DRY MATTER YIELD OF UNCULTIVATED FORAGE SPECIES AS AFFECTED BY GRADED LEVELS OF POULTRY MANURE IN SEMI-ARID ENVIRONMENT OF ALIERO LGA, KEBBI STATE, NIGERIA

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ABSTRACT
The Dry Matter Yield (DMY) of uncultivated forage species as affected by varying levels of poultry manure was investigated in the semi-arid area of Aliero LGA of Kebbi State at the Botanical Garden of Kebbi State University of Science and Technology during the 2021 rainy season. Treatments consisted of four varying poultry manure rates (0.00kg/T, 1.50kg/T, 2.50kg/T and 3.50kg/T) representing treatments 1, 2, 3 and 4 respectively which were applied two weeks before the commencement of the experiment, on four blocks consisting of three plots per block with each plot measuring (2.5m x 1.5m). The plots were laid out in a Randomized Complete Block Design (RCBD). All the free growing natural pasture within each plot were cleared to allow regrowth under rain-fed regime. There were two (2) weeks fortnightly visits to observe the regrowth of the forage species and to remove weeds from the experimental plots and to clear the paths which lasted for nine weeks. After nine weeks of free growth, one (1) replicate from each treatment was randomly selected for herbage harvest and estimation yield. Using a sharp sickle, all the forages of the selected plots were individually cut from 5cm above the ground level. Fresh herbage yield for individual specie were oven dried at 65^0C for 48 hours to determine the dry matter weights in grams (g) with the use of weighing balance. The dominant forage species identified are; two forbs (*Euphobia convolvuloides* and *Sida cordifolia*), three grasses (*Eragrotis tremula*, *Axonopus spp* and *Pennisetum horndeoides*) and one legume (*Crotalaria spp*). The poultry manure application rates had significant ($p<0.05$) effect on the DMY of the uncultivated forage species with the highest (94.20g) DMY was recorded for *Pennisetum horndeoides* in treatment 3 while *Axonopus spp* had the least value (6.23g) in treatment 4 but with the highest value (36.00g) recorded in the control treatment. The study indicated a positive response of the uncultivated forages to poultry manure rates for high dry matter yield.
Key words: dry matter yield, poultry manure, uncultivated forages

INTRODUCTION
Grassland plays a crucial role in global food security and are economically important as they represent an essential basis for milk and meat production in many regions of the world (Schaub *et al*., 2020). Biomass yield, forage quality and the resulting quality adjusted yield are economically relevant production aspects (Schaub *et al*., 2002; Mancoba *et al*., 2020). Natural grassland are often confined to rather unproductive soils and unfavorable climatic conditions (Schneiter and Rimien, 2001; Schaub *et al*., 2020). Nutritive quality of forage species varies from area to another, between seasons and growing stages. The potential of any feed to support animal production depends on the quality consumed by the animal and extent to which the feed meets its nutritive requirements (Minson, 1990; Mahala *et al*., 2009).
Several studies have been conducted on herbage yield of both cultivated and uncultured pasture plants as affected by poultry manure across the world (Mancoba *et al* 2020; Remi *et al*., 2020; Schneiter and Remien 2001). The use of organic wastes as manure has been in practice for centuries globally (Straub, 1977) and in the recent times (Clay *et al*., 2002; Gambara *et al*., 2002; López-Masquera *et al*., 2008; Oagile and Namasiku, 2010). There still need to assess the potential impacts and critical application levels of poultry manure on the herbage yield of uncultivated pasture species. There is no documented information in the study area on the

herbage yield of uncultivated pasture species as affected by graded levels of poultry dung. This is the focus of this study.

MATERIALS AND METHOD

Study area

The experiment was conducted during the raininy season period (June to August, 2021) at the Botanical Garden of Kebbi State University of Science and Technology, Aliero. The area is located in the Sudan-Sahelian zone north-western part of Nigeria and lies between latitude $12^0$19'06''N and longitude $4^0$3'10'S with an average temperature and annual rainfall of 28.3^{0}C and 400mm respectively (KARDA, 2018).

Experimental Procedure and Design

The experiment was laid down in a Randomized Complete Block Design (RCBD). Graded levels of poultry manure were applied two weeks after clearing the site to four treatment groups at the rate of 0.00kg/T, 1.50kg/T, 2.50kg/T and 3.50kg/T representing treatments 1, 2, 3 and 4 respectively and replicated three times amongst four blocks. Gross plots measuring 11.5m x 8.25m (94.88m^2) were demarcated having four blocks separated by 1m between were laid out in an east-west direction containing three plots each (2.5m x 1.5m) separated by 0.5m within making a total of twelve plots.

At the onset of the experiment, an area where there is free growth of natural pasture was located and demarcated using hoes according to the required sizes of the experimental plots. All the free growing natural pasture within each plot were cleared to allow regrowth under rain-fed regime. However, spaces between the plots were clearly weeded and served as paths for easy access to the plots. There were two (2) weeks fortnightly visits to observe the regrowth of the forage species and to remove weeds from the experimental plots and clear the paths. The whole of the experiment lasted for nine weeks. At mid-term of the experiment, local farmers were employed to identify the forage species across the experimental plots using their local names. Thereafter, the common and scientific names of all identified species were sorted from the Botany laboratory of the Kebbi State University of Science and Technology, Aliero.

After nine weeks of free growth, one (1) replicate from each treatment was randomly selected for herbage harvest and estimation yield. Using a sharp sickle, all the forages of the selected plots were individually cut from 5cm above the ground level. Fresh herbage yield for individual specie were oven dried at 65^{0}C for 48 hours to determine the dry matter weights in grams (g) with the use of weighing balance.

Data Analysis

The data on species dry matter yield were analyzed by General Linear model Analysis of variance (ANOVA) procedure. Where significant differences among treatments were detected, means were compared using the Tukey test at 5% probability.

RESULTS AND DISCUSSION

Table 1 shows the dominant species identified in the study area. The dominant forage species identified were; two forbs (*Euphobia convolvuloides* and *Sida cordifolia*), three grasses (*Eragrotis tremula*, *Axonopus spp* and *Pennisetum horndeoides*) and one legume (*Crotalaria spp*). These species were among the annual and perennial types. As most authors (De Ridder and Breman, 1993; Muftau *et al*., 2021) reported that in the Sudan and Sahel rangelands, the vegetation consisted mainly of annual and perennial plants.

Table 1: Dominant forage species in a natural pasture in the study area during 2021 rainy season

Specie names	Family names	Common names	Local names (Hausa)
Euphobia convolvuloides	*Euphorbiaceae*	Dove milk	*Nonon kurciya*
Eragrotis tremula	*Poacea*	Love grass	*Burburwa*
Axonopus spp	*Poacea*	Carpet grass	*Harkiya*
Pennisetum horndeoides	*Poacea*	Elephant grass	*Kyasuwa*
Crotalaria spp	*Fabaceae*	Goats ground nut	*Gyadan awaki*
Sida cordifolia	*Mallows*	Flannel weed	*Garmani*

Source: field survey, 2021

Results of herbage Dry Matter Yield (DMY) of dominant forage species as affected by poultry manure rates is presented in Table 2. Results shows that poultry manure rates significantly (P<0.05) affected the herbage dry matter yield of all the dominant species across the treatments.

The highest and the lowest (p<0.05) DMY as observed from the control treatment without poultry manure was recorded for *Axonopus spp* (36.00g) and *Euphobia convolvuloides* (7.87g). These results were in line with the report of Nmadu *et al*. (2022) who observed highest and lowest dry matter yield among four selected forages without poultry manure application.

Forage *Eragrotis tremula* and *Euphobia convolvuloides* had the highest (22.87g) and the lowest (7.90g) DMY respectively as observed in treatment 2. While in treatment 3, the highest DMY was recorded for *Pennisetum horndeoides* (94.20g) and the lowest (2.90g) was recorded for *Crotalaria spp*. Similarly *Axonopus spp* had the lowest (6.23g) DMY in treatment 4 which was lower as observed in the control treatment while the highest DMY in treatment 4 was recorded for *Euphobia convolvuloides* (80.77g). The variations observed on the dry matter yield among the species may be due to the effect of the poultry manure rates. The observations of this study was in agreement with the findings of Ogedegbe and Ewansiha (2016) who reported better growth, higher fresh herbage and dry matter yield (p<0.05) when poultry manure was applied to *Chloris gayana*. Similar observations were reported by (Fayemi *et al*., 1970; Muftau *et al*., 2021) that the mean dry matter yield of forage species varies among them.

Table 2: Dry matter yield (g) of dominant species as affected by poultry manure rates

Poultry Manure Rates (kg/T)	*Euphobia convolvuloides*	*Eragrotis tremula*	*Axonopus spp*	*Pennisetum horndeoides*	*Crotalaria spp*	*Sida cordifolia*
0.00	7.87^{c}	18.60^{c}	36.00^{b}	12.60^{d}	20.37^{b}	19.09^{b}
1.50	7.90^{c}	22.87^{c}	20.63^{b}	22.83^{c}	28.27^{a}	20.50b
2.50	46.70^{b}	34.17^{b}	43.30^{a}	94.20^{a}	2.90^{c}	43.21^{a}
3.50	80.77^{a}	79.07^{a}	6.23^{c}	53.13^{b}	19.90^{b}	47.34^{a}
SEM	3.087	2.069	18.044	1.714	2.242	3.942

a,b,c = means with different superscripts on the same column differ significantly (P<0.05)

CONCLUSION

The results of this study indicated poultry manure at varying rates had significantly affected the dry matter yield of uncultivated forages with the highest dry matter yield was recorded for *Pennisetum horndeoides* in treatment 3. The study area constitutes of grasses, forbs and legume species; *Euphobia convolvuloides*, *Sida cordifolia*, *Eragrotis tremula*, *Axonopus spp*, *Pennisetum horndeoides*, and *Crotalaria spp* which are of good forage materials that could support ruminant production.

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