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Green Forage Yield and Economics of Fodder Pearlmillet (*Pennisetum glaucum* L.) Genotypes as Influence by Nitrogen Levels

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ABSTRACT

A field experiment was conducted at dryland farm of S.V. Agricultural College, Tirupati, Acharya N.G. Ranga Agricultural University during kharif, 2015 on sandy clay loam soils to study the "Greenforage yield and economics of fodder pearlmillet genotype as influenced by nitrogen levels". Treatments comprising four fodder pearlmillet genotypes (Gaint bajra, BAIF bajra, Raj bajra chari-2 and APFB-09-1) and four nitrogen levels (75, 100, 125 and 150 kg N ha^{-1}) were laid out in factorial randomized block design with three replication. The forage yield of fodder pearlmillet genotypes were influenced significantly with different nitrogen levels. Fodder pearlmillet variety, BAIF bajra recorded the highest green forage yield and economics, which was significantly superior to other varieties tried and the lowest green forage yield was produced with Raj bajra chari-2. Among nitrogen levels application of 150 kg N/ha significantly increase green fodder yield Gross, net returns and B:C ratio. The highest green forage yield and economics of fodder pearlmillet was recorded with application of 150 kg N ha^{-1} , while the lowest green forage yield was produced with application of 75 kg N ha^{-1}.

Key words: *Genotypes, Nitrogen levels, Green Forage Yield, Economics*

INTRODUCTION

Fodder pearlmillet (*Pennisetum glaucum* L.) is erect, leafy and drought resistant plant, widely used for grain production in arid and semi-arid regions of India. Fodder pearlmillet as fodder crop has some additional advantages over sorghum and maize because of firstly, the green fodder of pearlmillet has high crude protein content (9.9 to 14 %) and secondly, its green fodder can be safely fed to cattle at all stages of growth because of absence of hydrocyanic acid. It is nutritious and palatable and can be fed as green, dry or as conserved fodder in the form of silage or hay. The more tillers production capacity, rapid growth rate and higher crude protein contents and short growth period make the pearlmillet as strong cereal for fodder purpose. Efficient fertilizer management plays important role in increasing the crop yield through efficient utilization of limited moisture/water supply.

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The soils of these areas are deficient in various nutrient elements in general and nitrogen in particular. It is, therefore, imperative to have better understanding of growth, yield and fodder quality of this crop in relation to nitrogen for promoting its adoption by farmers of these regions.

Nitrogen is an essential nutrient for plant growth and development. Nitrogen is a very important constituent of cellular components. Alkaloids, amides, amino acids, proteins, DNA, RNA, enzymes, vitamins, hormones and many other cellular compounds contain nitrogen as one of the elements. An adequate supply of nitrogen is associated with vigorous vegetative growth and deep green colour. Also Nitrogen is an integral part of chlorophyll ($C_{35}H_{72}O_5N_4Mg$) and to improve the yield and quality of forage pearlmillet. Judicious and appropriate use of fertilizer not only increases yield but also improves quality of forage pearlmillet. Judicious and appropriate use of fertilizer not only increases yield but also improves quality of forage especially protein contents[2]. Generally, pearlmillet has been known for growing under low N management but, several studies showed that N application can increase millet production efficiency[7]. Pearlmillet, being a cereal crop, responds well to nitrogen because nitrogen is one of the basic plant nutrients for profuse growth. Information on the relative performance of fodder pearlmillet genotypes for high forage production at different nitrogen levels is meager therefore; the present study was carried out.

MATERIAL AND METHODS

A field experiment was carried out during *kharif*, 2015 on sandy clay loam soils of dryland farm of S.V. Agricultural College, Tirupati, Acharya N.G. Ranga Agricultural University. The experiment was laid out in a randomized block design with factorial concept and replicated thrice. The treatments consisted of four fodder pearlmillet varieties *viz.*, Gaint bajra, BAIF bajra, Raj bajra chari-2 and APFB-09-1 and four nitrogen levels *viz.*, 75, 100, 125 and 150 kg N ha^{-1}. Crop was harvested for green fodder purpose at 50% flowering in all the varieties during both the cuts. The analysis of proximate principles in forage was done by the method recommended by Association of Official Analytical Chemists[1]. The data pertaining to growth parameters and yield was recorded at different intervals was statistically analysed following the analysis of variance for randomized block design with factorial concept as suggested by Panse and Sukhatme[6].

Table 1: Effect of Fodder pearlmillet genotypes and nitrogen levels on green forage yields and economics

Treatments	Green forage yield (t ha^{-1})		Gross returns (` ha^{-1})	Net returns (` ha^{-1})	B:C ratio
	1st Cut	2nd Cut			
Varieties					
V_1: Gaint bajra	36.54	16.62	106313	69093	2.9
V_2: BAIF bajra	45.95	23.02	137938	100718	3.7
V_3: Raj bajra chari-2	25.40	12.90	76604	39383	2.1
V_4: APFB-09-1	41.38	17.80	118358	81137	3.2
SEm±	1.09	0.44	2240.1	2240.1	0.06
CD (P=0.05)	3.2	1.3	6472	6472	0.2
Nitrogen levels (kg ha^{-1})					
N_1: 75	31.41	15.26	93336	56580	2.5
N_2: 100	35.87	16.49	104713	67649	2.8
N_3: 125	39.37	18.37	115484	78107	3.1
N_4: 150	42.62	20.22	125681	87996	3.3
SEm±	1.09	0.44	2240.1	2240.1	0.06
CD (P=0.05)	3.2	1.3	6472	6472	0.2
Interaction (V x N)					
SEm±	2.17	0.88	4480.1	4480.1	0.12
CD (P=0.05)	NS	NS	NS	NS	NS

RESULTS AND DISCUSSION

Data (Table-1) show that among the fodder pearlmillet varieties tested, during first cut the highest green forage yield was recorded with BAIF bajra, which was significantly superior than rest of the varieties. The next best variety in producing higher green forage yield was APFB 09-1followed by Gaint bajra with significant disparity between them. The lowest green forage yield was obtained with variety Raj bajra chari-2 which was significantly lesser than rest of the varieties tested and This increase in green forage yield of BAIF bajra than the other varieties could mainly attributed due to its genetic potentiality to utilize and translocate the photosynthates from source to sink more efficiently under given set of climatic conditions. Superiority of BAIF bajra in producing higher values of plant height, number of tillers plant^{-1}, leaf area and leaf to stem ratio has resulted in higher dry matter accumulation which inturn produced more green forage yield. Devi and Padmaja[3], and the highest green forage yield of fodder pearlmillet was obtained with BAIF bajra, which was significantly superior compared to rest of the varieties tried. Variety APFB-09-1 considered as the next best variety in producing higher green forage yield and it was on par with variety Gaint bajra. Among the fodder pearlmillet varieties tested, the performance of Raj bajra chari-2 was poor in producing green forage yield during the second cut and this might be due to lesser ratooning ability, low leaf to stem ratio and lesser number of tillers plant^{-1}.

During both the cuts, green forage yield was improved significantly as nitrogen level was increased from 75 to 150 kg ha^{-1}. The highest green forage yield was produced with the application of 150 kg N ha^{-1} which was significantly superior to other nitrogen levels tried. Application of 125 kg N ha^{-1} was the next best treatment in producing green forage yield. Increased green fodder yield with increase in nitrogen level might be due to nitrogen which is the essential element for synthesis of carbohydrates because it is an integral part of chlorophyll and also an essential component of amino acids and related proteins within the plants and thereby it stimulates the vegetative growth and development. Similar reports were also given by Tiwana and Puri[8]. Application of 75 kg N ha^{-1} resulted in significantly lower green forage yield which was significantly inferior than application of 100 kg N ha^{-1} in first cut and was comparable in second cut. This might be due to less nitrogen availability which resulted in poor vegetative growth.

Maximum gross returns, net returns and B:C ratio were realized with BAIF bajra and followed by APFB-09-1, Gaint bajra and Raj bajra chari-2. Maximum gross returns, net returns and B:C ratio were obtained with application of 150 kg N ha^{-1}, while minimum gross returns, net returns and B:C ratio were recorded with application of 75 kg N ha^{-1}, which might be owing to better nitrogen use efficiency resulting in increased green forage yield resulted higher benefit-cost ratio. The present findings corroborates with that of Singh and Sumeriya[7], Mahdi *et al.*[5], and Meena and Jain[4].

CONCLUSION

It can be inferred from the above study that higher green forage yield of fodder pearlmillet in two cuts could be successfully obtained with cultivation of the variety BAIF bajra along with the application of 150 kg N ha^{-1} during *kharif* season The above combination also realised higher monetary returns, thus satisfying the higher green forage yield and quality criterion.

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