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RESEARCH ARTICLE

BIOMASS YIELD, MORPHOLOGICAL CHARACTERISTICS, NUTRITIVE VALUE AND *IN-SACCO* DRY MATTER DEGRADABILITY OF DIFFERENT HYV NAPIER CULTIVARS.

N. R. Sarker[1], [*]M. K. Bashar[2], M. K. Alam[3], S. M. J. Hossain[2] and K. S. Huque[2].

1. Project Director, Fodder Research and Development Project, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh.
2. Animal Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh.
3. Ph.D. Fellow, Fodder Research and Development Project, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh.

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Abstract

An agronomic trial was conducted with five Napier (*Pennisetumpurpureum var.*) cultivars including one check (BLRI Napier-hybrid) collected from Japan and Vietnum at the red soil Madhupur tract of Savar with objectives to investigate and compare the biomass yield, morphological characteristics, botanical fractions, nutritive value and *in-sacco* dry matter degradability. The selected Napier cultivars were grown under identical condition having plot size of 15 x 15 sq. m with 5 replications in each cultivar. Therefore, a total of 25 plots were made for this agronomical trial and each cultivar was placed in five plots at random. The cultivar response to biomass production performance, chemical composition and nutritional value were analyzed in an ANOVA of a Randomized Complete Block Design (RCBD), while the differences in the rate and extent of the DM degradability *in-sacco* determined using three cannulated bulls. In addition, an intake trial & digestibility of BLRI Napier-4 with BLRI Napier hybrid (silage) was carried with twelvePabna bull calves having 6 animals in each group. Each group of animal received *ad libitum* feeding namely Napier Vietnum and Napier hybrid. Data were analyzed for variances in a completely randomized design. Means were separated by the least square difference (LSD). It observed that significant difference ($p<0.01$) was observed in bio-mass yield among the different Napier cultivars. Biomass yield was in the order of BLRI N.hybrid> MERKERON > BLRI Napier 4 > WRUK-WONA > Napier -Japan. The DM yield, CP yield, no. of tillers and plant height were also significantly differed ($p<0.01$) among the cultivars. The number of tillers per hill was significantly higher in WRUK-WONA and the lowest in Napier -Japan. The DM content in all cultivars was mostly similar but the DM (t/ha/cut) yield was significantly higher in BLRI Napier hybrid and the lowest in Napier -Japan. Similarly, CP yield (t/ha/cut) was also significantly the highest in MERKERON and the lowest in BLRI N. Hybrid. The CP content was significantly higher ($p<0.05$) in MERKERON (14.43) and the lowest in BLRI N.hybrid (10.40). The ADF content was higher in BLRI N.hybrid compared to other Napier cultivars. The *in-sacco* dry matter (DM) degradability of MERK-ERON (78.08%) and WRUK-WONA (74.01) were significantly higher than that of Napier- Japan (57.87%), BLRI Napier hybrid (52.23) and BLRI Napier-4(51.01%), respectively. The greater value of oxalate content was in BLRI Napier-4 (0.82^a±.212) and the lower value was in WRUK-WONA (0.111[b]±.012). The calculated metabolizable energy (ME) (MJ kg/DM) varies from 9.15 to 10.08 among the cultivars. It is mentioned here that the per cent digestibility of DM (47.05 vs50.68) and CP (48.57 vs 53.09) in BLRI Napier hybrid and BLRI Napier-4, respectively. Considering the above parameter, the MERKERON and WRUK-WONA were the best Napier cultivars for further propagation to the farmers.

***Corresponding Author:-M. K. Bashar.**

Introduction:-

Feed problem for livestock rising is more acute, and made dairy and fattening farming most competitive and challenging to sustain under open market trading policy. Fodder production at farm levels is very limited but in milk pocket areas farmer usually cultivate fodder for their animals as well selling in the market. Fodder crops play pivotal role in the agricultural economy of developing countries by providing cheapest source of feed for livestock. The performance of dairy animals depends on the consistent availability of quality fodder in adequate amount. Therefore, the critical limitation on profitable animal production in developing countries is the inadequacy of quality forage (Sarwar*et al*. 2002). In many developing countries because of ever growing human need for food, only limited cultivated land can be allocated to fodder production. Moreover, in our region, low per acre fodder yield and fodder scarcity periods, one is during summer months and second in the winter months, further aggravated the situation (Sarwar*et al*. 2002). In rest of the year, fodder is abundantly available and remains intact in the fields. Manipulating this surplus fodder can bridge the gap between supply and demand during scarcity periods. Manipulation of green fodder in sheep has shown promising results (Jabbar and Anjum, 2008).

The situation of fodder production and availability in Bangladesh is not satisfactory. There is no land exclusively used for fodder production by rural farmers except some milk pocket areas and where small scale dairy enterprises are prevailing. Generally, crop residues, green grasses and tree foliage and leaves are major sources of roughage for the ruminant of Bangladesh. The grasses/forages are mainly from roads, way sides, crop field boundaries, embankments, and the weeds of crops either by grazing or cut and carry system. It reported that there are about 0.44 million ha of cultivable waste land used as communal pasture and about 0.006 million ha of Bathan (basin like area) in Pabna and Sirajgonj districts are used for fodder cultivation during winter after recession of floodwater depended on seasonal changes (Chowduary, 2009). Bangladesh Livestock Research Institute (BLRI) in collaboration with other national and international institutes has started fodder germplasm collection, conservation and multiplication programs since its establishment. In the continuation of this program, BLRI has recently collected some high yielding Napier fodder germplasm from Vietnum and Japan. The present study was undertaken to evaluate the suitability, production performance and nutritional quality of different HYV Napier cultivars that may be identify the best Napier cultivars for further propagation and distribution of cutting to the farmers which is directly fill in the livestock production in Bangladesh.

Materials and Methods:-

The details of the experimental materials and methodology are described in the following sections.

Site of the experiment:-

The experiment was conducted at the Animal Research Station, Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka from 1st July 2015 to 30 June, 2016. The chemical analyses of Napier cultivars sample were done in the Animal Nutrition Laboratory of BLRI.

Cultivation Procedure of Napier cultivars:-

An agronomic trial was conducted with five Napier (*Pennisetumpurpureum var.*) cultivars including one check (BLRI Napier- hybrid) collected from Japan and Vietnum at the red soil Madhupur tract of Savar. The selected Napier cultivars were grown under identical condition having plot size of 15 x 15 sq.m with a 1-m border between plots and having 5 replications in each cultivar. Therefore, a total of 25 plots were made for this agronomical trial and each cultivar was placed in five plots at random. All the agronomical practices were step by step as per recommended practices developed by Bangladesh Livestock Research Institute. During land preparation fermented cow dung was applied at the rate of 35 kg/decimal. The cuttings were transplanted at 70 cm distance from line to line and 35 cm distance in row to row. Weeding and irrigation were done when necessary. During land preparation fertilizer only Phosphate (TSP) and MP were applied at the rate of 150 and 125 kg/ha. Urea at the rate of 50 kg was applied 20-30 days after transplanting followed by 50 kg urea was applied after 10-12 days of each cutting. Green fodder from each plot was harvested manually after 45 days of transplantation approximately 5-6 cm above ground. The biomass yield was determined in each plot and converted the yield in tons/ha. The representative samples was taken, chopped approximately 2-3 cm length and send to the lab. for nutritive evaluation. Biomass yield of five Napier cultivars was measured by weighing the mass. Height and number of hill (/ha) and tiller number per hill was counted. Five 5-kg fodders from each cultivar were fractionated manually into three fractions namely leaf blade, leaf sheath and stem (DM basis). Measurements of DM yields were taken from whole plots. Morphological characteristics were determined by measuring the plant height and leaf characteristics from representative tillers. Plant growth habit was determined by measuring tiller number/stool, tiller length and thickness from average angle of growth.

In Sacco Degradability Study:-

The degradability of different fodder cultivars from different treatments of first cutting was determined according to the method described by Mehrez and Ørskov (1977).

Preparation of Sample:-

The collected fresh samples of fodder were cut into as small as possible by scissor and placed in the nylon bags for incubation.

Animals:-

Three adult male cattle more than 300 Kg live weight (about 4 years of age) fitted with permanent rumen canula were used for the experiment. The animals were kept in individual pen under close observation and under appropriate hygienic condition.

Diets:-

For 10 days before and during the study period cattle were fed a diet (2.0% body weight) composed of similar roughages (70%) and concentrates (30%) having 7.5-8.0% CP to meet their maintenance requirement (Kearl,1982). Clean water was supplied to all animals. Ingredients compositions of the diet are given below:

Table 1:- Ingredients compositions of the diet to canulated cattle

Ingredients	g/100g DM
Rice Straw	65
Dal grass	5
Wheat bran	18
Rice polish	11.5
Common salt	0.5

The nylon bag technique described by Mehrez and Ørskov (1977) was used to obtain the rumen degradation values of DM. Approximately 2g of each sample was placed in nylon bag separately for ruminal incubation. The size of the bag was 7 cm X 5cm with pore size of 60µm they were sewn with double lines ream and with round corners to allow easy removal of un-degraded materials. To identify the bags they were numbered with a marker. After placing the samples in the bags, the neck of each bag was tied tightly with the help of string and then they were again tied closely with a piece of plastic tubing one after another in such an arrangement that the bags can be removed with easy withdrawal of bags at different time intervals with minimum disturbance of fermentation. The bags were placed into the rumen through the rumen canula and the upper end of the nylon string was kept outside. The bags with samples were incubated for the period of 72 hours in the rumen. After the assigned incubation period bags were removed from the rumen through the rumen canula and then transferred to the laboratory. Bags were washed under gentle stream of tap water until the dirt and rumen stuff sticking with the bags were clear. The bags with the contents were then dried in an oven at 100° C for complete removal of moisture. The disappearance of DM values was obtained by difference in weight of the sample before and after incubation.

Intake and digestion trial:-

To determine the intake of Napier Vietnum, digestion trial was conducted with twelve's Pabna bull calves having body weight of were used for intake trial. They were divided into two groups. Each group of animal received

Napier Vietnum and Napier hybrid silage. No concentrate or other feed was given to the animal except *ad libitum* drinking water. Each group of animal was offered *ad libitum* fodder and Napier silages and water individually. All animals used for intake trial was also used for digestibility trial. The trial was lasted for 14 days with 7 days adjustment period and 5 days data collection period. All animals were placed individually in the digestion stall. Each group of animal was offered *ad libitum* silages and water individually respective to their groups as mentioned above. Faeces and urine were collected throughout the last 5 days of collection period from all animals.

Oxalate determination:-

The oxalate contents of five Napier cultivars were determined through using of titration method as per procedure developed by Abaza*et al.* 1968. Two grams of dried and ground representative samples were taken into 250 ml volumetric flask and mixed with 10 ml 6N HCl and 190 ml distilled water, and the content was heated for one hour on a boiling water bath. The digested sample was cooled at room temperature and distilled water was added to 250 ml. The sample was mixed, allowed to settle and filtered in a conical flask. Fifty milliliters of the filtrate and 20 ml 6N HCl were mixed in another 250 ml volumetric flask and evaporated to half of its volume on a hot water bath. The mixture was filtered in a beaker and the volume was made to 125 ml by washing the precipitate several times with warm distilled water, 3 to 4 drops of methyl red indicator was added in the filtrate in the beaker, and ammonium hydroxide was mixed gradually until the color of the content becomes faint yellow. The content in the beaker was heated to just boiling, cooled and filtered for removing the precipitate containing ferrous compounds. The filtrate was boiled, 10 ml of calcium chloride solution was added while continuously stirred with a glass rod having rounded tip, and kept overnight undisturbed beneath a bell jar. Glass rod was left in the beaker. In the following day, it was filtered through Whatman filter paper No. 41 and the precipitate was made free of calcium ions after washing several times with hot distilled water (70°C). The washed precipitate on filter paper was transferred back to original beaker by washing hot distilled water (70°C0, diluted sulfuric acid (1:4) was added with the help of a graduated pipette, and content was stirred with a glass rod to dissolve the precipitate completely. The filter was put back on the funnel. The content in the beaker was heated (70 to 80°C) and titrated against 0.05N KMnO4 solution while hot indicating the end point by a faint pink color. The calculation of oxalate content was done by the following formula.

Oxalate in sample (% sample DM) = 0.5625 V%
Where, V= Volume of KMnO4 used (ml).
1 ml 0.05N KmnO4 = 0.00225g oxalate

Chemical analysis:-

The proximate and other components of feed and fecal materials were done by following the methods described by AOAC (1995). Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were estimated by using the methods described by Goering and Van Soest (1970). Kjeldhal method was used for determining the Nitrogen (N) content of feed, faeces and milk and the crude protein content were estimated as N x 6.25. The ME (MJ kg^{-1} DM) was estimated according to Ketelaars and Tolkamp (1992) as follows: DOMD (%) = 75.73 – (0.269 x ADF %); ME (MJ kg^{-1} DM) = DOMD% x 0.15

Statistical analysis:-

An analysis of variance was done to determine the varietals differences. Collected data were analyzed statistically by using Compare Means (CM) procedure of One-Way Analysis of variance (ANOVA): Post Hoc Multiple Comparisons of SPSS 11.5 for Windows (SPSS Inc. 2002) following the method of Randomized Complete Block Design (RCBD).

Results:-

Biomass yield:

The effect of five different Napier cultivars on fresh or dry matter (DM) yield (ton/ha/cut), CP yield (ton/ha/cut), no. Of hill per hectare, no. Tiller per hill and plant height (m) are shown in Table 2. The fresh (48.21 ton/ha/cut) and dry matter (7.57 ton/ha/cut) yield of BLRI Napier hybrid were significantly higher than that of MERKERON (29.35 ton/ha/cut and 3.89 ton/ha/cut), BLRI Napier-4 (23.0 ton/ha/cut and 2.94 ton/ha/cut), WROK-WONA (20.45 ton/ha/cut and 2.32 ton/ha/cut) and Napier Japan (8.50 ton/ha/cut and 1.23 ton/ha/cut) respectively. Bur the cultivar of MARKERON produced highest amount of CP where as the BLRI Napier hybrid was the lowest producer which were 3.60 ton /ha /cut and 0.78 ton/ha/cut, respectively. Table 2 also revealed that no. of tiller and plant height were also significantly differed ($p<0.01$) among the cultivars. The number of tiller per hill was significantly higher in WRUK-WONA and the lowest in Napier -Japan. The number of hill/ha of land varies from 21.75 thousand to 18.50 and there was no significant different among the cultivars.

Table 2:- Biomass yield and morphological characteristics of different Napier cultivars

Cultivars	Biomass yield (ton/ha/cut)	% DM	DM yield (t/ha/cut)	CP yield (t/ha/cut)	No. of hill/ ha	No. of tiller/hill	Plant Height
BLRI N. hybrid	48.21±4.56[a]	15.71±0.32	7.57±1.02	0.78±0.12	28.71±1.68	30.23±0.78	4.59±0.12
BLRI Napier-4	23.00[ab]±3.84	12.82±0.17	2.94[ab]±0.48	2.48[a]±0.43	21.75±0.62	27.25[b]±1.10	4.84[bc]±0.47
Napier - Japan	8.50[b]±1.95	15.41±1.74	1.23[c]±0.19	1.06[b]±0.31	18.50±0.86	21.50[b]±2.32	3.79[c]±0.20
WRUK-WONA	20.45[ab]±1.40	11.35±0.48	2.32[bc]±0.19	2.45[a]±0.21	21.50±1.19	49.75[a]±2.65	5.85[b]±0.29
MERKERON	29.35[ab]±4.23	12.94±0.94	3.89[a]±0.73	3.60[a]±0.54	21.25±1.75	28.00[b]±4.63	7.41[a]±0.61
Pooled	20.32±2.39	13.13±0.59	2.59±0.32	2.40±0.29	20.75±0.62	31.62±3.07	5.47±0.39
Sig.	**	*	**	**	NS	**	**

[ab]Values in the same row with different superscripts differ significantly ($p<0.05$)

Morphological characteristics:-

The check cultivar (BLRI N. hybrid contained the highest proportion of leaf blade (56%) and leaf (81%) but lowest proportion of stem (19%). Similarly, Napier-Japan contained the highest proportion leaf (70%) followed by MERKERON, BLRI Napier-4and WRUK-WONA, respectively (Table 3).

Table 3:- Proportion of botanical fractions (% DM) of five Napier varieties including check

Variety	Leaf blade	Leaf sheath	Leaf	Stem	Stem: leaf ratio
N.Hybrid (Check)	56	25	81	19	1.9:8.1
BLRI Napier- 4	30	20	50	50	5.0:5.0
Napier -Japan	40	30	70	30	3.0:7.0
WRUK-WONA	28	17	45	55	5.5:4.5
MERKERON	46	22	68	32	3.2:6.8

Chemical composition:-

The results indicated that the CP content was significantly higher ($p<0.05$) in MERKERON (14.43) and the lowest in BLRI N. hybrid (10.40). There was no significant difference in CP content among BLRI N. hybrid, BLRIN.apier 4, Napier Japan and WRUK-WONA. The ADF content was higher in BLRI N. hybrid compared to other cultivars. There was no difference ($p>0.05$) between BLRI Napier 4 and N. Japan in ADF content but the difference was significant ($p<0.05$) between WRUK-WONA and MERKERON (Table 4). The lower ADF value in WURK-WONA and MERKERON corresponded too significantly ($p<0.05$) higher *in- sacco*DM degradability at 72 hrs. of incubation compared to N.Japan, BLRI N. hybrid and BLRI Napier-4, respectively. The results revealed that the cultivars with lower ADF content had higher *in- sacco* rumen degradability of DM. The calculated ME (MJ kg/DM) varies from 9.15 to 10.08 among the cultivars.

Table 4:- Chemical composition of different Napier cultivars

Parameters	Name of cultivars					
	BLRI N hybrid	BLRI Napier - 4	N. Japan	WRUK-WONA	MERKERON	Sig.
% DM Fresh basis	15.71±0.32	14.11 ± 0.56	14.37± 0.61	14.53± 1.05	12.74± 0.73	NS
g/100g DM						
Ash	10.98± 0.78	10.26±0.90	9.10±1.36	11.55±0 .36	9.87±1.40	NS
OM	89.02±0.67	89.71±0.91	90.89±1.36	88.44±0.36	91.29.±1.4	NS
ADF	45.91[b]±0.45	41.24[a]±0.29	43.23[a]±0.50	37.38[b]±1.56	29.90[c]±0.77	*
CP	10.40[a]±0.21	11.49[a]±0.57	12.85[a]±0.39	13.71[ab]±0.21	14.43[b]±0.50	*
ME (MJ/kg DM)	9.15[d]±0.3	9.70b[c] ± 0.01	9.61[c] ± 0.02	9.82[b] ± 0.08	10.08[a] ± 0.07	**
In- sacco DM	52.23[c]±1.3	51.01[c] ± 2.9	57.87[b]±0.8	74.01[a]±0.82	78.08[a]±0.94	**

degradability (72 hrs)						

Oxalate percentage for different Napier cultivars, variation observed in 1% level. The greater value of oxalate content was in BLRI-Napier 4 ($0.82^a \pm .212$) and the lower value was in WROK-WONA ($0.111^b \pm .012$). The Oxalate content is positively correlated with ADF. It was observed that oxalate content significantly increased ($p< 0.01$) with the increase of ADF content in the fodder.

Table 5:- Oxalate content of different Napier cultivars

Parameter	N	Mean ± SE of Oxalate(%) of different cultivars				Sig.
		Napier-Hybrid	MARKERON	WROK-WONA	BLRI Napier- 4	
Oxalate (%)	4	$0.136^b \pm .025$	$0.257^b \pm .102$	$0.111^b \pm .012$	$0.82^a \pm .212$	*

The comparative voluntary nutrients intake from BLRI N.hybrid and BLRI Napier-4 are shown in Table 6. It is mentioned here that the per cent digestibility of DM, (47.05 vs50.68) and CP (48.57 vs 53.09) in BLRI N. hybrid and BLRI Napier -4, respectively.

Table 6:- Comparative nutrients intake and digestibility of BLRI Napier- 4 and BLRI Napier hybrid.

Parameters	NLRI Napier hybrid (±SEM)	BLRI Napier -4(± SEM)	Sig.
DM intake (kg/day)	$47^a \pm 0.01$	$2.67^b \pm 0.00$	**
CP intake (g/day)	$240.31^a \pm 0.85$	$287.33^b \pm 0.37$	**
% of DM digestibility	47.05±0.12	50.68.0.87	NS
% of CP digestibility	$48.57^b \pm 0.45$	$53.09^a \pm 0.53$	*
[ab]Values in the same column with different superscripts differ significantly ($p<0.01$)			

Discussion:-

The importance of Napier grass (*Pennisetumpurpureum*) can be seen from the role it plays as the major livestock feed in smallholder dairy production systems. Among the different cultivars of Napier grasses, the BLRI Napier hybrid was the highest biomass producer (7.57 DM yield per cut) and it has been the most promising and high yielding fodder (Anindo& Potter 1994) giving dry matter yields that surpass most tropical grasses (Humphreys, 1994; Skerman&Riveros, 1990). Reported on-farm dry matter yields from different regions of the country averaged about 16 tones/ha/year (Wouters, 1987) with little or no fertilizer, while according to Schreuder*et al.* (1993) yields on research stations vary between 10-40 tones dry matter per hectare depending on soil fertility, climate and management factors. These yields surpass those of Rhodes grass (*Chlorisgayana*) Setaria (*Setariasphacelata*) and Kikuyu grass (*Pennisetumclandestinum*) which are popular pasture grasses but which yield between 5 to 15 tons of DM per year (Boonman, 1993). High DM yields for Napier grass have been recorded elsewhere in the tropics (Ferraris & Sinclair, 1980: Woodard &Prine, 1991); exceptionally high yields up to 85 tons DM/ha have been cited when high rates of fertilizers were applied (Skerman&Riveros, 1990), for example under natural rainfall of 2000 mm per year where 897 kg of N fertilizer were applied per hectare per year and the grass was cut every 90 days the yield was 84, 800 kg DM/year (Vicente-Chandler *et al.* 1959). Dry matter yield alone, however, is of limited value if it is not closely related to the DM intake of the animals. At farm level, the combination of DM yield and observed DM intake can form the basis for estimating the number of livestock that can be supported by available forage. As Napier grass tolerates frequent defoliation, under good weather conditions it can be cut in Kenya every 6-8 weeks giving up to 8 cuts in a year, depending on fertilizer application, rainfall amount and distribution.

The stem to leaf ratio BLRI Napier hybrid was the highest among the treatment. But, Islam *et al*. (2003) reported that the proportion of stem contained by Hybrid was almost half of the stem contained by either Arusha or Bazra. Bazra contained the lowest proportion of leaf blade while Arusha contained the lowest proportion of leaf sheath. Hybrid and Bazra contained similar proportion of leaf sheath. On the other hand, Arusha and Bazra contained similar proportion of leaf and stem. The present findings revealed that the leaf and stem ratio of Napier Vietnum was similar to Arusa and Bazra.

Chemical composition of the forage is a major determinant in animal production (Skerman&Riveros, 1990; Minson, 1990). As Napier grass matures, the leaf to stem ratio declines (Kariuki, 1989; Karanja, 1984) causing changes in the chemical composition and a concomitant reduction in feed value (Minson, 1990). Feed quality may affect voluntary feed intake and animal performance in terms of milk yield or body weight gain. Grass maturity is usually negatively related to CP content (Minson, 1970; Norton 1981) and the results summarized by Skerman&Riveros (1990), Woodard &Prine (1991) and Williams & Hanna (1995) confirm this for Napier grass with the rate of decline in CP content more rapid in stems than leaves (Brown &Chavulimu, 1985). The cell wall, composed primarily of the structural carbohydrates cellulose and hemi cellulose, is the most important factor affecting forage utilization (Van Soest, 1994) as it comprises the major fraction of forage DM and its extent of degradation by the micro flora has important implications on forage digestibility and intake (Paterson *et al*., 1994). The cell wall content in Napier grass increases less prominently with age compared with other tropical grasses such as Kikuyu and Pangola grass (Minson&Mcleod, 1970) and ranges between 650 to 750g/kg DM. Whereas other tropical grasses showed a daily decline of 0.30 to 0.50 units of DM digestibility, Napier grass only declined by 0.20 units per day (Reid *et al*. 1973) which was lower than the mean of 0.26 units per day for tropical forages (Minson, 1990). This makes Napier an attractive feed since it can retain a given level of digestibility for a slightly longer period compared with other tropical grasses. Stobbs& Thompson (1975) reported that OM digestibility of most tropical grasses ranged from 50 to 60% which is consistent with observations by Minson (1990). However in well fertilized fields, Chaparro&Sollenberger (1997) recorded a range of 65 to 79 % in *vitro* DM digestibility for dwarf Napier grass so it is important to bear in mind that climate, soil fertility, cutting interval, variety and management practices may have an important influence on chemical composition and digestibility of Napier grass.

A study covering all main Napier grass growing areas in Kenya showed that the mean CP level on farms was 76g/kg DM (Wouters, 1987). Results from other parts of the world as summarized by Gohl (1981) and from Kenya as reviewed by Schreuder*et al.* (1993) indicate that the CP values commonly recorded for Napier grass lie between 50 and 90 g/kg DM. Observations from more recent studies are generally in agreement, as shown in Table 4. These results contrast with those for dwarf Napier grass whose CP content has been reported to range between 80 and 150 g/kg (Chaparro&Sollenberger, 1997; Flores *et al.* 1993, Sollenberger& Jones, 1989) under good management and high fertilizer application.

Previous studies on Napier grass in Eastern Africa have concentrated on aspects such as effects of climate, fertilizer and cutting interval on DM yield, and to a lesser extent on leaf stem ratio, proximate composition and in vitro digestibility (Anindo& Potter, 1994; Wouters, 1987; Karanja, 1984; Reid *et al*., 1973). Similar studies have been reported from other parts of the world (Chaparro&Sollenberger, 1997; Mislevy*et al*. 1989). Compared to other well known tropical pasture grasses such as *Digitariadecumbens, Chlorisgayana,* Kikuyu grass (*Pennisetumclandestinum)* and *Panicum maximum*, relatively few data are available on the effects of feeding Napier grass on animal performance (Minson, 1990, Minson& McLeod, 1970).

Conclusions:-

The results so far obtained that in terms of nutritive values, ADF and DM degradability the MERKERON and WURR-WONA are better than other cultivars. In addition to biomass production the cultivars of Napier ranked in the order of BLRI N.hybrid> MERKERON > BLRI Napier 4 > WRUK-WONA > Napier –Japan. Intake and digestibility studies including all cultivars are need to be evaluated through further research.

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