EFFECT OF CHEMICAL FERTILIZER, POULTRY DROPPINGS AND COW DUNG ON CHEMICAL COMPOSITION OF MAIZE LEAVES

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ABSTRACT
An experiment was conducted to determine the effect of different types of fertilizers on chemical composition of maize leaves. The experiment consisted of three treatments; treatment 1 (T1) was cow dung, treatment 2 (T2) was poultry droppings and treatment 3 (T3) was NPK fertilizer. After harvest, the chemical composition (organic matter (OM), dry matter (DM), acid detergent fibre (ADF), neutral detergent fibre (NDF), acid detergent lignin (ADL) and crude protein (CP) of the leaves were determined. The result indicated that treatment with cow dung was superior over the other two treatments in terms of NDF, ADF, ADL and CP. It was concluded that maize leaves fertilized with cow dung could be more digestible leading to more passage and intake by ruminants.

Keywords: NPK, poultry droppings, cow dung, maize leaves, chemical composition

INTRODUCTION
According to Arthur (2009) the use of crop residues has not been adopted by most tropical farmers, partly because they are not adequately informed about the nutrient values of these residues. Crop residues comprises of variety of feedstuff, some of high nutritive value like bran, broken grain, oil seed cake, and others of low nutritive value like straw and stover (Joshi, *et al.,* 2005). They further stressed that, in low inputs farming system, crop residues have increasingly become important source of feed, manure and bedding materials. Alexandratos (2008) also reported that crop residue may be used for thatching, mulching, fencing, mushroom production and fuel. Capper (2008) reported that the quality of crop residue is expressed in different ways in term of stem thickness, leaf content, sweetness or colour, chemical composition like crude protein, organic matter, cell wall and cell wall content, digestibility and dry matter intake.
Lustosa *et al.* (2017) reported that the excreta of birds ferment very quickly. If left exposed, 50 percent of its nitrogen is lost within 30 days. Poultry manure contains higher nitrogen and phosphorus compared to other bulky organic manures. The average nutrient content is 3.03 per cent N; 2.63 per cent P_2O_5 and 1.4 per cent K_2O (Lustosa *et al*, 2017). According to Tanimu*et al.*(2013), application of cow dung reduces the organic matter content of maize crop compared to the chemical fertilizer as many researchers reported increase in dry matter yield of stover and plant height using chemical fertilizer.The objective of this research work was to evaluate the effect of chemical fertilizer, poultry droppings and cow dung on chemical composition of maize leaves.

MATERIALS AND METHODS

Experimental Site

The experimental site was the Teaching and Demonstration Farm of the Federal College of Education (Technical), Gusau, (latitude 07^0 and 12^0 W and longitude 4^0 S 17^0 N, 139.5 m above sea level) in the northern Guinea Savanna ecological zone of Nigeria during the 2018 rainy season.

Treatments and Experimental Design

The experiment consisted of three (3) treatments: treatment 1 (T1) was chemical fertilizer (NPK and Urea), treatment 2 (T2), Cow dung while treatment 3 (T3) poultry droppings. The treatments were replicated three times making a total of nine (9) experimental units. The experimental design adopted was Randomized Complete Block Design.

Land Preparation and Field Layout

The land was ploughed, harrowed and ridged at 75cm apart to obtain a fine tilt and then marked out into required plot sizes with 1.0 m spacing between replications and 0.50 m spacing between plots. The total field size was 13.25m × 4.75m (62.938m^2) and the plot sizes were3.75m × 1.25 m (4.6875m^2) comprising 5 ridges in each plot.

Seed Treatment and Sowing

The seeds (SAMMAZ 20) were dressed with Apron-star at the rate of 10 g per 2.0 kg of seeds before sowing, in order to protect the seeds from soil borne diseases and pests. Two seeds were sown per hole and thinned to 1 plant per stand two weeks after sowing.

Fertilizer Application and Weed Control

Compound fertilizer (NPK 20:10:10) was applied by side placement at the rate of 250 kg ha^{-1} two weeks after planting for T1, cow dung and poultry droppings at the rate of 125$ha^{-1}$for T2 and T3 respectively to supply total nutrients of 95.0 N; 37.5 P_2O_5; 37.5 K_2O kg ha^{-1}.Weeds were controlled manually with hoe at 2 and 6 weeks after planting.

Data Analysis

Data collected was subjected to analysis of variance as described by (Geoff, 2015). Significant differences between treatment means were compared with Least Significant Difference (LSD) using SAS statistical package (2002 Version 9).

RESULTS AND DISCUSSION

Therewas no effect ($p \leq 0.05$) of treatments on DM content of the leaves. The DM contents were 95.28, 95.46 and 95.14% for cow dung, poultry dropping and NPK respectively.Fang *et al,* (2014) reported 92.96% DM for maize leaf; the difference in value may be due to climatic factors such as soil, rainfall and temperature (Prasad *et al.*, 2003).

Effect ($p \leq 0.05$) of treatment was observed on ash content of the leaves. The ash contents were 8.04, 7.28 and 7.62% for cow dung, poultry dropping and NPK respectively. Cow dung significantly recorded the highest ash content while poultry dropping was similar ($p \leq 0.05$) with NPK. The values of ash contents recorded in this experiment (7.28 – 8.04%) were similar to 9.9% reported by Eyob *et al.* (2017) but different from 2.19% reported by David *et al,* (2016). The difference may be attributed to difference in soil and other climatic factors.

There was effect ($p \leq 0.05$) of treatment on OM content of the leaves; their OM contents were 91.96, 92.72 and 92.33% for cow dung, poultry dropping and NPK respectively. The result indicated that poultry droppings had the highest OM while cow dung recorded the lowest. The organic matter recorded in this experiment ranged from 91.96 – 92.72% and these values were similar to 90.01% reported by Eyob*et al.* (2017) for maize leaf.

Effect ($p \leq 0.05$) of treatment was observed on NDF of the leaves. The NDF contents were 40.05, 44.11 and 47.12% for cow dung, poultry droppings and NPK respectively. The result indicated that NPK had the highest NDF while cow dung had the lowest. The NDF recorded in this experiment ranged from 40.05 – 47.12%, however, Van Soest *et al,* (2001) reported 51.5%. The difference may be attributed to genetic composition of the maize crops (Reed, *et al.*, 2008)

Effect ($p \leq 0.05$) of treatment was observed on ADF contents of the leaves. The ADF contents were 20.50, 25.13 and 25.36% for cow dung, poultry droppings and NPK respectively. The result indicated that NPK and Poultry dropping were similar($p \leq 0.05$) while cow dung had the least ADF contents. The ADF contents recorded in this experiment ranged from 20.50 – 25.36%, however, the values reported by Eyob et al, (2017) ranged from 32.5- 40.5%. The difference in values may be attributed to genetic composition of the maize crops and other climatic factors (Reed, *et al.*, 2008, Prasad *et al.*, 2003).

Table 1: Effect of Different Types of Fertilizer on Chemical Composition of Maize Leaves

Treatment	DM	Ash	NDF	ADF	ADL	CP	OM
Cow Dung	95.28[a]	8.04[a]	40.05[c]	20.50[b]	0.42[c]	12.41[a]	91.96[b]
NPK	95.14[a]	7.62[ab]	47.12[a]	25.36[a]	1.42[a]	10.70[b]	92.38[ab]
Poultry Droppings	95.46[a]	7.28[b]	44.11[b]	25.13[a]	0.65[b]	10.09[b]	92.72[a]
LSD	0.6171	0.5231	0.405	0.4385	0.1846	0.7092	0.5231
Significance level	NS	*	***	***	***	**	*
Mean	95.2922	7.64333	43.7589	23.6644	0.83111	11.0667	92.3567
CV (%)	0.28565	3.0191	0.40823	0.81734	9.79546	2.82684	0.24986

Means within a column of treatments followed by the same letter are not significantly different at 5% level of probability using LSD, **, *** represent significant at P≤0.01 and P≤0.001 respectively, DM= Dry Matter, OM= Organic Matter, NDF= Neutral Detergent Fibre, ADF= Acid Detergent Fibre, ADL= Acid Detergent Lignin, CP= Crude Protein, SL = Significance Level, LSD= Least Significance Difference

Therewas effect (p≤0.05) of treatment on ADL contents of the leaves. The ADL contents were 0.42, 0.65 and 1.42% for cow dung, poultry droppings and NPK respectively. The result indicated that NPK had the highest (p≤0.05) ADL followed by poultry droppings. Cow dung had the least ADL. The ADL recorded in this experiment ranged from 0.42 – 1.42%, however, Logah, (2011) and Brussard *et al.*(2002) reported 16.40 – 17.21% and 6.8% respectively. The difference may be due to different in climatic condition such as rainfall, humidity and temperature (Prasad, *et al.*, 2003)

There was effect (p≤0.05) of treatment on CP content of the leaves. The CP contents were 12.41, 10.09 and 10.70% for cow dung, poultry droppings and NPK respectively. The result indicated that cow dung had the highest CP while poultry droppings and NPK were similar (p≤0.05) in crude protein. The CP recorded in this experiment ranged from 10.09 – 12.41% were similar to those reported by David *et al.*(2016) and Antonio *et al.* (2012) that reported 8.75% and 10.58 – 11.40% of CP respectively .

CONCLUSION

It was concluded that the NDF, ADF and ADL contents of maize leaves fertilized with cow dung were lowered compared to those of poultry droppings and NPK. The implication of this finding was that maize leaves fertilized with cow dung would be more digestible leading to more passage and intake compared to those fertilized with either poultry droppings or NPK fertilizer.

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