

Effect of Organic and Inorganic Fertilizers on Proximate Analysis of Rhodes Grass (*Chloris gayana* L. Knuth.)

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Abstract A field experiment was conducted during (2009/2010) season in Demonstration Farm of the Faculty of Agricultural Studies, Sudan University of Science and Technology at Shambat, Sudan. The objective was to study the effect of fertilizers (urea, farmyard and chicken manure) on nutritive value of Rhodes grass. The fertilizer treatments used in this study were urea [U (100KgN/ha)], farmyard manure [FYM (5ton/ha)], chicken manure [CHM (3ton/ha)], combinations between them (U+FYM, U+CHM, FYM+CHM, and U+FTM+CHM) with 8 cuts (Two months firstly and monthly after that to 8th cut). The experiment was arranged in Randomized Complete Block Design (RCBD) with three replicates. The results revealed that all proximate analysis parameters were not significantly affected by fertilizers.

Keywords Rhodes Grass; Fertilizers; Organic; Inorganic; Sudan

1. Introduction

Forage production is gaining more attention in the tropics and subtropics; in both developed and developing countries. New species, varieties and cultivars of forage and pasture plant have been introduced from areas and countries rich in forage and pasture plant to areas where they are scarce. In Sudan forage production is very important because the forage is basic source of energy for growth and maintenance and product increment of livestock. Additionally, it is important due to the fact that Sudan has a huge number of animals which is estimated to about 143 million heads in 1998 (63 m goats, 42 m sheep, 35 m cattle and 3 m camels) (Mohammed, 2000).

Rhodes grass (*Chloris gayana* L. Kunth.) is a summer-growing, stoloniferous perennial, whose runners provide good soils, from infertile sands to fertile brigalow clays. It is difficult to established and have persistent on heavy cracking clay soils. Rhodes grass is one of the best

grasses for rotation land in tropical and subtropical areas, useful for establishment pasture leys. It is suitable for silage and hay liked by all kinds of stock but may causes skin trouble in horses. Its ability to establish rapidly makes it valuable for soil conservation (Reed, 1976).

Hassan (2002) reported that higher rate of chicken manure (7.5 tons/fed) significantly increased a number of growth attributes, HCN content, nutritive value and forage yield (fresh and dry) of two forage sorghum grass than the control. Adam (2004) observed that nitrogen improved forage quality by increasing crude protein of Teff grass. Others similar results were obtained by Eltelib (2004), Gasim (2001) and Soliman (2005). Moreover, Abbas (2003) and Gasim (2001) found that crude protein increased with increased phosphorus application. Gasim (2001) stated that increased in nitrogen level reduced fiber content of maize forage. Abbas (2003) showed that crude fiber decreased with addition of phosphorus. Kafats (1990) reported that nitrogen fertilization increased the crude protein of Rhodes grass by 15% at the early stage of growth. The main objective of this research is to evaluate the nutritive value of the forage as affected by different nitrogen sources.

2. Material and Methods

A field experiment was conducted during (2009/2010) season in Demonstration Farm of the Faculty of Agricultural Studies, Sudan University of Science and Technology at Shambat, Sudan, to study the effect of fertilizers (urea, farmyard and chicken manure) on nutritive value of Rhodes grass. The experimental site lies at latitude 15°40'N, longitude 32°32' E and 280 meters above sea level. The climate of the locality is semi-desert (Adam, 1996). The soil is alkaline (pH 8.0), cracking clay with about 50% clay content. It contains about 0.065% nitrogen (N), 0.230 meq/L potassium (K) and 0.193 meq/L available phosphorus (P) as determined by El Basari (1999). The treatments composed of three fertilization treatments 100kg N/ha as urea (U), 5ton/ha as farmyard manure (FYM), 3ton/ha as chicken manure

(CHM) and combinations (U+FYM, U+CHM, FYM+CHM and U+FYM+CHM) and no fertilizer as the control, in three replications. Treatments were arranged in a Randomize Complete Block Design (RCBD) with 8 cuts (The first cut was harvested after two months and the others were monthly).

The forage was sown on 1st June 2009 to 1st March 2010 and the fertilizer treatments were applied at sowing. The samples which were determined dry weight were completely dried by oven and plant samples were ground using an electrical grinder. Then Crude protein (CP%), crude fiber (CF%), ash% according to Association of Official Agricultural Chemists "A.O.A.C." (1984), and Minerals (N, P, K, Na, Ca and Mg) were calculated. The data were statistically analyzed by Computer program (M STAT-C) (1989). Means separation was performed by using LSD (Least Significant Difference) procedure.

3. Results and Discussion

The results cleared that mean crude protein; crude fiber and ash content were not significantly affected by fertilizers (Table 1). These results agreed with Saad (2009) who reported that mean crude fiber was not significantly affected by nitrogen. The results showed that the best mean crude protein was obtained when three mixed fertilizers was used and the lowest mean crude fiber when mixing farmyard and

chicken manure. Therefore, the best applied fertilizers was the mixture because more and more nitrogen and others minerals were incorporated. Nitrogen plays a great role in synthesis of protein. Also, phosphorus plays an important role in starch. Similar results regarding the increased crude protein due to the fertilizers application were obtained by several researchers. These results agreed with Brima (2007) who found exactly the same results. Also Adam (2004) observed that nitrogen improved forage quality by increasing crude protein of Teff grass. Others similar results were obtained by Eltelib (2004), Gasim (2001) and Soliman (2005). Moreover, Abbas (2003) and Gasim (2001) found that crude protein increased with increased phosphorus application. Gasim (2001) stated that increased in nitrogen level reduced fiber content of maize forage. Adam (2004) reported similar results on effect of nitrogen and Abbas (2003) showed that crude fiber decreased with addition of phosphorus. Results showed that mean crude protein in 1st cut was better than 8th cut. This is due to the fact that the 1st was early stage of forage but the 8th was late stage of forage. This is in agreement with Keftasa (1990) who reported that nitrogen fertilization increased the crude protein of Rhodes grass by 15% at the early stage of growth, but the percentage reduced at advanced growth stage. The results showed that mean minerals content (N, P, K, Na, Ca and Mg) was not significantly affected by fertilizers (Table 2 and 3).

Table 1. The effect of different fertilizers on crude protein, crude fiber and ash content during -2009/2010

Treatments	Crude Protein		Crude Fiber		Ash content	
	No. of Cuts		No. of Cuts		No. of Cuts	
	1	8	1	8	1	8
Urea (U)	7.87	8.64	37.42	34.33	14.00	14.90
Farmyard Manure (FYM)	10.80	6.83	37.99	35.64	11.50	14.63
Chicken Manure (CHM)	8.70	7.36	32.73	35.73	14.00	14.52
U+FYM	10.61	7.11	34.05	34.95	15.10	14.43
U+CHM	11.75	6.48	30.67	36.16	15.20	14.63
FYM+CHM	10.45	5.11	29.32	35.95	15.10	14.35
U+FYM+CHM	13.25	6.84	37.02	37.57	15.60	12.25
Control	10.98	8.35	37.84	35.68	15.00	14.70
LSD 5%	3.78	2.594	9.75	2.60	4.25	2.40
C.V	20.45	20.89	34.63	4.15	16.82	9.57
SE±	2.16	1.48	5.57	1.49	2.43	1.37

U= Urea. FYM= Farmyard Manure. CHM= Chicken Manure. LSD= Least Significant Difference. CV%= Coefficient of Variation. SE±= Standard Error.

Table 2. The effect of different fertilizers on nitrogen, phosphorous and potassium during -2009/2010

Treatments	Nitrogen		Phosphorous		Potassium	
	No. of Cuts		No. of Cuts		No. of Cuts	
	1	8	1	8	1	8
Urea (U)	1.251	1.372	3.12	3.63	18.86	10.27
Farmyard Manure (FYM)	1.778	1.092	2.16	2.35	14.88	9.30
Chicken Manure (CHM)	1.387	1.166	3.26	4.09	17.91	10.10
U+FYM	1.708	1.130	2.56	3.01	16.91	9.73
U+CHM	1.895	1.036	2.95	3.07	20.16	9.83
FYM+CHM	1.670	0.805	3.06	3.34	18.12	9.53
U+FYM+CHM	2.119	1.092	2.61	3.10	17.67	10.17
Control	1.783	1.335	2.84	2.95	17.70	10.47
LSD 5%	0.640	0.413	0.84	1.37	2.19	1.37
C.V	21.58	20.91	16.90	24.47	12.33	10.41
SE±	0.366	0.237	0.48	0.78	3.84	1.81

U= Urea. FYM= Farmyard Manure. CHM= Chicken Manure. LSD= Least Significant Difference. CV%= Coefficient of Variation. SE±= Standard Error

Table 3. The effect of different fertilizers on sodium, calcium and magnesium during--- 2009/2010

Treatments	Sodium		Calcium		Magnesium	
	No. of Cuts		No. of Cuts		No. of Cuts	
	1	8	1	8	1	8
Urea (U)	28.09	11.57	6.67	8.00	8.00	11.33
Farmyard Manure (FYM)	24.32	10.40	7.33	8.67	6.00	10.67
Chicken Manure (CHM)	28.45	9.63	8.00	8.00	8.00	14.33
U+FYM	28.32	9.97	7.67	7.67	8.00	15.00
U+CHM	36.76	11.67	8.00	8.33	10.00	15.33
FYM+CHM	31.60	8.77	8.33	10.33	9.00	13.33
U+FYM+CHM	32.46	10.27	9.33	10.00	7.00	13.33
Control	30.12	10.47	6.33	10.00	6.00	16.67
LSD 5%	10.74	3.83	2.28	2.98	2.19	4.05
C.V	20.43	21.15	16.87	19.14	12.33	29.55
SE±	6.13	2.19	1.30	1.70	3.84	2.31

U= Urea. FYM= Farmyard Manure. CHM= Chicken Manure. LSD= Least Significant Difference. CV%= Coefficient of Variation. SE±= Standard Error.

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