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Comparative Performance of Different Varieties of Marvel Grass (*Dichanthium annulatum*) Under Varying Levels of Nitrogen

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ABSTRACT

An experiment involving three varieties of marvel grass ('I.G.67-495-6,' 'Chandigarh' and 'Chharodi local') and four levels of nitrogen (0, 30, 60 and 90 kg N/ha) was conducted at the Gujarat Agricultural University, Anand Campus, Anand, for two years (1972-73 and 1973-74) under rainfed conditions. The varieties I.G.67-495-6 and Chandigarh produced significantly higher green dry matter and crude protein yields as compared to that of the control Chharodi local. The yields of green, dry matter and crude protein increased significantly with the increasing levels of nitrogen. The significantly highest crude protein yield (9·15 q/ha) was obtained with the application of 90 kg N/ha which was 38·8 per cent more than that of the control.

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INTRODUCTION

THE objectives of a forage and dairy cattle enterprise are to produce high quality forage that will promote maximum milk production and return a profit to the dairy farmer. Milk production is highly sensitive to changes in forage quality. Fertilizing a fodder grass not only increases the yield but also improves its quality. Several workers have reported increase in forage yield as well as crude protein by application of fertilizers. Das and Gupta (1964) found 58 to 108 per cent increase in yield of crude protein by application of 22 kg N/ha in the case of different grasses over control. Oakes (1966) also found increase in crude protein yield with application of nitrogen. Shankarnarayan and Dabadghao (1969) obtained 24·8 q/ha more hay by application of 40 kg N/ha over control in case of *Heteropogan* grass, while Chakravarty (1966) obtained 30 per cent higher forage yield of anjan grass with the application of 22 kg N/ha. Singh (1970) observed crude protein increase from 6·18 to 14·38 per cent in the para grass with the application of nitrogen at the rate of 201.8 kg/ha. Chopra and Singh (1970) obtained response upto 90 kg N/ha in the case of promising grasses.

Marvel grass (*Dichanthium annulatum*), is one of the best known grasses in India. It is palatable, nutritious, drought resistant and suitable for grazing and making hay. It is capable of giving high fodder yields under rainfed condition in two to three cuts in a year as pointed out by Seth (1946). Though it is, also one of the most important grass in natural grasslands of Gujarat, information regarding improved variety and its manurial require-

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ments on the basis of yield and quality is lacking. Hence this experiment was planned with a view to finding out a promising variety of marvel grass and its nitrogen requirement on the basis of yield and quality under rainfed condition.

MATERIALS AND METHODS

The investigation was undertaken by the Co-ordinated Research Project on Forage Crops, Gujarat Agricultural University, Anand Campus, Anand, during *kharif* season of the years 1972-73 and 1973-74. The soil under experimental field was of sandy loam texture with total N, available P and K being 480, 42 and 214 kg/h respectively. The experiment was laid out in a randomized block design and the following factors were included in the study.

(a) *Varieties* — 3
- (i) I.G. 67-495-6
- (ii) Chandigarh
- (iii) Chharodi local

(b) *Nitrogen levels* — 4
- (i) 0 kg N/ha
- (ii) 30 kg N/ha
- (iii) 60 kg N/ha
- (iv) 90 kg N/ha

Thirty-day old seedlings raised under seedbed were transplanted in *kharif* season of the year 1971, keeping row to row and plant to plant distance of 50 cm. The crop was allowed to establish under rainfed conditions. The gross plot size was 4 m × 3 m, while the net plot size was 3 m × 2 m. With the onset of monsoon in June 1972 and 1973, a common dose of 30 kg P_2O_5 + 20 kg K_2O was applied in the form of single superphosphate and muriate of potash to all the plots. Along with this, various doses of nitrogen were also applied in the form of urea as per treatments. In all, *four cuttings were taken in 1972 on July* 19, September 6, October 12 and November 20, while in 1973, cuttings were taken on July 25, August 27, October 3 and November 5. Fodder samples of each cut were analysed for crude protein by AOAC (1965) method.

RESULTS AND DISCUSSION

There was wide variation in rainfall during both the seasons. In the year 1972-73 the total rainfall was very low (402 mm) as compared to the year 1973-74 (1072 mm). The yield of marvel grass was not affected by rainfall indicating wider adaptability of the crop.

Effect of Varieties:

The results in Table 2 indicate that the differences in yield of green forage due to varieties were significant in both the years as well as in the test carried out for the pooled data of the two years. During the year 1973-74, all the three varieties differed significantly among themselves. The significantly highest and the lowest yield was produced by I.G. 67-495-6 and Chharodi local, respectively. The results of the first year (1972-73) as well as those of the pooled data indicate that I.G. 67-495-6 and Chandigarh were identical in their performance in respect of green forage yield. However, they produced significantly more yield than

that by Chharodi local. The data on mean plant height and the number of tillers/hill reported in Table 2 show that these characters were practically the same for all the varieties. The reasons for the increase in yield of I.G. 67-495-6 and Chandigarh might be due to thickness of the stem as well as prevailing a few branches at the internode of these varieties which was observed during the research period.

As regards the dry matter and crude protein yields similar trend as in case of green forage yield was observed. Based on pooled results the per cent increase in crude protein yield over Chharodi local for I.G. 67-495-6 and Chandigarh was 18·1 and 14·7, respectively.

As regards leafiness, on an average of two years, *I.G. 67-495-6 showed the* maximum L/S ratio of 0·99, indicating more leafiness *of the variety, while the* Chharodi local showed narrow L/S ratio of 0·88 indicating *less leafiness as compared* to other varieties.

Effect of Nitrogen:

Singificant variation in yields of green forage, dry matter and crude protein due to rate of nitrogen application resulted in the individual years as well as on pooling. The pooled data incorporated in Table 1 clearly indicate that the significantly highest green forage yield was produced with the application of nitrogen at the rate of 90 kg/ha. However, the variation between yields due to 60 and 90 kg N was not found to

TABLE 1

Green, dry matter and crude protein yields of different marvel grass as influenced by nitrogen application.

Treatment	Yield in q/ha (Total of 4 cuts)								
	Green forage			Dry matter			Crude protein		
	1972-73	1973-74	Pooled	1972-73	1973-74	Pooled	1972-73	1973-74	Pooled
Variety:									
I.G.67-495-6	395	402	399	111·0	88·4	99·7	9·02	7·97	8·50
Chandigarh	406	364	385	111·8	86·8	99·3	9·28	7·24	8·26
Chharodi local	325	318	322	94·3	77·3	85·8	7·46	6·94	7·20
S. Em. ±	6·60	7·6	5·1	1·99	1·87	1·4	0·16	0·15	0·11
C.D. at 5%	19·0	22·0	14·3	5·73	5·39	3·9	0·46	0·43	0·31
Levels of Nitrogen (kg/ha):									
N_0	338	334	336	94·3	77·7	86·0	7·02	6·15	6·59
N_{30}	360	355	358	99·9	85·9	92·9	7·80	7·36	7·58
N_{60}	398	372	385	114·9	86·2	100·6	9·66	7·60	8·63
N_{90}	405	385	395	113·5	88·9	101·2	9·86	8·43	9·15
S. Em. ±	7·62	8·8	5·8	2·30	2·16	1·5	0·18	0·17	0·13
C.D. at 5%	22·0	25·4	16·4	6·62	6·22	4·3	0·52	0·49	0·37

TABLE 2

Growth as well as quality characters as influenced by different treatments Mean of 4 cuts.

Treatments	*Plant height in cm*		*Numbers of tillers/hill*		*Leaf/stem ratio*		*Oven dry basis*			
							Dry matter t/ha		*C.P. t/ha*	
	1972-73	*1973-74*	*1972-73*	*1973-74*	*1972-73*	*1973-74*	*1972-73*	*1973-74*	*1972-73*	*1973-74*
Variety:										
I.G.67-495-6	71·0	85·0	139	136	105:1	0·92:1	29·1	22·0	8·3	8·8
Chandigarh	69·5	70·0	156	118	0·99:1	0·91:1	27·5	23·8	8·4	8·2
Chharodi local	78·2	76·0	163	126	0·80:1	0·96:1	29·0	24·3	8·1	8·7
Levels of Nitrogen kg/ha:										
N_1	68·0	73·0	140	113	0·95:1	0·97:1	27·9	23·3	7·6	7·8
N_{30}	73·5	80·0	150	123	0·91:1	0·94:1	27·6	24·2	8·1	8·4
N_{60}	75·1	76·0	164	137	0·97:1	0·91:1	28·9	23·2	8·6	8·8
N_{90}	75·0	78·0	155	144	0·93:1	0·90:1	28·0	23·1	8·6	9·2

be significant.

As regards dry matter yield, application of nitrogen at the rate of 60 kg/ha proved to be significantly superior to 30 kg/ha and the control. But no significant difference was noticed between yields due to 60 and 90 kg N/ha though the maximum dry matter yield was obtained by the application of 90 kg N/ha.

The pooled results further indicated that the differences in crude protein yield were significant due to nitrogen levels. All the four levels of nitrogen differed significantly from one another in respect of the said character. Application of nitrogen at the rate of 90 kg/ha produced the maximum crude protein yield (9·15 q/ha) followed by 60 and 30 kg levels of N, respectively. Application of 30, 60 and 90 kg N/ha increased crude protein yield of marvel grass by 15·0, 31·0 and 38·8 per cent, respectively. Protein content was increased with increasing rate of nitrogen application. This was in conformity with the findings of Das and Gupta (1964) and of Singh (1970).

Effect of interaction:

The interaction between variety × nitrogen levels was not found to be significant in the pooled analysis of the two years in all of the characters studied.

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REFERENCES

AOAC. 1965. Official Methods of Analysis. Association of Official Agricultural Chemists, Washington, D.C., 10 Edn.

Chakravarty, A. K. 1966. Perennial and palatable Anjan is cut out for the Arid Zone. *Indian Farming* **16** (2): 24-26.

Chopra, N. K. and H. K. Singh, 1970. A note on the response of promising perennial grasses to nitrogen, phosphorus and potash application under rainfed conditions. *Indian J. Agron.* **15**: 207-209.

Das, R. D. and B. S. Gupta, 1964. A note on the effect of different fertilizers on protein status of some important grasses. *Ann. Arid Zone* **2**: 185-187.

Oakes, A. J. 1966. Effect of nitrogen fertilization and harvest frequency on yield and composition of *Panicum maximum* in dry tropics. *Agron. J.* **58**: 75-76.

Seth, S. K. 1946. Results on trials of indigenous and exotic fodder grasses both under agricultural and forest conditions from 1939-45. U. P. For. Dept. leaflet, **14**: 18.

Shankarnarayan, K. A. and P. M. Dabadghao. 1969. It pays to manure natural grass lands. *Indian Frng.* **19** (3): 17-19.

Singh, G. S. 1970. Fertilize fodder grasses and improve nutrient content. *Indian Frng.* **20** (1): 34-35.