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Effect of climate change on production of hybrid Napier (DHN-6) grass on milk yield

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Abstract

The on farm trial was conducted during two consecutive years 2015-16 and 2016-17 at two contact villages of Deendayal Research Institutes Krishi Vigyan Kendra, Ambajogai District Beed (Maharashtra). The trials were laid out in a randomized block design consisting of three treatments with 10 replications of each. The hybrid Bajra napier variety DHN – 6 was compared with two Guinea grass varieties Bundel guinea -1 and Bundel guinea - 2 for its performance and effect on milk yield. It was observed that the mean values of plant height (189.2 & 196.7 cm) and green fodder yield (88.7 & 93.5 t/ha) were highly significant ($P<0.05$) in hybrid napier variety DHN-6 over Bundel guinea-1 and Bundel guinea – 2. The mean values of dry matter (24.3 & 20.1%) were significantly ($P<0.05$) higher in hybrid napier variety DHN – 6 over Bundel guinea - 1 and Bundel guinea – 2. The recorded mean values of crude protein content (11.32 & 11.71%) were significantly ($P<0.05$) higher recorded in hybrid napier variety DHN – 6 over rest of the treatments. The mean values of milk fat (7.2 & 7.3 %) were significantly ($P<0.05$) higher recorded in treatment group fed with hybrid napier grass DHN – 6 than rest of the treatments. The higher milk yield was observed in treatment group fed with hybrid napier grass DHN – 6 than rest of the treatments. The mean values of cost of feeding observed lower in the treatment group fed with DHN-6 than group fed with Bundel guinea – 1 and Bundel guinea – 2. Moreover, the higher B: C ratio was observed in the treatment group fed with DHN-6 than rest of treatments groups. Therefore, it may be concluded that DHN-6 is better hybrid Napier variety for round the year nutritious green fodder and profitable milk production as compared to other varieties of green fodder.

Keywords: Hybrid Napier, fodder, milk and economics

Introduction

Milk has highest value in Indian agriculture and food sector, more than combined value of wheat and rice. Milk contributes close to the 1/3rd of gross income of rural households. The livestock sector contributes 4% of India's GDP and the dairy sector comprises majority of share (Anonymous, 2018) [3]. Dairy farming is mean of subsistence for millions of dairy farmers in country. It provides livelihood support to millions of small marginal farmers and land less labours. The dairy sector today provides approximately 70.0 million families the triple benefits of nutritious food, supplementary income and productive employment (Tajpara *et al.*, 2016) [10].

The dairy industry in Marathwada region becomes rudimentary mainly due to unavailability of green fodder round the year. Dairy animals are largely fed on inferior quality fodders such as crop residues, straw and weeds from wastelands. Such low quality feeding material leads to low milk productivity per animal. This situation needs to be addressed through alternative sources of fodder which could provide good quality fodder round the year so that the milk productivity as well as animal health may not jeopardised. Green fodder is an economic source of nutrients for the dairy animals. It is highly palatable and digestible and its feeding improves digestibility of crops residues under mixed feeding system. It also helps in maintaining good health and improving breeding efficiency of animals. The feeding of green fodder in the ration of animals may reduce cost of milk production. To reduce the gap between demand and availability of green fodder, there is a need to improve green fodder yield through cultivation of high yielding multi-cut perennial fodder crop like Hybrid Napier grass DHN-6 (Hossain, *et al.*, 2017) [5].

In terms of quality and availability of good quality fodder hybrid napier variety DHN-6 (Sampoorna) will prove to be a better option under marathwada conditions because of its perennial nature, profuse tillering habit, high yield, palatability, nutritional value and suitability for silage making than other forage crops. Hybrid napier variety DHN- 6 (Sampoorna) may be a boon for dairy industry on account of supply of adequate green fodder of high nutritional value with round the year availability and minimum expense on

repeated fodder cultivation (Kadam, *et al.*, 2017) [6]. With this view on farm trial (OFT) was conducted on 'Assessment of New hybrid Napier fodder variety DHN-6 (Sampoorna)' during two consecutive years 2015-16 and 2016-17 at two different contact villages of Deendayal Research Institutes Krishi Vigyan Kendra, Ambajogai District Beed (Maharashtra).

Materials and methods

The on farm trial was conducted during two consecutive years 2015-16 and 2016-17 at two different contact villages of Deendayal Research Institutes Krishi Vigyan Kendra, Ambajogai District Beed (Maharashtra). The trial was laid out in a randomized block design consisting of three treatments with 10 replications of each. The hybrid Bajra napier variety DHN – 6 was compared with two Guinea grass varieties Bundel guinea -1 and Bundel guinea - 2 for its performance and effect on milk yield. For conducting on farm trials, planting material of hybrid napier varieties were brought from different agricultural institutes. Ten farmers were selected from each village during two consecutive years. Farmers were selected for trials having similar soil type and soil nutrient profile along with Murrah buffaloes having same parity status. The stems of crops were planted manually by maintaining a distance of 90 cms in between two rows and distance of 60 cms between two plants. The size of each trial plot was 172.8 square meters. After planting, the plots were immediately irrigated for proper growth and hand weeded at 15-20 days after sowing and every cutting. All the treatments were fertilized with 250:60:90 kg NPK/ha. A common dose of FYM 10 t/ha + 50 kg Nitrogen + 60 kg P₂O₅ + 90 kg K₂O in the form of urea, SSP and MOP was applied basal, respectively and remaining doses of nitrogen @ 50 kg/ha were top dressed at 30 days after transplanting and every harvest except last. After completion of one year of experiment, again equal basal doses of FYM, phosphorus & potash were mixed in soil between row spaces. During 2015-16 and 2016-17, eight cuttings were done at 15 cm height from ground level at regular interval of 90 days. Forage yield, yield attributes and quality components were measured and analyzed at every cutting during both the years.

Analytical procedure of feeds and milk

Fodder samples were analyzed for dry matter as per the method of AOAC (1975) [1], crude protein by micro-Kjeldhal method (AOAC, 1975) [1] and milk obtained by different treatment combinations were chemically analyzed for fat by Gerber's method described in ISI: 1224 (Part II) 1977.

Statistical analysis

Data of fodder yield, yield attributes and quality components obtained analysed statistically as per Snedecor and Cochran (1967) [9].

Result and discussion

The mean values of plant height (189.2 & 196.7 cm) and green fodder yield (88.7 & 93.5 t/ha) were significantly ($P<0.05$) higher observed in hybrid napier variety DHN-6 than Bundel guinea - 1 and Bundel guinea – 2. The results are comparable to those of Biradar *et al.*, 2014 [4] who reported higher plant height and green fodder yield in DHN-6. Moreover, the significant differences were observed in the mean values of plant height and green fodder yield among all treatment groups during the year 2015-16 and 2016-17 (Table-1).

The mean values of dry matter (24.3 & 20.1%) were significantly ($P<0.05$) higher observed in hybrid napier variety DHN – 6 than Bundel guinea - 1 and Bundel guinea – 2 during the year 2015-16 and 2016-17. Moreover, the non-significant differences were observed in the value of dry matter content in rest of the treatments. The results are comparable to Sarmini and Premratne (2017) [8] who reported that hybrid napier produced significantly higher dry matter (Table-1).

The mean values of crude protein content (11.32 & 11.71%) were significantly ($P<0.05$) higher recorded in hybrid napier variety DHN – 6 than rest of the treatments. The crude protein content in Bundel guinea – 1 is at par with Bundel guinea – 2. The present findings were in agreement with those of Kadam *et al.*, (2016) who reported high crude protein content in hybrid napier variety DHN-6 (Table-1).

The mean values of milk fat (7.2 & 7.3 %) were significantly ($P<0.05$) higher recorded in treatment group fed with hybrid napier grass DHN – 6 than rest of the treatments. Moreover, non-significant differences were observed in the value of milk fat content in rest of treatments during the year 2015-16 and 2016-17 (Table-1).

The higher milk yield was observed in treatment group fed with hybrid napier grass DHN – 6 than rest of the treatments. The present findings were in agreement with those of Muia, (2000) [7]. The mean values of cost of feeding observed lower in the treatment group fed with DHN-6 than group fed with Bundel guinea – 1 and Bundel guinea – 2 fodder grasses individually. Moreover, the higher B: C ratio observed in the treatment group fed with DHN-6 than rest of treatments groups (Table-2).

Table 1: Effect of variety on growth, yield and quality of hybrid napier grass and milk during 2015-16

Varieties	Plant height (cm)		Green fodder yield (t/ha)		Dry matter content (per cent)		Crude protein content (per cent)		Milk Fat (per cent)	
	15-16	16-17	15-16	16-17	15-16	16-17	15-16	16-17	15-16	16-17
Bundel – 1	125.2 ^c	134.4 ^c	69.0 ^c	83.6 ^c	22.3 ^b	18.2 ^b	10.20 ^b	10.70 ^b	7.2 ^b	7.2 ^b
Bundel – 2	172.4 ^b	187.3 ^b	82.5 ^b	87.1 ^b	23.1 ^b	18.9 ^b	10.21 ^b	10.39 ^b	7.1 ^b	7.2 ^b
DHN – 6	189.2 ^a	196.7 ^a	88.7 ^a	93.5 ^a	24.3 ^a	20.1 ^a	11.32 ^a	11.71 ^a	7.2 ^a	7.3 ^a
CD (P < 5 percent)	3.065	3.311	3.038	2.942	1.030	1.414	0.277	0.317	0.088	0.073
C V per cent	2.013	2.049	4.030	3.553	4.745	7.879	2.810	3.164	1.212	1.092

Values with different superscript are significantly differed at $P<0.05$

Table 2: Effect of feeding hybrid Napier on milk yield and cost of production during 2015-16

Varieties	Milk yield (kg)		Cost of feeding (Rs.)		Gross return (Rs.)		B:C ratio	
	15-16	16-17	15-16	16-17	15-16	16-17	15-16	16-17
Bundel - 1	2116	2142	31995	32101	76196	77147	2.38	2.40
Bundel – 2	2132	2157	31885	32793	77475	79964	2.42	2.44
DHN – 6	2210	2224	30141	30402	80498	81923	2.67	2.69

Conclusion

From two years study, it was observed that hybrid napier variety DHN-6 produced higher yield of nutritious green fodder than Bundel guinea - 1 and Bundel guinea - 2. The feeding of hybrid napier DHN-6 to lactating Murrah buffaloes is more economical. Therefore it may be concluded that DHN 6 is best hybrid napier variety for round the year nutritious green fodder and profitable milk production. Moreover, it is climate resilient variety as it can sustain the extreme weather conditions like heavy rains or drought.

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