Original Research Article

Effect of different varieties, nitrogen levels and cutting management on yield and its attributes of fodder bajra (*Pennisetum glaucum* L.)

ABSTRACT

Aims: To identify an ideal pearl millet variety under ideal nitrogen level and cutting management for high green fodder yield and dry fodder yield.
Study design: Factorial Randomized block design.
Place and duration of study: AICRP on Forage Crops and Utilization, Agricultural Research Institute, from July 2021 and Nov 2021.
Methodology: Field experiment was conducted at AICRP on Forage Crops and Utilization, ARI, Rajendranagar, Hyderabad during *kharif* 2021. The treatments consisted of three varieties (TSFB 15-4, TSFB 15-8 and Moti bajra), three nitrogen levels (80, 100 and 120 kg N ha^{-1}) and two cutting management practices (C_1: Two cuts: 1st at 60 days after sowing (DAS), 2nd cut at 50% flowering) (C_2: Three cuts: 1st at 50 days after sowing (DAS), 2nd cut at 35 days after 1st cut and 3rd cut at 50% flowering) laid out in randomized block design with factorial concept, with Factor (A) as varieties, Factor (B) as nitrogen levels and Factor (C) as cutting management with three replications. The soil was sandy loam in texture with pH of 7.0 low in available nitrogen, medium in available phosphorus and available potassium.
Results: Variety TSFB 15-8 recorded significantly higher plant height (67.2 cm) and leaf-stem ratio (0.4) green forage yield (821.1 q ha^{-1}), dry fodder yield (198.4 q ha^{-1}) respectively, but Moti bajra variety was recorded highest number of tillers m^{-2} (4.5). Application of nitrogen at the rate of 120 kg ha^{-1} significantly recorded highest plant height (72.0 cm), number of tillers m^{-2} (4.7) and leaf-stem ratio (0.4), green forage yield (817.7 q ha^{-1}), dry fodder yield (201.0 q ha^{-1}). Three cuts for green fodder recorded significantly higher plant height (65.9 cm), number of tillers (5.1) and leaf-stem ratio (0.5) green fodder yield (910.0 q ha^{-1}), dry fodder yield (216.4 q ha^{-1}) compared to two cuts.
Conclusion: Variety TSFB 15-8 with nitrogen level of 120 kg N ha^{-1} at C_2 found suitable and economical for cultivation in southern Telangana zone.

Keywords: *Pearl millet Varieties, nitrogen levels and cutting management.*

1. INTRODUCTION

Pearl millet (Pennisetum glaucum. L) is an important minor millet that is being cultivated for its high dietary fibre and nutrient source for humans as well as a good fodder crop for livestock. It requires less irrigation water than other cereal fodders and can thus be cultivated in command areas under rice fallows, where water is very scarce. It is an ideal crop because of its high tillering ability, high dry matter production, high protein content (10-12%), excellent growth habit, high palatability, and higher nutritive value. The pearl millet's dual-purpose nature has recently been identified due to its profuse tillering, withstanding capacity for

repeated harvesting, absence of anti-nutritional factors such as prussic acid, and better performance under marginal and low fertile soils. In comparison to maize and sorghum, pearl millet grows quickly and produces green fodder in a short period of time. It is an essential fodder for animal inhabitants in arid and semi-arid regions of the world due to its tall, vigorous growth and exceptional fodder yielding potential. In India, the demand for green fodder was 611.99 Mt, while only 224.08 Mt were available Anonymous [2]. It reflects a large gap between demand and supply because the regional deficit is greater than the national deficit, particularly for forages, which account for only 3.4 million ha and 9.3 million ha of total cultivable land in Rajasthan and India, respectively GOI [5]. As a result, the development of quality fodder cultivars and management to meet the fodder requirements of an ever-increasing livestock population is critical, as fodder quality is a critical issue in terms of livestock health and animal production.

2. MATERIAL AND METHODS

Field experiment was conducted during *kharif* season of 2021 at AICRP on Forage Crops and Utilization, ARI, PJTSAU, Rajendranagar, Hyderabad, India. The present research work is framed with an objective to identify an ideal pearl millet variety under ideal nitrogen level and cutting management for high green and dry fodder yield. The experiment was laid out in Factorial randomized block design. The soil was sandy loam in texture with pH of 7.0 low in available nitrogen, medium in available phosphorus and available potassium. The experiment consisted of 18 treatment combinations *viz.,* three varieties (TSFB 15-4, TSFB 15-8 and Moti bajra), three nitrogen levels (80, 100 and 120 kg N ha^{-1}) and two cutting management practices (C_1: Two cuts: 1st at 60 days after sowing (DAS), 2nd cut at 50% flowering) (C_2: Three cuts: 1st at 50 days after sowing (DAS), 2nd cut at 35 days after 1st cut and 3rd cut at 50% flowering) with three replications, phosphorus (40 kg P_2O_5 ha^{-1}) and potassium (20 kg K_2O ha^{-1}) were applied through Di-ammonium phosphate and Muriate of potash respectively. Nitrogen was given in split-doses, half as basal and other dose was given after 30 DAS and after each cut as top dressing. Crop was sown at a row distance of 30 cm. The crop was sown during 2nd week of July and harvested at certain cutting treatment. Five plants were randomly selected in each net plot area for taking observations on growth and yield attributing parameters. The samples were first dried under shade and then in electric oven at temperature of 60^{0}C till attaining constant weight, on the basis of weight of these samples, the green fodder yield was converted into dry matter yield (q ha^{-1}). Data of yield and its attributes that is plant height (cm), number of tillers m^{-1} row length, leaf-stem ratio and forage yield as green and dry (q ha^{-1}). Data obtained were statistically analyzed as mentioned by Gomez and Gomez [7].

3. RESULTS AND DISCUSSION

3.1 Yield attributes

3.1.1 Varieties

The yield attributes and fodder yield of pearl millet significantly varied among studied varieties (Table 1). The pearl millet variety TSFB 15-8 recorded significantly higher plant height (67.2 cm) and leaf-stem ratio (0.4) as over other varieties, but the maximum number of tillers was found in Moti bajra variety (4.5) and was at par with TSFB 15-8 variety. The TSFB 15-8 variety recorded highest green fodder yield of 821.2 q ha^{-1} which was followed by TSFB 15-4 (757.6 q ha^{-1}) and the same variety recorded highest dry matter yield of 198.4 q

ha^{-1} followed by variety Moti bajra (181.7 q ha^{-1}). This was due to the superiority of the genotype to produce more mean values of yield attributes like plant height, number of tillers.

3.1.2 Nitrogen levels

Application of nitrogen at the rate of 120 kg N ha^{-1} recorded significantly higher green fodder yield (817.7 q ha^{-1}) and was at par with 100 kg N ha^{-1} (787.9 q ha^{-1}) and dry matter yield (201.0 q ha^{-1}) over other studied nitrogen-levels. Increase in green bio-mass yield was due to improved growth parameters *viz.,* plant height (72.0 cm) and number of tillers m^{-2} (4.7). Nitrogen is directly involved in cell division, cell elongation, formation of nucleotides and co-enzymes that increased meristematic activity, since nitrogen is an integral part of chlorophyll, plays an important role in photosynthesis and produce more of photosynthates, which helped in accumulation more dry matter yield. This is in conformity with the findings of Golada et al. [6] and Damame et al. [4].

3.1.3 Cutting management

Results with cutting management indicated that maximum average means of plant height (65.9 cm), number of tillers m^{-2} (5.9) were recorded with three cuts for green fodder and recorded significantly higher green fodder yield (910.0 q ha^{-1}) and dry matter yield (216.4 q ha^{-1}) as compared to two cuts of green fodder yield (641.1 q ha^{-1}) and dry matter yield (151.4 q ha^{-1}). This might be due to high production potential of all the varieties and higher number of tillers m^{-2} as evident from data (Table 1).

3.1.4 Interaction effect

The interaction between different varieties and nitrogen levels was found to be significant and revealed that variety TSFB 15-8 recorded maximum green fodder yield at 100 kg N ha^{-1} (860.1 q ha^{-1}) but it was significantly on par with Moti bajra at 80 kg N ha^{-1} and 120 kg N ha^{-1}. Contrary to this, at 100 kg N ha^{-1} TSFB 15-8 was significantly on par with TSFB 15-4 (Table 2).

The interaction between different varieties and nitrogen levels on dry fodder yield was found to be significant and it was observed that TSFB 15-8 recorded maximum dry fodder yield at 100 kg N ha^{-1} (202.9 q ha^{-1}) and 120 kg N ha^{-1} (216.2 q ha^{-1}) but significantly on par with TSFB 15-4 at 100 kg N ha^{-1} and with Moti bajra at 120 kg N ha^{-1}. Contrary to this, at 80 kg N ha^{-1} Moti bajra (176.4 q ha^{-1}) was found to be superior and was on par with TSFB 15-8 (Table 3).

Table 1: Effect of different varieties, nitrogen levels and cutting management on growth parameters and fodder yield of pearl millet.

Treatments	Plant height (cm)	Number of tillers m^{-2}	Leaf-stem ratio	Green fodder yield (q ha^{-1})	Dry fodder yield (q ha^{-1})
Varieties					
TSFB 15-4	63.6	3.7	0.3	757.6	171.6
TSFB 15-8	67.2	4.4	0.4	821.2	198.4
Moti bajra	60.2	4.5	0.4	747.7	181.7
S Em±	0.9	0.09	0.01	14.9	4.4
CD (P=0.05)	2.7	0.2	0.04	42.7	12.6
Nitrogen levels (kg ha^{-1})					
80	56.6	3.9	0.4	720.9	167.5

100	62.4	3.9	0.3	787.9	183.2
120	72.0	4.7	0.4	817.7	201.0
S Em±	0.9	0.09	0.01	14.9	4.4
CD (P=0.05)	2.7	0.2	0.04	42.7	12.6
Cutting management					
C_1 (Two cuts)	61.5	3.3	0.3	641.1	151.4
C_2 (Three cuts)	65.9	5.1	0.5	910.0	216.4
S Em±	0.8	0.07	0.01	12.1	3.6
CD (P=0.05)	2.2	0.2	0.03	34.9	10.3
Interaction					
Varieties × Nitrogen					
S Em±	1.6	0.15	0.02	25.7	7.6
CD (P=0.05)	NS	0.4	0.06	74.0	21.8
Varieties × Cutting management					
S Em±	1.3	0.1	0.01	21.0	6.2
CD (P=0.05)	NS	NS	NS	NS	NS
Nitrogen × Cutting management					
S Em±	1.3	0.1	0.01	21.0	6.2
CD (P=0.05)	NS	NS	NS	NS	NS
Varieties × Nitrogen × Cutting management					
S Em±	2.3	0.2	0.03	36.4	10.7
CD (P=0.05)	NS	NS	NS	NS	NS

Table 2 : Interaction effect of different varieties and nitrogen levels on green fodder yield of pearl millet.

Treatments	**Nitrogen levels (kg ha^{-1})**			
	80	100	120	**Mean**
Varieties				
TSFB 15-4	674.2	807.6	791.1	757.6
TSFB 15-8	767.9	860.1	835.8	821.2
Moti Bajra	720.7	696.1	826.2	747.7
Mean	720.9	787.9	817.7	
V × N	**S Em±**		**CD (P=0.05)**	
	25.7		74.0	

Table 3 : Interaction effect of different varieties and nitrogen levels on dry fodder yield of fodder pearl millet

Treatments	**Nitrogen levels (kg ha^{-1})**			
	80	100	120	**Mean**
Varieties				
TSFB 15-4	150.2	181.6	183.1	171.6
TSFB 15-8	176.0	202.9	216.2	198.4

Moti Bajra	176.4	165.1	203.7	181.7
Mean	167.5	183.2	201.0	
V × N		**S Em±**		**CD (p=0.05)**
		7.6		21.9

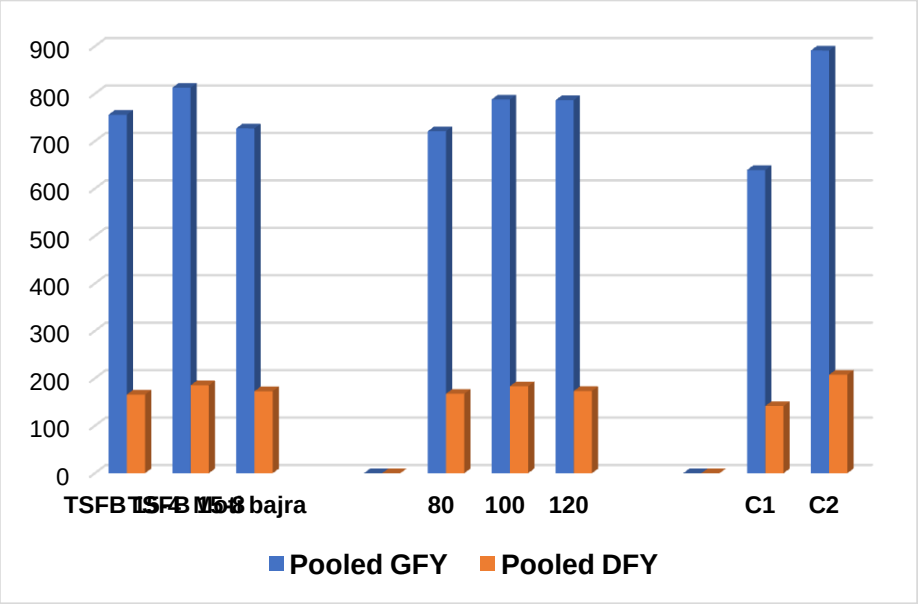

Table 4 : Effect of different varieties, nitrogen levels and cutting management on economics of fodder pearl millet

Treatments	Gross returns (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B-C ratio	Cost of cultivation
Varieties				
TSFB 15-4	113643	62659	2.2	51656
TSFB 15-8	123182	72197	2.4	51326
Moti bajra	112150	61165	2.2	50977
Nitrogen levels (kg ha^{-1})				
80	108139	57386	2.1	51495
100	118185	67200	2.3	51385
120	122652	71434	2.4	51105
Cutting management				
C1 (Two cuts)	96159	46506	1.9	50610
C2 (Three cuts)	136491	84174	2.6	52496

Among varieties tested TSFB 15-8 registered higher net returns (72197 Rs. ha^{-1}) and benefit-cost ratio (2.4). Application of nitrogen at the rate of 120 kg N ha^{-1} recorded higher net returns (71434 Rs. ha^{-1}) and benefit-cost ratio (2.4) and among cutting management practices C_2 (Three cuts) recorded higher net returns (Rs. 84174 ha^{-1}) and

benefit-cost ratio (2.6). This might be due to better growth attributes which resulted higher green forage yield with higher level of nitrogen.

4. CONCLUSION

Based on the research results it can be inferred that forage pearl millet variety TSFB 15-8 with nitrogen level of 120 kg N ha^{-1} at C_2 (Three cuts) found suitable and economical for cultivation in Southern Telangana Zone. These results are in conformity with findings of Shekara et al. [17] and Shekara et al. [18].

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