Dry Matter Yields and Pasture Quality in Nigerian Savanna

J. I. Muoghalu

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Dry matter yields and pasture quality in Nigerian savanna

J.I. Muoghalu

Key words : herbaceous yield , quality , Nigerian savannas

Introduction Rangeland savannas cover approximately 55 % of Nigeria's land area and support the country's substantial ruminant livestock population . The distinct wet and dry seasons of the Nigerian savannas result in a marked seasonality in both quality and quantity of forage for free-ranging herbivores . The extent of seasonal decline in forage quality for the savannas is unknown . A study was therefore conducted to determine the changes in forage quality of grasses and forbs during seasonal growth in Guinea and Sudan zones of Nigeria .

Materials and methods Two sample plots , each 25 m x 25 m , were established in each savanna zone (Southern Guinea , Northern Guinea , Sudan) . Standing peak biomass was estimated by harvesting above-ground biomass within ten 1 m x 1 m quadrats selected at random in each plot at the end of the growing season . The harvested materials were sorted into forb and grass , oven-dried at 80℃ to constant weight , weighed and ground for chemical analysis to determine the nutrient element content . Three grass and 2 forb species growing in Northern Guinea savanna were harvested during early growth (July) and peak growth (October) , oven-dried at 80℃ to constant weight , ground and analyzed for nitrogen , calcium , magnesium , potassium , copper and zinc (Allen et al ., 1974) , neutral detergent fibre (NDF) , acid-detergent fibre (ADF) and acid-detergent lignin (ADL) (Goering and van Soest 1970) .

Results Herbage yield and nutrient concentrations at peak biomass Above-ground biomass was highest for the Southern Guinea savanna (4072 kg /ha DM) and lowest for Sudan savanna (1307 kg/ha DM) (Table 1) . Yields of forbs were similar in all zones (280-370 kg/ha DM) but their contribution to total biomass varied between zones (7-28%) .

Table 1 *Mean herbaceous yield (kg/ha) and nutrient element concentrations in natural rangeland in Nigerian savanna . Forbscontained higher concentrations of N , K , Ca and Mg than grasses (Table 2) .*

Savanna zone	Herbaceous component	Yield	Nutrient element concentration (%)					
		(kg/ha)	N	K	Ca	Mg	Cu	Zn
Southern Guinea	Grass	3796±1013	0 .70	1 .04	0 .47	0 .20	0 .0012	0 .0006
	Forb	276± 6	1 .17	1 .48	1 .87	0 .38	0 .0012	0 .0011
	Total	4072±1209						
Northern Guinea	Grass	1389± 433	0 .80	1 .38	0 .43	0 .17	0 .0005	0 .0003
	Forb	367±43	1 .41	1 .70	1 .99	0 .32	0 .0003	0 .0059
	Total	1756±436						
Sudan	Grass	937±172	0 .62	0 .69	0 .28	0 .09	0 .0001	0 .0015
	Forb	370±3						
	Total	1307±65						

Changes in nitrogen concentration and structural constituents of grass and forb species during growth . Nitrogen concentration declined and structural components (fibre , lignin , cell wall constituents) of the grass and forb species increased with time . Decreases in N concentrations were more pronounced in grass species (1 .16 to 0 .43 % for *Andropogon gayanus*) than in forbs (1 .42 to 0 .95 % for *Indigofera bracteolata*) (Table 2) .

Table 2 *Changes in total nitrogen and structural constituents of 3 grass and 2 forb species during growth in natural rangeland of Nigeria savanna .*

Species	Early growth (July) (%)				Peak growth (October) (%)			
	N	NDF	ADF	ADL	N	NDF	ADF	ADL
Grass								
Andropogon gayanus	1 .16	68 .9	49 .8	6 .46	0 .43	78 .3	52 .2	7 .36
Rottboellia Cochinchinensis	1 .07	69 .2	46 .6	5 .92	0 .46	76 .7	51 .8	6 .98
Setaria pumila	1 .21	66 .4	42 .8	5 .21	0 .37	75 .2	55 .1	7 .03
Forbs								
Indigofera bracteolata	1 .42	58 .6	55 .3	8 .93	0 .95	68 .9	58 .3	9 .37
Vigna racemosa	2 .05				1 .60			