International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2022; 10(4): 34-38

Received: 15-05-2022
Accepted: 25-06-2022

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Effect of levels of major and micronutrients on yield and economics of hybrid napier

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Abstract
An experiment was conducted during the growing seasons of 2019-20 to know the response of hybrid napier to combinations of major (150:50:40 and 225:75:60 kg NPK ha^{-1}) and micro (0, 25 kg ha^{-1} $ZnSO_4$ and $FeSO_4$ ha^{-1} singly and in combination) nutrients in the semiarid tropics under irrigation. Results revealed that application of 225:75:60 kg NPK ha^{-1} along with 25 kg $ZnSO_4$ ha^{-1} and 25 kg $FeSO_4$ ha^{-1} recorded significantly higher green fodder yield (70.09, 80.00, 75.53, 80.36, 75.81, 62.00 and 57.00 t ha^{-1}, respectively at 1st to 7th cut), net returns (₹ 29272, 85535, 77671, 83467, 78007, 63935 and 57935/-, respectively at 1st to 7th cut) and benefit cost ratio (9.17, 6.99, 7.44, 7.02, 7.11 and 6.54 benefit cost ratio at 2nd to 7th cut, respectively) due better growth compared to recommenced fertilization of 150:50:40 kg NPK ha^{-1} (52.00, 58.60, 57.00, 59.85, 52.59, 48.00, and 43.00 t ha^{-1} green fodder yield, ₹ 21540, 60428, 56008, 59428, 50716, 47708, 41708/- net returns at 1st to 7th cut, respectively and 7.11, 5.52, 5.80, 5.09, 5.82 and 5.22 B:C at 2nd to 7th cut, respectively).

Keywords: Super napier, nutrition, zinc sulphate, iron sulphate, yield, economics

Introduction
Livestock plays an important role in the rural economy of the country especially for small land holdings and landless rural poor households. Agriculture and livestock together provide employment to 52% of the work force. Livestock production contributes about 4.8% to national GDP and 25.8% to the agriculture GDP and also it is a source of self-employment. It supports livelihood of 65 to 70% population in rural areas besides providing food security through supply of milk, eggs and meat (Bhakar and Hardev, 2019) [3]. Livestock population in India is around 512 million producing about 164 mt milk, which accounts for 19% of world production (Bhakar and Hardev, 2019) [3].

The average milk and meat yield of Indian animals is, however, lower than the global average. The main reasons for the low productivity of our livestock are malnutrition, under-nutrition or both, besides the low genetic potential of the animals. India is highly deficient in respect of availability of green fodder, dry fodder and feed concentrate. At present the country faces a deficit of 63.5% green fodder and 23.5% dry crop residues. The best alternative is to address the shortage of feed resources by producing nutrient rich, high yielding, but less resource intensive fodder crops.

Super napier grass is one of the high yielding fodder crops obtained by crossing elephant grass (*Pennisetum purpureum*) and pearl millet (*Pennisetum glaucum*). Growing of this crop is more advantageous because it has high crude protein (14-18%), palatability and good fodder quality, and is highly suitable for silage and forage yield. Optimum crop productivity can only be achieved by a combination of management strategies of effective and efficient nutrient management. In the tropics and subtropics where the soil fertility is generally low yields decline, even in conventional cropping systems due to excess soil mining, which calls for the inclusion of nutrients to maintain soil fertility. Only limited studies are available on fodder crops pertaining to the application of nutrients especially nitrogen fertilization. Hence, the present investigation was carried on this new napier hybrid.

Material and Methods
An experiment was conducted on farmer's field, near Siruguppa taluk, Bellary district, Karnataka, on crystal black soil, clay loam in texture having initial organic carbon 0.48%, pH 8.15, EC 0.32 dS m^{-1}, available nitrogen 193, phosphorus 45.4 and potassium 345 kg ha^{-1},

available zinc 0.59 ppm, and available iron 7.49 ppm during the growing seasons of 2019-20. There were eight treatment combinations *viz* 150:50:40 kg NPK ha^{-1} (RDF), 150:50:40:25 NPKZn kg ha^{-1}, 150:50:40:25 kg NPKFe kg ha^{-1}, 150:50:40:25:25 NPKZnFe kg ha^{-1}, 225:75:60 kg NPK ha^{-1}, 225:75:60:25 kg NPKZn ha^{-1}, 225:75:60:25 kg NPKFe ha^{-1}, and 225:75:60:25:25 kg NPKZnFe ha^{-1} tried using RBD; Zn was applied as $ZnSO_4$ and Fe through $FeSO_4$. The crop was sown in 60 cm × 60 cm spacing 05-01-2019. First harvest was done after 75 days after planting and subsequent harvests were taken at the intervals of 45-48 days. The data on growth yield, economics and crude protein and total ash were collected periodically following standard procedures and analyzed and interpreted.

Results and Discussion

Super napier responded to increased application of major nutrients and also to micronutrients (Table 1 to 3 and Fig 1). As for interactions are concerned, significantly taller shoots (180.00, 192.17, 202.60, 206.33, 186.00, 173.70 and 166.80 cm, respectively, Table 1), higher leaf area index at harvest (14.06, 21.03, 25.35, 31.78, 16.33, 13.54 and 11.40, respectively, Table 2), fresh shoot weight (72.00, 109.83, 142.58, 169.63, 79.67, 60.28 and 55.44 g, respectively, Table 3), and green fodder yield (70.09, 80.00, 75.53, 80.36, 75.81, 62.00 and 57.00 t ha^{-1}, respectively, Fig 1) at 1st to 7th cut were observed with the application of 150% RDF (225:75:60 kg NPK ha^{-1}) along with 25 kg $ZnSO_4$ ha^{-1} and 25 kg $FeSO_4$ ha^{-1} over control receiving only RDF (150:50:40 kg NPK ha^{-1}) and no micronutrients (143.33, 151.98, 162.60, 166.27, 154.00, 138.33, 135.00 cm shoot height and 6.65, 9.68, 12.34, 17.13, 6.98, 5.34, 4.22 leaf area index and 39.93, 50, 87.79, 110.27, 36, 31.68, 22.44 g fresh shoot weight and 52.00, 58.60, 57.00, 59.85, 52.59, 48.00, and 43.00 t ha^{-1} green fodder yield at 1st to 7th cut, respectively) followed by application of 225:75:60 kg NPK ha^{-1} along with 25 kg ha^{-1} $ZnSO_4$.

Increase in fresh and dry fodder yield could be ascribed to improvement in growth attributes particularly leaf attributes which helped in accumulation of more dry matter through increased photosynthesis. Results are in line with Paroda (1975) [7] who revealed that in fodder crops plant height and number of tillers are positively correlated with leafiness and are, therefore, important components of dry matter yield. Similar findings were reported in pearl millet by Mannan and Razaque (1980) [4]. Earlier, Miyagi (1983) [5] recorded remarkable increase in forage yield of napier grass with annual application of N up to 600 kg ha^{-1}. Munegouda *et al.* (1987) [6] reported that application of 120-180 Kg N, 80-120 Kg P_2O_5 and 40-80 Kg K_2O ha^{-1} to hybrid napier cv. NB-21 gave higher total fresh fodder yields. Arya and Singh (2000) [2] reported that dry matter accumulation and yield increased significantly with increased levels of Zn up to 30 kg $ZnSO_4$ ha^{-1}. The considerable improvement in dry fodder yield of sorghum was obtained with 25 kg $ZnSO_4$ ha^{-1} (Paroda *et al.*, 1979) [8] while, Sarangi *et al.* (2006) [11] observed significant increase in dry matter production due to basal application of $FeSO_4$ @ 15 kg ha^{-1} along with 1.0% foliar spray of $FeSO_4$ at 35 DAS. In the present investigation, it was evident that super napier being high yielder needs higher fertilization than the usual recommendation along with micronutrients and soil being low in Zn, zinc nutrition is critical and Fe supplementation is essential from the point of sustained fodder production as the crop remains in field for years.

Economics

Production economics i.e., net returns and BC ratio followed trends in green fodder yield and revealed significant variations due to levels of NPK, micronutrients and their interactions. With regard to interaction, significantly higher economic returns throughout (₹ 29272, 77671, 83467, 85535, 78007, 63935 and 57935/- net returns ha^{-1}, at 1st to 7th cut, respectively) were obtained with 150% RDF + $ZnSO_4$ + $FeSO_4$ (F_2M_4) (Table 4), 150% RDF + $ZnSO_4$ (F_2M_2) and 150% RDF + $FeSO_4$ (F_2M_3) were almost at par, all the combinations were significantly superior to control i.e., RDF without Zn or Fe or both (F_1M_1) which consistently recorded the lowest net returns (₹ 21540, 60428, 56008, 59428, 50716, 47708, 41708/- ha^{-1}, at 1st to 7th cut, respectively) throughout the period of study.

Trends in B:C ratio were almost similar and revealed significant variations due to levels of major nutrients, micronutrients and their combinations. Significantly higher B:C ratios throughout except initially (9.17, 6.99, 7.44, 7.02, 7.11 and 6.54 at 2nd to 7th cut, respectively) were noticed with 225:75:60 kg NPK ha^{-1}+ 25 kg ha^{-1} each of $ZnSO_4$ and $FeSO_4$(F_2M_4) (Table 5). While, lower B:C ratios (7.11, 5.52, 5.80, 5.09, 5.82 and 5.22 at 2nd to 7th cut, respectively) except at first cut were observed with RDF without Zn or Fe or both (F_1M_1) throughout. Results are in line with many earlier studies in other forage crops. Agarwal and Suraj (1997) [1] reported higher net returns when crop was given 25 kg $ZnSO_4$ ha^{-1}. Patel *et al.* (2003) [9] recorded the maximum total return and incremental cost: benefit ratio with the soil application of multi-micronutrients mixture. Sagarika (2011) [10] obtained higher gross returns, net returns and benefit: cost ratio with foliar application of iron and zinc.

Thus, the investigation emphasizes the need for application of 225:75:60 kg ha^{-1} of N, P_2O_5 and K_2O along with 25 kg ha^{-1} each of $FeSO_4$ and $ZnSO_4$ for higher forage yield and profitability in the Tunga Bhadra Project irrigation command.

Table 1: Effect of nutrient management on shoot height (cm) of hybrid napier under irrigation at different cuts

Treatment	1st cut	2nd cut	3rd cut	4th cut	5th Cut	6th cut	7th cut
Major nutrient (NPK) (F)							
F_1: 100% RDF	157.37^b	167.03^b	177.70^b	180.52^b	162.60^b	149.96^b	142.91^b
F_2: 150% RDF	173.58^a	184.63^a	195.26^a	198.82^a	177.29^a	166.74^a	159.39^a
S.E(m) ±	2.59	2.78	2.70	2.66	2.02	2.28	1.98
Micronutrient (M)							
M_1: Control	156.17^b	165.83^b	176.49^b	180.07^b	163.87^b	150.66^b	145.00^b
M_2: 25 kg $ZnSO_4$ ha^{-1}	168.17^a	178.60^a	189.04^a	192.54^a	169.72^{ab}	160.13^{ab}	151.84^{ab}
M_3: 25 kg $FeSO_4$ ha^{-1}	165.50^{ab}	175.93^{ab}	186.37^{ab}	189.87^{ab}	169.10^{ab}	157.47^{ab}	150.21^{ab}
M_4: 25 kg $ZnSO_4$ + 25 kg $FeSO_4$ ha^{-1}	172.08^a	182.98^a	194.04^a	196.20^a	177.11^a	165.14^a	157.54^a
S.E(m) ±	3.67	3.93	3.82	3.77	2.86	3.23	2.80
Interaction (F X M)							

F_1M_1	143.33^{c}	151.98^{c}	162.60^{c}	166.27^{c}	154.00^{c}	138.33^{c}	135.00^{c}
F_1M_2	162.00^{b}	172.19^{b}	182.37^{b}	185.87^{b}	165.10^{b}	153.47^{b}	145.17^{c}
F_1M_3	160.00^{b}	170.19^{b}	180.37^{b}	183.87^{b}	163.10^{b}	151.47^{b}	143.17^{bc}
F_1M_4	164.17^{b}	173.80^{b}	185.48^{b}	186.07^{b}	168.21^{b}	156.58^{b}	148.28^{b}
F_2M_1	169.00^{ab}	179.69^{ab}	190.37^{ab}	193.87^{ab}	173.73^{b}	162.98^{ab}	155.00^{ab}
F_2M_2	174.33^{a}	185.02^{ab}	195.70^{ab}	199.20^{a}	174.33^{ab}	166.80^{a}	158.50^{a}
F_2M_3	171.00^{a}	181.69^{a}	192.37^{a}	195.87^{a}	175.10^{a}	163.47^{a}	157.25^{a}
F_2M_4	180.00^{a}	192.17^{a}	202.60^{a}	206.33^{a}	186.00^{a}	173.70^{a}	166.80^{a}
S.E(m) ±	5.19	5.50	5.41	5.33	4.05	4.57	3.96

***Note*:** Data subjected to DMRT and means with same alphabets do not differ significantly
RDF – Recommended dose of fertilizer (150:50:40 kg ha^{-1}, N, P_2O_5 & K_2O)

Table 2: Effect of nutrient management on leaf area index of hybrid napier under irrigation at different cuts

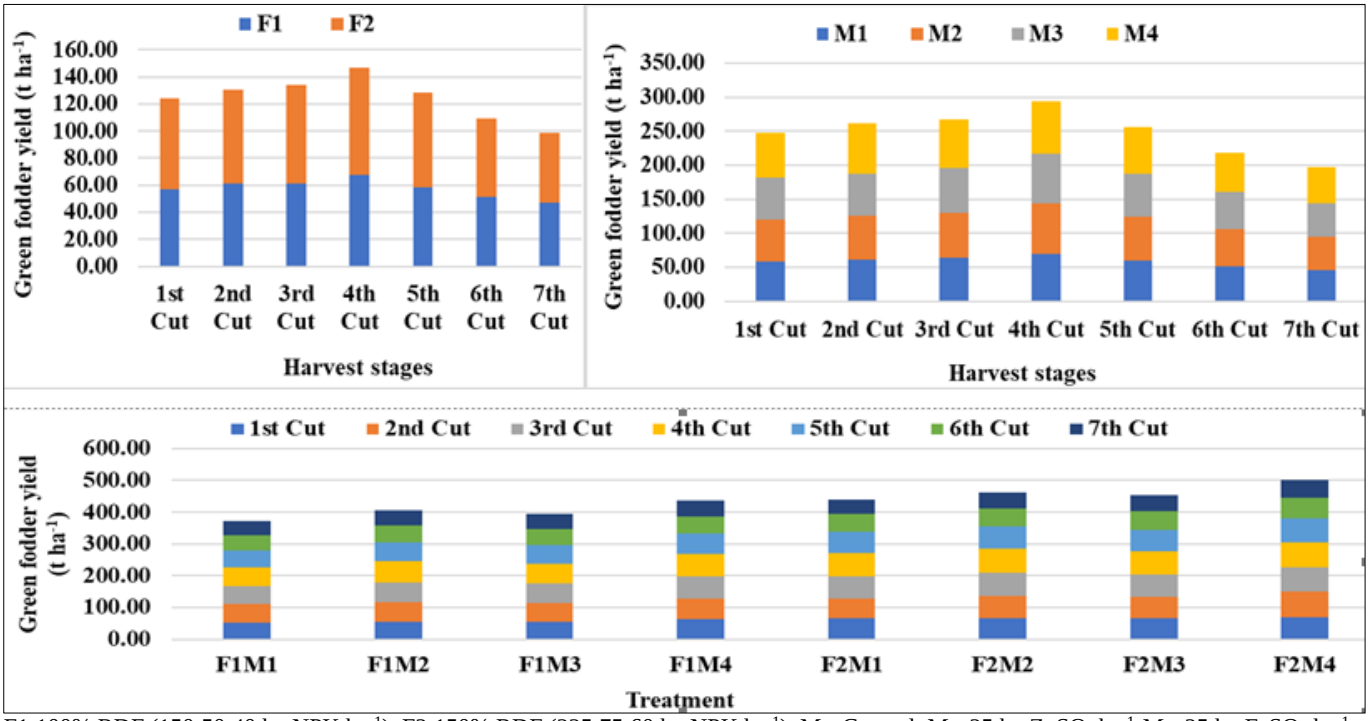
Treatment	1st cut	2nd cut	3rd cut	4th cut	5th cut	6th cut	7th cut
Major nutrient (NPK) (F)							
F_1: 100% RDF	8.63^{b}	12.96^{b}	16.32^{b}	21.56^{b}	10.00^{b}	7.91^{b}	6.44^{b}
F_2: 150%RDF	12.89^{a}	18.96^{a}	23.53^{a}	29.65^{a}	15.00^{a}	12.28^{a}	10.26^{a}
S.E(m) ±	0.16	0.24	0.28	0.41	0.23	0.23	0.22
Micronutrient (M)							
M_1: Control	9.31^{c}	13.66^{c}	17.52^{c}	22.65^{c}	10.48^{c}	8.34^{c}	6.82^{d}
M_2: 25 kg $ZnSO_4$ ha^{-1}	11.14^{b}	16.49^{b}	20.49^{b}	26.44^{b}	13.07^{b}	10.56^{b}	8.76^{b}
M_3: 25 kg $FeSO_4$ ha^{-1}	10.66^{b}	15.80^{b}	19.79^{b}	25.45^{b}	12.50^{b}	10.06^{b}	8.31^{c}
M_4: 25 kg $ZnSO_4$ + 25 kg $FeSO_4$ ha^{-1}	11.93^{a}	17.88^{a}	21.90^{a}	27.89^{a}	13.96^{a}	11.41^{a}	9.51^{a}
S.E(m) ±	0.22	0.33	0.40	0.58	0.32	0.32	0.31
Interaction (F X M)							
F_1M_1	6.65^{f}	9.68^{d}	12.34^{d}	17.13^{d}	6.98^{d}	5.34^{d}	4.22^{d}
F_1M_2	9.23^{d}	14.04^{c}	17.58^{c}	22.96^{c}	10.98^{c}	8.74^{c}	7.16^{c}
F_1M_3	8.82^{e}	13.39^{c}	16.92^{c}	22.17^{c}	10.45^{c}	8.28^{c}	6.76^{c}
F_1M_4	9.80^{d}	14.72^{c}	18.45^{c}	23.99^{c}	11.58^{c}	9.27^{c}	7.62^{c}
F_2M_1	11.97^{c}	17.65^{b}	22.69^{b}	28.17^{b}	13.97^{b}	11.34^{b}	9.42^{b}
F_2M_2	13.05^{b}	18.94^{b}	23.40^{b}	29.91^{a}	15.16^{a}	12.38^{a}	10.35^{a}
F_2M_3	12.49^{b}	18.21^{b}	22.66^{b}	28.72^{b}	14.54^{b}	11.84^{b}	9.86^{b}
F_2M_4	14.06^{a}	21.03^{a}	25.35^{a}	31.78^{a}	16.33^{a}	13.54^{a}	11.40^{a}
S.E(m) ±	0.31	0.47	0.56	0.82	0.45	0.45	0.44

***Note*:** Data subjected to DMRT and means with same alphabets do not differ significantly
RDF – Recommended dose of fertilizer (150:50:40 kg ha^{-1}, N, P_2O_5 & K_2O)

Table 3: Effect of nutrient management on fresh shoot weight per stalk (g) of hybrid napier under irrigation at different cuts

Treatment	1st cut	2nd cut	3rd cut	4th Cut	5th cut	6th cut	7th Cut
Major nutrient (NPK) (F)							
F_1: 100% RDF	44.48^{b}	54.79^{b}	94.45^{b}	117.27^{b}	42.50^{b}	33.81^{b}	25.08^{b}
F_2: 150% RDF	70.50^{a}	94.79^{a}	138.90^{a}	159.08^{a}	76.17^{a}	54.71^{a}	52.18^{a}
S.E(m) ±	1.11	2.74	1.67	2.27	0.38	0.80	0.68
Micronutrient (M)							
M_1: Control	54.47^{b}	67.00^{b}	109.89^{b}	129.47^{b}	54.00^{d}	38.34^{b}	34.72^{b}
M_2: 25 kg $ZnSO_4$ ha^{-1}	58.00^{ab}	76.39^{ab}	116.00^{ab}	139.53^{a}	61.00^{b}	45.83^{a}	40.23^{a}
M_3: 25 kg $FeSO_4$ ha^{-1}	57.00^{a}	70.50^{a}	118.00^{b}	138.82^{ab}	59.00^{c}	44.78^{a}	38.86^{a}
M_4: 25 kg $ZnSO_4$ + 25 kg $FeSO_4$ ha^{-1}	60.50^{a}	85.28^{a}	122.79^{a}	144.88^{a}	63.34^{a}	48.09^{a}	40.72^{a}
S.E(m) ±	1.57	3.88	2.66	3.22	0.54	1.13	0.97
Interaction (F X M)							
F_1M_1	39.93^{c}	50.00^{c}	87.79^{d}	110.27^{c}	36.00^{f}	31.68^{c}	22.44^{c}
F_1M_2	45.00^{bc}	54.45^{c}	91.00^{d}	119.33^{c}	44.00^{e}	34.65^{c}	26.00^{c}
F_1M_3	44.00^{b}	54.00^{c}	96.00^{cd}	119.33^{c}	43.00^{e}	33.00^{c}	25.90^{c}
F_1M_4	49.00^{b}	60.72^{c}	103.00^{c}	120.13^{c}	47.00^{d}	35.90^{c}	26.00^{c}
F_2M_1	69.00^{a}	84.00^{b}	132.00^{b}	148.67^{b}	72.00^{c}	45.00^{c}	47.00^{b}
F_2M_2	71.00^{a}	98.33^{ab}	141.00^{a}	159.73^{ab}	78.00^{a}	57.00^{a}	54.45^{a}
F_2M_3	70.00^{a}	87.00^{ab}	140.00^{a}	158.30^{a}	75.00^{b}	56.55^{a}	51.81^{a}
F_2M_4	72.00^{a}	109.83^{a}	142.58^{a}	169.63^{a}	79.67^{a}	60.28^{a}	55.44^{a}
S.E(m) ±	2.22	5.48	3.34	4.55	0.77	1.60	1.37

***Note*:** Data subjected to DMRT and means with same alphabets do not differ significantly
RDF – Recommended dose of fertilizer (150:50:40 kg ha^{-1}, N, P_2O_5 & K_2O)



F1:100% RDF (150:50:40 kg NPK ha^{-1}), F2:150% RDF (225:75:60 kg NPK ha^{-1}), M_1: Control, M_2: 25 kg $ZnSO_4$ ha^{-1}, M_3: 25 kg $FeSO_4$ ha^{-1} M_4: 25 kg $ZnSO_4$ ha^{-1} + 25 kg $FeSO_4$ ha^{-1}

Fig 1: Effect of nutrient management on green fodder yield (t ha^{-1}) of hybrid napier under irrigation at different cuts

Table 4: Effect of nutrient management on net return (₹ ha^{-1}) of hybrid napier under irrigation at different cuts

Treatment	1st cut	2nd cut	3rd cut	4th Cut	5th cut	6th cut	7th Cut	Cumulative net return
Major nutrient (NPK) (F)								
F_1: 100% RDF	21480^{b}	63308^{b}	61453^{b}	66112^{b}	58075^{b}	51491^{b}	46478^{b}	368397^{b}
F_2: 150% RDF	31477^{a}	72827^{a}	73765^{a}	78544^{a}	70357^{a}	59090^{a}	51335^{a}	437395^{a}
S.E(m) ±	388	1086	978	1030	1042	1004	1006	10105
Micronutrient (M)								
M_1: Control	28073^{a}	62866^{b}	63294^{c}	67122^{c}	58746^{c}	52162^{b}	43822^{c}	376082^{c}
M_2: 25 kg $ZnSO_4$ ha^{-1}	28349^{a}	66784^{b}	67752^{b}	73758^{b}	64260^{b}	55498^{ab}	48622^{b}	405020^{b}
M_3: 25 kg $FeSO_4$ ha^{-1}	22979^{b}	65326^{b}	65922^{bc}	69972^{bc}	62934^{bc}	54046^{b}	49462^{b}	390638^{bc}
M_4: 25 kg $ZnSO_4$ + 25 kg $FeSO_4$ ha^{-1}	26513^{a}	77296^{a}	73470^{a}	78462^{a}	70926^{a}	59458^{a}	53722^{a}	439844^{a}
S.E(m) ±	548	1536	1384	1457	1473	1421	1422	14290
Interaction (F X M)								
F_1M_1	21540^{b}	60428^{c}	56008^{c}	59428^{d}	50716^{d}	47708^{c}	41708^{d}	337536^{c}
F_1M_2	22986^{b}	62432^{c}	60928^{c}	67576^{c}	59884^{c}	53060^{bc}	47708^{b}	374574^{c}
F_1M_3	17640^{c}	61316^{c}	59608^{c}	63988^{c}	57856^{c}	50216^{c}	46988^{c}	357612^{c}
F_1M_4	23754^{b}	69056^{b}	69268^{b}	73456^{b}	63844^{bc}	54980^{bc}	49508^{bc}	403866^{b}
F_2M_1	34606^{a}	65303^{b}	70579^{b}	74815^{b}	66775^{b}	56615^{b}	45935^{c}	414628^{b}
F_2M_2	33712^{a}	71135^{b}	74575^{ab}	79939^{ab}	68635^{b}	57935^{ab}	49535^{bc}	435466^{b}
F_2M_3	28318^{a}	69335^{b}	72235^{b}	75955^{b}	68011^{b}	57875^{b}	51935^{b}	423664^{b}
F_2M_4	29272^{a}	85535^{a}	77671^{a}	83467^{a}	78007^{a}	63935^{a}	57935^{a}	475822^{a}
S.E(m) ±	776	2172	1957	2060	2083	2009	2011	20209

***Note*:** Data subjected to DMRT and means with same alphabets do not differ significantly
RDF – Recommended dose of fertilizer (150:50:40 kg ha^{-1}, N, P_2O_5 & K_2O)

Table 5: Effect of nutrient management on benefit cost ratio of hybrid napier under irrigation at different cuts

Treatment	1st cut	2nd cut	3rd cut	4th cut	5th cut	6th cut	7th Cut	Cumulative BC ratio
Major nutrient (NPK) (F)								
F_1: 100% RDF	1.47^{b}	7.40^{b}	5.96^{b}	6.34^{b}	5.69^{b}	6.21^{b}	5.70^{b}	4.67^{b}
F_2: 150% RDF	1.65^{a}	7.96^{a}	6.69^{a}	7.06^{a}	6.43^{a}	6.65^{a}	5.91^{a}	5.11^{a}
S.E(m) ±	0.03	0.11	0.10	0.10	0.11	0.11	0.11	0.09
Micronutrient (M)								
M_1: Control	1.66^{a}	7.17^{b}	5.98^{b}	6.28^{b}	5.62^{b}	6.12^{b}	5.31^{b}	4.83^{a}
M_2: 25 kg $ZnSO_4$ ha^{-1}	1.61^{ab}	7.56^{b}	6.34^{b}	6.81^{a}	6.06^{b}	6.45^{a}	5.78^{b}	5.00^{a}
M_3: 25 kg $FeSO_4$ ha^{-1}	1.46^{c}	7.42^{b}	6.19^{b}	6.51^{ba}	5.96^{b}	6.30^{b}	5.86^{ab}	4.70^{a}
M_4: 25 kg $ZnSO_4$ + 25 kg $FeSO_4$ ha^{-1}	1.49^{bc}	8.58^{a}	6.79^{a}	7.18^{a}	6.59^{a}	6.83^{a}	6.27^{a}	5.02^{a}
S.E(m) ±	0.04	0.16	0.14	0.14	0.16	0.16	0.16	0.13
Interaction (F X M)								
F_1M_1	1.53^{b}	7.11^{c}	5.52^{b}	5.80^{c}	5.09^{c}	5.82^{b}	5.22^{b}	4.55^{b}

F_1M_2	1.51^{b}	7.31^{c}	5.92^{b}	6.45^{b}	5.83^{b}	6.36^{b}	5.82^{b}	4.85^{ab}
F_1M_3	1.36^{c}	7.20^{c}	5.81^{b}	6.16^{b}	5.67^{b}	6.08^{b}	5.75^{b}	4.49^{b}
F_1M_4	1.46^{bc}	7.98^{b}	6.59^{a}	6.93^{a}	6.15^{b}	6.56^{a}	6.00^{a}	4.79^{ab}
F_2M_1	1.79^{a}	7.24^{c}	6.44^{a}	6.77^{b}	6.15^{b}	6.41^{b}	5.39^{b}	5.11^{a}
F_2M_2	1.71^{a}	7.80^{b}	6.75^{a}	7.17^{a}	6.29^{b}	6.54^{a}	5.73^{b}	5.16^{a}
F_2M_3	1.55^{b}	7.63^{b}	6.57^{a}	6.86^{a}	6.25^{b}	6.53^{a}	5.96^{a}	4.91^{a}
F_2M_4	1.53^{b}	9.17^{a}	6.99^{a}	7.44^{a}	7.02^{a}	7.11^{a}	6.54^{a}	5.25^{a}
S.E(m) ±	0.06	0.22	0.20	0.20	0.22	0.23	0.22	0.18

***Note*:** Data subjected to DMRT and means with same alphabets do not differ significantly
RDF – Recommended dose of fertilizer (150:50:40 kg ha^{-1}, N, P_2O_5 & K_2O)

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