

Performance of marvel grass variety under different level of nitrogen in irrigated condition of middle climatic zone of Gujarat

ABSTRACT

Main Forage Research Station, ICAR Unit 9, Anand Agricultural University located in middle agroclimatic zone of Gujarat India, having different Agroclimatic zone with different agricultural patten. Most of farmers are doing agriculture as a first enterprise and dairy as a second one. Demand of fodder is higher under different zone of Gujarat state. With aim to improve cultural practices and reduced shortfall of fodder with high nutritive fodder these studies were carried out to evaluate the effect of level of nitrogen on different marvel grass varieties under middle Gujarat. Continuous three years experimentation on marvel grass, results revealed that response of marvel grass varieties did not show its significant effects on growth, yield attributes and yield as well as quality parameters of marvel grass. Perusal of experiment data revealed that application of 60 kg N/ha (30 kg N/ha at time of transplanting or immediate after cutting and 30 kg N/ha at 30 DAS/ 30 Days after each cutting) noted higher growth parameter (height and number of tillers per meter row length) also reported higher total green fodder yield and quality of marvel grass. Same treatment i.e 60 kg N/ha reported higher net return and benefit cost ratio.

Key word: Marvel grass, nitrogen, green fodder yield, dry matter, dry matter yield and crude protein

Introduction

Marvel grass (*Dichanthium annulatum* (Forssk.) Stapf) is a highly valuable and important forage grass in India and Afrika [1]. It is one of the popular pasture grasses in many areas of the India since ancient time. Presently these grasses most popular among dairy farmers and also utilized these one in open grazing area. It can be used for grazing livestock as a green fodder and dry fodder utilized for making hay and silage. Most of milchig animals are reared on crop based reside, availability of cultivated fodder, dry fodder and concentration is deficient by 36 %, 40 % and 44 %, respectively. It is therefore introduced improved package of practices for achieving scarcity in fodder production. Due to its highly palatability capacity it is most favourable for ruminant. It grows well in the areas of 350 to 2000 mm rainfall of arid regions with good sunlight (Patel et al., 2022). It is widely adoptable in low rainfall area of Gujarat and Rajasthan as well as heavy rainfall area of south Gujarat. It tolerates a wide range of soils but more suitable under black cotton soil but not suitable under acid soil. Forage grasslands are used to feed livestock.

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Forage production can be improved to through balance fertilization and management. Essential nutrient like nitrogen, phosphorus and other micronutrients are important for plant growth and development. Nitrogen plays important role among all major nutrient in both qualitative and quantitative fodder production. Nitrogen is required for fodder production as it influences cell elongation, inter-nodal expansion and cell division. It is also important for the early establishment of the crop. It improves growth parameters and dry matter growth to increase fodder yield (Kumar et al., 2001). Nitrogen turns plants green and promotes early vegetative development. Application of nitrogen is important for forage yield and also improved quality parameters of fodder grass.

In view of above consideration, and less research work of grasses the experiment on level of nitrogen on different varieties of marvel grass was planning to developed technology for dairy farmers.

Material and Method

Three-year field experiment carried out at Main Forage Research Station, Anand Agricultural University, Anand to evaluate effect of nitrogen level of different varieties of marvel grass during kharif 2018 to kharif 2021 in loamy sand soil of Gujarat. Evaluation carried out on two marvel grass varieties i.e GMG 1 (Gujarat Marvel grass 1) and GAMG 2 (Gujarat Anand Marvel grass 2) and three levels of nitrogen (N₁:20 kg N/ha, N₂:40 kg N/ha and N₃:60 kg N/ha). The soil of experiment was low in organic carbon (0.30 %), available

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phosphorus (37.50 kg/ ha) and available potassium (285 kg/ha) with soil pH 7.60. During the experimentation period total 18 cuts were taken. Nitrogen was applied as a basal and topdressing after every cut (half at transplanting/just after cutting and remaining at 30 DAS/30 days after each cut). The marvel grass maintained continuous up to kharif 2021. During rabi and summer season irrigation done at 15 days and 20 days interval, respectively for proper growth and development. For the proximate analysis used standard protocol to analysis.

Results and Discussion

Marvel grass is great and popular fodder grass and it adored by all ruminants' animals. It is mixed with all other grasses, feed and fodder as a green or dry for animal feeding. The collected data have been discussed in three parts like growth, yield and its quality.

Effect of varieties

Data presented in Table 1 indicated that response of different varieties on growth, green fodder yield and quality of marvel grass. Response of marvel grass varieties on plant height at each cut and number of tillers per meter row length were found to be non-significant. Different varieties like GMG 1 and GAMG 2 effect on total green fodder yield was found to be non-significant its mean potentialities of these varieties are similar under field condition by which either grow GMG 1 or GAMG 2 varieties for fodder cultivation. Quality parameter plays a major role for judging quality of any fodder. Response of marvel grass varieties on fodder quality like dry matter content, crude protein content, dry matter yield, crude protein yield, acid detergent fiber and neutral detergent fiber were found to be non-significant.

Effect of nitrogen level

Data revealed that a significantly higher plant height (91.06 cm) and number of tillers per meter row length (63.67) at higher level of nitrogen (N_3 : 60 kg N/ha) than rest of nitrogen level. Nitrogen is a major element that is essential for synthesis of amino acids, nucleic acid and some organic acids etc. and which is very useful and necessary for element for plant growth and development. Height of plant increased with increased dose of nitrogen. These might be a fact that nitrogen being an important constituent of chlorophyll, nucleotides, proteins and enzymes involves in various metabolic processes which has a direct impact on vegetative and reproductivity of plants. The increment in plant height with the increase in nitrogen levels indicated that plants used sufficient amount of nitrogen during active cell division to form building blocks (protein) for cell elongation (Sewhaget *et al.*, 2021).

Perusal of data noted in Table 1 indicated that application of nitrogen significantly affects on total green fodder yield, total crude protein yield and total dry matter yield.

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Separate the two sections

Increasing level of nitrogen from 20 to 60 kg N/ha reported significantly higher total green fodder yield (1799 q/ha) of marvel grass. Treatment N₁ (20 kg N/ha) reported significantly the lowest total green fodder yield (1280 kg N/ha). The increasing total green fodder yield by application of nitrogen might be due to increasing levels of nitrogen provides sufficient nitrogen to crop that requires for proper growth and development of plant which stimulates the chlorophyll content so ultimately increase photosynthesis and biomass production will be increased (Patel *et al.*, 2022 and C. Wand, 2020).

Response of level of nitrogen on dry matter content was found to be non-significant. Protein has a vital role for human nutritional. Nitrogen application affected the crude protein content in forage. The amount of crude protein can increase with increasing nitrogen application rate. Significantly higher crude protein content (5.78%) was reported in higher level of nitrogen (N₃: 60 kg N/ha). Increasing crude protein content by application of nitrogen might be due to nitrogen is an active component of protein molecule and a building block of amino acid results gives good result in crude protein content. Analysis data reported in Table 1 indicated that response of nitrogen on total dry matter yield and crude protein yield found significant. Application of 60 kg N/ha (N₃) reported significantly the maximum total dry matter yield (806 q/ha) and total crude protein yield (46.03 q/ha) over lower level of nitrogen (N₁), whereas response of nitrogen on dry matter yield where found non-significant. Increasing crude protein yield and dry matter yield mainly due to better translocation within plant system with higher level of nitrogen. Increasing fodder yield, dry matter, crude protein content has direct relation with quality yield production. Neutral detergent fibre and acid detergent fibre did not show its significant effect.

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Interaction effect

Data presented in Fig 2 regarding interaction effect of marvel grass and level of nitrogen on number of tillers per meter row length. Variety GAMG 2 (V₂) with higher level of nitrogen (N₂: 60 kg N/ha) reported significantly the maximum number of tillers per meter row length (65.57) while lower number of tillers per meter row length (50.85) was reported in N₁V₁ treatment combination (N₁: 20 kg N/ha and V₁: GMG 1).

Economic

Data presented in (Fig.1) regarding response of varieties on net return and BCR. Variety V₂ (GAMG 1) reported numerically higher net realization (147318 Rs/ha) with BCR (1.93). Higher rate of application N₃ (60 kg N/ha) reported higher net realization (182790 Rs/ha) with benefit cost ratio (2.03).

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Conclusion

Forage grass having its own important in dairy sector. Selection of variety, rate of application of nitrogen directly responsible for healthily and quality fodder production. For three-year ongoing experiment on response of different marvel varieties on level of nitrogen. According to presented results it can be concluded that growing marvel grass variety either GMG 1 or GAMG 2 with higher level of nitrogen (N_3 : 60 kg N/ha.e 30 kg N/ha at basal and 30 kg N/ha after one month) reported higher total green fodder yield, dry matter yield and crude protein yield of marvel grass.

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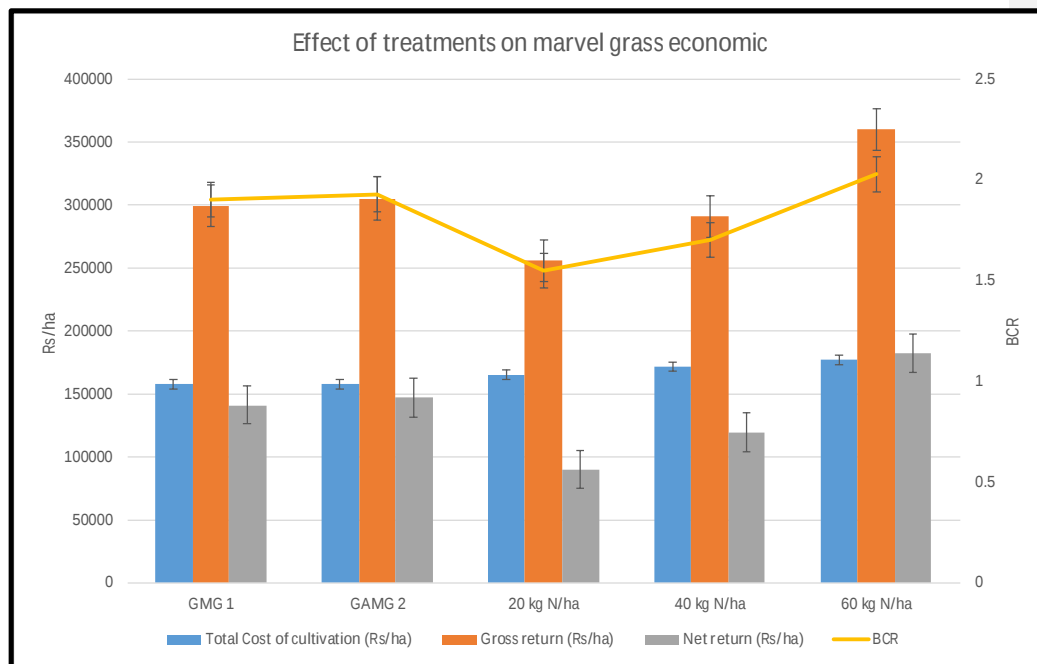


Fig. 01 Effect of varieties and levels of nitrogen on economics of marvel grass

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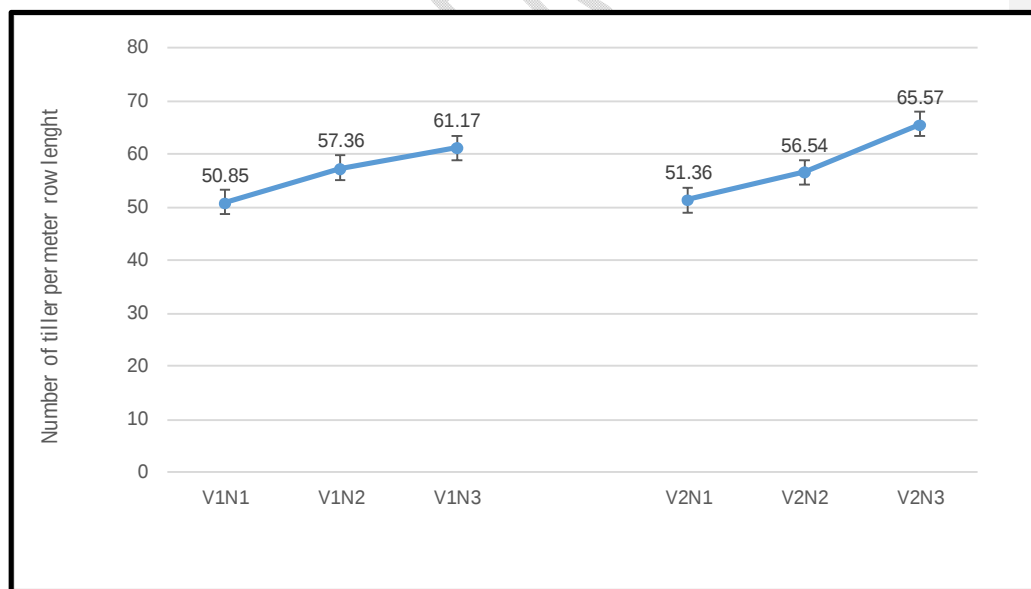


Fig : 2 Number of tillers per meter row length as influenced due to V×N interaction effect

Table 1 Effect of nitrogen levels on growth, yield, yield attributes and quality parameters of different marvel grass varieties

(Pooled of three year and total 18 cuts)

Treatment	Plant height (cm) at cutting	Numbers of titter per meter row length	Total GFY (q/ha)	Dry matter (%)	Total Dry matter yield (q/ha)	CP (%)	Total crude protein yield (q/ha)	ADF (%)	NDF (%)
Variety (V)									
V ₁	84.76	56.46	1496	44.30	665	5.38	35.29	53.12	83.26
V ₂	85.28	57.83	1526	44.37	680	5.49	36.86	52.99	82.31
S.Em.±	1.79	0.57	25	0.29	13	0.04	0.75	0.29	0.42
CD 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrogen level (N)									
N ₁	79.93	51.11	1280	43.63	561	5.14	28.37	53.21	82.50
N ₂	84.07	56.95	1455	44.62	653	5.39	34.73	52.97	82.82
N ₃	91.06	63.37	1799	44.78	806	5.78	46.03	52.98	83.06
S.Em.±	1.52	0.70	31	0.36	15	0.09	0.89	0.38	0.51
CD 5%	4.59	2.01	91	NS	44	0.37	2.69	NS	NS
Interaction									
V × N	NS	Sig.	NS	NS	NS	NS	NS	NS	NS
Y × V	Sig.	NS	NS	NS	NS	NS	NS	NS	NS
Y × N	NS	NS	NS	NS	NS	Sig.	NS	NS	NS
Y × V × N	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	6.08	6.04	5.71	3.95	6.67	4.48	7.37	3.28	3.02

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management on yield and quality of different varieties of oat fodder. Indian Journal of Animal Nutrition, 18(3), 262-266.

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