practice in the early stage. Land saving under surge irrigation is yet another factor responsible for higher yield. In the second crop the farmers practice was comparable with $I_1 A_1 S_1$.

iii. Economics

The higher net returns with higher benefit cost ratio was recorded under coconut fibre waste applied plots than the FYM applied treatment. Between the methods of irrigation, surge flow recorded a higher net returns and higher benefit cost ratio as compared to farmers practice. This may be attributed to higher grain number combined with other favourable yield attributes. The lowest net returns and benefit cost ratio were recorded under farmer's practice. Among the Sectors, Sector I recorded higher net returns with greater benefit cost ratio and gradually decreased upto Sector III and again increased in Sector IV. This might be due to higher yields obtained in these sectors as compared to Sector III. Considering the three sectors namely S_1, S_2, S_4 were free from 'Middle depression' which was recorded in Sector III. The middle depression has to be overcome especially in summer season by suitable device to make the surge irrigation feasible for a length of 100 m and above.

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EFFECT OF ORGANIC, INORGANIC SOURCES OF NITROGEN AND MOLYBDENUM ON THE QUALITY OF BAJRA-NAPIER HYBRID GRASS (CO 2)

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ABSTRACT

Field experiment was conducted at the Tamilnadu Agricultural University, Coimbatore to study the effect of organic (FYM) and inorganic sources (Urea, CAN) of nitrogen with and without molybdenum on the quality characters of CO.2 Bajra Napier hybrid grass under irrigated condition. The results indicated that application of 75 kg N ha^{-1} in the from of urea with 2.5 t of FYM ha^{-1} recorded higher crude fibre, crude fat and total ash content than the other treatments. The interaction effect did not influence the crude fibre, crude fat and the total ash content.

KEY WORDS : Bajra-Napier, Molybdenum, Nitrogen, Calcium Ammonium Nitrate (CAN), Urea, FYM

Livestock is an insurance in the changing pattern of rural economy which is significantly influenced due to the vagaries of nature. Livestock industry is providing uniform employment opportunity round the year and enhances per capita income. The efficiency with which the ruminants convert forage crops to milk and meat depends largely on the quality and quantity of the feed. Of these factors, quality of forage is the most important in determining the degree of efficiency of animal. In this juncture, the forage crop like high yielding Bajra-Napier hybrids play a greater role in the productivity of animal through higher yields coupled with quality fodder. In the evaluation of quality of fodder, crude fat play a vital role since the excess energy supplied to the animal over its requirements is generally stored by the system as fat to be drawn upon in times of need. Some of the important vitamins and fatty acids essential for the health of an animal are also supplied through the fats in the diet. Similarly the crude fibre and ash content also play a significant role in the quality of fodder The crude fibre value is an indication of digestability of the forage and occupies a prime position in the evaluation of forage material. The composition of forage crops can be manipulated by different nitrogen management.

Further Bajra - Napier hybrid grass has been found to contain oxalic acid and nitrate which are poisonous to the cattle. Deficiency of molybdenum has been shown to result in accumulation of nitrate in forage grasses. From recent research, it has been found that molybdenum is the metallic component of the enzyme nitrate reductase which plays an important role in the accumulation of nitrate.

Moreover meagre information is available about the response of forage grasses to organic and inorganic sources of nitrogen alone or in combinations. Keeping this in view, a study was undertaken to evaluate the quality of grass as influenced by nitrogen sources and molybdenum.

MATERIALS AND METHODS

A field experiment was laidout in sandy loam soil (PH 8.2 ; Ec = 0.2 dSm^{-1}, N = 197 kg/ha ; P = 18 kg/ha and K = 504 kg/ha) at Tamil Nadu Agricultural University, Coimbatore under irrigated condition adopting a factorial randomised block design with three replication for a continuous period of ten months.

100 kg N ha^{-1} was applied through organic, inorganic sources of N and their combinations with following treatments.

T1 - 100 kg N ha^{-1} as urea

T2 - Farm yard manure (FYM) at 10 t ha^{-1}

T3 - 100 kg N ha^{-1} as Calcium ammonium nitrate (CAN)

T4 - 75 kg N ha^{-1} as urea + FYM at 2.5 t ha^{-1}

T5 - 50 kg N ha^{-1} as urea + FYM at 5.0 t ha^{-1}

T6 - 25 kg N ha^{-1} as urea + FYM at 7.5 t ha^{-1}

T7 - 75 kg N ha^{-1} as CAN + FYM at 2.5 t ha^{-1}

T8 - 50 kg N ha^{-1} as CAN + FYM at 5 t ha^{-1}

T9 - 25 kg N ha^{-1} as CAN + FYM at 7.5 t ha^{-1}

Molybdenum Treatments

Mo(-) - Without molybdenum

Mo(+) - Molybdenum 1.0 percent foliar spray on 10th day after each cutting

Thus a total of 18 treatment combinations were evaluated. The crop was planted in rows 50 cm apart on either side of the ridge. A basal dose of 50 kg P_2O_5 ha^{-1}. 50 kg K_2O was also applied. Nitrogen was applied after each cutting. Irrigation and weeding operations were done as and when required. First cutting was done on 75 days after planting. Subsequent cuttings were made at an interval of 45 days. At each cutting , samples were collected randomly in each treatment and crude fibre content (Georing and Vansoest, 1970) and crude fat and total ash content (AOAC, 1962) were estimated and expressed in per cent. Foliar spraying was done with molybdenum (1%) at 10 days after cutting. Five cutting was made during the period of observation.

RESULTS AND DISCUSSIONS

In the present study application of 75kg N ha^{-1} as urea along with FYM at 2.5 t ha^{-1} recorded lower crude fibre content (Table 1). It is proven fact that higher the crude fibre content, lower will be the digestability and vice versa. Beneficial effect of application of 75 kg N ha^{-1} as urea in addition to FYM at 2.5 t ha^{-1} might be due to the significant role of N in the protein synthesis and consequent reduction in carbohydrates besides succulence and bushy growth of the grass. This results are in

Table 1. Effect of organic, inorganic sources of N, their combinations and molybdenum on crude fibre content (per cent)

T.NO	First cut			Second cut			Third cut			Fourth cut			Fifth cut		
	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean
T_1	27.80	27.93	27.87	28.06	28.31	28.19	28.19	28.06	28.13	28.06	27.93	28.00	27.55	27.93	27.74
T_2	29.33	28.33	28.83	29.58	29.58	29.58	29.71	29.84	29.78	29.71	29.46	29.59	28.62	28.57	28.60
T_3	28.64	28.82	28.73	28.70	28.56	28.63	28.82	29.20	29.01	28.95	28.95	28.95	28.06	28.57	28.32
T_4	27.68	27.55	27.62	28.19	27.93	28.06	28.95	29.20	29.08	28.23	28.31	28.27	27.42	27.67	27.55
T_5	28.19	28.19	28.19	28.95	28.95	28.95	29.20	29.08	29.14	29.03	29.20	29.12	28.06	28.57	28.32
T_6	28.90	28.82	28.86	29.33	28.95	29.14	29.71	29.46	29.59	29.46	29.58	29.52	28.44	28.82	28.63
T_7	29.33	29.33	29.33	28.82	28.82	28.82	29.33	29.58	29.46	29.58	29.33	29.46	28.57	28.70	28.64
T_8	29.84	29.46	29.65	29.46	29.58	29.52	29.58	29.46	29.52	29.46	29.33	29.40	29.20	29.08	29.14
T_9	30.22	30.22	30.22	30.34	29.96	30.15	30.22	29.96	30.09	29.96	29.84	29.90	29.33	29.45	29.39

	First cut SEd	First cut CD	Second cut SEd	Second cut CD	Third cut SEd	Third cut CD	Fourth cut SEd	Fourth cut CD	Fifth cut SEd	Fifth cut CD
N	0.21	0.42	0.26	0.54	0.18	0.36	0.23	0.46	0.28	0.56
Mo	0.10	NS	0.12	NS	0.08	NS	0.11	NS	0.13	0.26
NxMo	0.12	NS	0.37	NS	0.25	NS	0.32	NS	0.39	NS

confirmity with the findings of Govindaswamy and Manickam (1988 a) and Mani (1977) in forage grasses. Molybdenum had no marked influence on the crude fibre content in all the five cuttings.

Application of 10 t FYM ha^{-1} recorded more fibre content which might be due to the reduction of succulency of plants. This resulted in increased formation of polysaccharides viz., cellulose, hemicellulose and lignin which generally increase the crude fibre content of grass. This is in confirmity with the findings of Miller *et al.*, (1961). in Bermuda grass and Rathi and Vaishya (1983) in forage oats.

Data on crude fat content presented in Table 2 indicated, that there was significant increase in the crude fat content in the first, second and third cuttings and after that a slight decrease was noticed. Application of 75 kg N as urea along with 2.5 t of FYM ha^{-1} recorded higher crude fat content followed by the application of 50 kg N ha^{-1} in the form of urea in addition to 5 t FYM ha^{-1} invariably in all the cuttings.

The highest ash content was recorded in the application of 75 kg N ha^{-1} as urea in association with 2.5 t of FYM ha^{-1} in the first and third cuttings (Table 3). Eventhough fertilizer treatments influenced the ash content significantly, the difference among the treatments was negligible in the second, fourth and fifth cuttings. Molybdenum had a significant influence on the total ash content in the third cutting.

The application of 75 kg N ha^{-1} urea along with 2.5 t FYM ha^{-1} recorded the higher crude fat and total ash content than the other treatments which might be due to enhanced uptake of nutrients and minerals. Increasing the proportion of inorganic sources of N in combination with organic source recorded high crude fat, and ash

Table 2. Effect of organic, inorganic sources of N, their combinations and molybdenum on crude fat content (per cent)

	First cut			Second cut			Third cut			Fourth cut			Fifth cut		
	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean
T_1	1.30	1.31	1.31	1.35	1.36	1.36	1.37	1.36	1.37	1.35	1.36	1.36	1.38	1.36	1.37
T_2	0.78	0.80	0.79	0.89	0.90	0.90	0.86	0.85	0.86	0.89	0.90	0.90	0.85	0.83	0.84
T_3	1.28	1.26	1.27	1.39	1.37	1.38	1.40	1.39	1.40	1.39	1.37	1.38	1.37	1.35	1.36
T_4	1.36	1.35	1.36	1.42	1.41	1.42	1.46	1.45	1.46	1.42	1.44	1.43	1.40	1.39	1.40
T_5	1.33	1.30	1.32	1.41	1.39	1.40	1.44	1.42	1.43	1.41	1.39	1.40	1.41	1.39	1.40
T_6	1.26	1.25	1.26	1.33	1.32	1.33	1.36	1.35	1.36	1.33	1.32	1.33	1.35	1.33	1.34
T_7	1.24	1.23	1.24	1.34	1.33	1.34	1.37	1.32	1.35	1.34	1.33	1.34	1.35	1.31	1.33
T_8	1.23	1.22	1.23	1.30	1.29	1.30	1.32	1.29	1.31	1.30	1.29	1.30	1.33	1.32	1.33
T_9	1.22	1.21	1.22	1.27	1.25	1.26	1.28	1.27	1.28	1.27	1.26	1.27	1.30	1.29	1.30

	First cut SEd	First cut CD	Second cut SEd	Second cut CD	Third cut SEd	Third cut CD	Fourth cut SEd	Fourth cut CD	Fifth cut SEd	Fifth cut CD
N	0.007	0.01	0.007	0.01	0.007	0.01	0.005	0.01	0.08	0.02
Mo	0.004	0.008	0.003	0.006	0.003	0.006	0.003	0.006	0.004	0.008
NxMo	0.01	NS	0.009	NS	0.01	NS	0.007	NS	0.01	NS

Table 3. Effect of organic, inorganic sources of N, their combinations and molybdenum on total ash content (per cent)

T.NO.	First cut			Second cut			Third cut			Fourth cut			Fifth cut		
	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean	Mo (-)	Mo (+)	Mean
T_1	10.28	10.15	10.22	10.41	10.28	10.35	10.79	10.41	10.60	10.28	10.15	10.22	10.15	10.28	10.22
T_2	9.77	9.52	9.65	9.90	9.77	9.84	10.28	10.15	10.22	9.90	9.65	9.78	10.03	9.90	9.97
T_3	10.28	9.93	10.11	10.28	10.41	10.35	10.66	10.54	10.60	10.16	10.03	10.10	10.67	10.41	10.54
T_4	10.31	10.41	10.36	11.05	10.54	10.80	11.30	11.05	11.18	10.80	10.41	10.61	11.05	10.92	10.99
T_5	9.52	9.52	9.52	10.00	9.90	9.95	10.28	10.15	10.22	10.41	10.16	10.29	10.67	10.80	10.74
T_6	9.36	9.14	9.25	9.77	9.77	9.77	10.16	9.76	9.96	10.03	10.03	10.03	10.41	10.16	10.29
T_7	9.45	9.30	9.38	9.96	9.90	9.93	10.41	9.90	10.16	10.67	10.28	10.48	10.92	10.80	10.86
T_8	9.33	9.14	9.24	9.52	9.90	9.71	10.16	9.65	9.91	9.82	9.90	9.86	10.41	10.36	10.39
T_9	9.01	8.89	8.95	9.73	9.65	9.69	9.90	9.65	9.78	9.53	9.65	9.59	9.90	10.15	10.03
		SEd	CD		SEd	CD		SEd	CD		SEd	CD		SEd	CD
N		0.03	0.05		0.21	0.43		0.27	0.55		0.22	0.44		0.24	0.49
Mo		0.01	NS		0.10	NS		0.13	0.26		0.10	NS		0.11	NS
NxMo		0.04	NS		0.30	NS		0.38	NS		0.31	NS		0.34	NS

content compared to inorganic source alone. The reason might be that the availability of N will be comparatively less within the shorter period due to N losses, in the case of urea application. But in the case of combination of organic and inorganic sources, the decomposition of FYM will release N slowly for a longer period, due to gradual mineralisation. Similar results were also reported by Nehra *et al* (1981) in fodder maize and Narwal *et al.*, (1986) in Dinanath grass. However Mukerjee *et al.*, (1981) reported that increasing the proportion of inorganic source of N decreased the total ash content in Dinanath grass. Application of 10 t FYM ha^{-1} recorded low values of fat and ash. This is in confirmity with findings of Mahalingam and Krishnamoorthy (1985). The interaction effect did not influence the crude fibre crude fat and total ash contents in any of the cuttings recorded.

From the study, it can be concluded that the application of 75 Kg N ha^{-1} in the form of Urea along with 2.5 t of FYM ha^{-1} recorded higher crude fibre, crude fat and total ash content than the other the treatments. The crude fat and total ash content were significantly influenced by molybdenum spray. However, molybdenum had no marked influence on the crude fibre content. The interaction effect did not influence the crude fibre, crude fat and total ash content.

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