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Short Communication

Effect of different organic manures on BLRI developed Napier-4 fodder production in Bangladesh

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Abstract: An agronomical trial on Napier fodder was conducted to determine the biomass yield and chemical composition with the effect of different sources of organic manures such as biogas slurry, broiler litter and layer litter for fodder production. There was significant ($P<0.05$) difference in biomass yield and chemical composition among different treatment groups. The maximum biomass yield (mt/ha) was observed in layer litter ($16.67^{a}\pm 0.89$) followed by Broiler litter ($10.05^{bc} \pm 0.10$), Biogas slurry ($08.97^{bc}\pm 0.99$) and control group ($06.65^{c}\pm 0.90$; respectively. It also showed that number of tiller/hill was significantly ($P\leq0.05$) differed among the treatments and maximum observed in layer litter ($19.50^{a} \pm 1.05$) than others. The DM% in all groups was mostly similar but DM yield was the highest ($19.11\pm 0.44\%$)) in layer litter compared to others group. It may be suggested that layer litter may be used as organic sources of fertilizer as well as the soil health and fodder cultivation for small to large scale farmers in Bangladesh.

Keywords: Napier fodder; organic manures; yield; tiller

1. Introduction

The shortage of quality feed and fodder remains one of the major reasons for low productivity in livestock in developing countries like Bangladesh (Tareque and Chowdhury, 2010). Most of the livestock farmers meet their fodder requirements by grazing animals on common land, fallow agricultural field or harvested agricultural land. Traditional green grasses in pasture land and aforesaid areas have been reducing gradually and the demands of cultivated fodders in these areas are increasing rapidly. Assuming that milk production, breeding efficiency, growth rate and disease resistances are reducing due to acute shortage of green grass during the lean period. BLRI developed high yielding fodder crops those can minimize the acute feed shortage in those areas. Napier grass (*Pennisetum purpureum*) is a perennial grass grown widely as a fodder crop and feed for the cut-and-carry zero-grazing dairy systems (Bayer, 1990) and constitutes up to 80 % of forage for smallholder dairy farms (Stall *et al*., 1987). It is the forage of choice not only in the tropics but also worldwide (Hanna *et al*., 2004) due to its desirable traits such as tolerance to drought and a wide range of soil conditions and high photosynthetic and water-use efficiency (Anderson *et al*., 2008). While much attention has been directed towards research for improving the productivity of major cereal crops (Katz, 2003), there has been comparatively little effort to improve Napier grass an important forage crop that has been grown over centuries and currently enjoys a multiplicity of uses besides conventional animal consumption (Jaradat, 2010). Considering the acute shortage of green fodder in the milk shed areas of milk vita, BLRI Regional Station (RS) has taken various effective initiatives to mitigate the feeds and fodder problems in the milk vita areas. About ten (10) lakh fodder cuttings of BLRI developed Napier-4 were given to the dairy farmers in each year from 2012 to till date. Recently, BLRI developed Napier-4 fodder genotype has gained more popularity among the

dairy farmers of Baghabri milk pocket areas. Hence, the present study was undertaken along with conservation and maintenance of different high yielding fodder crops with the objectives to know the effect of fertilizers on BLRI developed Napier-4 fodder production at Regional Station.

2. Materials and Methods

2.1. Experimental location

An agronomical trial was conducted at BLRI regional station, Baghabari, Shahjadpur, Sirajgonj during March 2014 to June 2014.

2.2. Propagation method

Vegetative propagation method was used for propagation of BLRI Napier-4 fodder with line to line and plant to plant distance of 70 cm and 30 cm, respectively.

2.3. Experimental layout

Twelve experimental plots were distributed into four blocks. The area of each plot was 170 ft^2 and the plots were prepared by ploughing. There were four treatment groups' viz. biogas slurry, broiler litter, layer litter and chemical fertilizer as control. Layout of the experiment was shown in Table 1.

Table 1. Layout of the experiment.

Replication	Treatment			
	T_1	T_2	T_3	T_0
R_1	T_1 R_1	T_2R_1	T_3R_1	T_0R_1
R_2	T_1 R_2	T_2 R_2	T_3 R_2	T_0 R_2
R_3	T_1 R_3	T_2 R_3	T_3 R_3	T_0 R_3

$T_{1=}$ Biogas slurry, T_2 = Broiler litter, T_3 = Layer litter, T_0= No organic manure

2.4. Sample analysis

The feed samples from each plot of different treatment groups were taken for analyzing nutrient composition at the Nutrition Laboratory of BLRI Regional Station, Baghabari, Sahjadpur, Sirajgonj.

2.5. Statistical analysis

Collected data were analyzed by using the 'SPSS' statistical program. Duncan's Multiple Range Test (DMRT) was used to determine the differences among the treatment means.

3. Results and Discussion

The biomass yield and morphological characteristics of BLRI Napier-4 fodder are presented in Table 2. It was observed that significant ($P<0.01$) difference was observed in biomass yield among different treatment group. Biomass yield (mt/ha) was in order of Layer litter ($16.67^{a}\pm 0.89$)> Broiler layer ($10.05^{bc} \pm 0.10$)> Biogas slurry ($08.97^{bc}\pm 0.99$)> Control group ($06.65^{c}\pm 0.90$). Number of tillers per hill in all plots applied manures was significantly higher than the plot of control group, although overall differences were not significant. Total biomass yield in 2nd cutting was significantly ($p<0.001$) higher than 1st cutting. On the other hand, here was no significant variation of number tiller per hill on cutting interval. The overall biomass yield and number of tiller per hill irrespective of different treatment groups and cuttings were 10.58±0.49 metric tons/hectare and 17.00±0.67, respectively. There was no significant ($p>0.05$) interaction effect between treatment and cutting interval for both biomass yield and number of tiller per hill.Our result agreed with the result of Islam *et al* (2010). Islam *et al* (2010) stated that Poultry liter and biogas slurry increased biomass yield of maize fodder. Dauden and Quilez (2004) conducted a maize fodder yield experiment using different levels of pig slurry, and observed no significant differences in plant height or biomass yield between the different treatments. According to Zillur *et al.* (2015) the results revealed that Biogas slurry was reduced the expenditure of cultivation cost of fodder but our findings disagreed with his findings.

Chemical composition of Napier fodder under different treatment groups and cutting intervals and their interaction effect are given in Table 3. There was no significant ($p>0.05$) difference among treatment groups for the chemical composition of DM%, Ash% and CP%. But ADF was differed significantly ($p<0.05$) among treatment groups that may be effect of organic manures. There was no significant ($p>0.05$) difference between 1st and 2nd cutting. Table 3 showed that chemical composition was not influenced significantly ($p<0.05$) by the

interaction effect of different treatment groups and cuttings. In Kenya, the average dry matter yields vary between 10 and 40 t DM ha-1 yr-1 depending on soil fertility, climate, and management (Schreuder *et al*., 1993). Napier grass on average contains 20% DM, 7 to 10% CP, 70% NDF, 45% ADF (Gwayumba *et al*., 2002; Islam *et al*., 2003). But our findings slightly higher than Gwayumba *et al*. (2002) and Islam *et al.* (2003) these may occur because forages when harvested at early stages of their development have relatively higher crude protein content, other extract and ash content, but crude fiber, acid detergent lignin, hemicelluloses and cellulose increase with later harvesting resulting in decreased dry digestibility (Mirza *et al.*, 2002).

Table 2. Production parameters of fodder under different treatment groups.

Factors		Production parameters (Mean ± SE)	
		Biomass yield	**Number tiller/hill**
Treatment	Biogas slurry	8.97^{bc}± 0.99	18.00^{a}±1.34
	Broiler layer	10.05^{bc} ± 0.99	15.67^{a}± 1.02
	Layer litter	16.67^{a}± 0.99	19.50^{a} ± 1.02
	Fertilizer	6.65^{c}± 0.99	14.83^{b}± 1.02
	Level of significance	p<0.001	p>0.05
Cutting	1st cutting	8.55^{b} ± 0.69	16.67±0.95
	2^{nd} cutting	12.61^{a} ± 0.69	17.33±0.95
	Level of significance	p<0.001	p>0.05
Overall mean		10.58 ± 0.49	17.00±0.67
Interaction (treatment x cutting)		p>0.05	p>0.05

Least square means with different superscript along the column differed significantly (p<0.001) and (p<0.005)

Table 3. Chemical compositions of fodder.

Factors		Chemical composition (Mean ± SE)			
		DM (%)	**Ash (%)**	**CP (%)**	**ADF (%)**
Treatment	Biogas slurry	18.65± 0.44	12.23±1.02	12.50± 0.35	44.08^{ab} ± 0.51
	Broiler layer	18.19 ± 0.44	11.59± 1.02	12.02± 0.35	42.76^{a}± 0.51
	Layer litter	19.11± 0.44	12.81 ± 1.02	11.74± 0.35	45.29^{b} ± 0.51
	Fertilizer	19.42± 0.44	11.77± 1.02	11.45v± 0.35	44.91^{b} ± 0.51
	Significance level	p>0.05	p>0.05	p>0.05	(p<0.05)
Cutting	1st cutting	18.92 ± 0.31	12.36±0.72	11.97± 0.25	44.39± 0.36
	2^{nd} cutting	18.77 ± 0.31	11.83±0.71	11.98± 0.24	44.13± 0.25
	Significance level	p>0.05	p>0.05	p>0.05	p>0.05
Overall mean		18.84 ± 0.21	12.10±0.51	11.92± 0.18	44.26± 0.26
Interaction effect (treatment x cutting)		p>0.05	p>0.05	p>0.05	p>0.05

Least square means with different superscript along the column differed significantly (p<0.001) and (p<0.005)

4. Conclusions

From the results of the experiment, it can be concluded that layer litter is more suitable for biomass yield of Napier production compare to other inorganic sources.

Conflict of interest

None to declare.

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