NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

EFFECT OF POULTRY MANURE ON GROWTH COMPONENTS OF SOME SELECTED FORAGES IN NORTHERN GUINEA SAVANNA ZONE OF NIGERIA

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Abstract

Field experiment was conducted to determine the effect of poultry manure application on the growth characteristics of four forages two legumes (*Mucuna pruriens* and *Stylosanthes hamata*) and two grasses (*Brachiaria ruziziensis* and Chloris gayana). The experiment was laid out as a 4x2 factoria in a Randomized complete block design with manure application and four forages at three replicates. Agronomy parameters and dry matter yield of the forages were determined eight weeks after sowing. The results shows that leaf fresh weight of Mucuna treated with poultry manure recorded significant values (304.58 g) over Mucuna without poultry manure (210.35g) and Stylosanthes both with (56.28g) and without poultry manure (87.77g). Similarly in stem fresh weight and herbage regrowth, Mucuna with poultry manure and without had significant higher values over Stylosanthes with poultry manure and control respectively. However, the dry matter values of both Mucuna and Stylosanthes with or without poultry manure shows no significant difference. On the grasses, the results showed that tiller density values of both Brachiaria and Chloris with or without poultry manure shows no significant difference. Both Brachiaria and Chloris with poultry manure recorded significant higher (55.52cm 60.45cm) values for plant height over Brachiaria and Chloris without poultry manure. Significant values for leaf density and leaf area of 469.00 and 73.61cm respectively was obtained from Brachiaria treated with poultry manure over other groups. It can be concluded based on this study that Mucuna and Brachiaria with poultry manure had better performance in most of the parameters measured over other groups. . Mucuna and Brachiaria are recommended because they could provide substantial quantities of fodder for ruminant nutrition if poultry manure is used as fertilizer.

Keywords: Brachiaria, Chloris, Mucuna, Stylosanthes and Poultry Manure

Introduction

One of the ways to increase livestock production in Nigeria is to increase the area and quality of legumes-based pasture (Nworgu and Ajayi, 2005). Forage legumes are important in Agriculture intensification (Tarawali *et al*., 2001) because they provide herbage for livestock, grain for humans, green manure to the soil, nitrogen to both companion and subsequent crops through legume fallows. Forage is the main source of feed for ruminants in most countries (Indah *et al*., 2020). In most of these countries, concentrate rations are unaffordable to small holder livestock farmers, while forage which provides most of the animal nutrition is supplied by natural vegetation. Natural pastures provide the cheapest feed for ruminants but deficient in required nutritional quality and unable to sustain the animals all year-round. The nutritive value of the predominant pasture species in the dry season is very poor with an average crude protein (CP) content of less than 7%, and grazing livestock may be deficient in about 50 % of their required CP intake (Khan and Habib, 2012). The practice of producing forage legumes and grasses is an alternative way identified for both commercial and smallholder farmers to provide nutritive quality forage to their livestock animals. However, there is need to have information on the growth component of some forages such Mucuna (*Mucuna pruriens*), Stylosanthes (*Stylosanthes hamata)*, Chloris (*Chloris gayana)* and Bracharia *(Brachiaria ruziziensis)* grown in the Northern Guinea Savanna Zone of Nigeria. Therefore the study is

aimed to evaluate the effect of poultry manure on the growth components of the four forages (2 legumes and 2 grasses) in terms of growth component,

3 MATERIALS AND METHODS

Experimental Site

The research was carried out at the teaching and research farm, Federal University of Technology Minna, Niger State, Nigeria. Minna is located within latitude 09^0 30^0 and 06^0 45^0 north and longitude 06^0 30^0 and 06^0 45^0 of the equator. It falls within the Northern Guinea Savanna agro-ecological zone of Nigeria. The mean rainfall varies from 1100 to 1600mm and mean temperature of between 21^0c and 35^0c (FMSC, 2015).

Source of experimental material

The seeds obtained were Mucuna pruriens, Stylosanthes hamate, Brachiaria ruziziensis and Chloris gayana (2kg each) from the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika, Zaria.

Experimental Design and Layout

A total land area of $100m^2$ was used for the trial. The experimental plot was laid out in a randomized complete block design (RCBD). The experimental plot was divided into 8 sub plot measuring ($12m^2$) each with 1m pathway represent the sowing arrangement shown as follows: Then each sub-plot was further divided into three sub-plot with each measuring $4m^2$ and 1m pathway as replicates totalling 24 sub-plots. Treatments were made in 4x2 factorial arrangements in a Randomized Complete Block Design with three replicates. For the Grasses, Treatment 1 was Bracharia without poultry manure, Treatment 2 Bracharia with poultry manure, Treatment 3 was Chloris without poultry manure, Treatment 4 was Chloris with poultry manure. For the Legumes, Treatment 1 was Mucuna without poultry manure, Treatment 2 was Mucuna with poultry manure, Treatment 3 was Stylosanthes without poultry manure and Treatment 4 was Stylosanthes with poultry manure.

Land Preparation

The land was cleared of trash, ploughed, then harrowed after one week of ploughing to provide a clean seed bed and to enhance early seed germination.

Method of Planting

Two methods of sowing were applied (*i.e* dibbling method and drilling method) dibbling method was used for Mucuna (1m x 1m) while the drilling method (1m) was used for Bracharia, Stylozanthes and Chloris. **The** seeds weresown when there was sufficient moisture for germination.

Weeding and Fertilizer Application

Weeding was carried out twice manuallyby using hoe (3 and 6 weeks) after sowing while poultry manure was applied at 2 weeks after sowing.

Data collection

The variables that were measured 8 weeks after sowing include: leaf fresh weight (LFW), stem fresh weight (SFW), leave stems ratio (L:S ratio) and fresh herbage yield (FHY) for legumes. Similarly, tiller density, plant height, leaf density, leaf length and width, leaf/stem ratio and dry matter yield for grasses.

Statistical analysis

Data collected were subjected to analysis of variance (SAS, 2019) and means separated using the Duncan's Multiple Range Test.

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5 Results and discussions

6 **Table 1 shows the effect of poultry manure on growth characteristics of some selected legumes. The result showed that there were no significant (P>0.05) differences on dry matter. However, there were significant (P>0.05) differences on leaf fresh weight (LFW), stem fresh weight (SFW), leaf ratio (LR), stem ratio (SR) fresh herbage yield (FHY) and herbage regrowth (HR). Mucuna with poultry manure (T2) had better leaf fresh weight (304.58g), leaf ratio (304.58g), stem ratio (191.52g), fresh herbage yield (496.03g), herbage regrowth (432.25g), and stem fresh weight (191.52g) than Stylosanthes with and without poultry manure. The variations observed on both treatments may be due to the effects of poultry manure and species. The findings of this research negates that of Mubiru and Olet (2021), who reported a non-significant (P>0.05) difference on growth parameters when poultry manure was applied to cowpea.**

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8 Table 1: Effect of poultry manure on growth parameters of selected legumes

Parameters	T1	T2	T3	T4	SEM	LS
Leaf Fresh Weight(g)	210.35^{b}	304.58^{a}	56.28^{c}	87.77^{c}	30.80	*
Stem Fresh Weight(g)	125.10^{a}	191.52^{a}	40.33^{b}	48.77^{b}	20.96	*
Leaf Ratio	210.35^{b}	304.58^{a}	56.28^{c}	87.77^{c}	30.30	*
Stem Ratio	125.10^{a}	191.52^{a}	40.33^{b}	48.77^{b}	20.96	*
Fresh Herbage Yield(g)	332.67^{b}	496.03^{a}	96.77^{c}	144.02^{c}	50.98	*
Herbage Regrowth(g)	374.18^{a}	432.25^{a}	133.05^{b}	185.83^{b}	39.10	*
Dry Matter(g)	21.79	22.93	25.92	28.39	1.27	NS

$^{a\ b\ c}$ = Means bearing different superscripts within the same row differ. * = (P<0.05), NS = Not Significant (P>0.05), SEM = Standard Error of Means, T1= Mucuna without poultry manure, T2= Mucuna with poultry manure, T3= Stylosanthes without poultry manure and T4=Stylosanthes with poultry manure.

Table 2 shows the effect of poultry manure on selected grasses. The results showed that there were no significant differences on tiller density (TD) and dry matter (DM). However, there were significant (P<0.05) differences on plant height (PH), leaf density (LD), leaf area (LA), leaf ratio (LR) and stem ratio (SR). Chloris with poultry manure and Brachiaria with poultry manure had significantly better plant height (60.45cm and 55.52cm) than Chloris without poultry manure and Brachiaria without poultry manure. Chloris with and without poultry manure had significantly better leaf ratio (84.42 and 86.25g) than Brachiaria with and without poultry manure. Brachiaria with poultry manure had significantly better leaf density (469.00) and leaf area (73.61cm) than brachiaria without poultry manure, Chloris with and without poultry manure. This could be the effect of poultry manure and forage species in case of Chloris. This agrees with the work of Ogedegbe and Ewansiha (2016) who reported significantly (P<0.05) better growth, higher fresh herbage and dry matter yield when poultry manure was used to fertilize *Chloris gayana.*

9 Table 2: Effect of poultry manure on growth parameters of selected grasses

Parameters	T1	T2	T3	T4	SEM	LS
Tiller density	130.75	142.02	137.33	144.85	04.37	NS
Plant height	47.00^{c}	55.52^{a}	49.52^{c}	60.45^{a}	01.79	*
Leaf density	352.37^{b}	469.00^{a}	213.43^{c}	256.92^{c}	31.72	*
Leaf area(cm)	61.51^{b}	73.61^{a}	16.15^{c}	22.39^{c}	07.57	*
Leaf ratio	49.42^{b}	46.93^{b}	86.25^{a}	84.42a	05.63	*
Stem ratio	50.52^{a}	52.76^{a}	13.75^{b}	15.58^{b}	05.60	*
Dry matter(g)	25.68	25.87	24.08	24.02	01.44	NS

^{a,b,c} = Means bearing different superscripts within the same row differ. * = (P<0.05), NS = Not Significant, SEM = Standard Error of Means, T1=Bracharia without poultry manure, T2=Baracharia with poultry manure, T3= Chloris without poultry manure, T4= Chloris with poultry manure.

Conclusion and Recommendation

It can be concluded based on this study that Mucuna and Brachiaria with poultry manure had better performance in most of the parameters measured over other groups. Therefore Mucuna and Brachiaria are recommended because they could provide substantial quantities of fodder for ruminant nutrition if poultry manure is used as fertilizer.

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