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Ethnoveterinary Survey of Plants used in Treating Livestock among the Fulani people of Girei, Adamawa State, Nigeria

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ABSTRACT

The study surveyed plants used in ethno-veterinary practice among the Fulani people of Girei, Adamawa State, Nigeria. Herein, a total of 100 key guided respondents were interviewed or took part in focus group discussion, mainly *Jauro*, *Jemila* and *Ardo* herdsmen along the Girei-Mubi road who were highly experienced and inherited ethno-veterinary knowledge from their fore-fathers. The results identified 30 medicinal plants species and the different livestock diseases conditions they treat. The plant names in Fulani, the parts of plants used and mode of preparations were also documented. In the study, we also noted the significant employment of cow milk (Madara or Nunu) and evaporites or potash (Kanwa) as recipes in livestock diseases management. Of the identified plants, the leaves (61.29%) were commonly used, then bark (25.80%), root (6.45%) and fruits (6.45%). The phytochemical screening of the available plants showed the presence of secondary metabolites such as saponins, alkaloids, tannins, anthraquinone and steroids/triterpenes. These are thought responsible for the antibacterial, antifungal, wound healing, anti-venom, and other pharmacological activities. As a result of our work, we concluded that the identified plant material, when extracted, purified and isolated could be used in the development of new drugs for livestock management.

Keywords: Ethnoveterinary survey, plants, Fulani people of Girei, Adamawa State and Phytochemical screening

1. INTRODUCTION

Traditional medicine is the whole total knowledge, skills, practices based on the theories, beliefs and experiences of different cultures used in the maintenance of health as

well as in the prevention, diagnosis, improvement or treatment of physical and mental illness (WHO, 2011). The indigenous knowledge existed among various traditional practitioners, elderly people, bone setters, hunters, TBAs, including herdsmen who are knowledgeable about medicinal plants utilization using holistic and tailored approaches to meet the needs and expectations of their populace (WHO, 2008; Abdulhamid *et al.*, 2017) including livestock illnesses. Medicinal plants are known to contain varieties of chemical substances that have therapeutic effect on many kinds of ailment and diseases (Cragg *et al.*, 2005). Its exploitation for medicines, functional or health food, dietary supplements, cosmetics application, herbal tea or other purpose of its use and the national regulatory framework (Etkins, 2007) have been developed in some countries with little or no standardization and recognition. Significantly, World Health Organization reported that over 60 percent of the world population relies on medicinal plants to meet their health care needs (WHO, 2011). Sofowora, (1993) highlighted some reason of their global utilization due to easy accessibility, wide diversity, inexpensive and cultural believes that supported it needs even in management of livestock health. Nevertheless, ethnoveterinary is an old practice in treating and controlling livestock diseases. It requires the knowledge of local individual in managing animal health and prevention of infection. Rashid *et al.* (2010) have reported different ethnoveterinary practices in Northern Nigeria, (Alawa *et al.*, 2002; Offiah *et al.*, 2012), Ethiopia (Yineger, 2007; Birhanu and Abera, 2015) among other documentation in different parts of the world. In Nigeria, the Fulani popularly known as “Fulbes” are the major producers of wide ranges of livestock in many part of West Africa, from Lake Chad in the East to the Atlantic Coast. They are predominantly in West African countries including Nigeria, Mali, Guinea, Cameroun, Senegal and Niger (Jacob, 1998). They are mainly pastoralist, experienced in rearing livestock such as cattle, goat, sheep and sometimes local fowls. Fulanis are completely isolated from people probably to enjoy plant diversities and enjoy making temporary camps and huts on river valley in search of good pastures and water for their livestock. Blench, (1994) and Jacob (1998) reported that they are known for their self-denials and caring heart for animals at the expense of their comforts and lives. They possibly ensure that feeding livestock is as paramount as early morning prayers and society usually give respect to the livestock with special greetings such as “Yaya shanu” meaning how are your cattle? Fulani could goes beyond grazing by feeding livestock with crops which usually results to communal conflicts between the herdsmen and farmers that could be bloody and lead to mass slaughtering. Similarly, they enjoy rainy seasons because their livestock could have access to water, plants as food and probably for medicinal purposes. They considered livestock management as the most prestigious activity and prefer profession among all other works and reject western education and lifestyle and were minority study group but known for meat, milk and milk products production. The problem exist in African countries especially Nigeria where veterinary health services management are still poor and obtainable in few urban centers with high cost, fear of orthodox drugs or scarcity (Teklehaymanot *et al.*, 2009; Tamiru *et al.*, 2013) may grow beyond the reach of Nomads and results to medicinal plants for livestock health need. There is little or no documentation of plants used in treating livestock that are mainly sources of protein to man and its need for documentation as a conservation tool and safeguarding cultural heritages and ethno knowledge for future studies. The study therefore aimed to document some medicinal plants used in treating livestock among the Fulani people of Girei, the parts used, Fulani names, livestock disease conditions and mode of preparation

for future utilizations and drug development (Meeusen, 1999; Maphosa, 2010; Calabrese, 1995; Akhtar, 2000; Hutchings, 1989).

2. RESULTS / EXPERIMENTAL

2. 1. Study location

The study was carried out in Girei town which is one of the Local Government Area of Adamawa state, located in latitude 7°11" North and longitude 11°14" East of Northern Guinea Savannah of Nigeria. It lies along the river Benue and the predominant tribe is Fulani, however substantial group of *Bwatiye* also dwells in the villages like *Greng*, *Ntabo* and *Labondo*. The major occupation of the people in the area is farming and livestock rearing. It has tropical climatic conditions with rainfall of about 700-1600 mm per annum and minimum temperature of 16 – 19 °C and maximum of 37 – 39.20 °C.



Figure 1. Adamawa state reference map.

2. 2. Survey

The survey was conducted in October 2013 to February 2014 in Girei Local Government Area of Adamawa state. The data collected was based on purposive sampling techniques using key respondent's oral interview and guided focus group discussion with the aid of a semi structured questionnaire. The livestock and common diseases conditions targeted were associated to cattle, sheep, goat and local fowls during the study. One hundred (100) questionnaires tools were administered in Ffulde language and only data from willing respondents were documented. Reconnaissance visits were also done in cattle market section of Girei market (Saturdays). The respondents selection were based on prior information from the head of community leader in Girei Market and the study targeted groups were the Fulani community leaders called the "Ardos", "Jauro" and the "Jemila" and few herds men along Girei- Gumbi road were also interviewed orally to ensure broad information about the study.

2. 3. Ethical consideration and approval

Introduction letter was collected from the Department of Plant Science, Modibbo Adama University of Technology Yola, Adamawa State. Pre-informed visit was sought among Fulani community leaders with formal adulation and greetings for their support and cooperation during the study. The researchers' ensures the respondent understood the aimed of the research and the respondents consented and were duly acknowledged during the study.

2. 4. Collection and Identification

Some of the respondents were followed willingly into the bush for collection of available plant parts and taxonomical identification was done by a renounced taxonomist Professor S. S Sanusi, Department of Biological Sciences, University of Maiduguri. All voucher specimen were documented in the herbarium unit of the Department of Biological Science, Modibbo Adama University of Technology Yola for future references.

2. 5. Preliminary Phytochemical Screening

Qualitative phytochemical screening was carried out for the readily available aqueous methanol plants parts extract using procedures of Harbourne (2009).

2. 6. Data analysis

The fidelity level (FL) in % was also done to compare data from the study area on plants that are often used. It was calculated using the formula:

$$FL = \frac{Np}{N} \times 100\%$$

where:

FL = Fidelity level

Np = No. of respondents that claim the use of a plant for the treatment of typhoid fever
(No. of citations of each plant)

N = Total No. of respondents in the study area. These results were reported in percentages, tables and chart.

3. RESULTS AND DISCUSSION

Table 1. Demographic details of the respondents

Demographic details of the respondents	Frequency (%)
Gender	
Male	100 (100)
Female	0 (0)
Knowledge of medicinal plants used in livestock management (%)	Yes (90) No (10)
Age (years)	
10-30	15 (15)
31- 60	35 (35)
61 > above	50 (50)
Experience of livestock rearing	5-10
	11-40
	50> above
Estimated livestock size	10-25
	< 100
	100-150
Total respondents	100

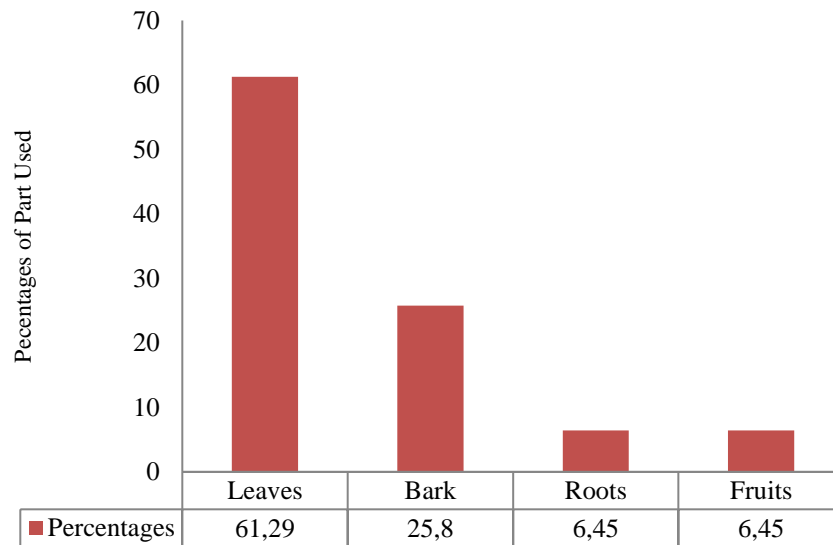


Figure 2. Percentages of plants part used as ethnoveterinary

Table 2. Medicinal plant, name, family, Fulani names, part used, livestock treated, diseases conditions and mode of preparation

Scientific name	Family name	Fulani names	Vouch No.	Livestock treated	Parts used	Diseases treated	Mode of preparation
<i>Allium sativum</i> L.	Alliaceae	<i>Kagalmu Wasalde</i>	MBS01	Cattle	Leaf	Streptothricosis	Pound the leaves and mix with feed
<i>Khaya senegalensis</i> A. Juss	Meliaceae	<i>Kadhill Taitthaci</i>	MBS02	Cattle, Goat Sheep Fowl	Bark	Parasitic gastro enteritis complex, Diarrhea, Fowl pox	Soak the bark in water and give to cattle. Add potash then give the animal to drink. Use 1 teaspoon and give it to fowl
<i>Butyrospermum paradoxum</i> (C.F. Gaertn.) Hepper	Sapotaceae	<i>Kareyhii</i>	MBS03	Sheep	Bark	PEG complex	Soak in water for 3 days and give the animal
<i>Moringa oleifera</i> Lam	Moringaceae	<i>Bishii, Konamarade</i>	MBS04	Cattle, Sheep Goat	Leaf	Diarrhea	Mixed the leaf with feed or soak or soaked in water for the animal to drink
<i>Tamarindus indica</i> L.	Caesalpinaceae	<i>Jabbehi</i>	MBS05	Cattle, Sheep, Goat	Leaf	Stomach disorder	Mix with feed or soak in water for the animal to drink
<i>Adansonia digitata</i> L.	Bombacaceae	<i>Nyande</i>	MBS06	Cattle, Goat Sheep	Fruit Leaf,	Flies Feed	Burned fruits pulp to prevent insects. Leaves are eaten as feed.

<i>Bombax costatum</i> Pelleg. & Vuillet	Bombacaceae	<i>Kuriha</i>	MBS13	Goat Sheep, Cattle	Bark	Goat pox	All kind of infections and antimicrobial
<i>Elaeis guineensis</i> Jacq	Areaceae	<i>Monja</i>	MBS12	Goat	Fruit	Poisson	Give palm oil in excess through to animal in the mouth
<i>Parkia biglobosa</i> Benth.	Leguminosae	<i>Sareyhi</i>	MBS11	Cattle, Goat Sheep	Fruit shell	Snakebite	The fruit shell is dried and soaked in water then applied to the affected part
<i>Ficus platyphylla</i> Delile	Moraceae	<i>Dunde</i>	MBS10	Cattle, Goat Sheep	Bark	Dullness	Burn bark in charcoal and the animal inhaled
<i>Carica papaya</i> L.	Caricaceae	<i>Dukkuje kabusee</i>	MBS09	Cattle, Goat Sheep	Leaf	Peg Complex	Pound the leaves and mix with animal feed
<i>Waltheria americana</i> L.	Sterculiaceae	<i>Yankufa</i>	MBS08	Cattle, Sheep Goat	Leaf	Wounds	Ground and applied as topical on the surface of wound
<i>Allium cepa</i> L.	Alliaceae	<i>Sandoji Tingyere</i>	MBS07	Cattle, Goat Sheep	Leaf	Gastro-intestinal parasites	Soak leaf in water and give to animals to drink

<i>Ocimum gratissimum</i> L.	Lamiaceae	<i>Hako</i>	MBS20	Fowls	Leaf	Constipation	Pound and mix with water, add 2-3 drops into the fowl mouth
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Rutaceae	<i>Lemuje</i>	MBS19	Cattle	Leaf	Tick fever and infestation	Burn very close to the animal camp when dried
<i>Azadirachta indica</i> A. Juss	Meliaceae	<i>Gadima</i>	MBS18	Goat	Leaf	Wound	Applied on the affected plant
<i>Psidium guajava</i> L.	Myrtaceae	<i>Gueva</i>	MBS17	Sheep Goat	Leaf	Diarrhea	Soak in water and cook before given to animal
<i>Aloe vera</i> L.	Aloaceae	NS	MBS16	Fowl	Leaf	Lousiness Red diarrhea	Mix the leaf with ashes and salt then used it to rub the animal
<i>Nicotiana tabacum</i> L.	Solanaceae	<i>Tabal</i>	MBS15	Cattle	Leaf	Black quarter	Pound the leaves and mix with feed
<i>Cucumis melo</i> L.	Cucurbitaceae	<i>Ciklire</i>	MBS14	Sheep, Goat	Root	Snake bite	Apply to the bite area of the animal

<i>Detarium microcarpum</i> Guill ex Perr.	Caesalpiniaceae	<i>Tauuro</i>	MBS27	Cattle, goat, sheep	Root	Wound	The juicy part could be dropped on their wound
<i>Annona senegalensis</i> Pers.	Annonaceae	<i>Dukuhii</i>	MBS26	Cattle Goat, Sheep	Root Bark	Snake bite Wound.	The roots or barks are soak and applied to the bitten area
<i>Vernonia amygdalina</i> Darke	Asteraceae	<i>Katko</i>	MBS25	Cattle, Goat Sheep	Leaf	Wound	Rubbed the juicy to the affected area
<i>Sesamum indicum</i> L.	Pedaliaceae	<i>Gubudu</i>	MBS24	Cattle, Sheep, Goat	Leaf	Peg complex	Soak in water and mix with animal feed
<i>Senna alata</i> (L.) Roxb	Caesalpiniaceae	NS	MBS23	Cattle, Goat, Sheep	Leaf	Skin infection	Burn the leaf around the fowls
<i>Mucuna Adans</i> Fam. PL. (Adanso)	Fabaceae	<i>Nyanace Gaduru</i>	MBS22	Cattle, Fowls	Leaf	Snake bites	Dried and burn around the fowls and cattle
<i>Tephrosia vilosa</i> (L.) Persoon	Fabaceae	NS	MBS21	Cattle Fowls	Leaf	Flies.	Dried and burns around the fowls and cattle as insecticides

Evaporites (Potash)		<i>Kaun</i>		All livestock	PEG	stomach disorder	Add small quantity in their drinking water and also rub it on their body.
Cow milk		<i>Nunu</i>		Goat	Goat pox	Smooth body and energy.	Inject the cow milk to the animal and sometime mix with feed.
<i>Boswellia dalzielii</i> Hutch.	Burseraceae	<i>Dikkwar</i>	MBS30	All animals	Root	Flies and other airborne diseases	Allow the animal to inhale the burnt dried roots
<i>Pilotigma Reticulatum</i> (DC) Hochst	Caesalpinaceae	<i>Kardo</i>	MBS29	Cattle, sheep Goat	Leaf Bark	Wound	The juicy part could be dropped on their wound
<i>Acacia albida</i> Del.	(Mimosaceae)	<i>Karau</i>	MBS28	All animals	Leaf	Wound	The juicy part could be dropped on their wound

NS = Not stated; All livestock used targeted cattle, sheep, goat and fowl

Table 3. Preliminary phytochemical screening of some readily available aqueous methanol extracts

Secondary metabolites	Alkaloid	Flavonoids	Saponins	Tannins	Antraquinone	Steroid /triterpenes	Glycosides
<i>Allium sativum</i> L.	+	-	+	+	-	+	+
<i>Khaya senegalensis</i> A. Juss	+	+	+	+	-	+	-

<i>Butyrospermum paradoxum</i> (C.F. Gaertn.) Hepper	-	+	+	+	-	+	+
<i>Moringa oleifera</i> Lam	+	+	+	+	-	-	+
<i>Tamarindus indica</i> L.	+	+	+	+	-	+	+
<i>Adansonia digitata</i> L.	+	-	+	+	-	+	+
<i>Allium cepa</i> L.	+	+	+	+	-	-	+
<i>Waltheria americana</i> L	+	+	+	+	-	+	-
<i>Carica papaya</i> L.	+	+	+	+	-	+	+
<i>Ficus platyphylla</i> Delile	+	+	+	+	-	+	+
<i>Parkia biglobosa</i> Benth.	+	+	+	+	+	+	+
<i>Bombax costatum</i> Pellegr. & Vuillet	+	+	+	+	-	+	+
<i>Cucumis melo</i> L.	+	+	+	+	-	+	-
<i>Nicotiana tabacum</i> L.	+	+	+	+	-	+	+
<i>Aloe vera</i> L.	+	+	+	+	-	+	+
<i>Psidium guajava</i> L.	+	+	+	+	-	+	+
<i>Azadirachta indica</i> A. Juss	+	+	+	+	+	+	+
<i>Senna alata</i> (L.) Roxb	+	+	+	+	+	+	-
<i>Sesamum indicum</i> L.	+	+	+	+	-	+	-
<i>Annona senegalensis</i> Pers.	+	+	+	+	+	+	+

Key: (+) = Present; (-) = Absent

The demographic details (Table 1) showed that the respondents were mainly male and (90%) claimed that they have knowledge of medicinal plants in livestock diseases management while the remaining (10%) were aware of its use through their fore fathers but preferred services of veterinary doctors in managing their livestock health and the respondents have over 5 year's experiences in livestock management.

However, (15%) of ages (10-30) in the study (Table 1) were suspected to be the herdsmen with little knowledge of plants used in treating livestock. Their low knowledge in relation to ethnoveterinary could be attributed to the fact that traditional knowledge is

developed with number of experience spent in livestock rearing (Awas, 2007) and ethnoveterinary knowledge is orally transfers among family with preference to old age group as secrete and protection of their cultural heritage (Birhanu and Abera, 2015) except in case of traditional birth attendants with specialized ethno knowledge of child delivery but mainly among old women (Abdulhamind *et al.*, 2017). The result was in agreement with similar studies carried out by Yirga *et al.* (2012) and Tamiru *et al.* (2013). The respondents also noted that livestock diseases are traditionally recognized and named after the observed affected part of the animals during slaughter. The various parts of plants (Figure 1) mainly used were leaves (61.29%), bark (25.80%), roots (6.45) and fruits (6.45%) that are prepared for different diseases conditions as insecticides, removal of flies or to chase away snake from the livestock ranch. Rashid *et al.* (2010) and Tekle (2014) reported similar percentages of parts of plant used in Bangladesh. Offiah *et al.* (2012) also documented different parts of plant used by Fulani herdsman in management of animal diarrhea in Plateau State, Nigeria. In this study, a total of 30 plant species across different plant families were documented as ethnoveterinary plants used alongside with cow milk (Nunu) and mineral elements (evaporites) or potash (Kanwa) were also reported in addition as traditional medicinal agents used in treating livestock among the Fulani people of Girei, Adamawa state (Table 2). The details of their Fulani names, part used and mode of preparation alongside with their possible livestock diseases condition treated were documented for future use and for further studies. This could help in conservation, biodiversity and documentation for its ethno medicinal uses (Tamiru *et al.*, 2013; Akwaji *et al.*, 2017) for further pharmacological and biological activities leading to drug development. Similar studies have carried out by some plant species as antidiarrhoea and anti-helminthic (Offiah *et al.*, 2011). The most frequent plant families documented were Fabaceae and Meliaceae followed by other plant families. The preliminary phytochemical screening (Table 3) revealed the presence of secondary metabolites including alkaloid, tannins, saponins, anthraquinone flavonoid, glycosides and steroids/triterpenes that confirmed the ethnomedicinal claimed as anti-venom, anti-microbial and PEGs and wound healing potential of their utilization. El-Mahmood and Ameh (2007); Kubmarawa *et al.* (2008) have established some of the acclaimed pharmacological activities of the medicinal plants surveyed during the study as antimicrobial. The addition of potash and its utilization by different people among cultures in livestock diseases management may not be harmful. The cow milk (Nunu) is widely taken in Northern Nigeria and also sourced for its rich mineral composition could support it's claimed by respondents in its utilization for livestock management. The need for documentation of ethnoveterinary findings should be encourage protecting biodiversity due to endangerment of plants or its loss of knowledge among the newer generations of who have low interest and over dependence on western life and orthodox drug.

4. CONCLUSIONS

The study identified 30 medicinal plants alongside with different livestock diseases conditions they treat ethno medically among the Fulani people of Girei, Adamawa State, Nigeria. The Fulani names, part of plants and mode of preparations were documented. The survey identified use of cow milk (Madara or Nunu) and evaporites or potash (Kanwa) as recipes to medicinal plants usages in livestock diseases management. Further efforts should be channeled towards standardizations characterization and isolation of the active principle.

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References

- [1] M. O. Jacob, K. O. Farah & W. N. Ekaya, Indigenous knowledge. The basis for the Maasai Ethnoveterinary Diagnostic Skills. *Jour. Human Ecology* (2004), 6(1), 43-48
- [2] A. Sofowora, Medicinal Plants and Traditional Medicine in Africa Spectrum Books. Ltd. Ibadan (1993) Pp. 289
- [3] G. J. Martins, E. Marthias, & C. M. McCorkle, Ethno veterinary medicine. An annotated Bibliography of Community Animal Health Care. ITDG Publishing, London, UK (2001).
- [4] M. D. Harun-or-Rashid, et al., An ethnoveterinary survey of medicinal plants used to treat cattle diseases in Birishiri area, Netrakona district, Bangladesh. *Adv. in Nat. Appl. Sci.* 2010, 4(1), 10-13
- [5] J. P. Alawa, G. E. Jokthan & K. Akut, Ethnoveterinary medical practice for ruminants in the sub humid zone of northern Nigeria. *Preventive Veterinary Medicine*, (2002), 54, 79-90.
- [6] H. E. Yineger, et al., Ethnoveterinary medicinal plants at Bale Mountains National Park, Ethiopia. *Journal of Ethnopharmacology*, (2007) 112, 55-70.
- [7] T. Awas, Plant diversity in Western Ethiopia: Ecology Ethnobotany and Conservation. PHD Dissertation, Faculty of Mathematics and natural Sciences, University of Oslo, Norway, (2007).
- [8] Z. Abdulhamid, U. S. Lawal, A. M. Tahir, M. M., Harande, H. Usman and A. Nuhu, Perceptions of Hausa and Fulani Tribes on Traditional Birth Attendants in Zaria Local Government Area, Kaduna State, Nigeria. *Journal of Complementary and Alternative Medical Research* (2017) 2(2), 1-7
- [9] Y. Tekle, An ethno-veterinary botanical survey of medicinal plants in Kochore district of Gedeo Zone, Southern Nations Nationalities and Peoples Regional State (SNNPRs), *Ethiopia Journal of Scientific and Innovative Research* 2014, 3(4), 433-445
- [10] T. Sori, M. Bekana, G. Adugna, & E. Kelbessa, Medicinal Plants in the Ethnoveterinary Practices of Borana Pastoralists, Southern Ethiopia. *Intern. J. Appl Res Vet Med* 2004, 2(4), 220-225.
- [11] N. Etkin, Edible Medicine: An Ethnopharmacology of Food. University of Arizona Press Teuson (2007), Pp. 201-220
- [12] Meeusen ENT (1999). Immunology of helminth infections, with special reference to immunopathology. *Vet Parasitol* 84: 259–273

- [13] G. M. Cragg, & D. J. Newman International collaboration in drug discovery and development from natural sources. *Pure Appl. Chem.* Vol. 77, No. 11, (2005), pp. 1923-1942
- [14] Z. B. Harborne, *Phytochemical methods: A guide to modern techniques of plant analysis*, 3rd edn. Chapman and Hall Press, London, (2009). Pp. 13, 53, 53 195, 283.
- [15] T. Teklehaymanot, F. Mesfin & S. Demissew, An ethnobotanical study of medicinal plants in Wgo Woreda, SSNPR. *Ethiopia J. Ethnobiology Ethnomed.* (2009), 5, 28
- [16] N. V. Offiah, et al., Survey of herbal remedies used by Fulani herdsmen in the management of animal diarrhoea in Plateau State, Nigeria. *Journal of Medicinal Plants Research* Vol. 6(312), 2012, Pp. 4625-4632
- [17] A. M. El-Mahmood, & J.M Ameh, In vitro Antibacteria activity of *P. biglobosa* root bark extract against some micro-organism associated with tract infections. *African Journal of Biotechnology*, 2007, Vol. 6 (11), Pp. 1272-1275
- [18] D. Kubmarawa, M.E. Khan, A. M. Punah & M. Hassan, Phytochemical screening and antibacterial efficacy extract of *Khaya sengalensis*. *Africa Journal of Biotechnology*, (2008), 7, 45-56
- [19] G. Yirga, M. Teferi, G. Gidey & S. Zerabruk. An ethnoveterinary survey of medicinal plants used to treat livestock disease in Seharti Samre district, Northern Ethiopia. *African Journal of Plant Science* (2012), 6(3), 113-119. DOI:10.5897/AJPS11.242
- [20] T. Birhanu & D. Abera, Survey of Ethnoveterinary medicinal plants at selected Horro Guduru Districts, Western Ethiopia. *African Journal of Plant Science* (2015), 9 (3), 185-192
- [21] R. Blench, The expansion and adaptation of Fulbe Pastoralism to sub humid and humid Conditions in Nigeria. *Cahier D Etudes Africaines* (1994), 34(1-3), 197-213
- [22] P. I. Akwaji, E. O. Eyam and R. A. Bassey, Ethnobotanical Survey of Commonly Used Medicinal Plants in Northern Cross River State, Nigeria. *World Scientific News* 70(2) (2017) 140-157
- [23] Viola Maphosa, Patrick Julius Masika. Ethnoveterinary uses of medicinal plants: A survey of plants used in the ethnoveterinary control of gastro-intestinal parasites of goats in the Eastern Cape Province, South Africa. *Pharmaceutical Biology* Volume 48, 2010, Issue 6. Pages 697-702
- [24] Calabrese EJ (1995). Toxicological consequences of multiple chemical interactions: a primer. *Toxicology* 105: 121–135
- [25] Akhtar MS, Iqbal Z, Khan MN, Lateef M (2000). Anthelmintic activity of medicinal plants with particular reference to their use in animals in the Indo-Pakistan subcontinent. *Small Rumin Res* 38: 99–107
- [26] Hutchings A (1989). Observations on plant usage in Xhosa and Zulu medicine. *Bothalia* 19: 225–235