PRELIMINARY STUDY ON THE NUTRITIVE POTENTIAL OF NEWLY INTRODUCED JUNCAO GRASS (*Pennisetum purpureum*) IN SHIKA, NIGERIA

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ABSTRACT
The global demand for sustainable agricultural practices has intensified due to population growth, climate change, and environmental degradation. Juncao grass, derived from the Chinese term "mushroom grass," represents a breakthrough in agricultural technology. This paper explores a preliminary nutritive potential of Juncao grass, focusing on its cultivation in a sustainable agriculture. An experiment was conducted at the Introduction Plot of Feeds and Nutrition Research Programme, National Animal Production Research Institute, Shika, to perform preliminary investigation of the nutritive value of newly introduced Juncao grass (Pennisetum purpureum). The grass was planted in a Randomize Complete Block Design with three replicates in a 5m x 5m plots. The stem cuts were planted with 2 to 3 nodes at angle 45^0 into the ground. Harvest was done to separate the leaves from the stem on the 10th November, 2024 with sickles and 0.5 x0.5 quadrat. The Kjeldahl method was used to measure the total nitrogen in Juncao grass samples. Data on moisture, dry matter, crude protein, ether extract, crude fibre, nitrogen free extract and metabolizable energy were determined. Data collected were analysed using SAS, package and means were compared using Duncan Multiple Range Test. The percentage crude protein, ether extract, moisture and metabolizable energy are significantly ($P<0.05$) highly concentrated in the leaves 7.40%, 2.89%, 62.65% and 1,205 kcal/kg respectively. The percentage Dry matter (46.61%), Crude fibre (22.03%), Ash (12.82%) and Nitrogen Free Extract (12.18%) are highly concentrated in stems of Juncao grass. The nutritive values obtained for Juncao grass in Shika are critical and necessary for improvement of livestock feed. There is a serious concern to explore the potential yields of Juncao grass as feed for ruminants in Nigeria.
Keywords: Nutritive, Juncao grass, Shika, Ruminant feed

INTRODUCTION

Livestock production plays a very important role in the food security of any nation. Many years back the livestock industry has been neglected and practice the traditional system of management. Success can hardly be achieved when human population is increasing day by day, so the demand for meat and milk. To get sustainable livestock production, there must be seriousness in the system of production. The availability of feed and fodder in quantity and quality at the right time most be provided. In 2024, Nigeria took the challenges of climate change, crisis between stock owners and farmers and effect of covid-19 as threat to food security, then inaugurated the Nigeria Feed and Fodder Multi-Stakeholder Platform under the Resilient African Feed and Fodder Systems Project (RAFFS-P). The feed and fodder shortages that have resulted in significant livestock losses, erosion of livelihoods, loss of incomes, and increased prices of nutritious feeds. The small child who should be fed milk or protein has been denied as a result of shortage in feed and fodder for the livestock. It was reported that 1 in 3 children in Nigeria experiences severe child food poverty due to conflict, climate crises and inequality, (farmingfarmersfarms.com). Also, in 2024, the President Bola Ahmed Tinubu revealed that Nigeria spends approximately 1.5 billion dollars each year on importing milk and dairy products, highlighting the urgent needs for reforms in the livestock sector. He said, the long-term neglect of the livestock sector has weighed heavily on the country's import bills, with milk and dairy products accounting for 1.2 to 1.5 billion dollars. In addition, our per capital consumption levels 8.7 litres of milk, 9 kg of meat and 3.5kg or 45 eggs per year are troubling low compared to global averages. More so, it is worrisome that the average milk yield by cow breeds managed by our pastoralist mere between 0.5 to 1.5 litre per day compared to global average of 6.6litres per day. As part of measure to quell the farmer-herder crisis ravaging different parts of the country, the president established Federal Ministry of livestock development (FMLD) to handle livestock affairs in the country. Recently, Nigeria has shown interest in adopting Juncao technology to enhance its agricultural productivity. In April, 2022, the Nigerian government announce plan to invest in this technology, aiming to strengthen the country's agricultural base. Follow up to this, the African Union Development Agency (AUDA-NEPAD) has advocated for the integration of Juncao technology into Nigerian Universities curricula. In August, 2022 a workshop was organised in Abuja to emphasized that domestication of this technology to generate employment, promote business and improve nutrition (farmingfarmersfarms.com). This study explores nutritional value of Juncao grass (*Pennisetum purpurem*) in Shika, Nigeria.

MATERIALS AND METHODS

Description of the experimental site

The study was conducted during the rainy season in 2024 at the experimental farm of Feeds and Nutrition Research Programme, National Animal Production Research Institute (NAPRI), Shika, Zaria. Shika is located on Latitude 11^0 12'W. Longitude 07^0 33'E and altitude 660m above sea level, 22km North-West of Zaria in the Northern Guinea Savannah zone of Nigeria. The climate of the study area is characterized by a defined wet and dry season. Wet season starts from April to early May and ends in late September to early October while the dry season from October to April. Long-term annual rain fall (2014-2024) ranges from 1110 to 1160mm with a maximum temperature of 39^0C in May and minimum temperature of 10.5^0C recorded in December/January and relative humidity of approximately 75% (IAR, 2024).

Soil sampling and analyses

Soil samples was collected from the experimental site with the aid of soil auger at 4 corners and centres of the plots at 15 and 30cm depth and make a composite sample for soil analysis before the commencement of the experiment. The soil samples were analysed for physical and chemical properties as described by (AES, 1998), to determine texture, particle size, total nitrogen, total carbon, phosphorus, soil pH and cations exchange capacity (CEC). The analysis was done at the Department of Soil Science, Faculty of Agriculture, Ahmadu Bello University, Zaria.

Planting of Juncao grass

The Juncao grass was planted on 4th May in 2024. Seeding method was double to triple nodes horizontally buried in soil at 45^0 and covered with soil. The area of each plot is 5m x 5m and plant spacing, inter and intra rows are 0.5m x 1m respectively. The chemical fertilizer used in the experiment was N-P-K = 20:10:10, the application quantity was 250 kg/ha. The 60% fertilizer was used as a base fertilizer, 20% fertilizer was applied in tillering stage and 20% fertilizer was used during elongation stage. Weeding was done manually with hoes at 4 and 8 weeks after sowing. The experiment was laid in a Randomized Complete Block Design with three replicates. Harvest was done to separate the leaves from the stem on the 10th November, 2024 with sickles and 0.5m x 0.5m quadrat. The Kjeldahl method (AOAC, 2005) was used to measure the total nitrogen in Juncao samples. Data on moisture, dry matter, crude protein, ether extract, crude fibre, Nitrogen Free Extract and Metabolizable energy were determined and analysed using SAS, (2005) package. Means were compared using Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The percentage crude protein, ether extract, moisture and metabolizable energy are significantly ($P<0.05$) highly concentrated in the leaves 7.40%, 2.89%, 62.65% and 1,205 kcal/kg respectively than those found in the stems of the Juncao grass. Its high crude protein (8 to 12% CP) makes it valuable component of ruminant feed. The percentage Dry matter (46.61%), Crude fibre (22.03%), Ash (12.82%) and Nitrogen Free Extract (12.18%) are highly concentrated in stems of Juncao grass. Juncao grass is highly nutritious, making it an excellent substrate for mushroom cultivation and a valuable forage crop for livestock feeding (Lin 2022).

Table 2: Percentage Nutrient composition of Juncao grass in Shika (on wet basis)

Juncao grass	No of Samples	CP	EE	Moisture	DM	CF	ASH	NFE	ME (kcal/Kg)
		8.01	2.96	63.75	36.25	13.09	4.33	7.86	1233.237
		7.75	3.12	63.15	36.85	13.09	4.32	8.57	1237.06
Leaves	4	6.90	2.73	61.87	38.13	14.43	5.50	8.57	1173.59
		6.92	2.76	61.81	38.19	14.40	5.50	8.61	1176.81
	mean	7.40^a	2.89^a	62.65^a	37.36^b	13.75^b	4.91^b	8.40^b	1205.17^a
		3.63	1.65	52.00	48.00	20.20	11.50	11.02	964.38
		3.67	1.40	52.55	47.45	20.30	11.64	10.44	945.04
Stems	4	3.45	0.98	54.50	45.50	23.60	14.14	13.33	902.06
		3.45	0.10	54.51	45.49	24.00	14.00	13.94	828.51
	mean	3.55^b	1.04^b	53.39^b	46.61^a	22.03^a	12.82^a	12.18^a	910.10^b
	SEM	0.41	0.50	1.15	1.15	1.55	1.13	1.24	49.15
	LOS	*	*	*	*	*	*	*	*

Means^{*ab} with different alphabets are significantly ($P<0.05$) different, SEM=standard error of mean, LOS= level of significance. CP=Crude protein, EE= Ether extract DM= Dry matter CF=Crude fibre, NFE= Nitrogen free extract, ME= Metabolizable energy

The nutritive composition of Juncao grass in this study is up to 7.40% CP depending growth stage. The value reported for giant Juncao was 11.33 to 17.74% (Lin, 2022) higher than what was observed in this study. Nitrogen is one of the key factors affecting the quality and yield of Juncao grass (Zhu *et al*., 2022). In another study, Lin, (2022) reported that crude protein in first and second harvest are 5.58 and 25.4 respectively and crude fiber of

40.6 to 56.6% higher than the values obtained in this study was sufficient for ruminant production. The Crude fibre content in stem was 24% which supports growth and provides roughage for livestock. The metabolizable energy was comparable to the report of 10.8MJ/Kg DM, (Islam *et al.*, 2023).

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