Singh
Department of Agronomy
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Punnam Chhetri
Department of Agronomy
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

RK Singh
Department of Agronomy
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Correspondence
Choudary Pradeep Kumar
Department of Agronomy
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Effect of integrated nitrogen management and spacing on growth and yield of fodder maize (*Zea mays* L.) var. shiats - makka-2

Choudary Pradeep Kumar, Rajesh Singh, Punnam Chhetri and RK Singh

Abstract
A field experiment was conducted during the *Rabi* season of 2017-18 on fodder maize crop (var. SHIATS-Makka 2) at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.). The soil of the experimental field was sandy loam with low organic carbon (0.45%) and a soil pH of 7.6. The experiment comprised of three planting geometry *viz* 40 ×10 cm, 50× 10 cm, 60×10 cm and 2 nitrogen levels i.e. 90 kg N ha^{-1} and 120 kg N ha^{-1} respectively, with 18 treatments replicated thrice and laid out in Randomized Block Design. The experiment was conducted to evaluate the growth and yield of fodder maize (*Zea mays* L.). The result revealed that treatment T_{17} [120 kg N ha^{-1} + (50% N through vermicompost + 50%N through urea) + Seed inoculated with *Azotobacter* + 50x10cm] recorded higher plant height (93.19 cm), dry weight (67.72 g) and green fodder yield (44.56 t ha^{-1}).

Keywords: Integrated nitrogen management, vermicompost, *Azotobacter*, spacing, growth and green fodder yield

Introduction
Maize (*Zea mays* L.) is one of the most versatile and multi utility cereals and commonly known as queen of cereals due to its highest genetic yield potential and wider adaptability under diverse agro-ecological conditions. In India area under fodder crops is only 8.4 m ha which is static since last two decades. At present, the country faces a net deficit of 61.1% green fodder, 21.9% dry crop residue and 64% feeds (Chaudhary *et al*., 2012).Among cultivated forage crops, maize is most suitable crop for fodder as well as silage because of its high yielding ability and excellent nutritional profile. Besides, it is served as source of food, feed and industrial raw material and provides enormous opportunity for crop diversification, value addition and employment generation. Worldwide, maize is an ideal fodder crop because of its quick growing nature, succulence, palatability and excellent quality without any anti-nutritional factor; when harvested at any stage of crop growth (Anonymous, 2013). Forage maize responds differently to plant densities under different environmental and cultural factors, which influence maize forage yield and quality (Carpici *et al*., 2010).
Furthermore, the fertilizer management is one of the most important factor that influences the growth and yield of maize crop. In fact, organic manure not only provides plant nutrients but also improves or sustains the soil health. The micronutrient content in organic manure may be sufficient enough to meet the crop production requirement but problem of low soil fertility is one of the obstacles to maintain and sustain agricultural production and productivity. Integrated nutrient management (INM) is a judicious use of organic and inorganic sources of nutrients to crop field. (Kannan, *et al*., 2013). Nitrogen (N) sources and rates influence grain yield and profitability and total dry matter accumulation, agronomic N-use efficiency and harvest index in maize (*Zea mays* L.). Planting geometry directly influences the plant population /m^2 or the fodder production /m^2. Therefore the present experiment was planned to check the effect of planting geometry and integrated Nitrogen on quality and yield of fodder maize

Materials and Methods
A field experiment was conducted during the Rabi season of 2017-2018 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad, Utter Pradesh, which is located at 25° 24’ 41. 27” N latitude, 81° 51’3.42” E longitude and at an altitude of 98 m above the mean sea level. This area is situated in the south east side of Allahabad city, on the right side of the river Yammuna. The soil of the experimental field was sandy loam with a Ph 7.4.

The sowing of the crop was done on 6th November 2017 and was harvested in the first week of February, 2018.The field experiment was laid out in Randomized Block Design which consisted of 18 treatments, and each replicated thrice. The treatments consisted of two nitrogen levels i.e. 90 kg and 120 kg N ha^{-1}, managed through three different sources viz, 50% N through vermicompost + 50% N urea, 50% N through vermicompost + 50% N urea in addition with seed inoculation with Azotobacter, which was compared with 100% N supplied through urea alone with three different row spacing i.e, 40cm, 50cm, and 60cm, at a plant to plant spacing of 10cm

Results and Discussions

The result of the experiment revealed that the treatments having integrated nitrogen management through vermicompost gave the highest green fodder yield among all the treatments. Higher plant height and dry matter accumulation in plants having nutrient provided as 50% RDN through Urea and the rest 50% N through vermicompost has also been reported by Bindhani *et al.*, 2007. Higher Crop growth rate was observed with row spacing of 50 cm. Khan *et al.* 2008 stated that successive increase in plant population decreases the crop growth rate.

The maximum green fodder yield recorded with plants having nutrient provided by 50% RDN through Urea and the rest supported by vermicompost combined with wider spacing. The results are in confirmation with the results reported by Arif *et al.* (2010); Barik *et al.* (2007) and Muhua *et al.* (2004).

Table 1: Effect of integrated nitrogen management and spacing on growth and yield of fodder maize (*Zea Mays* L.) var. Shiats Makka-2

Treatments		Growth attributes (60 DAS)				Green Fodder yield (t ha^{-1})
		Plant height (cm)	Plant Dry weight (g)	CGR (g $m^{-2}day^{-1}$)	RGR (g g^{-1} day^{-1})	
T_1	90 kg N ha^{-1} + 100% N through Urea + 40×10 cm	48.68	33.37	15.50	0.075	38.00
T_2	90 kg N ha^{-1} + 100% N through Urea + 50×10 cm	48.53	37.75	17.53	0.075	34.00
T_3	90 kg N ha^{-1} + 100% N through Urea + 60×10 cm	50.40	39.71	18.26	0.072	35.00
T_4	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 40×10 cm	50.56	43.99	20.37	0.075	33.50
T_5	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 50×10 cm	55.32	46.50	21.86	0.079	34.80
T_6	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 60×10 cm	59.06	40.44	18.78	0.074	33.00
T_7	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + *Azotobacter* (SI) + 40×10 cm	59.06	46.68	21.99	0.079	37.50
T_8	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + *Azotobacter* (SI) + 50×10cm	53.92	56.69	27.15	0.085	39.00
T_9	90 kg N ha^{-1} + 50% N through VC + 50% N through Urea + *Azotobacter* (SI) + 60×10cm	46.10	50.04	23.35	0.077	35.50
T_{10}	120 kg N ha^{-1} +100% N through Urea + 40 ×10 cm	51.94	51.93	24.20	0.073	33.60
T_{11}	120 kg N ha^{-1} +100% N through Urea + 50 ×10 cm	52.91	46.68	21.62	0.076	40.00
T_{12}	120 kg N ha^{-1} +100% N through Urea + 60 ×10 cm	76.16	56.58	26.61	0.078	41.00
T_{13}	120 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 40×10 cm	78.25	58.61	27.79	0.082	42.50
T_{14}	120 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 50×10 cm	79.32	45.77	21.14	0.074	42.66
T_{15}	120 kg N ha^{-1} + 50% N through VC + 50% N through Urea + 60×10 cm	79.33	59.52	28.18	0.082	42.00
T_{16}	120 kg N ha^{-1} +50% N through VC + 50 % N through Urea + *Azotobacter*(SI) + 40×10 cm	88.43	66.21	31.51	0.079	43.60
T_{17}	120 kg N ha^{-1} + 50% N through VC + 50% N through Urea + *Azotobacter* (SI) + 50×10 cm	93.19	67.72	31.84	0.083	44.56
T_{18}	120 kg N ha^{-1} + 50% N through VC + 50% N through Urea + *Azotobacter* (SI) + 60×10cm	90.16	66.64	31.54	0.081	44.00
	F- test	S	S	S	S	S
	S. Ed. (±)	2.393	10.427	1.571	0.002	1.018
	C. D. (P = 0.05)	4.938	21.520	3.243	0.004	2.102

Conclusion

From the above experimental findings, it can be concluded that for obtaining economically higher green fodder yield (44.56 t ha^{-1}), SHIATS Makka-2, should be fertilized with 120kg/ha of N as 50% N through vermicompost and 50% N through urea in addition to seed inoculated with *Azotobacter* and should be sown at a spacing of 50cm (row to row) ×10cm (plant to plant)

References

1. Anonymous, Indian Grassland and Fodder Research Institute (Indian Council of Agricultural Research) Jhansi, 2013.Vision-2050.
2. Aravinth A, Kuppuswamy G, Gangapathy M. Growth and yield of baby corn (*Zea mays* L.) as influenced by intercropping, planting geometry and nutrient management. Indian Journal of agricultural Sciences. 2011; 81(9):875-877.
3. Arif M, Amin I, Jan MT, Munir I, Nawab K, Khan NU. Effect of plant population and nitrogen levels and methods of application on ear characters and yield of maize. Pakistan Journal of Botany. 2010; 42(3):1959-1967.
4. Bindhani, Anita KC, Garnayak LM, Mahapatra PK. Nitrogen management in baby corn (Zea mays).Indian Journal of Agronomy. 2007; 2(2):135-138.
5. Carpici EB, Necmettin, C. Gamze B. Yield and quality of forage maize as influenced by plant density and nitrogen rate. Turkish Journal of Field Crops. 2010; 15(2): 28-32.
6. Chaudhary DP, Kumar AS, Sapna, Mandhania, Srivastava P, Kumar RS. Maize As Fodder? An alternative approach, Directorate of Maize Research, Pusa Campus, New Delhi - 110 012, Technical Bull, 2012, 32.
7. Jat SL, Parihar CM, Singh AK, Kumar B., Singh B, Saveipune D. Plant density and fertilization in hybrid quality protein maize (*Zea mays*): Effects on the soil nutrient status and performance of succeeding wheat (*Triticum aestivum*) and productivity of cropping system. Indian Journal of Agricultural Sciences 2017; 87:23-8.
8. Kannan, RL, Dhivya M, Abinaya D, Krishna RL, Kumar SK. Effect of Integrated Nutrient Management on Soil Fertility and Productivity in Maize. Bulletin of Environment, Phamacology and Life Sciences 2013; 2(8):61-67.
9. Khan A, Rahman H, Shah Z, Shah P. Plant density and nitrogen effects on growth dynamics, light interception and yield of maize. Archives of Agronomy and soil Science. 2008; 54(4):401-411.
10. Mudua B, Singh S. Effect of nitrogen and plant population on yield componants and yield of popcorn varieties of maize. Annals of Agricultural Research. 2003; 24 (4):968-970.
11. Panwar AS, Munda GC. Response of baby corn (*Zea mays* L.) to nitrogen and land configuration in mid hills of Meghalaya. Indian Journal of Agricultural sciences. 2006; 76(5):293-296.