



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; 9(4): 1813-1815

Received: 16-05-2020

Accepted: 20-06-2020

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Performance of hybrid Napier grass Cultivars under irrigated condition of northern dry zone of Karnataka

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Abstract

Hybrid Napier grass is most adopted forage crops in Northern Karnataka due to its quick growth, high yield potential, better palatability, digestibility and rooting ability. It is advantages in various ways such as saving in cost of production, and high yield in short period. Rationing also offers an opportunity of continuous supply of green forage. Several Hybrid Napier crosses have been developed by the TNAU, IGFRI, UAS, Dharwad *etc.* It is very much need of the hours to study the performance of these hybrids under varying climatic conditions to know its suitability and yield potentiality. Keeping this in view a field experiment was conducted at Krishi Vigyana Kendra, Vijaypaura, Karnataka for two subsequent years of 2018-19 and 2019-20 under irrigated conditions in medium black soils having 0.58 per cent organic carbon, 211 kg/ha available Nitrogen, 56 kg/ha available Phosphorus and 135 kg/ha available Potassium with 8.2 pH. to explore the performance of Hybrid Napier grasses under irrigated condition. The treatments comprised eight Hybrid Napier cultivar, *viz.*, NB-21, DHN-6, APBN-1, IGFRI-7, Phule Jaywanth, CO-3, CO-5 and DHN-15. A total of eight treatments were laid out in randomized block design with three replications. The pooled results of two years revealed that, Hybrid Napier *cv.* DHN-15 recorded significantly higher green fodder yield (759 q/ha). However which was on par with the hybrid napier cultivar DHN-6, CO-3, CO-5, Phule Jaywanth and APBN-1. Significantly lower green fodder yield was recorded by NB-21 cultivar (445 q/ha). Among different perennial grasses, the highest net returns (Rs. 59401 ha⁻¹) and BC ratio (2.68) was obtained with Hybrid Napier cultivar DHN-15 and closely followed by DHN-6, CO-3, CO-5, Phule Jaywanth and APBN-1. The lowest was with NB-21 cultivar (Rs. 22174 ha⁻¹ & 1.66, respectively).

Keywords: Perennial grasses, Hybrid Napier, irrigated condition, Green forage yield, Economics

Introduction

Livestock farming will give more profit than Agriculture. But without agriculture, it will never give a coin. Now, it is our time to think about the integration of agriculture and livestock farming. Whatever the livestock we prefer to rear, we should primarily bother about feeding them. To purchase all the ingredients of feed is unprofitable. So we should produce the feeding materials our own. Concentrates and roughages are the two major components of livestock feeds. Roughages require in bulk quantity than the concentrates. That is why we cultivate fodder grass. Hybrid Napier is one of the widely cultivated fodder grasses. Napier grass is also called as Elephant Grass due to its tallness and vigorous vegetative growth. The plants tiller freely and a single clump may produce more than 50 tillers under favorable climatic and soil conditions. Unfortunately, the grass coarse-textured, the leaf blade and sheaths hairy, leaf margins sharply serrated and stems less juicy and fibrous. In 1953, a cross was made in India between Bajra which is more succulent, leafy, fine-textured, palatable, fast growing and drought resistant and Napier to combine these qualities with its high yielding potential. Hybrid Napier is a perennial grass which can be retained on field for 3-4 years. Compared to Napier grass, Hybrid Napier produces numerous leaves. It has larger leaves, softer and less persistent hairs of leaf blades and sheaths and less sharp leaf edges. The stems are also less fibrous than Napier. The characteristic features of improved Hybrid napier varieties are: profuse tillering, high yield potential, high dry matter and crude protein content, quick regeneration capacity, high leaf to stem ratio, high palatability, free from pest and diseases and low in adverse factors. The tillers are more numerous and grow faster. It is one of the highest yielding perennial tropical fodder grasses and considered as cut-and-carry forage for stall feeder systems. Several Hybrid Napier crosses have been developed by the TNAU, IGFRI, UAS, Dharwad *etc.*

Hybrid Napier grass is widely cultivated fodder grasses in the region. These are most adopted forage crops in Northern Karnataka due to its quick growth, high yield potential, better palatability, digestibility and rooting ability (Kakkar *et al.*, 1986) [1]. It is advantages in various ways such as saving in cost of production, and high yield in short period. Rationing also offers an opportunity of continuous supply of green forage (Tiwari *et al.*, 1975) [4]. It is very much need of the hours to study the performance of these Various Hybrid Napier grass genotypes under varying climatic conditions to know its suitability and yield potentiality.

Keeping in view the above facts, the present study was conducted to explore the best compatible genotypes of perennial grasses under irrigated conditions in Northern Dry Zone of Karnataka.

Materials and Methods

The field experiment was conducted during 2018-19 and 2019-20 at Krishi Vigyana Kendra, Vijaypura, Karnataka, on medium black soil having 0.58 per cent organic carbon, 211 kg/ha available Nitrogen, 56 kg/ha available Phosphorus and 135 kg/ha available Potassium with 8.2 pH. The treatments comprised eight Hybrid Napier cultivar *viz.*, NB-21, DHN-6, APBN-1, IGFRI-7, Phule Jaywanth, CO-3, CO-5 and DHN-15. A total of eight treatment combinations were laid out in randomized block design with three replications. The Farm Yard Manure were incorporated 15 day before planting of grasses. The stem cuttings / root slips were planted in second fortnight of June with a spacing of 60 x 60 cm spacing. The recommended dose of fertilizers were applied to all the grasses 15 days after planting in the form of urea, DAP and Muriate of potash (MOP). The first irrigation was applied immediately after planting and there after irrigation were given at an interval of 13-15 days depending upon the climatic condition. The first cutting was taken about 65 days after transplanting (DAT) and subsequent cutting at an interval of 35-40 days (about 1- 1.5 m. height). During first year (2018-19) 5 cuts and second year (2019-20) 7 cuts were taken. The growth and yield observations were recorded from the net plots and green fodder yield (GFY) of various grasses were converted on hectare basis in quintals. The protein content was analysed from the composite sample. The economics of each treatment was computed with prevailing prices of green grasses during corresponding years. The data of two years were statistically analyzed and discussed on

pooled basis. The yield was further computed in terms of gross and net returns as well as BC ratio to assess the profitability.

Results and Discussion

In general the trend of yield in 2018-19 and 2019-20 was almost similar, probably due to similar rainfall pattern and weather parameters. The error variance for the yield during all the two seasons were found homogeneous and therefore, the pooling of data was done.

Growth parameters

Pooled data of two year showed significant variation *w.r.t* plant height, number of tillers per plant and leaf: stem ratio (Table 1).

Significantly higher plant height, was recorded with DHN-15 (273 cm). However which was on par with the all the cultivars of hybrid Napier except Phule jaywanth and APBN-1. Significantly lower plant height was noticed in NB-21 (199 cm). Hybrid Napier *cv.* DHN-15 recorded significantly higher number of tillers (38). However which was on par with the hybrid Napier cultivar CO-5 (32). Lowest was with NB-21 cultivar (22). Significantly higher leaf: stem ratio (3.03) recorded with Hybrid Napier cultivar DHN-15 as compared to all other treatments. The lowest leaf: stem ratio was observed in NB-21. The results are in conformity with the finds of Nilanthi *et al.* (2004) [3].

Green fodder yield

Pooled data of two year showed significant variation in Green fodder yield (GFY) among different Hybrid Napier cultivars tried under irrigated ecosystem. Hybrid Napier *cv.* DHN-15 recorded significantly higher green fodder yield (718 q/ha) (Table 1). This is mainly because of highest plant height and number of tiller obtained in this cultivar and also may be due to quick growth, high yield potential, better palatability, digestibility and rooting ability as reported by Kakkar *et al.*, (1986) [1]. The similar have been also reported by Sindhu *et al.*, (2001). However which was on par with the other cultivars *viz.*, DHN-6, CO-3, CO-5, Phule Jaywanth and APBN-1 (731, 723, 718, 705 and 611 q/ha, respectively). However, Significantly lower green fodder yield was recorded by NB-21 cultivar (445 q/ha). This is mainly because of lower numbers of tillers and leaf: stem ratio.

Table 1: Green fodder yield (GFY), yield attributes, protein content and crude protein Yield (CPY) of Hybrid Napier grasses under irrigated condition (Pooled data of 2018-19 & 2019-20)

Treatment details	Plant ht. (cm)	No. of tillers / clump	Leaf stem ratio	Green Fodder yield (q/ha)			CP %	CPY (q/ha)
				2018-19 (5 cuts)	2019-20 (7 cuts)	Pooled		
Hybrid Napier (NB-21)	199	22	0.97	405	484	445	6.21	27.44
Hybrid Napier (DHN-6)	240	29	3.31	699	764	731	10.21	74.58
Hybrid Napier (APBN-1)	221	27	3.20	609	614	611	8.66	52.72
Hybrid Napier (IGFRI 7)	230	25	2.35	572	576	574	8.35	48.31
Hybrid Napier (CO- 3)	233	27	2.60	693	753	723	9.42	66.85
Hybrid Napier (Phule Jaywanth)	216	26	2.65	679	731	705	9.63	67.38
Hybrid Napier (CO- 5)	258	32	2.73	646	791	718	10.74	77.01
Hybrid Napier (DHN 15)	273	38	3.03	704	813	759	10.76	82.33
SEm	18	3	0.03	72	51	52	0.60	6.30
CD (P=0.05)	53	8	0.10	219	155	157	1.83	19.11

Table 2: Economics of Hybrid Napier grasses cultivation under irrigated condition (Pooled data of 2018-19 & 2019-20)

Treatment details	Green Fodder yield (q/ha)	Gross Returns (Rs/ha)	Net Returns (Rs/ha)	B: C
Hybrid Napier (NB-21)	445	55587	22174	1.66
Hybrid Napier (DHN-6)	731	91407	55973	2.58

Hybrid Napier (APBN-1)	611	76430	40996	2.16
Hybrid Napier (IGFRI 7)	574	71774	36341	2.03
Hybrid Napier (CO- 3)	723	90365	54932	2.55
Hybrid Napier (Phule Jaywanth)	705	88083	52650	2.49
Hybrid Napier (CO- 5)	718	89805	54372	2.53
Hybrid Napier (DHN 15)	759	94834	59401	2.68
SEm	52	6481	6481	0.18
CD (P=0.05)	157	19657	19657	0.56

Quality parameters

Pooled data of two year showed that significant higher protein content was recorded in Hybrid Napier cv. DHN-15 (10.76%) followed by Hybrid Napier cv. Co-5, DHN-6, Phule Jaywanth and CO-3 (10.74, 10.21, 9.63, and 9.42%, respectively). Lower protein content was recorded in NB-21 (6.21%). Similarly, significantly higher crude protein yield (CPY) was in Hybrid Napier cv. DHN-15 (82.33 kg/ha) (Table 1). This is mainly because of higher GFY obtained in DHN-15. However which was on par with CO-5, DHN-6, Phule Jaywanth and CO-3 (77.01, 74.58, 67.38 and 66.85, respectively) and the results are in conformity with the findings of Tiwana *et al.*, (2004) [5]. The lowest CPY was recorded with NB-21 (27.44 q/ha).

Economics

The economic analysis indicated that, the highest net returns (Rs. 59401 ha⁻¹) and BC ratio (2.68) was obtained with Hybrid Napier cultivar DHN-15 and closely followed by DHN-6, CO-3, CO-5, Phule Jaywanth and APBN-1. The lowest was with NB-21 cultivar (Rs. 22174 ha⁻¹ & 1.66, respectively) (Table 2). This is in confirmation of results represented by Premaratne and Premalal (2006) [2] and Suneetha *et al.*, (2004) [6].

Conclusion

It was concluded that based on the two years data, The Hybrid Napier genotypes DHN-15 and DHN-6 proved more suitable under irrigated condition of Northern Karnataka with higher green fodder yield, crude protein yield, net returns and BC ratio.

Acknowledgement

The author extend sincere thanks to University of Agriculture Sciences, Dharwad for providing the opportunity to conduct the experiment and also Dept. of Agriculture (ATMA) for providing the financial assistance.

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