Influence of Chicken and Rabbit manure on the Nutritive quality of *Lablab pupureus, Mucuna pruriens* and *Centrosema pascuorum*

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Abstract

This **s**tudy was conducted to evaluate the effects of manure type on the proximate composition and fibre fractions of *Lablab pupureus, Mucuna pruriens* and *Centrosema pascuorum* during the rainy season of 2018. A total of 27 experimental plots (3×3 m each) were used for the study. The plots were laid out in a 3 x 3 factorial arrangement such that each unit had one of the 3 leguminous forage planted with one of the manure (control, rabbit, poultry) applied. Each plot was replicated thrice in a completely randomized design. Plant samples were harvested 12 weeks after planting for the determination of their chemical composition. In comparison with other legume studied, *C. pascuorum* had higher ($p<0.05$) Ash, Neutral detergent fibre (NDF) and Acid Detergent Lignin (ADL) content while *L. purpureus* showed higher ($p<0.05$ values for Crude Protein (CP), Nitrogen Free Extract (NFE) and Acid Detergent Fibre (ADF). Dry matter content of *M. pruriens* (86.64%) was also higher ($p<0.05$). Higher ($p<0.05$) values of CP, CF, NDF, ADF and ADL were found in legumes fertilized with either rabbit or poultry manure compared to the control. Application of rabbit manure led to a significant improvement in the DM, CF and fat and CP, and ash content of *M. pruriens* and fat and NDF contents in *L. purpureus*. Therefore application of rabbit manure to legumes understudied is recommended for improved nutritive quality.

Introduction

Ruminant animals rely more essentially on pasture for their nutrient requirement than on any other feed resources (McDonald *et al*., 1995). Legumes such as *Lablab pupureus, Mucuna pruriens* and *Centrosema pascuorum* have been used as feed resources for bovines, sheep and goats due to their high CP content and their highly digestible fibre compared to grasses They are rich in nutrients needed to supplement ruminant livestock in critical period (Ayala Burgos *et al.*, 2003). However, factors such as seasonal variations, poor quality soil have been shown to influence the nutritional quality as well as chemical compositions of forage species, (Sleugh *et al*., 2000). Thus the application of fertilizers and manures have been practised over the years to boost the DM content of the soil and consequently improve the nutritive quality of the legumes planted on them. However inorganic fertilizers are often associated with reduced crop yield, soil acidity and nutrients imbalance (Ojeniyi,2000), thus use of organic manure have been strongly advocated for (Gambara et al., 2002), Hence this study was designed to study the impact of rabbit and poultry manure on the nutritive quality of *Lablab pupureus, Mucuna pruriens* and *Centrosema pascuorum*

Materials and methods

The experiment was carried out at National Biotechnolgy Development agency, Abuja, Nigeria which lies within the latitude 4^0 4^1 and North and longitude 8^0 16^1 East, during the rainy season (August-November) 2018.The experimental land area following conventional tillage operations was cleared and harrowed after it was mapped out. Soil samples were randomly collected at the depth of 0-15 cm using soil auger. The samples were bulked per replicate, mixed thoroughly and sub samples were taken for analysis to determine their nutrient status.

Experimental design

A total of 27 experimental plots (3×3 m each) were used for the study. The plots were laid out in a 3 x 3 factorial arrangement such that each unit had one of the 3 leguminous forage planted with one of the manure (control, rabbit, poultry) applied. The experimental arrangement was done as follows

L. purpureus + control manure, *L. purpureus* + rabbit manure *L. purpureus* + poultry manure

C. pascuorum + control manure *C. pascuorum* + rabbit manure *C. pascuorum* + poultry manure

M. Pruriens + control manure *M. Pruriens* + rabbit manure *M. Pruriens* + poultry manure

Seeds of *Lablab purpureus, Centrosema pascuorum* and *Mucuna pruriens* were sourced from the National Animal Production Research Institute, Zaria. Prior to seed sowing, there was germinating test to determine the level of the seeds viability. The experimental land area was divided into three equal block each with space of 2 m between them. Each block was divided into individual plot size of 3m × 3m with 1 m between the plots. The manure was applied by broadcasting on the bottom of the seed bed mixed with soil and distributed equally to the entire plot using hand hoe .Two seeds each of the legumes were sown at 0.5 m (inter-row) × 0.5 m (intra-row) with an established planting density of 49 plants/$9m^2$

At week 12 of planting, legume samples (stem and leaf) were collected from each experimental plots and replicates. The dried forage samples were milled and allowed to pass through a 1mm sieve screen and subjected to proximate analysis (AOAC, 2010) and fibre fraction analysis. Neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL) was determined according to Van Soest *et al*. (1991) procedure. Cellulose was calculated as the difference between ADF and ADL while hemicellulose was calculated as the difference between NDF and ADF. Data collected were subjected to Analysis of Variance using SAS (1999) package and the treatment means separated using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

The effect of manure application on the proximate and fibre composition of *M puriens, L. purpureus* and *C. pascuorum* is shown on table 1. Compared to other legumes used in the present study, *C. pascuorum* had higher ($p<0.05$) CF, Ash, NDF, ADL contents, *L. purpureus* had higher ($p<0.05$) CP, NFE and ADF contents, while *M puriens*, had higher ($p<0.05$) DM contents. However, there were no differences in the fat content of the legumes considered. This trend observed are in sync with the observations of Agbogidi and Ofuko (2005) who reported that plants respond differently to environmental factors based on their genetic makeup and their adaptation capability. Higher CP content in *L. purpureus* compared to *M. pruriens*

in the present study is at variance with the report of Nyambati (2002) who reported that *M. pruriens* had a higher CP content than *L. purpureus* when both legumes were subjected to the same defoliation mode. These variations in observations may be probably attributed to differences in the precipitation received during the year of planting Badr et al. (2005)

Legumes fertilized with either rabbit or poultry manure had higher ($p<0.05$) CP, CF, NDF, ADF and ADL content compared to the control while fat content was not affected ($p>0.05$) by manure application.

Furthermore, application of Rabbit manure led to a significant improvement ($p<0.05$) in the CP, CF, Ash, Fat, NDF, ADF and ADL contents of *L. purpureus;* DM, fat, and ADF content of *M. pruriens*; DM,NFE and NDF content of *C. pascuorum.* The ash content of *M. pruriens* and fat content of *C. pascuorum* were also improved by application of poultry manure. Ash content recorded for the legumes in the present study is higher than the values of 66.6 and 71.8 g/kg DM reported by Nworgu and Ajayi (2005) which might be because of the manure application. The plants also had CP content higher than the minimum protein requirement of 100 – 120 g/kg DM recommended by ARC (1985) for ruminants

The NDF contents was however higher than the value of 410.9 g/kg DM reported by Mahala *et al*. (2012) which might be due to the higher age at harvest considered in this study as Minson (1990) as earlier reported that fibre constituents of a plant is dependent on its maturity.

In conclusion, the study seem to suggest that rabbit manure is superior to poultry manure with respect to boosting the nutritive quality of the legumes understudied particularly *L. purpureus.*

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Table 1:Effects of manure application on the proximate and fibre compositions (%) of *Lablab pupureus*, *Mucuna pruriens* and *Centrosema molle*

[a-i] Means along the same row with different superscripts are significantly ($p<0.05$) different ;SEM=Standard Error of Mean; ;NDF= Neutral detergent fibre; ADF=Acid detergent fibre; ADL=Acid detergent lignin; DM= Dry matter content; CP= Crude protein; EE= Ether extract, CF=Crude fibre, MC=Moisture content, ns=not significant, * signuficant