Herbage Yield, Quality and Nutrients Composition of Bajra Napier (BN) Hybrid Grass Varieties under Central Gujarat Condition

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Introduction

Among various perennial grasses, BN hybrid grass (*Pennisetum glaucum* x *Pennisetum purpureum*) is most popular in irrigated areas of India including Gujarat state due to several factors like wide spread agro-climatic adaptability, high yield potential, nutritional quality, low cost of cultivation, insect-pest-disease resistances, tolerance to grazing/damages by wild animals, vegetative propagation and high response towards manure, fertilizer and irrigations. In Central Gujarat region, farmers are mainly cultivating CO 3 and APBN 1 varieties, which have been supplied to them by agriculture institutes. These two popular varieties were considered as local checks (LC) in trial. Three very old varieties (IGFRI 6, PBN 233 and IGFRI 10) were also considered for trial due to their popularity at national level. Newly notified varieties of BN hybrid grass (CO 4, DHN 6 & BNH 10) were included in the trial as sufficient information's on performance of these new varieties under Central Gujarat condition is not available. Hence, need was felt to compare the yield, quality and nutrient composition of old, local checks and new notified varieties of BN hybrid together in one experiment under Central Gujarat condition.

Materials and Methods

The field experiment was conducted during two consecutive years 2013-14 and 2014-15 at fodder demonstration unit (FDU) of National Dairy Development Board, Anand (Gujarat). The experiment was laid out in a randomized block design with three replications consisting of eight treatments of different BN hybrid varieties (IGFRI 6, IGFRI 10, CO 3, CO 4, APBN 1, PBN 233, DHN 6 and BNH 10). For conducting experiment, planting material of BN hybrid varieties was brought from different agricultural institutes and multiplied at fodder demonstration unit, NDDB, Anand. The soil of the experimental site was loam in texture with EC - 0.30, pH –7.80, total nitrogen (810.76 kg/ha), available P_2O_5 (50.82 kg/ha) and available K_2O (240.65 kg/ha). The soil contained DTPA-extractable Fe (15.31 ppm), Mn (20.51 ppm), Zn (2.09 ppm), available S (5.70 ppm) and Cu (2.21 ppm). The crop was transplanted manually on 20th June, 2013. The total plot size was 5 x 4 square meters with net plot area of 4 x 3 square meters at harvest. The experiment was planted through two rooted slips per hill at 75 cm x 50 cm spacing. After sowing, 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 P_2O_5 + 90 kg K_2O 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 2013-14 and 2014-15, 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. Data were analysed statistically as per Snedecor and Cochran (1994).

Results and Discussion

Significant differences among BN hybrid varieties were observed in green & dry matter yields in 2013-14 and mean data (Table 1). On the basis of mean data, significantly the highest green fodder yield was recorded in new variety BNH 10 (94.2 t/ha) variety over CO 4 and IGFRI 6 varieties. However mean green fodder yields of new varieties (BNH 10 & DHN 6), PBN 233 and local checks (ABPN 1 & CO 3) varieties were found at par amongst themselves. Among varieties mean green fodder yields ranged from 77.8 to 94.2 t/ha. Khadda *et al*. (2013) also reported similar mean green fodder yields of 97 t/ha in front line demonstrations of APBN 1 variety of BN hybrid grass conducted under Central Gujarat conditions. Mean data revealed that BNH 10 variety at par with DHN 6 and PBN 233 produced higher plants (212.8 cm)

in comparison to remaining varieties (Table 1). High green fodder production in BNH 10 variety may be due to higher plant height. Ekemini *et al.* (2012) reported positive correlation between plant height and fodder yield in Napier grass. In this study, mean dry matter yields were recorded 16.8 to 20.9 t/ha between varieties. On the basis of mean data, DHN 6 variety at par with PBN 233 and BNH 10 recorded significantly higher dry matter yield (20.9 t/ha) over local checks (APBN 1 & CO 3) and remaining varieties. Significantly higher mean dry matter content of 22.7 per cent was observed in DHN 6 variety as compared to IGFRI 6, IGFRI 10, CO 3 and APBN 1 varieties. Higher dry matter yield of DHN 6 variety may be attributed mainly due to combination of better plant height and dry matter content. This result is in conformity with Alam *et al.*, 2010where the taller BN hybrid varieties showed higher dry matter yields. On the basis of mean data, APBN 1 variety at par with PBN 233 produced the highest crude protein yield (1.64 t/ha) over remaining varieties. All the other varieties were found at par amongst themselves in mean crude protein yield. APBN 1 variety recorded significantly higher mean crude protein content (8.7 per cent) in comparison to remaining varieties (Table 1). Mean crude protein and oxalic acid content varied from 6.4 to 8.7 and 2.3 to 2.8 per cent, respectively among BN hybrid varieties. Anthony and Thomas (2014) reported oxalic acid content varied from 2.40 to 3.77 per cent in eleven BN hybrid varieties, which was below 4 per cent of permissible limit. Mean data revealed that IGFRI 6 variety at par with PBN 233 recorded highest calcium content (0.49 per cent) among all varieties. Mean calcium content ranged from 0.31 to 0.49 per cent among varieties (Table 2). On the basis of mean data, APBN 1 at par with IGFRI 10, CO 3 and BNH 10 recorded significantly higher phosphorus content over remaining varieties. Potassium content was found significant on the basis of mean data (Table 2). APBN 1 variety at par with CO 3 and CO 4 recorded significantly higher potassium content (2.06 per cent) as compared to other varieties. On the basis of mean data BNH 10 variety at par with IGFRI 6 and PBN 233 varieties recorded significantly higher magnesium content (0.91 per cent) in comparison to other varieties. Sulphur, manganese and iron contents were found to be significant among varieties on the basis of mean data (Table 2). BNH 10 variety recorded significantly higher sulphur content (0.20 per cent) than other varieties. Significantly highest mean manganese content (57.7 ppm) was recorded in IGFRI 6 variety as compared to remaining varieties. IGFRI 6 variety at par with BNH 10 recorded significantly higher iron content (602.5 ppm) as compared to other varieties. Non-significant differences occurred among BN hybrid grass varieties for zinc and copper content (Table 2).

Table 1. Effect of varieties on growth, yield and quality of BN hybrid grass during 2013-14 and 2014-15.

Varieties	Green Fodder Yield (t/ha)			Dry Matter Yield (t/ha)			Crude Protein Yield (t/ha)			Plant height (cm)			Dry matter content (per cent)			Crude Protein content (per cent)			Oxalic acid content (per cent)		
	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
IGFRI 6	70.0	85.5	77.8	17.3	16.4	16.8	1.39	1.40	1.39	127.6	140.7	134.2	24.0	18.7	21.4	7.8	7.5	7.7	2.8	2.9	2.8
IGFRI 10	83.0	94.9	88.9	19.2	18.4	18.8	1.41	1.58	1.50	174.6	189.4	182.0	22.7	18.7	20.7	7.4	7.9	7.6	2.6	2.1	2.4
CO 3 (LC)	87.0	91.3	89.2	17.6	18.3	17.9	1.39	1.43	1.41	168.1	182.4	175.3	22.3	19.9	21.1	7.8	7.3	7.6	2.8	1.9	2.3
CO 4	84.0	89.6	86.8	19.6	17.9	18.8	1.52	1.38	1.45	191.1	179.0	185.1	23.6	19.6	21.6	7.8	6.5	7.1	2.9	2.1	2.5
APBN 1 (LC)	87.4	95.2	91.3	18.5	17.6	18.0	1.66	1.63	1.64	181.2	179.4	180.3	21.2	18.1	19.7	8.7	8.7	8.7	2.7	2.2	2.5
PBN 233	92.3	90.1	91.2	22.7	17.6	20.2	1.73	1.28	1.50	201.4	192.5	196.9	24.0	20.3	22.2	7.4	6.6	7.0	2.6	2.4	2.5
DHN 6	93.6	90.3	91.9	23.1	18.7	20.9	1.67	1.25	1.46	201.3	213.6	207.4	24.9	20.5	22.7	7.0	5.8	6.4	2.6	2.0	2.3
BNH 10	89.6	98.8	94.2	20.1	18.2	19.1	1.60	1.38	1.49	205.1	220.4	212.8	21.7	18.1	19.9	7.8	6.1	6.9	2.4	2.4	2.4
CD (P< 5 per cent)	5.9	NS	6.5	2.9	NS	2.0	0.24	NS	0.15	21.0	33.6	24.7	NS	NS	1.5	NS	1.2	0.9	NS	NS	NS
CV per cent	3.9	7.3	4.1	8.5	10.8	6.0	8.8	10.1	5.7	6.6	10.2	7.7	6.7	6.5	4.1	9.8	9.6	7.3	7.4	6.9	6.7

Table 2: Mean nutrient content of BN hybrid grass as affected by different varieties during 2013-14 and 2014-15.

Varieties	Per cent					ppm			
	Calcium	Phosphorus	Potassium	Magnesium	Sulphur	Zinc	Manganese	Iron	Copper
IGFRI 6	0.49	0.36	1.73	0.89	0.14	32.3	57.7	602.5	11.4
IGFRI 10	0.41	0.39	1.90	0.74	0.17	33.5	45.5	372.3	10.0
CO 3 (Local Check)	0.41	0.43	1.91	0.80	0.17	32.9	46.6	342.2	8.6
CO 4	0.34	0.32	1.80	0.76	0.17	32.4	45.7	325.8	9.9
APBN 1 (Local Check)	0.42	0.44	2.06	0.77	0.17	32.7	51.6	481.0	10.1
PBN 233	0.44	0.34	1.59	0.89	0.17	35.3	42.1	398.3	11.1
DHN 6	0.31	0.32	1.59	0.63	0.15	30.3	48.6	354.1	17.4
BNH 10	0.40	0.40	1.78	0.91	0.20	37.6	50.1	492.2	12.0
CD (P< 5 per cent)	0.06	0.06	0.23	0.08	0.03	NS	5.9	117.4	NS
CV per cent	8.2	8.9	7.5	6.0	8.5	12.0	7.0	15.9	14.3

Conclusion

During two years study, green fodder yields of new varieties of BN hybrid grass (BNH 10 and DHN 6) were found at par but slightly better than local checks (CO 3 and APBN 1) and old varieties (IGFRI 6, IGFRI 10 and PBN 233). But in dry matter yield, DHN 6 variety significantly out yielded local checks and old varieties of BN hybrid. However, nutrients content and fodder quality of BNH 10 variety was found similar to local checks. Therefore it may be concluded that among new released varieties BNH 10 and DHN 6 are best for fodder cultivation in South Gujarat conditions.

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