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ASSESSMENT OF PERENNIAL FODDER GRASSES WITH VARIOUS ORGANIC NUTRIENT SOURCES IN UTTARA KANNADA DISTRICT OF KARNATAKA INDIA

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ABSTRACT

A field experiment was conducted at Agricultural Research Station, Malagi, Uttara Kannada district University of Agricultural Science, Dharwad, Karnataka, India during August-2021 to March-2022 to assess the quality parameters of perennial fodder grasses as influenced by various organic nutrient sources. The soil texture of the experimental site was sandy loam, pH of the soil was 6.35 and 6.35 and 6.34, EC of the soil was 0.20 dSm^{-1} and 0.19 dSm^{-1} and organic carbon content of the soil was 0.50 per cent and 0.48 per cent at 0-15 cm and 15-30 cm depth respectively. Available N, P_20_5 and K_2O in the soil were 340 kg and 321 kg, 30 kg and 33 kg and 195 kg and 201 kg respectively at 0-15 cm and 15-30 cm depth. Hybrid napier grass performed significantly higher green forage yield (165.3 t ha^{-1}) and dry forage yield (46.6 t ha^{-1}) in comparison with Guinea grass and Green panic. In case of green forage yield (286.70 t ha^{-1}) and dry forage yield (82.30 t ha^{-1}) Poultry manure performed on par with the recommended dosage of NPK in standard comparison. The experiment consists of two factors i.e., perennial grasses and organic nutrient sources. The experiment was laid out in factorial randomized compete block design with three replications. Hybrid napier was recorded significantly higher N, P, K and crude protein content (*i.e.,* 0.92 per cent, 0.59 per cent, 0.75 per cent and 5.7 per cent respectively) but lower crude fibre (20.32%) and total carbohydrate (20.34%) content as compared to guinea grass and green panic. Application of poultry manure was recorded significantly higher N (1.88%), P(0.75%),K (1.70%) and crude protein (11.7%) content but lower crude fibre (35.77%) and total carbohydrate (35.77%) and total carbohydrate (35.24%) content as compared to recommended NPK.

Keywords : Fodder, Hybrid Napier Grass, Crude Protein, Crude Fibre

Introduction

Ensuring an ample supply of both quantity and quality feed and fodder resources is crucial for enhancing livestock productivity. The scarcity of these resources primarily stems from the heightened pressure on land for cultivating food grains, oilseeds, and pulses, coupled with insufficient attention to the cultivation of fodder crops. The diminishing grazing lands and areas dedicated to fodder cultivation result from degradation or restrictions imposed on livestock grazing. Currently, the total area under fodder cultivation has remained relatively constant at approximately 8.4 million hectares (5.23%) for the past two decades (Koli and Bhardwaj, 2018).While there has been some improvement in feed and fodder availability over the last decade, a disparity persists between demand and supply during lean periods and adverse weather conditions such as droughts or floods (Anonymous, 2017). Furthermore, the forages provided to animals are largely of subpar quality. Presently, India faces a net deficit of 35.6% in green fodder (GF), 10.95% in dry crop residues, and 44% in concentrate feeds (Anonymous, 2013). Although there has been a notable reduction in deficits for green and dry fodder (DF) in recent years, the challenge remains, particularly with the consistent growth of the livestock

population at a rate of 1.23% in the coming years (Kumar, 2016a). This situation is particularly acute in states experiencing a deficit in rainfall, such as Gujarat, Rajasthan, Karnataka, Madhya Pradesh, Andhra Pradesh, and Maharashtra.

Objectives

1. Screening of different fodder grasses for high rainfall areas.
2. Assessment of quality parameters of Perennial grasses influenced by various organic nutrient sources.

Hypothesis:

Hypothesis of the study was Ensuring an ample supply of both quantity and quality feed and fodder resources which is crucial for enhancing livestock productivity

Material and Methods

The field experiment was conducted at Agricultural Research Station, Malagi, Uttara Kannada, Karnataka. The soil texture of the experimental site was sandy loam, pH of the soil was 6.35 and 6.35 and 6.34, EC of the soil was 0.20 dSm^{-1} and 0.19 dSm^{-1} and organic carbon content of the soil was 0.50 per cent and 0.48 per cent at 0-15 cm and 15-30 cm depth respectively. Available N, P_20_5 and K_2O in the soil were 340 kg and 321 kg, 30 kg and 33 kg and 195 kg and 201 kg respectively at 0-15 cm and 15-30 cm depth. The experiment consists of two factors i.e., perennial grasses and organic nutrient sources, there were fifteen treatment combinations involving different perennial grasses *i.e.,* hybrid napier, guinea grass and green panic and various organic nutrient sources like water hyacinth compost, domestic sludge, sewage sludge, poultry manure and rec, NPK. The nitrogen was applied in equal split doses in the form of urea and entire P and K was applied at the time of planting. Planting was done at the spacing of 60 x 45 cm, the first cutting was done at 75 days after planting (DAP) and subsequent (second, third and fourth) cuttings were done at 45 days interval. The experiment was laid out in factorial randomized compete block design with three replications.

Results and Discussion

The data green forage and dry forage yield (Table -1) revealed that the green forage yield of hybrid napier (BH-18) was significantly higher green forage (*i.e.*, 45.2, 38.7, 42.5 and 38.9 t ha^{-1}) yield respectively at first, second, third and fourth cutting and similar trend was followed for dry forage yield as compared to guinea grass and green panic. Recommended NPK was registered significantly higher green forage yield (*i.e.* 73.9, 74.4, 75.3 and 74.3 t ha^{-1}) and dry forage yield (*i.e.,* 21.4, 21.5, 21.0 and 23.0 t ha^{-1}) at first, second, third and fourth cutting respectively. Whereas application of poultry manure was found on par with recommended NPK during second, third and fourth cutting (*i.e.,* 73.5, 74.4, and 73.8 t ha^{-1} green forage and 21.2, 20.6 and 22.5 t ha^{-1} dry forage yield respectively), this might be due to increased plant height, number of leaves per tiller, number of tillers per plant, leaf area per plant and quality parameters of grasses. Kumar *et al.,* 2016b, reported similar report by studying different genotypes of napier grass performed similar quantity of yields. Also, this might be due to positive heterosis in tillering capacity as reported by Govindaraj and Siddiqu (1986) and increase growth rate and vegetative growth in hybrid rice was noticed by Yamanchi (1994), whereas poultry manure is a rich source of macro and micro nutrients, higher and steady released of nutrients (Devegowda, 1997: Dosani *et al.,* 1999 and Narahari, 1999) as compared to other organic nutrient sources of all agricultural wastes. Though all the treatments received the equal quantity of N, Faster release of macro and micro nutrients from poultry manure resulted in increased green forage and dry forage yield of perennial grasses, hence it was found on par with recommended N.P.K.

The data on quality parameter (Table-2) showed higher N,P,K and crude protein content of 0.92 per cent, 0.59 per cent, 0.75 per cent and 5.7 per cent respectively and crude fibre content of 20.32 per cent and total carbohydrate content of 20.34 per cent in case of hybrid napier as compared to guinea grass (*i.e.,* 0.84 percent N,0.52 per cent P, 0.73 per cent K5.2 per cent crude protein, 23.05 per cent crude fiber and 21.50 per cent total carbohydrate) and green panic (*i.e.,* 0.74 per cent N, 0.17 per cent P, 0.68 per cent K 4.6 per cent crude protein, 25.81 per cent crude fibre and 22.39 per cent total carbohydrate) among various nutrient sources poultry manure was recorded significantly higher N(1.88%), P(0.75%), K(1.70%) and crude protein (11.7%) and significantly lower crude fiber (35.77%) and total carbohydrate content (35.24%) as Compared to rec, NPK (*i.e.,* 1.31%N, 0.41%P, 1.11%K, 8.18% crude protein, 47.35% crude fiber and 42.07% total carbohydrate content) and the interaction of grasses and various organic nutrient sources was found to be non-significant, higher protein concentration attributed to high nutrient content of poultry manure and easy availability to crop plants. The results are in conformity with Ananda (2003) because young leaves are low in NO_3 nitrogen as compared to old leaves and high nitrates are seen in turnips, napier, silage and hay, the higher protein content with increased poultry manure as reported by

Vasanthi *et al.* (1998) in sorghum and maize and Rajasekar (1995) in Bhendi. The decrease in crude fiber may be due to increase in N levels as find out by earlier scientist Prasannakumar (1997). Kumar *et al.*, 2016b reported the similar range of Crude fibre (7.21-12.30%) and Crude fibre (22.76-38.50%).

Table 1 : Green forage and Dry forage yield of grasses as influenced by different organic nutrient sources at I, II, III and IV cutting

G / OM	Green forage yield (t ha^{-1})					Dry forage yield (t ha^{-1})				
	I	**II**	**III**	**IV**	**Total**	**I**	**II**	**III**	**IV**	**Total**
HN	45.2	38.7	42.5	38.9	165.3	12.8	10.3	11.6	11.9	46.6
GG	32.4	32.8	33.5	33.8	132.5	9.2	9.5	9.3	9.5	37.5
GP	21.7	22.4	22.8	23.1	90.0	6.4	6.5	6.3	6.6	25.8
S.Em±	0.27	0.28	0.27	0.30	--	0.11	0.08	0.08	0.08	--
C.D @ 5%	0.78	0.80	0.78	0.86	--	0.31	0.23	0.22	0.25	--
WHC	38.9	36.6	42.8	42.5	160.8	11.0	10.8	12.6	12.5	46.9
DS	52.8	46.5	51.5	49.0	199.8	15.1	14.1	14.0	14.6	57.8
SS	59.9	57.8	58.6	57.1	233.4	17.0	16.7	17.4	16.4	67.5
PM	67.6	72.6	74.4	72.1	286.7	19.2	21.4	21.9	19.8	82.3
Rec, NPK	78.7	73.4	75.3	72.9	300.3	22.4	21.5	22.2	21.0	87.1
S.Em±	0.45	0.46	0.45	0.49	--	0.18	0.13	0.13	0.14	--
C.D @ 5%	1.31	1.34	1.30	1.43	--	0.51	0.39	0.47	0.51	--
Interaction (G x OM)										
S.Em±	1.35	1.38	1.35	1.48	--	0.53	0.40	0.49	0.52	--
C.D @ 5%	NS	NS	NS	NS	--	NS	NS	NS	NS	--

HN: Hybrid Napier, GG: Guinea Grass, GP: Green Panic, WHC: Water Hyacinth Compost, DS: Domestic Sludge, SS: Sewage Sludge, PM: Poultry Manure, NS: Non Significant, OM: Oragnic Manures, G: Grasses

Table 2: Nutrient content and quality parameters of grasses as influenced by organic sources of nutrients (Per cent dry after basis and mean data of four cuttings)

G / OM	N	P	K	Crude Protein	Crude Fibre	Total Carbohydrates
HN	0.92	0.59	0.75	5.7	20.32	20.34
GG	0.84	0.52	0.73	5.2	23.05	21.50
GP	0.74	0.17	0.68	4.6	25.81	22.39
S.Em±	0.002	0.001	0.004	0.031	0.043	0.026
C.D @ 5%	0.005	0.002	0.010	0.090	0.126	0.074
WHC	1.32	0.42	1.13	8.2	47.78	41.97
DS	1.46	0.55	1.25	9.1	41.78	38.47
SS	1.67	0.59	1.54	10.4	38.10	36.77
PM	1.88	0.75	1.70	11.7	35.77	35.24
Rec, NPK	1.31	0.41	1.11	8.18	47.35	42.07
S.Em±	0.006	0.005	0.009	0.052	0.072	0.043
C.D @ 5%	0.018	0.016	0.027	0.150	0.210	0.124
Interaction (G x OM)						
S.Em±	0.019	0.017	0.028	0.156	0.217	0.128
C.D @ 5%	NS	NS	NS	NS	NS	NS

HN: Hybrid Napier, GG: Guinea Grass, GP: Green Panic, WHC: Water Hyacinth Compost, DS: Domestic Sludge, SS: Sewage Sludge, PM: Poultry Manure, NS: Non Significant, OM: Oragnic Manures, G: Grasses

Implication of the results of the study

The diminishing grazing lands and areas dedicated to fodder cultivation result from degradation or restrictions imposed on livestock grazing. Currently, the total area under fodder cultivation has remained relatively constant at approximately 8.4 million hectares (5.23%) for the past two decades. Hence, the following implications can be made with the present study.

1. The study imparts the knowledge about the influence of various quality parameters of fodder grasses with organic nutrient resources to enhance the carrying capacity and live stock productivity as well.
2. Scarcity of fodder in central western ghats districts of Karnataka can be confront by practicing the tree-based pasture system,
3. Majority of the farmers are depending on Bettalands or Soppina betta for fodder collection to harness quality fodder resources.
4. Hybrid napier grass growing with Poultry manure can give hope to dairy farmers to meet the deficit quantity and quality of fodder.

Reference

Ananda, M.G. (2003). Utilization of organic wastes in paddy – groundnut cropping systems for sustainable production under tank irrigation. *MSc. (Agri) Thesis, UAS, Bangalore.*

Anonymous (2013). Vision document-2050, ICAR-Indian Grassland and Fodder Research Institute, Jhansi, India.

Anonymous (2017). Steps taken to bridge the gap between the demand and availability of fodder through sub-mission on fodder and feed development. Thirty Fourth Report of Standing Committee on Agriculture (2016-2017), Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, India.

Devegowda, G. (1997). Poultry excreta and other waters as sources of organic manures. In: training course of farming. *UAS, G.K.V.K.,* Pp.7-11

Dosani, A.A., Tilashilkar, S.C. and Mehta, V.B. (1999). Effect of poultry manure applied in combination with fertilizers on the yield, quality and nutrient uptake of groundnut. *Journal of Indian Society of Soil Science,* 47(1): 166-169.

Govindaraj, K. and Siddiaq, E.A. (1986). Hybrid vigour in rice with reference to morpho –physiological components of yield and root density. *SABROAJ.,*18(1):1-7.

Koli, P. and Bhardwaj, N.R. (2018). Status and use of pesticides in forage crops in India. *Journal of Pesticide Science,* 43: 225-232.

Kumar, R. 2016a. Fodder production-status, constraints, strategies. https://www.biotecharticles.com/ Agriculture-Article/Fodder-Production-Status-constraints-strategies-3563.html.

Kumar, S., Babu, C., Revathi, S. and Iyanar, K. (2016b). Estimation of per se performance of yield traits in napier grass. *Progressive Research- An International Journal*, 11: 4703-4707.

Narahari, D., Naik, B.N. and Patel, K.G. (1994). Effect of nitrogen and phosphorus on yield and quality of forage sorghum. *Indian Journal of Agronomy,* 39(1): 123-125.

Prasannakumar (1997). Effect of fertilizer and amendments on growth, yield and quality of fodder maize and jowar irrigated with dairy water. *M.sc (Agri)*Thesis UAS, Bangalore.

Rajashekar, G.C. (1995). Studies on organic and inorganic farming in bhendi. *M.Sc (Hort.) Thesis. Tamilnadu Agriculture University*, Coimbatore.

Vasanthi, D., Kumarswamy, K. and Subbiah, S. (1998). Yield and nutritive values of cereal forages an influence by manure – fertilizer schedules. *Forage Resourses,* 24(3):163-168.

Yamanchi, M. (1994). Physical base of higher yield potential in F_1hybrids. In: Virmani, S.S (Ed) Hybrid rice technology. *New developments and future prospects, IRRI. Los Banos, Philippines*, Pp.71-80