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EFFECT OF ORGANIC AND INORGANIC SOURCE OF NITROGEN ON GROWTH AND FODDER YIELD OF M.P. CHARI

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SUMMARY

A field experiment was conducted during *Zaid* season of 2022 at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) India to study the response organic and inorganic nitrogen management on growth and fodder yield of M.P Chari. The experiment was laid out in randomized block design with ten treatments which are replicated thrice on the basis of one year experimentation. The treatments consist of FYM at 2,4,6 t/ha respectively and N at 40,60 and 80 kg/ha and a control. Results revealed that the higher plant height (216.38 cm),plant dry weight (58.85 g/plant), number of leaves/plant (15.20),crop growth rate (60.8), green fodder (61.29 t/ha) yield were significantly influenced with FYM 4 t/ha along with 80 N kg/ha. Higher gross return (INR 1,01,134/ha), net return (INR71,698/ha) and B:C ratio (2.44) were also recorded with application of FYM 4 t/ha along with 80 N kg/ha.

Keywords : Sorghum, organic fertilizers, nitrogen, growth parameters, green fodder yield and economics

Sorghum (*Sorghum bicolor*) also known as great millet or jowar is a grass species cultivated for fodder, grain and ethanol production. In India, sorghum is popularly known as "Jowar" and is one of the important food and fodder cereal crops. Sorghum is the world's fifth most important cereal crop after rice, wheat, maize and barley. The largest growers of sorghum are India, America and Nigeria. World covers 39.6-million-hectare area, producing 57.79 million tonnes with a productivity of 1404 kg/ha. Average yields are very high in the American sub-continent, while they are low in India (Maikasuwa and Ala, 2013).

India is a notable for its huge livestock population and its economic integration with farm production, particularly under the less mechanized dry land agriculture. Sorghum is very important crop to resource poor farmers for nutritional and livelihood security. (Shivaprasad and Singh 2017). Sorghum grain is principally used for food purpose (55%) followed by feed grain (33%). As a result of its drought adaptation capability, sorghum is most well-liked crop in tropical, hotter, and semi-arid regions of the world as sorghum crop can tolerate high temperature and water stress. With the rise in human and animal population as to keep a balance between them sorghum production should be increased. Sorghums are generally non-maintenance type of roughages, containing about 4-5% of protein. Green jowar contains 0.5% DCP, 16% TDN, 0.13% calcium and 0.03% phosphorus (Bhanderi *et al.*2014).

Organic manures are a good source of nutrients and contribute towards built up of organic matter in soil. Hence, balanced fertilizer use along with organic manure like FYM is considered as promising agro-technique to sustain yield and restore soil fertility. On an average well decomposed farmyard manure contains 0.5 percent N, 0.2 percent P_2O_5 and 0.5 Percent K_2O (Rekha Rana and S. K. Prasad 2020). Nitrogen plays an important role in crop yield. It imparts the green color of leaves and stems and enables efficient photosynthesis which ultimately maximizes crop production. Nitrogen plays a key role in various physiological processes like root growth, dry matter production and metabolic activities, especially in protein synthesis. Inorganic fertilizers are quickly available because of more mobility. It slightly increases the growth of micro-organism used in less quantity.

Keeping these points in view, the present study entitled ''Influence of organic and inorganic source of nitrogen on growth and fodder yield of M.P Chari" was conducted during *Zaid*-2022, at crop research farm, SHUATS, Prayagraj (U.P).

MATERIALS AND METHODS

A field experiment was conducted during *zaid* season of 2022 at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture,

Technology and sciences, Prayagraj (U.P.) India. The soil of experimental plot was sandy loamy in texture, nearly neutral in soil reaction (pH 7.8), low in organic carbon (0.35%), The treatments consist ofFYM 2 t/ ha + 40N kg/ha, FYM 2 t/ha + 60N kg/ha, FYM 2 t/ha + 80N kg/ha, FYM 4 t/ha + 40N kg/ha, FYM 4 t/ha + 60N kg/ha, FYM 4 t/ha + 80N kg/ha, FYM 6 t/ha + 40N kg/ha, FYM 6 t/ha + 60N kg/ha, FYM 6 t/ha + 80N kg/ha and control plot. The experiment was laid out in Randomized Block Design, with 10 treatments replicated thrice. The observations were recorded for plant height, plant dry weight, number of leaves/ plant,Crop Growth Rate (g/m^2/day), and green fodder yield (t/ha) for 1st and 2nd cut. The collected data was subjected to statistical analysis by analysis of variance method (Gomez and Gomez, 1976).

RESULT AND DISCUSSION

GROWTH PARAMETERS

Plant height : At 60 DAS, the significantly higher plant height of (216.38 cm) [Table.1] was recorded with treatment-6 [FYM 4 t/ha + 80 N kg/ ha]. However, treatment-5 [FYM 4 t/ha + 60 N kg/ ha] was found to be statistically at par with treatment-6 [FYM 4 t/ha + 80 N kg/ha]. The plant height of sorghum increased significantly due to with the application of nitrogen and farmyard manure. The higher plant height on higher levels of nitrogen was mainly attributed to more availability and uptake of nitrogen by crop which resulted in more vegetative growth and increase in protoplasmic constituent and acceleration in the process of cell division, expansion, and differentiation there by resulting in luxuriant growth. These findings were in conformity with Agarwal *et al.* (2005).

Nitrogen promotes the vegetative growth thus, leading to increase in plant height. Nitrogen present in the FYM promoted the vegetative growth, probably influenced root growth in a positive manner which could have helped better absorption and transformation of nutrients from source to sink capacity of plants and results in increasing the plant height. These similar findings reported by Thakare and Wake (2015).

Number of leaves/plant : At 60 DAS, the significantly higher number of leaves (15.20) [Table 1] were found in treatment-6 [FYM 4 t/ha + 80 N kg/ ha]. However, treatment-5 was found to be statistically at par with treatment-6 [FYM 4 t/ha + 80 N kg/ha]. Higher number of leaves/plant might be with the application of nitrogen 80 kg/ha.The production and

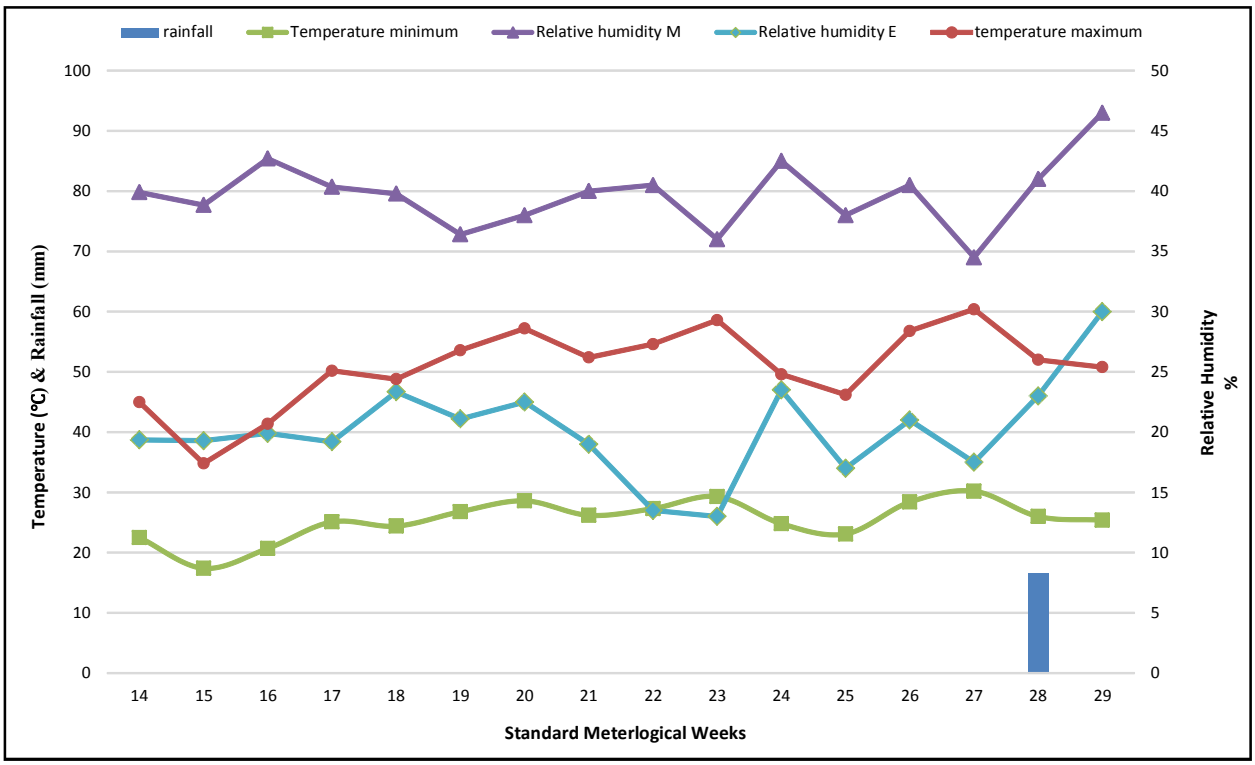

Fig. 1. Weekly parameter and total rainfall during the cropping season.

TABLE 1
Influence of organic and inorganic source of nitrogen on growth attributes and green fodder yield of M.P. Chari.

S. No.	Treatment combinations	Plant height (cm)	No. of leaves/plant (no)	Plant dry weight (g)	CGR ($g/m^2/day$)	Green fodder yield (t/ha)
1.	FYM 2 t/ha +40 N kg/ha	188.38	13.04	45.40	38.6	42.62
2.	FYM 2 t/ha + 60 N kg/ha	194.53	13.67	46.51	36.5	45.06
3.	FYM 2 t/ha + 80 N kg/ha	203.30	13.43	48.51	38.5	46.60
4.	FYM 4 t/ha + 40 N kg/ha	207.27	14.10	51.32	44.7	49.51
5.	FYM 4 t/ha + 60 N kg/ha	211.73	14.54	56.32	52.7	58.81
6.	FYM 4 t/ha + 80 N kg/ha	216.38	15.20	58.85	53.2	61.29
7.	FYM 6 t/ha + 40 N kg/ha	188.67	14.17	54.77	49.9	51.83
8.	FYM 6 t/ha + 60 N kg/ha	193.99	14.04	52.85	51.3	49.71
9.	FYM 6 t/ha + 80 N kg/ha	186.96	13.58	52.93	49.9	50.53
10.	Control(0:40:40 NPK kg/ha)	178.41	13.84	50.75	44.0	44.83
	F test	S	S	S	S	S
	S. Ed±	2.73	0.23	1.08	2.45	1.29
	C. D. (P=0.05)	8.11	0.70	3.22	7.28	2.71

TABLE 2
Influence of organic and inorganic source of nitrogen on economics of M.P. Chari

S. No.	Treatment combinations	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	Benefit cost ratio
1.	FYM 2 t/ha +40 N kg/ha	27,066	70,329	43,263	1.60
2.	FYM 2 t/ha + 60 N kg/ha	27,506	74,349	46,843	1.70
3.	FYM 2 t/ha + 80 N kg/ha	27,936	76,886	48,950	1.75
4.	FYM 4 t/ha + 40 N kg/ha	28,566	81,697	53,131	1.86
5.	FYM 4 t/ha + 60 N kg/ha	29,006	95,381	66,375	2.29
6.	FYM 4 t/ha + 80 N kg/ha	29,436	1,01,134	71,698	2.44
7.	FYM 6 t/ha + 40 N kg/ha	30,066	855,14	55,448	1.84
8.	FYM 6 t/ha + 60 N kg/ha	30,506	82,016	51,510	1.69
9.	FYM 6 t/ha + 80 N kg/ha	30,936	83,369	52,433	1.69
10.	Control(0:40:40 NPK kg/ha)	25,566	73,964	48,398	1.89

*Data was not subjected to the statistical analysis.

supply of food material created during photosynthesis is greatly aided by leaves. Thus, the number of leaves per plant and the production of green fodder from forage crops are directly correlated. Higher leaf area was due to higher accumulation of dry matter in leaves and to obtain higher leaf area there must be a greater number of leaves or the size of the leaves should be large. To hold a greater number of leaves in the plant the plant height must be higher. Similar results were reported by Abdulgani Nabooji *et al.,* (2018).

Plant dry weight : At 60 DAS, the significantly higher plant dry weight(58.85 g/plant) [Table 1] was found in treatment -6 [FYM 4 t/ha + 80 N kg/ha]. However, treatment-5 [FYM 4 t/ha + 60 N kg/ha] was found to be statistically at par with treatment-6 FYM 4 t/ha + 80 N kg/ha. The dry weight of sorghum increased significantly with the application of nitrogen and farmyard manure. Nitrogen promotes the vegetative growth thus, leading to increase in dry weight. Might be with influenced root growth in a positive manner which could have helped better absorption and transformation of nutrients from source to sink capacity of plants. These similar results reported by Ghosh *et al.* (2004) and Duhan (2013).

YIELD ATTRIBUTE

Green fodder yield : At harvest, the significantly higher green forage yield was observed

in Treatment-6 FYM 4 t/ha + 80 N kg/ha (61.29 t/ ha)[Table.1]. However, treatment-5[FYM 4 t/ha + 60 N kg/ha] was found to be statistically at par with treatment-6 [FYM 4 t/ha + 80 N kg/ha]. The results revelled that higher green forage yield was recorded with the application of nitrogen 80 kg/ha. This may be mainly attributed to improved growth viz., plant height, number of leaves, and the beneficial effects of nitrogen on cell division and elongation, formation of nucleotides and Co-enzymes which resulted in increased meristematic activity and photosyntheticarea and hence more production and accumulation of photosynthates, yielding higher green fodder. These results are in conformity with the findings of Ayub *et al.* (2002), Sheoran and Rana (2006). And also, the higher plant nutrient uptake might be due to when organic fertilizers are applied, nutrient will be released slowly and also the nutrient losses will be minimized due to increased absorption of nutrients as a result of increased cation exchange capacity with increased organic matter content. Similar results are reported by Patidar and Mali (2002) and Singh *et al.* (2004).

Economic Analysis

Maximum Gross returns (1,01,134.00 Rs./ ha), Net returns (71,698.00 Rs./ha) and Benefit cost ratio (2.44) [Table 3] was observed in treatment-6 with the application of FYM 4 t/ha + 80 N kg/ha.

CONCLUSION

Based on the results, it can be concluded that with the application of FYM 4 t/ha along with nitrogen 80 kg/ha improves the growth and yield parameters of M.P. Chari. Maximum green forage yield, gross returns, net return and benefit cost ratio were also recorded with the application of FYM 4 t/ha along with nitrogen 80 kg/ha.

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