IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 13, Issue 10 Ser. I (October 2020), PP 30-34
www.iosrjournals.org

Varietal Differences in Fodder Yield and Nutritive Value of Late-Maturing Groundnut *Arachis Hypogaea* Genotypes Grown In Semi Arid Zone Of Nigeria

*[1]I.A. Gumel, [2]U. Musa,[3] I.R. Muhammad, [3]M. Baba, [4]B. Babandi, I. Usman, [5]M.U Baso[6]Y. Mustapha, [7]Umar, Z. and [8]Sariyyu. S

[1]Department of Animal Science Federal University, Dutse Jigawa State P.M.B 7156
[2]Ministry of Agriculture Natural Resources Kano State P.M.B 3078
[3]Department of Animal Science BayeroUniversty, Kano P.M.B 3011
[4]Department of Animal Health and Production Binyaminu Usman polytechnic, Hadejia P.M.B 103
[5]Department of Agric Education Federal College of Education, Katsina P.M.B 2041
[6]Department of Regulatory Affairs, Nigerian Institute of Animal Science plot 1882, KabusaOkanjeDistric, Abuja
[7]Department of BiologyJigawa State College of Education Gumel P.M.B 1002
[8]Department of Animal Health and Production Audu Bako College of Agriculture Danbatta, Kano State

Abstract
A study was conducted to evaluate fodder yield from three groundnut genotypes residues and their nutritive value (NV). The three cultivars of Groundnut were SAMNUT 10, SAMNUT 23 and SAMNUT 24. The residues were collected from International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) farm at Bayero University Teaching and Research Farm which is located between latitude 11^0 $58^1$55" and to 0000N and longitude 8^0 25^1 58.6" to 0000E in the semi-arid zone of Northern Nigeria. The experiment was laid out in Completely Randomized Design (CRD). Replicated three times. The result obtained revealed that groundnut genotypes have similar (p>0.05) fodder yield, thus SAMNUT 24 had highest fodder yield (0.49kg/stand). For nutritive value, SAMNUT 23 had higher Dry Matter and Crude Protein values (97.55% DM and 9.25% CP), while SAMNUT 10 obtained the highest Crude Fibre value (4.63%CP). The results showed evidence of varietal differences among residues and indicated the possibility of selecting groundnut based on fodder yield and Chemical content. From the result, a residue from SAMNUT 10 was recommended as the best among genotypes.
***Keywords**: Genotypes, Dry matter, Residues, SAMNUT and Nutritive value*

Date of Submission: 30-09-2020 Date of Acceptance: 13-10-2020

I. Introduction

In **the** tropics, livestock suffers from shortages of feed supply especially during dry season despite the vast grassland resources available in the area (Steinboch, 2012). The traditional livestock production in the tropics is mostly based on crop residues and browse plants (extensive system). There is abundance of feeds during the rainy season; followed by period of relatively rapid deterioration and long period of stagnation that is dry season (Ago, 2013). Legume residues have higher CP content and are generally used as supplements in addition to the grazing of ranges and cereal crop residues (Singh, *et. al.*,2003) Legumes could be harvested and conserved either for dry-season feeding for the farmer's animal or for sale to other farmers during the critical period of feed scarcity in the mid-to-late dry season (Singh and Tarawali, 1997). Legumes residues (cowpea, groundnut and soybean) have the advantage of being nutritionally valuable especially in the dry season, when feeding of ruminant animals is critical in the tropical countries (Mgheni, *et al.,* 2001). According to Akinola, *et. al*., (2015),the allocation of the legume residues for feed purposes was about 64%, In addition, that of cereal residues as animal feed was 26%. Crop residues are used generally as animal fodder, stall feeding, soil amendment and manufacturing of animal feed.

In Nigeria, leguminous crop residues such as groundnut haulms, pods/hulls and cowpea haulms are usually better and may be used as complementary forages if quantities permit except when they grow moulds (Oyaraku, 2011). Thus smallholder crop-livestock farmers in the semi-arid zone prefer late-maturing groundnut cultivars to early-maturing type (Olorunju, *et al.*,1996), this is because late-maturing cultivars provide a larger quantity of fodder for livestock in addition to seed and grains. Feed materials that are known for their high

digestibility such as legumes will contribute in minimizing seasonal weight loss. Such materials can be utilized economically if their yield and nutritive value are well determined, this will help the farmer to manage and utilize the residues efficiently. Groundnut haulm provides an important animal feed source in the semi-arid region of Nigeria (Zerbini and Thomas, 2003). However, they are grown mostly for grains and seeds, haulm is valuable feed for livestock in semi-arid zones (Njie and Reed 1995; Larbi, *et al.,* 1999; Etela, *et al.,* 2000;). In the semi-arid, animal rearing is one of the major occupations, groundnut haulm is much valued, even more than the seeds because it is a major sources of protein for animal fattening which brings higher income to the farmer than income from selling of seeds (Bdliya, 2007; Pande*et al*., 2003). Therefore, this research determined the yield and nutritive value of the late maturing groundnut genotypes.

II. Materials And Methods

EXPERIMENTAL AREA

The study was conducted at Bayero University Teaching and Research Farm which is located at between longitude $11^{0}58^{1}55^{"}$ and to 0000N and latitude 8^{0} 25^{1} $58.6^{"}$ to 0000E in the semi-arid zone of Northern Nigeria. The location is characterized by two seasons: a wet season (May – September) and dry season (October-April). Mean annual rainfall is 800mm and temperature is 31^{o}C. The area is characterized by sandy-loamy soil, which is conducive for the production of cereals and legumes crops. The environment is also conducive for the production of different species of tropical livestock.

TRIAL I: FORAGE COMPONENT YIELDS OF GROUNDNUT GENOTYPES

Crop residues were collected from International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) farm after harvest. The residues used were SAMNUT 10, SAMNUT 23 and SAMNUT 24 varieties.

Sampling Procedure for Groundnut Forages and Pod Yield

At pod maturity, 5kg of each genotype was collected by uprooting from their respective replicate for the determination of forage and pod yield, the pods were hand- picked. For the yield composition, the data was obtained and recorded by random sampling at the farm immediately after harvest on 23/11/2014 and 24/11/2014.For laboratory analysis, the information was obtained from the analysis in 3 round as replicates and was analyzed using CRD. 10 plants were randomly selected and recorded from each genotype for number of pod, weight of pod (g) and weight of haulms (including leave, stems, roots and pegs) (g). Sub-sample of each genotype was oven-dried at 65^{0}c for 48hours to determine the % DM and chemical analysis.

Chemical Composition of the Residues

The oven-dried samples were grounded to pass 1mm screen for proximate fractions (CP, CF, EE, NFE and Ash) as described by the 1990). Acid Detergent Fibre (ADF) and Neutral Detergent Fibres (NDF) were determined according to Van Soest*et al*., (1991) procedures.

Data Analysis

Data collected (yield at maturity and chemical composition indices) were subjected to Analysis of variance (ANOVA) using SAS computer package version 9.2, of 2009. Significant differences were determined at 5% probability level (P = 0.05). The differences between means were separate by least significant difference (LSD).

III. Results And Discussion

RESULTS

Fodder Yield Component of the 3 Late-maturing Groundnut Genotypes

The fodder yield component of groundnut genotypes was recorded in (Table 2), the average pods numbers varied from 27.6 to 22.5 pods /stand. SAMNUT 23 had the highest pod number while SAMNUT 10 recorded the least pod number (18.9). In addition, the means were similar (P>0.05). SAMNUT 24 had the highest pod weight (0.14) and the least was SAMNUT 10 (0.11 kg /stand). The haulm weight ranged from 0.28 to 0.348kg/stand with SAMNUT 23 having the highest haulm weight 0.348kg/stand. Therefore, the total weight of the plant ranged from 0.37 to 0.49kg/stand. In general, there were no significant differences among groundnut genotypes (P>0.05).

Chemical composition of the Three Late-Maturing Groundnut Genotypes (%DM)

Chemical composition of the three late-maturing groundnut genotypes was presented in Table 2. DM values were range from 96.68 to 97.55%. SAMNUT 23 had higher value (97.55%) and SAMNUT 24 obtained the least value (96.68%). The CP ranged from 6.10 to 9.25%. SAMNUT 23 had higher CP content (9.25%) among groundnut genotypes and the least value was obtained from SAMNUT 24 (6.10%), there were significant different (p<0.05) among the genotypes. The CF value ranges from 3.43 to 4.63% for SAMNUT 23 and

SAMNUT 10 respectively; there was significant different ($p<0.05$) among genotypes. Three groundnut genotypes have similar EE value ($p>0.05$), the value ranged from 0.65 to 1.20% SAMNUT 10 had higher value of 1.20% while SAMNUT 24 had lower value (0.65%). ADF value range from 32.97 to 39.45% SAMNUT 23 and SAMNUT 10, respectively and there was significant different among the genotypes ($p<0.05$). The NDF ranged from 49.85 to 56.70%. SAMNUT 24 had higher NDF value (56.70%) while SAMNUT 23 had least NDF value (49.85%), the means were significantly differs ($p<0.05$). NFE value ranges from 87.25 to 89.85%. SAMNUT 24 had higher NFE value (89.85%) follow by SAMNUT 23 (87.5%), the three groundnut genotypes have similar NFE value ($p>0.05$). DM values were ranged from 96.68 to 97.55% Samnut 24 and Samnut 23, respectively.

Discussion

Average Fodder Yield from Haulm of the Three Late-maturing Groundnut Genotypes

The yield value obtained was slightly similar with value recorded by Virender and Kandhola, (2007) (24. to 28.7 pod /stand). According to ICRISAT (unpublished report) SAMNUT 23 was early maturing crop with 90-100 day of maturity period, it has pod yield of 2043kg/ha and yielded 2t/ha haulm while SAMNUT 24 matured at 80-90 days and yield 2.5 to 3 t/ha haulm. The yield value obtained was slightly similar with value recorded by Virender *et al.,* (2007) (24.95 pod /stand). According to Blummed*et al.* (2005) the relationship between pod yield and haulm quantity was not inversely related because they are compatible traits among groundnut genotypes

Chemical Composition of the Three late – Maturing Groundnut Genotypes

The DM values obtained from the study (96.68 to 97.55%) were also higher than the value recorded for groundnut husk by (Chakeredza*et al.,* 2002) 93 and 94% respectively. The DM was also higher than 94.3% reported by Bogoro, *et al.,* (1994), but is similar with the report from Ramatu, (2015) who recorded 96.95 and 97.07% for inoculated and non-inoculated soybean residues at pod maturity. The DM values were in agreement with Muhammad *et al.,* (2013) who reported 95.40 to 95.93% for diet containing protein in semi-arid environment. According to Van Soest, (1991), higher DM values suggest a good source of energy and roughage that could enhance rumination and prevent digestion upset for the production of volatile fatty acids.

The chemical values were similar with (Ososanya, 2012) recorded 78 to 83 % DM, 9 to12 % CP, 22 to 22.5% CF, 13 to 18 Ash and 47-54% NFE for groundnut haulm. The percentage CP value for all the genotypes (7.50 to 9.25%) was higher than report of Fadel *et al*. (2007) who recorded 2.7-4.9% for leaves and 3.2 – 7.4 for stem. The value was similar to report of Bogoro*et al*. (2006) and lower than 10.1% by Bogoro (1994) for groundnut haulm. The value was also similar to report of Maherisis (2011) and Kraidees (2005) for soybean genotypes 5.10 and 4.1%, respectively. Manyuchi, *et al.,* (1997) reported lower value of 13.15% CP for groundnut haulm and Larbi *et al*. (1999) reported CP level of 158g/kg DM for leaf and 111g/kg DM for stem, this result was in agreement with reported Hindrichson, *et al.,*(2001) that most crop residues were low in protein content. According to Bulümmed*et al*., (2005), rumen microbes require a minimum of 1 to 1.2% nitrogen (6.25 to7.5% protein), for the fodder to effectively degrade. The CF values ranges from 3.43 to 4.63%, the figures were less optimum for ruminant CF requirement; this may be attributed to age at harvest. Thus, the value was lower than 63.7% for groundnut haulm reported by Bogoro (1994) and these differences may be due to environmental influences. The CF values were lower than 6.02-7.07% reported by Muhammad *et al.* (2013). The CP, CF, EE, ADF, NDF and Ash values were lower than those recorded by Ramatu, (2015) who worked with residues from soybean in the same environment. The NDF values were lower than 75% that by Buxton (1996) to inhibits feed intake. Thus, this is higher than values reported by Chineke*et al.* (2013).The residues used in this study had higher DM, CP and EE content. Such variation in quality of crop residues may be due to many factors, which include: genetic characteristics Subba *et al.*,1994), environmental factors (rainfall, temperature, soil characteristics) and crop management (level of fertilizer application, plant density, stage of maturity at harvest, methods of harvesting and storage Ramatu (2015). Under practical farming conditions, the chemical composition was often low, because leguminous crops such as groundnut are grown primarily for grains in semi-arid zones. In this study, residues were collected from crops grown purposely for seed producti

IV. Summary, Conclution And Recommendation

Three late-maturing crop residues from groundnut (SAMNUT 10, SAMNUT 23 and SAMNUT 24) genotypes were evaluated based on fodder yield component and Chemical composition. Theresult revealed thatS 23 had the highest fodder yield component and contained high amount of CP (9.25%) while SAMNUT 23 have higher % DM (97.55%); furthermore, SAMNUT 10 have higher CF of (4.63%). The result revealed that residues from SAMNUT 24 have more fodder yield and SAMNUT 23 have more nutritive value among groundnut genotypes. The result also showed evidences of varietal differences and indicated the possibility of

selecting groundnut genotypes based on fodder yield and chemical composition indices. It is recommended that a residue from SAMNUT 10 was best to be used as animal feed among genotypes.

References

[1]. Ago, Y.A. (2013). The problem of livestock production is feeding. National Livestock Training Centre Kachia, Kaduna State Personal Communication, the Daily Trust on 12 Sept. 2013.

[2]. Akinola, A.A, Ayedun, B., Abubakar, M., Shehu, M. and Abdoulaye, T. (2015): Crop residue usage and its determinants in Kano State, Nigeria. *Journal of Development and Agricultural Economics* **7**(4):162.

[3]. Bdliya, B. S. (2007). Groundnut haulm quality as affected by cercospora leaf spot severity. *Journal of Plant Protection Research* 47(3): 231-233 Pp.

[4]. Blummed, M., Vellaikumar, s., Devulapalli, R., Nigam, S. N.; Upadhyaya, H. D. and Khan, A. (2005). Preliminary observations on Livestock productivity in sheep fed exclusively on haulms from 11 cultivars of groundnut. *International Arachnids Newsletter* 25:544-57.

[5]. Bogoro, S., Kallah, M. S. and Fomukong, B. (2006). Chemical composition and *in situ* rumen degradability of blood meal and urea crop residues. *Nigerian Journal of Experimental and Applied Biology* **7**(1):29.

[6]. Bogoro, S., Lufadeju, E. A., Adeyinka, O. A., Butswat, I. S., and Kudi, A. C. (1994). Nutritive value and utilization of crop residue based diets by Bunaji bulls. *Journal of Animal Science*, 14(182): 49 –58.

[7]. Buxton, D.R. (1996). Quality-related characteristics of forage as influenced by plant environment and agronomic factors. Animal Feed Science and Technology. 53:37-49.

[8]. Chakeredza, S., Te-Meulen, U. and Ndlovu, I. R. (2002). Effect of cowpea hay, groundnut hay, cottonseed meal and maize meal supplement to maize stover intake, digestibility, microbial protein supply and acetate kinetics in weaned lambs. *Journal Tropical Animal Health and Production* 34(11): 49-64.

[9]. Chineke, C. M., Fajemisin, A. N., Adedeji, A. E., Fejemisin, A. J., and Olaiya, O. (2013). Effect of processing on nutritive value of corncob fed to West African Dwarf rams. Annual NSAP conference held at Rivers State University of Science and Technology, Port-hacourt, Nigeria. 201-204 Pp.

[10]. Etela, I. Larbi, A. Olorunju, P. E. Dung, D. D. and Oji, U. I., (2000). Yield fodder quality of dual-purpose groundnut genotypes fed to West-African dwarf sheep. *Journal of Animal Science* 84(1): 459.

[11]. Fadel, A. M. A., Niemat, I., Amasaib, E. O. (2007). Chemical Composition and *in situ* dry matter degradability of stover fractions of five sorghum varieties. *Journal of Applied Sciences Research* 3(10):1141 – 1145.

[12]. Hindrichson, I.K.,Osuiji, P. O., Odenyo, A. A. and Madsen, J. (2001). Effect of supplementation with four multipurpose trees and *Lablab purpureums* on rumen microbial protein supply in sheep. Proceeding. Tanzania Society for Animal Production Volume. Pp 22 – 28.

[13]. Larbi, A., Dung, D.D., Olorunju,, P.E., Smith, J.W., Tanko R.J., Muhammad, I.R. and Adekunle, I.O.(1999). Groundnut (*Arachishypogaea*) for food and seed yields, chemical composition and rumen degradation of leaf and stem fractions of 38 cultivars. *Animal's Feed Science Technology* (77).33-47 PP.

[14]. Maherisis, N., Abdullahi-Ziveh, B., Salamat-Doustnobar, R., Ahmadzadeh, A., Aghajanzadeh-Golsshani, A. and Muhebbizadeh, M. (2011). Determining nutritive value of soybean straw for ruminants using nylon bags technique. *Pakistan Journal of Nutrition.*10 (9): 838-841 PP.

[15]. Manyuchi, B., Deb Hovell, F. D; Ndlovu, l. R; Topps, J. H. and Tigere, A. (1997). Groundnut hay as supplements in diets of sheep consuming poor quality natural pasture hay. *Livestock Production Science*. 19: 33-41PP.

[16]. Mgheni, D.M., Ndemanisho, E. E. and Weisberg. (2001). Evaluation of the feeding value of two tropical cereal straw, maize stover, rice straw and their botanical fractions by nylon and mobile bag technique. *African JournalofScienceandTechnology* (AJST). 2. 141 - 145

[17]. Muhammad, N., Tukur, H. M., Maigandi, S. A., Daneji, A. I. and Usman, H. B. (2013). Performance of growing Uda sheep fed diets containing similar energy and varying protein levels in semi arid environment. Proceeding of the 38th Annual Conference and 40th Anniversary of the Nigerian Society of Animal Production (NSAP).17th - 20th March 2013, held at Rivers State University of Science and Technology, Portharcourt. 232 – 235.

[18]. Njie, M. Reed, J.S. (1995). Potential of crop residues and Agricultural by-products for feeding sheep in a Gambian village. *Animal Feed Science and Technology*, 25: 313-323.

[19]. Olorunju, P.E., Ntare, B.R., Babalola, O. A. and Alabi, O. (1996). Proceeding Workshop on Nationally Coordinated Groundnut Research Project, 25-29 September 1995, Zaria, Nigeria, and PP 47.

[20]. Ososanya, T. O. (2012).Effects of Groundnut Haulms Supplementation on Intake, Digestibility and

[21]. Growth Performance of Rams. *Nasarawa State University, KeffiJournal of Animal Science.8 (1): 209 -215*

[22]. Oyaraku, M. A. (2011). Evaluation of the nutritional and microbiological status of co-fermented cereals and cowpea. *Agriculture and Biology Journal of Northern America***2**(1):61-73 PP.

[23]. PandeS.Bandyopaddyay, R. Blümmel, M. Rao, J. N. Thomas, D. Navi, S.S.(2003). Diseases management factors influencing yield and quality of sorghum and groundnut residues. *Field Crop Research* 84: 89 - 103.

[24]. Ramatu A, (2015). Evaluation of nutritive value of residues from rhizobium inoculated soybean genotypes fed to Uda sheep. M.Sc. A thesis submitted to the Department of Animal Science, Bayero University, Kano, 44 – 63.

[25]. Statistical Analytical Systems SAS. (2009). User's guide, SAS Institute Inc., North Carolina, USA.

[26]. Singh, B. B., Ajeigbe, H. A., Tarawali, S. A., Fernandez-Rivera S. Abubakar, M. (2003). Improving the production and utilization of cowpea as food and fodder. *Field Crops Research* 84. 139-167

[27]. Singh, B. B., Tarawali, S. A., (1997). Cowpea and it improvement: key to sustainable mixed crop/ livestock farming in West Africa. In Crop residues in sustainable Mixed crop-livestock farming systems. Commonwealth Agricultural Bureau International CABIICRISAT - ILRI, Wallingford, UK. 79-100.

[28]. Steinbach, J. (2012). Alternative to crop residues as feed resources in mixed farming system department of livestock ecology tropical sciences centers, G-lessen, Germany.

[29]. Subba, R, A., Prabhu, U. H., Gowda, B.T. S. and Seetharam, A. (1994). Genetic and management influence on straw quality and quality of finger millet (*Eleucinecorana*). Beef Development Research Foundation, Pune, Indian. 1-8.

[30]. Van Soest, P.J., Robertson, J. B. and Lewis B.A. (1991). Methods for destiny fibre, neutral detergent fibre and non-starch polysaccharides in relation to animal nutrition. J*ournal of Dairy Science* 74:3583 – 3597.

[31]. Virender S. and Kandhola S. S. (2007). Productivity of semi-spreading and bunch type varieties of groundnut as influenced by sowing dates. Journal of SAT Agricultural Research. 5(1)

[32]. Zerbini, E. and Thomas, D. (2003). Opportunities for improvement of nutritive value in sorghum and pearl millet residues in south Asia through genetic enhancement. *Field Crops Research*, 84: 3-15.

Table 1: Fodder Yield Component of Three Late Maturing Groundnut Genotypes

Parameters/stand	Genotypes			
	SUMNUT10	SUMNUT23	SUMNUT24	SEM
Pod number/plant	19.90	27.60	22.50	3.057
Pod weight (kg)	0.11	0.12	0.14	0.02
Haulm weight (kg)	0.28	0.35	0.35	0.07
Total weight (kg)	0.39	0.47	0.49	0.08

SAMNUT: Samaru groundnut, SEM: Standard error of mean at 5% level of significant

Table 2: Chemical Composition of the Three Late-Maturing Groundnut Genotypes (%DM)

Parameters (%)	Genotypes			
	Samnut 10	Samnut 23	Samnut 24	SEM
DM	96.88[a]	97.55[a]	96.68[a]	0.41
CP	7.50[b]	9.25[a]	6.10[c]	0.05
CF	4.63[a]	4.38[a]	3.43[b]	0.16
EE	1.20[a]	0.75[a]	0.65[a]	0.18
ADF	39.45[a]	32.95[b]	37.00[ab]	0.77
NDF	52.10[b]	49.85[b]	56.70[a]	0.75
NFE	87.25[a]	87.5[a]	89.85[a]	0.84
ASH	3.10[a]	32.45[a]	3.45[a]	0.23

a, b and c = means in the same column with different superscript differ significantly (P<0.05), SEM = standard error of mean.DM = dry matter CP = crude protein, CF = crude fibre, EE =ether extract, ADF = acid detergent fibre, NDF = neutral detergent fibre, NFE = nitrogen free extract. SAMNUT = Samaru Groundnut

I.A. Gumel, et. al. "Varietal Differences in Fodder Yield and Nutritive Value of Late-Maturing Groundnut Arachis Hypogaea Genotypes Grown In Semi Arid Zone Of Nigeria." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 13(10), 2020, pp. 30-34.