

Original Research Article

Effect of Nitrogen and Spacing on green fodder yield and economics of M P Chari (*Sorghum Bicolor* L.)

ABSTRACT

At the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj (U.P.), India, a field experiment was carried out during the Harvest season of 2022. To investigate how spacing and nitrogen affect sorghum growth and fodder production (*Sorghum bicolor* L.). The treatments include nitrogen at rates of 60, 80, and 100 kg/ha, spaced 35, 45, and 55 cm, respectively. There were 10 treatments total, with three replications of each. The soil in the trial plot had a sandy loamy texture, a pH of 7.8 that was almost neutral, a low level of organic carbon (0.35%), and high levels of available N (163.42 kg/ha), available P (21.96 kg/ha), and available K (256.48 kg/ha) nutrients. In accordance with the results, nitrogen application at a rate of 100 kg per hectare and a spacing of 55 cm apart had a significant impact on plant height (186.96 cm), plant dry weight (52.78 g/plant), crop growth rate (55.0 g/m²/day), and green fodder yield (28.36 and 22.43 t/ha) for the first and second cuttings. With nitrogen 100 kg/ha and the spacing 55cm, there were also larger gross returns (INR 83809.00/ha), net returns (INR 58133.00/ha), and B:C ratios (2.26).

Keywords: *sorghum, nitrogen, spacing, green fodder yield and economics.*

INTRODUCTION

Sorghum (*Sorghum bicolor* (L.) Moench), the primary kharif and rabi season crop of the Poaceae family, is widely cultivated to meet the demands of livestock for both green and dry feed. The sudanese and bicolor are two species that are important economically. Bicolor is utilised as food, feed, and forage in India, whilst Sudanese are only used as fodder. All three crops—sorghum, Sudan grass, and hybrids of the two—are adaptable and have a range of uses. Grain sorghum is utilised for different purposes than forage

of Agriculture, Technology And Sciences, Prayagraj (U.P.), India. The experimental plot's soil was sandy loamy in texture, nearly neutral in soil reaction (pH 7.8), and low in organic carbon (0.35%). The treatments included nitrogen at 60 kg per ha with spacing of 35 x 15 cm, 45 x 15 cm, and 55 x 15 cm, as well as nitrogen at 80 kg per ha with spacing of 35 x 15 cm, 100 kg per ha with spacing of 45 x 15 cm, and 100 kg per ha with spacing of 55 x 15 cm. Ten treatments were reproduced three times in a randomised block design experiment. Plant height, dry weight, the number of leaves per plant, crop growth rate (g/m²/day), and the yield of green fodder (t/ha) were all noted. The data was gathered and statistical analysis using the analysis of variance approach was performed (Gomez and Gomez, 1976).

RESULT AND DISCUSSION

YIELD ATTRIBUTE

Green fodder Yield (t/ha) - The significantly higher green fodder yield (28.36 t/ha) was observed in treatment-9 (Nitrogen 100 kg/ha + Spacing 55x15cm) during 1st cutting. However, treatment-8 (Nitrogen 100 kg/ha + Spacing 45x15cm) was found to be statistically at par with treatment- 9 (Nitrogen 100 kg/ha + Spacing 55x15cm). The significantly higher green fodder yield (22.43 t/ha) was observed in treatment-9 (Nitrogen 100 kg/ha + Spacing 55x15cm) during 2nd cutting. However, treatment-8 (Nitrogen 100 kg/ha + Spacing 45x15cm) was found to be statistically at par with treatment- 9 (Nitrogen 100 kg/ha + Spacing 55x15cm). The significantly higher green fodder yield (28.36 t/ha) was observed with the application of nitrogen 100 kg/ha along with the spacing 55x15 cm, The increased plant height, number of leaves, plant population per metre, and leaf to stem ratio all contributed to the higher green fodder output at increasing spacing. In addition, the excessive plant population may fight with each other for light and nutrients, resulting in lanky growth and grassy shoot appearance, which reduced the output of green fodder at decreasing spacing. The benefits of nitrogen on cell division and elongation, the formation of nucleotides and co-enzymes that resulted in an increase in meristematic activity and photosynthetic area and, consequently, more production and accumulation of photosynthates, yielding higher green fodder, are among the nitrogen levels that are primarily attributed to improved growth and yield parameters. These parameters include plant height, number of leaves, plant population per metre, leaf: stem ratio, plant height and dry weight. Similar results are conformity with **Mane Shivprasad and Rajesh Singh (2017), Dudhat *et al.* (2004).**

ECONOMIC ANALYSIS

Gross Returns

Observations regarding the economics of treatments are given in table 2.

Highest gross return (83809.00 INR/ha) was obtained in treatment-9 (Nitrogen 100 kg/ha + Spacing 55x15cm) as compared to other treatments.

Net Returns

Net return (58133.00 INR /ha) was found to be highest in treatment-9 (Nitrogen 100 kg/ha + Spacing 55x15cm) as compared to other treatments.

Benefit Cost Ratio

Benefit Cost ratio (2.26) was found to be highest in treatment-9 with (Nitrogen 100 kg/ha + Spacing 55x15cm) as compared to other treatments.

CONCLUSION - It was concluded that with the application of nitrogen 100 kg/ha and along with the spacing 55×15cm (Treatment-9), has performs positively and improves growth and yield parameters. Higher green fodder yield and higher gross return, higher net return and benefit cost ratio were also recorded with the application of nitrogen 100 kg/ha and along with the spacing 55×15cm (Treatment-9). These findings are based on one season therefore; further trials may be required for further confirmation.

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Table 1. Influence of nitrogen and spacing on green forage yield of fodder sorghum M P Chari.

Treatment No.	Treatment combinations	Green fodder (t/ha) 1st cutting	Green fodder (t/ha) 2nd cutting
1.	Nitrogen 60 kg/ha + Spacing 35x15cm	22.68	18.17
2.	Nitrogen 60 kg/ha + Spacing 45x15cm	23.97	18.74
3.	Nitrogen 60 kg/ha + Spacing 55x15cm	25.09	19.31
4.	Nitrogen 80 kg/ha + Spacing 35x15cm	24.08	18.39
5.	Nitrogen 80 kg/ha + Spacing 45x15cm	25.19	19.52
6.	Nitrogen 80 kg/ha + Spacing 55x15cm	27.03	21.60
7.	Nitrogen 100 kg/ha + Spacing 35x15cm	26.41	20.08
8.	Nitrogen 100 kg/ha + Spacing 45x15cm	27.45	21.73
9.	Nitrogen 100 kg/ha + Spacing 55x15cm	28.36	22.43
10.	CONTROL	23.25	18.85
	F test	S	S
	SEm±	0.71	0.34
	CD (P=0.05)	2.10	1.02

Table 2. Economic analysis of different treatment combinations of fodder sorghum M P Chari.

S. No.	Treatment combinations	Economics			
		Cost of cultivation	Gross return	Net return	B:C ratio
1.	Nitrogen 60 kg/ha + Spacing 35x15cm	27206	67397	40191	1.48
2.	Nitrogen 60 kg/ha + Spacing 45x15cm	26006	70466	44460	1.71
3.	Nitrogen 60 kg/ha + Spacing 55x15cm	24806	73260	48454	1.95
4.	Nitrogen 80 kg/ha + Spacing 35x15cm	27636	70070	42434	1.54
5.	Nitrogen 80 kg/ha + Spacing 45x15cm	26436	73766	47330	1.79
6.	Nitrogen 80 kg/ha + Spacing 55x15cm	25236	80234	54998	2.18
7.	Nitrogen 100 kg/ha + Spacing 35x15cm	28076	76714	48638	1.73
8.	Nitrogen 100 kg/ha + Spacing 45x15cm	26876	81153	54277	2.02
9.	Nitrogen 100 kg/ha + Spacing 55x15cm	25676	83809	58133	2.26
10.	CONTROL	26436	69454	43018	1.63

*DATA WAS NOT SUBJECTED TO THE STATISTICAL ANALYSIS.

UNDER PEER REVIEW