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Ethnobotanical Survey of Fodder/Forage Plant Species in Range and Farming Systems in the Savannahs of Ngoketunjia, North Western Cameroon

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Abstract

The world is changing. Desertification, climate change, non-sustainable agricultural and environmental practices like bush fires are leading to decrease in biological diversity and the appearance of invasive species. Ethnobotanical surveys were carried out in the 13 villages of Ndop, Ngoketunjia Division, Cameroon, to explore the ethnobotanical knowledge of the local people in Ngoketunjia Division; to raise awareness among the local community about the protection of native fodder/forage flora; and to propose guidelines for proper utilization, management and conservation of useful plants and the landscape, contributing in improving on the livelihood of the rural and urban population. Regular field trips were made and data were collected using Show and Tell Semi-structured Interviews employing a checklist of questions, guided field walks, discussions and direct field observations. The plant inventory of 151 species belonging to 105 genera and 44 families was constructed, including their common/vernacular name, life form, part used, animal, threats and availability of these plants. The leaves of these species were the most commonly used plant parts. Plants were collected, identified, preserved, mounted and voucher specimens were deposited at the National Herbarium and the University of Dschang Herbaria for future references.

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Introduction

Savannahs are tropical and sub-tropical grasslands with scattered trees and they occupy about 20% of the land surface of the Earth and 40% of Africa (van Wilgen et al., 2000). Desertification, climate change, non-sustainable agricultural and environmental practices like bush fires are leading to decrease in biological diversity and the appearance of invasive species in the savannahs of north western Cameroon, as they are elsewhere in Africa. Measures to improve ecosystem health and maintain species diversity can't be effectively maintained without knowledge of species present. Of all savannah species, those used as pasture are a critical component in livestock agriculture and hence human welfare.

Livestock rearing is an occupation and source of income for the majority of resource-poor farmers in the area. Ruminant livestock play a very important role in Cameroon agriculture, contributing about 9% of the total agricultural output or about 2.1% of the gross domestic product (MINEPIA, 2002). This subsector is a source of revenue to more than 30% of the rural population. North West Region is one of the major cattle production regions in Cameroon, with Ngoketunjia division being the major transhumance zone (seasonal displacement of flocks from one area to another, by herders in search of pasture and water). Pastures are the main land-use

system in the Ngoketunjia of Cameroon. Livestock find their fodder in the natural savannahs. The available grazing is degrading and not sufficient to meet the maintenance requirements of animals. In the savannahs of north western Cameroon, they practice extensive animal production that results in soil fertility decline, poor crop-tree-livestock integration, and increased encroachment on fragile areas (The World Bank, 2012). With the current increase in crop area, coupled with population growth, less land is available for grazing. Forage forms the main and cheapest feed for ruminants (Pamo et al., 2006a and 2006b) and pressure on forage resources is increasing.

Current knowledge about the plant species used as fodder/forage is poor. However, there is a fund of potentially useful knowledge in the folk traditions of local farmers. Ethnobotany is an integral part of indigenous/local knowledge of a particular society (Osawaru and Danin-Ogbe, 2010). However, some of the knowledge is liable to be distorted or lost completely if transfer is not done continuously.

This research was therefore an effort to document and to preserve this folk asset of indigenous knowledge on plants to make it available to present and future generations. More comprehensive identification of forage species, and preliminary assessment of their abundance, would also contribute to some of the Millennium Development Goals (MDGs) of poverty eradication and environmental sustainability, while assisting Cameroon to meet obligations under the Convention on Biological Diversity (CBD, 2014).

Specific objectives of the present research work were (1) to explore the ethnobotanical knowledge of the local people in Ngoketunjia Division; (2) to raise awareness among the local community about the protection of native fodder/forage flora; and (3) to propose guidelines for proper utilization, management and conservation of useful plants and the landscape.

Materials and methods

The study area: Location

The study was carried out in Ngoketunjia Division of the North West Region of Cameroon (Fig. 1). Ngoketunjia Division is bordered by Bui Division to the north, Mezam Division to the west, Bamboutos and Noun Divisions to the south and east respectively. It lies between latitudes 5° 15' and 6° 10' N and 10° 15' and 10°40' E (Wirsiy, 2011). The division covers a surface area of 1.152 km^2 with a population of about 230,501 inhabitants [projection from the 2005 population census (considering the national annual population growth rate of 2.5%)] giving a population density of 200 inhabitants per km^2 (Mbarga, 2010). It has an active farming population of about 184,401 persons (80% of 230,501) with 30,734 farm families (Wirsiy, 2013). The population is high and increasing, naturally, and through immigration, and people are poor.The main ethnic group is the Tikari tribe (Nkouandou, 2005).

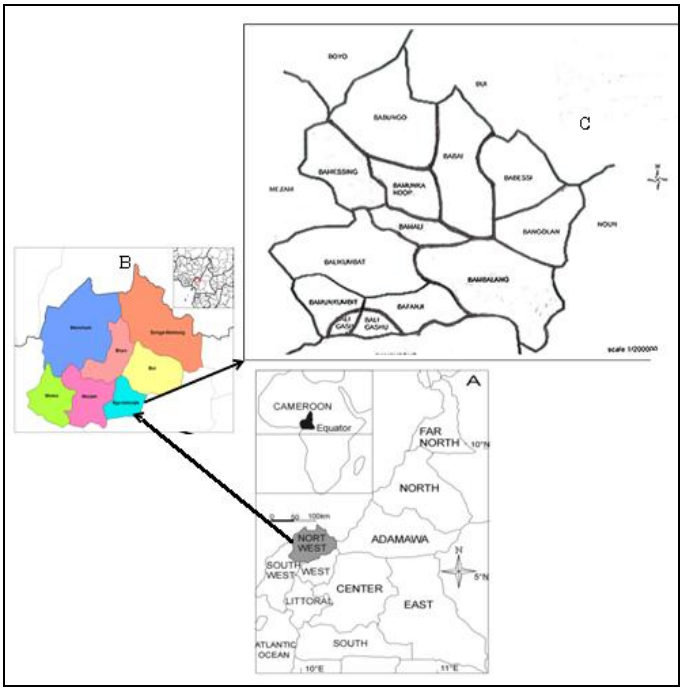

Fig. 1: Geographical location of study area. A: North West Region of Cameroon, B: Ngoketunjia Division in the North West Region, C: Ngoketunjia Division. *Source:* Adapted from the map of the North West Region.

Nature of the survey location

The relief is characterized by the Ndop Plain surrounded by numerous hills which are catchments for several rivers. Ndop plain is an intermontane basin in the Bamenda Highlands (Neba, 2009). It ranges from 300 to 2000 m in altitude (Nkouandou, 2005) and the average altitude is 1200 m (MINEF, 1999). The climate is sub-tropical with low temperatures and two distinct seasons; a dry season from mid-November to mid-March and a rainy season which extends from mid-March to mid-November. Annual rainfall is estimated at 1600 mm (Nkouandou, 2005) and the mean annual temperature is approximately 30°C (MINEF, 1999). The vegetation is principally savannah with stunted trees and a few tree

plantations (Fig. 2). The soil type is sandy loam, clay and alluvial deposits (Wirsiy, 2011). Consequently, the human pressure on the resources of the area is extremely high and the overall biodiversity and a number of key species are under threat. The main activity of the people is agriculture and fishing, with grazing, bushfires, over-harvesting of firewood and medicinal plants predominant. Maize is the main subsistence food crop and the main cash crop is rice which is cultivated on an industrial scale by the Upper Nun Valley Development Authority (UNVDA).

Ethnobotanical surveys

Ethnobotanical surveys were carried out in the 13 villages of Ngoketunjia Division in July 2011- July 2013, to investigate, create awareness, collect, identify, document the indigenous knowledge of local people about the plants used as fodder/forage and the threats to their survival, to guide proper utilization, management, conservation of useful plants and the landscape and to contribute in improving on the livelihood of the rural and urban population.

Regular field trips were made and data were collected using Show and Tell Semi-structured Interviews (Fig. 3 A, B) employing a checklist of questions, guided field walks, discussions and direct field observations (Bahru et al., 2014, Zereen and Khan, 2012, Bele et al., 2011).

Collection and preservation of plants

Frequent field trips were carried out to collect the live specimens of the plants used as fodder/forage (Fig. 3 C, D and E). The data taken in the field was transferred to the slip pasted on the herbarium sheets. The samples were dried. The samples were identified with the help of available taxonomic literature, manuals and floras and comparing with the already identified plant specimens of the herbarium. Identification was then confirmed by senior botanists at the National Herbarium (Fig. 3 F and G). The dried specimens were then mounted on herbarium sheets, voucher specimens were deposited in the National Herbarium (HNC), and the University of Dschang herbaria for future references.

Check list and ethnobotanical inventory

Ethnobotanical inventory was developed consisting of Plant families, scientific names, Common and vernacular names, part used, animals, the threats and availability of the plants.

Fig. 2: Nature of the study sites.

Fig. 3A and B: Sampling interview and guided Field walk in Ngoketunjia, Cameroon.

Fig. 3: C, D and E: Collection and pressing of fodder plant samples in Ndop, Cameroon.

Fig. 3: F and G: Identification and confirmation of fodder plants at the National Herbarium of Cameroon.

Statistical analysis

The data analysis was performed using Microsoft Office Excel 2007, and descriptive statistics (frequencies and percentages were presented).

Results

Distribution of people interviewed

Eight hundred and three people were interviewed amongst which 484 were from Ndop Central sub-division, 203 from Babessi sub-division and 116 from Balikumbat sub-division. With respect to cultural groups, the Tikari (55%) had the highest number of people who participated during the inquiry, followed by the Mbororo (40%) then the Hausa (5%). The farmers (60%) were the majority of people interviewed followed by the herders (23%) (Fig. 4).

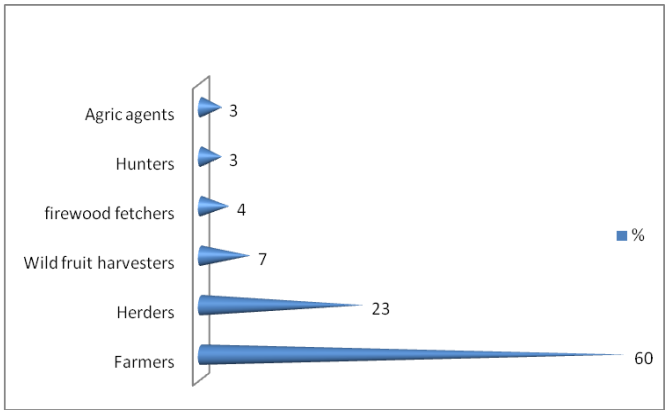

Fig. 4: Distribution of people interviewed in terms of occupation in Ngoketunjia, Cameroon

The informants were interviewed following different age groups and sexes. Those ages between 12 and 21 were considered to be youths, and between 21 and 50 were considered to be adults, and those >50 years were considered to be the old. In terms of gender, the sample was fairly balanced, as there were females (55.6%) and males (44.4%). The distribution of people interviewed in terms of age groups shows that the adults (50.07%) had the highest number of informants, followed by the old (30.09%) and lastly the youths (19.84%).

Plants sampled

The plant inventory of 151 species belonging to 105 genera and 44 families was constructed, including their common/vernacular name (Appendix 1), life form, part used, animal (Appendix 2), threats and availability of these plants. The plant families with more species were Poaceae (31 species), Fabaceae (22 species) and Asteraceae (14 species) (Fig. 5; Table 1).

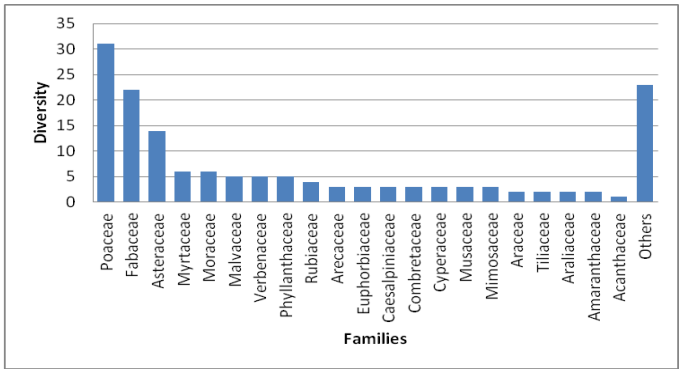

Fig. 5: Specific diversity of the fodder/forage plant families. The numbers of recorded species are indicated for every family.

The fodder/forage plant species have different life forms and parts used and different animals feed on them (Appendix 2).

The frequency of fodder plants in Ndop

Pennisetum purpureum, *Brachiaria* spp., *Oryza sativa* and *Zea mays* had the highest frequencies (Fig. 6). The plant species are arranged in decreasing order of frequency (Appendix 3).

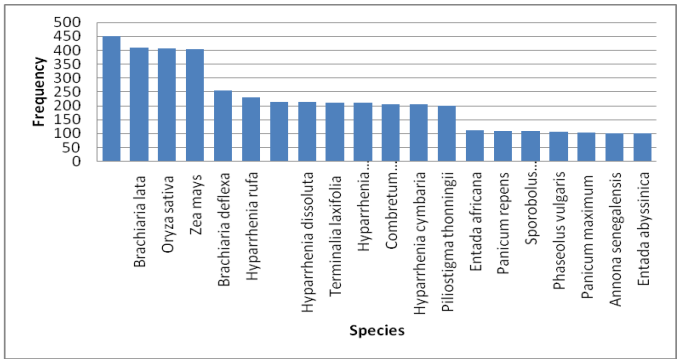

Fig. 6: Species with the highest values of frequency.

Distribution of plants with respect to their morphology

The majority of plants used as fodder were herbs, followed by shrubs, which is closely followed by trees (Fig.7).

Frequency of plant parts used as fodder

The leaves were the most utilized plant part (44%). The least utilized plant part was the root (0.6%) (Fig. 8).

The frequency of threats to the fodder plants

Uncontrolled fire had the highest frequency of threats (31.2%), followed by overexploitation (26.6%), which is followed by the use of herbicides (16.7%) (Fig. 9).

The availability of the fodder plants in Ndop

The majority of the plants are getting rare (56%), 25% of plants are available and 16% are rare and very rare plants (Fig.10).

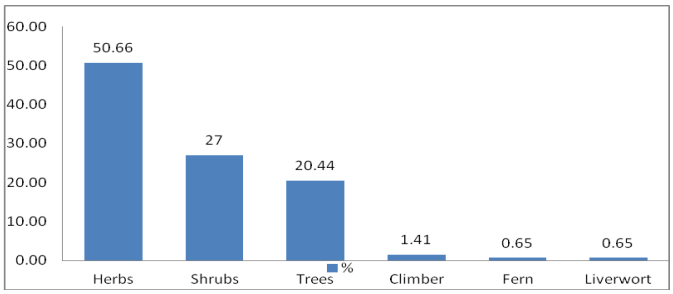

Fig. 7: Life forms of the fodder/forage plants in Ngoketunjia Division, Cameroon.

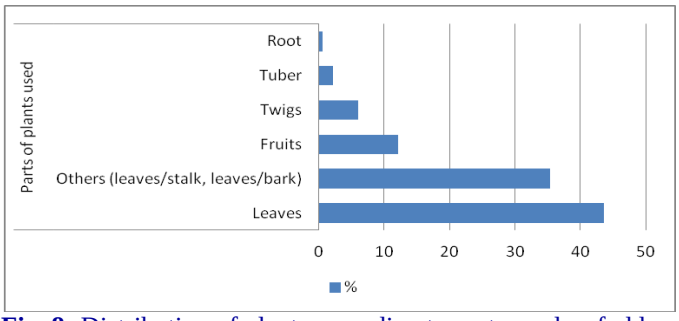

Fig. 8: Distribution of plants according to parts used as fodder in Ngoketunjia Division, North West Region, Cameroon.

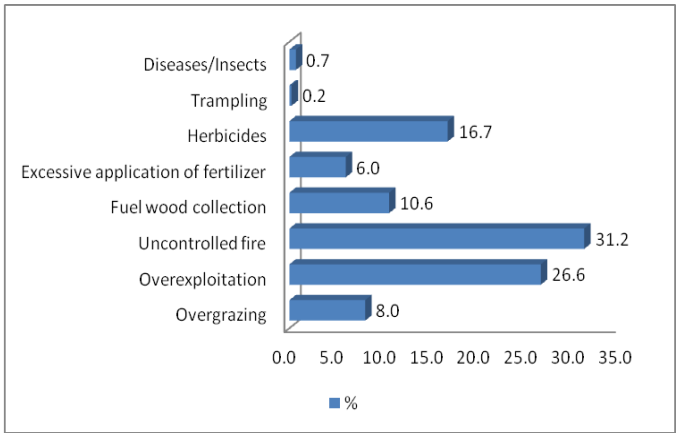

Fig. 9: The threats to the fodder plants in Ngoketunjia Division Cameroon.

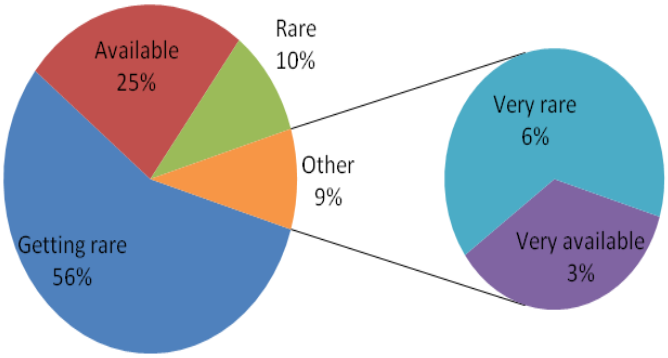

Fig. 10: The availability of the fodder plants in Ngoketunjia Division, Cameroon.

Frequency of animals

The goats were the highest (25.42%), followed by the sheeps (23.73%), which is closely followed by the cattle (23.35%) (Table 2).

Table 1. Diversity of 44 families in function of species.

Families	N_G	N_E
Poaceae	19	31
Fabaceae	16	22
Asteraceae	9	14
Myrtaceae	3	6
Moraceae	1	6
Malvaceae	4	5
Verbenaceae	3	5
Phyllanthaceae	2	5
Rubiaceae	3	4
Arecaceae	3	3
Euphorbiaceae	3	3
Caesalpiniaceae	2	3
Combretaceae	2	3
Cyperaceae	2	3
Musaceae	2	3
Mimosaceae	1	3

Families	N_G	N_E
Araceae	2	2
Tiliaceae	2	2
Araliaceae	1	2
Amaranthaceae	1	2
Acanthaceae	1	1
Amaryllidaceae	1	1
Anacardiaceae	1	1
Annonaceae	1	1
Azaliaceae	1	1
Azollaceae	1	1
Burseraceae	1	1
Convolvulaceae	1	1
Cucurbitaceae	1	1
Hymenocardiaceae	1	1
Hypericaceae	1	1
Lamiaceae	1	1
Lauraceae	1	1
Loganiaceae	1	1
Marchantiaceae	1	1
Polygalaceae	1	1
Portulacaceae	1	1
Proteaceae	1	1
Rutaceae	1	1
Sapotaceae	1	1
Smilacaceae	1	1
Solanaceae	1	1
Sterculiaceae	1	1
Zingiberaceae	1	1

NG: Genera number; **NE:** Species number.

Table 2. The animals that feed on the fodder/forage plants in Ngoketunjia.

Animal	Frequency	Percentage (%)
Goats	135	25.42
Sheeps	126	23.73
Cattle	124	23.35
Horses	56	10.55
Rodents	17	3.20
Pigs	14	2.64
Monkeys	9	1.69
Bats	8	1.51
Birds	8	1.51
Grass cutters	8	1.51
Chickens	5	0.94
Squirel	4	0.75
Rabbits	4	0.75
Giant rats	4	0.75
Guinea pigs	3	0.56
Gorilla	2	0.38
Chimpanzees	1	0.19
Donkeys	1	0.19
Antelopes	1	0.19
Rats	1	0.19
Total	**531**	**100.00**

The frequency of animal is the number of time the animal was mentioned.

Discussion

Sustainable production of livestock usually involves efficient utilisation of locally available resources. Fodder herbs, trees and shrubs are the diet of these animals and constitute the main source of proteins, minerals and vitamins. Out of the 151 plant species sampled, 131 are not in the list of animal feed resources information system (Only 20 species sampled are in the list of animal feed resource information system- INRA CIRAD AFZ and FAO (Feedipia, 2012-2013). 134 species were not cited in the Cameroon country pasture/forage resource profiles (Only 17 species *were* reported in the country pasture) (Pamo, 2008).

Only nine of the species were cited by Neba, 2010 as trees and shrubs of the silvopastoral systems of the Bamenda highlands of Cameroon; these are *Mangifera indica*, *Piliostigma thonningii*, *Vernonia amygdalina*, *Bridelia micrantha*, *Albizia gummifera* and *Albizia zygia*. To the best of my knowledge all the plant species sampled are being documented for the first time as fodder/forage plants in Ngoketunjia.

Bidens pilosa, *Cajanus cajan*, *Ficus benghalensis*, *Oryza sativa* and *Zea mays* are also used as fodder in Nepal (Malla and Chhetri, 2009). Only 14 of the plants sampled were cited by Speedy and Pugliese, 2011 as trees and shrubs of known fodder value in tropical humid Africa. Two of the plants (crop legumes) *Arachis hypogea* and *Vigna unguiculata* were reported to have valuable hay sold in Mali (Speedy and Pugliese, 2011). Fodder herbs, shrubs and trees play a significant role both in farming systems (as fallow species) and in livestock production. Jamala et al., 2013 stated that just 4 of the trees and shrubs; *Annona senegalensis*, *Leucaena leucocephala*, *Gardenia ternifolia* and *Gliricidia sepium* are also used in Nigeria in both farming and livestock production systems. In Rwanda, *Calliandra calothysus*, *Leucaena leucocephala* and *Pennisetum purpureum* are used as fodders to ruminants within agroforestry systems (Holmström, 2013).

Asah 1994 and Zimmermann 1996 cited 12 of the species as Indigenous woody species feasible for integration in crop production systems of Ndop Plain. These are *Albizia adianthifolia*, *Albizia gummifera*, *Albizia zygia*, *Bridelia speciosa*, *Calliandra calothyrsus*, *Cassia siamea*, *Entada abyssinica*, *Erythrina sigmoides*, *Leucaena leucocephala*, *Piliostigma thonningii*, *Polyscia fulva* and *Sesbania marcrantha*. Konsala et al. (2013) cited *Piliostigma thonningii*, *Erythrina Sigmoidea*, *Alchornea cordifolia*, *Bridelia ferruginea* and *Syzygium guineense* var. macrocarpum as woody species used as fodder in Cameroon and *Annona senegalensis*, *Terminalia glaucescens*, *Vernonia guineense* and *Piliostigma thonningii* as woody species used to treat animal diseases. *Pennisetum purpureum*, *Ipomoea batatas* and *Sorghum bicolor* are also used as forage crops in Western Kenya (Muyekho et al., 2005).

In India 14 of the plants sampled are wild fodder plants which are *Mangifera indica*, *Ficus benghalensis*, *Portulaca oleracea*, *Amaranthus spinosus*, *Lantana camara*, *Phoenix sylvestris*, *Eragrostis tenella*, *Imperata cylindrica* and *Panicum repens* (Ghosh, 2012). In India Rice, maize, sorghum, napier grass (elephant grass) and banana are also used as fodder crops (ILRI, 2010).

Tabuti and Lye, 2009 reported 11 of these plants as fodder plants for cattle in Kaliro district, Uganda. These are *Mangifera indica*, *Bidens pilosa*, *Vernonia amygdalina*, *Sesbania sesban*, *Albizia zygia*, *Echinochloa pyramidalis*, *Hyparrhenia rufa*, *Imperata cylindrica*, *Panicum maximum*, *Pennisetum polystachion* and *Pennisetum purpureum*. Some of the plants sampled are used as food and fodder like the maize and rice. *Ipomoea batatas* is used as food, fodder and fuel (Jata et al., 2011). *Echinochloa pyramidalis* is recommended as a suitable plant for forage production in treatment wetlands (Pare et al., 2009). In Pakistan the seeds of *Oryza sativa* are used to ease delivery and release of placenta in cattle, the seed of *Zea mays* fluor in the form of paste is given to goats to cure blood in urine (Shah et al., 2012).

30 of the plants sampled were noted by Focho et al., 2009 as plants used to treat diseases of the reproductive system such as gonorrhoea, syphilis, candidiasis and female infertility in Ndop Central Sub-division, Cameroon. Adjanohoun et al., 1996 recorded 20 of the plants as medicinal plants of Cameroon. The leaf and root of *Ficus benghalensis* is used in Central Punjab, Pakistan for increasing human male sexual power. Stem is used in furniture utilities and as fuel (Zereen and Khan, 2012). *Mangifera indica*, *Psidium guajava*, *Musa paradisiaca* and *Saccharum officinarum* are used to treat different ailments in Nepal (Malla and Chhetri, 2009). Simbo, 2010 cited 19 of these plant species as medicinal plants in Babungo, North West Region Cameroon.

Some of the plants sampled are melliferous plants, these include some native melliferous plants such as *Ageratum conyzoides*, *Albizia adianthifolia*, *Albizia gummifera*, *Albizia zygia*, *Alchornea laxiflora*, *Aspilia africana*,

Bidens pilosa, *Calliandra callothyrsus*, *Canarium schweinfurthii*, *Elaeis guineensis*, *Emilia coccinea*, *Entada abyssinica*, *Erythrina senegalensis*, *Harungana madagascariensis*, *Leucaena leucocephala*, *Mangifera indica*, *Piliostigma thonningii*, *Polyscias fulva*, *Syzygium guineense*, *Terminalia glaucescens*, *Tithonia diversifolia*, *Urena lobata*, *Vernonia amygdalina* and *Voacanga africana* (Ingam, 2011). Some of the plants are exotic melliferous plants such as *Alchornea cordifolia*, *Hibiscus rosa-sinensis*, *Lantana camara*, *Musa sapientum*, *Persea americana*, *Phaseolus vulgaris*, *Psidium guajava* and *Zea mays* (Ingam, 2011).

Only 25 of the plants sampled were recorded as plants of Mt. Cameroon (Cable and Cheek, 1998) and only 14 of the 151 plants sampled are found on Mount Oku and Ijim Ridge, Cameroon (Cheek et al., 2000). Only 8 of the plants sampled are plants of Dom in the Bamenda Highlands, Cameroon (Cheek et al., 2010). Harvey et al., 2010 recorded only six of these plants in the Lebialem Highlands, Cameroon.

Most of the species actually present have not been previously recorded and are becoming rare. Some grazers complain that fire is the major threat to these fodder/forage plants. It destroys some plant species, leading to species extinction, desertification, and the contribution of changing land use to global warming. Norgrove (2008) reports savannahs are rendered less useful for grazing and this negatively affects pastoralist's livelihoods. The results of land degradation, pasture depletion, poor nutritional value of forage and degradation of water catchments leave livestock with no alternative than to encroach into the farm lands precipitating conflicts between graziers and their neighbouring farmers.

The goats, sheep, cattle, pigs and chickens are very important during Christmas feast, feast of the Ramadan, marriages and dead celebrations. Sheep play an important socio-economic role in the life of the population, particularly Moslems. The goats, sheep, cattle, pigs and chickens are used for meat and fattening of these animals for sale is an important economic activity. Goats and sheep provide over 13% of all meat consumed in Cameroon (MINEPIA, 2002). Traditional feeding of goats and sheep is based on agricultural by-products, grazing on fallow, scavenging and browsing (Pamo, 2008).

Out of the 151 plant species sampled, a few are also used as fodder elsewhere, some also have other functions in Ndop and elsewhere, signifying that these plants are not only important as fodder but also have other functions. Some of the rangelands elsewhere may be highly degraded than in Ndop. In other areas people may commercialised fodder plants thus cultivating some particular species. In Ndop they mostly rely on natural pastures.

Guidelines

Carrying out agroforestry and agroecological agriculture. Increasing the stock through planting (fencing material, direct sowing). Plants of the Moraceae family, particularly *Ficus* spp. are readily browsed by ruminants, are fire resistant and are also recommended for life fencing. Their use on rangelands could be of advantage to range resource utilizers since they are readily browsed by ruminants and are fire resistant (Neba, 2010). Certain areas should be reserved for the dry season, either as standing hay for direct grazing or for the preparation of conserved forages (such as hay or silage). Direct seeding mulch-based cropping systems (DMC) of cover plants like grasses (*Brachiaria* sp., *Eleusine* sp., *Panicum* sp., *Sorghum* and leguminous plants (*Cajanus cajan*), thus preparing fields for subsequent crops ("biological tillage") can be adopted to improve livestock nutrition by combining crop and livestock farming through the use of cover plants as forage. This will also combat desertification, and maintain the resilience of agrarian systems. This offers solutions to the main short-term environmental challenges facing the world, especially in sub-arid to sub-humid areas threatened by desertification, through: erosion control, soil protection and cost-effective fertility regeneration. Cover plants will also in this way aid in the Clean Development Mechanism and the United Nations Framework Convention on Climate Change (UNFCCC).

Applying improved agricultural practices is advantageous. Intercropping practices offer many advantages, but improved understanding of the ecological mechanisms associated with planned special diversity, including associated additional benefits, is needed to enhance the benefits achieved. There is the scope for farmers to increase cowpea and system productivity in the Guinea-savannah by intercropping maize with medium maturing improved cowpea varieties such as IT97K and *A2214* (Maurice et al., 2010). Instead of using uncontrolled fire and too much application of fertilizers to have high crop yield which is detrimental to the soil, Maurice et al. (2010) recommended that pure cowpea culture or simultaneous cowpea/maize cropping can produce high yield.

The nutritive values of the key fodder and forage plants should be determined and sensitisation by carrying out environmental education.

Conclusion

The savannahs of Ngoketunjia Division, North Western Cameroon are endowed with fodder plants (herbs, shrubs and tree species) which are an important feed source for livestock in the area. The majorities of the plants are either getting rare or are rare and very rare plants due to major threats like uncontrolled fire and overexploitation. Details of graze, browse production, nutritive value, storage systems and trade are still lacking for most of the species identified.

Recommendations

For optimum utilisation of fodder herbs, trees and shrubs, it is essential that details of production, palatability, nutritive value and deleterious substances of the species are measured. It is very vital to promote fodder production and trade and to improve on the storage systems.

Integration of livestock production within local farming systems.The use of browse plants for fencing land. Direct seeding mulch-based cropping systems (DMC) of cover plants like grasses (*Brachiaria lata, Eleusine indica, Panicum repens, Sorghum bicolor* and leguminous plants (*Cajanus cajan*).

Conflict of interest statement

Authors declare that they have no conflict of interest.

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Appendix 1: Fodder/Forage Plant families, collection number, species and common/vernacular names.

No.	Family	Collection No.	Species	Common/Vernacular name
1	Acanthaceae	063	*Dychoriste perrotteti* (Nees) O. Ktze	Botoron (Mbororo)
2	Amaranthaceae	136	*Amaranthus hybridus* L.	Green, feih (Bamunka)
		137	*Amaranthus spinosus* L.	
3	Amaryllidaceae	090	*Scadoxus multiflorus* (Martyn) Raf.	
4	Anacardiaceae	026	*Mangifera indica* L.	Manguteh (Bamunka), Mongoroh (Mbororo)
5	Annonaceae	025	*Annona senegalensis* Pers.	Wild african custard apple, Dokonih (Mbororo)
6	Araceae	119	*Colocasia esculenta* Schott	Ibo coco, achu coco, taro
		120	*Xanthosoma sagittifolium* K.Koch	Macabo
7	Araliaceae	066	*Cussonia arborea* Hochst. Ex A Rich	Yamasehtoh (Mbororo)
		069	*Cussonia djalonensis* A.Chev	Oyahih (Mbororo)
8	Arecaceae	152	*Cocos nucifera* L.	Coconu, tneikwokeh (Bamunka)
		148	*Elaeis guineensis* Jacq	King tree, Teng (Bamunka)
		059	*Phoenix reclinata* Jacq. Var. *reclinata*	Date palm, Kehnah (Bamunka)
			Phoenix sylvestris	Dailih (Mbororo)
9	Asteraceae	109	*Ageratum conyzoides* L.	Goatweed, kinggrass
		061	*Aspilia africana* (Pers.) C.D. Adams	Iodine grass, Tahkamahoh (Mbororo), Nchinga (Bamunka)
		112	*Bidens pilosa* L.	Black jack
		023	*Echinops gracilis* O. Hoffm	Monkey kola, Gorodoro mongehkola
		024	*Echinops lanceolatus* Mattf.	Monkey kola, Dorodoro (Mbororo)
		087	*Emilia coccinea* (Sims.) G. Don.	
		079	*Helichrysum* sp.	
		093	*Spilanthes filicaulis* (Schumach. & Thonn.) C.D.Adams.	Eye for fowl, nyuohnyi (Bamunka)
		129	*Tithonia diversifolia* A. Gray.	Sunflower
		027	*Vernonia guineensis* Benth	Ginseng, Hihbih (Bamunka)
		044	*Vernonia ambigua* Kotschy & Peyr.	Sabolo (Mbororo)
		113	*Vernonia amygdalina* Del.	Bitterleaf, ndole
		077	*Vernonia* sp.	
		078	*Vernonia* sp.	
10	Azaliaceae	108	*Polyscias fulva* (Hiern). Harms.	
11	Azollaceae	092	*Azolla africana* Desv.	Mosquito fern
12	Burseraceae	149	*Canarium schweinfurtii* Engl.	Black, bevakeh (Bamunka)
13	Caesalpiniaceae	097	*Cassia mimosoides* L.	
		104	*Cassia siamea* Lam.	
		040	*Piliostigma thonningii* (Schum.) Milne-Red head	Barkerih (Mbororo)
14	Combretaceae	072	*Combretum glutinosum* Perr ex. DC	
		047	*Terminalia laxifolia* Engl. & Diels	Njoboh (Bamunka)

No.	Family	Collection No.	Species	Common/Vernacular name
		048	*Terminalia glaucescens* Planch ex. Benth	Bohdih (Mbororo)
15	Convolvulaceae	138	*Ipomoea batatas* (L.) Lam.	Sweet potatoes, keuneh (Bamunka)
16	Cucurbitaceae	151	*Cucurbita mixta* Pang.	Pumpkin, cheng (Bamunka)
17	Cyperaceae	098	*Cyperus difformis* L.	
		096	*Fimbristylis ferruginea* (L.) Vahl.	
		018	*Fimbristylis littoralis* Gaudet	
18	Euphorbiaceae	147	*Alchornea cordifolia* Schum and Thonn	
		049	*Croton macrostachyus* Hochst. Ex. Del.	
		131	*Manihot esculenta* Crantz	Cassava, chachun (Bamunka)
19	Fabaceae	141	*Arachis hypogea* L.	Nene (Bamunka)
		110	*Cajanus cajan* (L.) Millsp.	Pigeonpea, greenbeans
		103	*Calliandra calothyrsus* Meisn.	Calliandra
		074	*Calopogonium mucunoides* Desv.	
		075	*Dalbergia lactea* Vatke	Pehlohary (Mbororo)
		055	Desmodium ascendens (Sw.) DC	Bihligewah (Mbororo)
		070	*Desmodium repandum* (Vahl.). De	
		056	Desmodium canum (J.F. (Jmel.) Schinz & Thell	
		105	*Entada abyssinica* Steud. ex A. Rich.	
		041	*Entada africana* Guill & Perr.	Tchikwohkeh (Bamunka), Fuluh (Bamessing), Pelowahih (Mbororo)
		052	*Erythrina sigmoidea* Hua	
		057	*Gliricidia sepium* (Jacq.) Walp.	
		115	*Glycine max* (L.) Merr	Soyabeans, soja beans
		082	*Kotschya schweinfurthii* (Taub.) Dewit & Duvign	Black
		106	*Leucaena leucocephala* (Lam.) de Wit.	
		143	*Phaseolus vulgaris* L.	Beans, wuoa (Bamunka)
		083	*Pseudarthria hookeri* Wight et Arn	
		107	*Sesbania macrantha* Phil. & Hutch	
		080	*Vigna multineruis* Hutch et Dalz.	Herb, climbing, 70cm
		081	*Vigna nigritia* Hook. f	Herb, climbing, 1.5m
		125	*Vigna subterranea* (L.) Verdc.	Bambara groundnut
		114	*Vigna unguiculata* (L.) Walp.	Cowpea, keukwusoh, wuokeh (Bamunka)
20	Hymenocardiaceae	071	*Hymenocardia cacida* Tul.	Yamasetoh (Mbororo)
21	Hypericaceae	039	*Harungana madagascariensis* Lam. ex Poir	Bonechi (Bamunka), Brukalih(Mbororo)
22	Loganiaceae	073	*Anthocleista djalonensis* A. Chev	Bohgih (Mbororo)
23	Lamiaceae	006	*Hyptis lanceolata* Poir	Cow grass, Dokory (Mbororo)
24	Lauraceae	134	*Persea americana* Mill.	Pear, bea (Bamunka)
25	Malvaceae	126	*Hibiscus rosa-sinensis* L.	Flower

No.	Family	Collection No.	Species	Common/Vernacular name
		127	*Malvaviscus arboreus* var. *drummondii.*	Flower
		060	*Sida acuta* Burm.f	Bascara (Mbororo)
		085	*Sida rhombifolia* L.	Barji (Mbororo)
		004	*Urena lobata* Linn	Cow grass, Bodoroh/ kehnih (Bamunka)
26	Marchantiaceae	135	*Marchantia polymorpha* L.	Liverwort
27	Mimosaceae	050	*Albizia adianthifolia* (Schumach.) W.F. Wight	
		051	*Albizia gummifera* (J.F. Gmel.) C.A.Sm.	
		101	*Albizia zygia* (DC.) JF Macbride	
28	Moraceae	038	*Ficus abutilifolia* (Miq.) Miq	Fig, Bambamiwoh (Mbororo)
		145	*Ficus benghalensis* L.	Fig, gwunekeh (Bamunka)
		144	*Ficus exasperata* Vahl	Sand leaf
		089	*Ficus ingens* (Miq.) Miq.	Fig
		088	*Ficus ovata* Vahl	Fick tree
		037	*Ficus vogelii* (Miq.) Miq.	Fig, Yihbih (Mbororo)
29	Musaceae	062	*Ensete gilletii* (De Wild.) E.E. Cheesm	Monkey banana
		123	*Musa sapientum* L.	Banana
		124	*Musa paradisiaca* L.	Plantain, yeukeh (Bamunka)
30	Myrtaceae	140	*Eucalyptus globulus* Labill.	Eucalype, frosgarde (Bamunka)
		029	*Psidium guajaba* Linn	Quava, Guabeh (Mbororo), Megueba (Bamunka)
		030	*Syzygium guineense* (Willd.) DC	Bohdeh
		031	*Syzygium guineense* var. guineense (Willd.) DC.	
		032	*Syzygium guineense* var. macrocarpum (Engl.) F.	
		086	*Syzygium* sp.	
31	Phyllanthaceae	043	*Bridelia ferruginea* Benth	Fentebih (Bamunka)
		046	*Bridelia micrantha* (Hochst.) Baill	Bush coffee
		102	*Bridelia speciosa* Müll.Arg.	
		065	*Phyllanthus amarus* Schumacher et Thonning	
		007	*Phyllanthus muellerianus* (O. Kze) Exell	Debrokih (Mbororo)
32	Poaceae	014	*Andropogon tectorum* Schum. & Thonn.	
		005	*Brachiaria deflexa* (Schumach) C.E Hubbard ex. Robyns	Cow grass, Sohtereh (Mbororo)
		002	*Brachiaria lata* (Schumach) C.E Hubbard	Long cow grass, Tohlejih (Mbororo)
		122	*Brachiaria ruziziensis* R. Germ. & C.M. Evrard	
		132	*Cymbopogon citratus* L.	Fever grass, lemon grass
		121	*Echinochloa pyramidalis* (Lam.) Hitchc. And Chase	Antelope, water grass, meuh (Bamunka)
		099	*Eleusine indica* L.	
		010	*Eragrostis atrovirens* (Desf) Trin. ex Steud.	Yeikehneh (Bamunka), Rasta (Mbororo)
		017	*Eragrostis ciliaris* (Linn.) R. Br.	Njabor (Mbororo)
		022	*Eragrostis tremula* Hochst. Ex Steud	Sohnih (Mbororo)

No.	Family	Collection No.	Species	Common/Vernacular name
		003	*Eragrostis tenella* (Linn.) P. Beauv. ex Roem & Schult	
		117	*Hyparrhenia cymbaria* (Linn.) Stapf.	Thatching grass
		116	*Hyparrhenia dissoluta* (Nees ex Steud.) C.E. Hubb	Thatching grass
		001	*Hyparrhenia involucrata* Stapf	Cow grass, kehnih (Mbororo)
		013	*Hyparrhenia rufa* (Nees) Stapf.	Long white red seed cow grass, kuoh (Mbororo)
		100	*Imperata cylindrica* L.	Spear grass, yoankeh (Bamunka)
		021	*Oryza sativa* L.	Rice, Lehshi (Bamunka)
		133	*Panicum maximum* Jacq.	
		009	*Panicum repens* Linn	Bahama grass, Pagameh (Mbororo), Kehnih (Bamunka)
		151	*Paspalum distichum* L.	Water grass, sisih (Bamunka)
		016	*Pennisetum pedicellatum* Trin	Goat grass
		094	*Pennisetum polystachion* (L.) Schult.	
		054	*Pennisetum purpureum* K. Schumach	Elephant grass, Gi-ih (Bamunka)
		095	*Pennisetum violaceum* (Lam.) Rich	
		015	*Peratis indica* L.	
		111	*Saccharum officinarum* L.	Sugarcane, soukeh (Bamunka)
		011	*Setaria longiseta* P.Beauv	Short black cow grass, Selbih (Mbororo)
		142	*Sinarundinaria alpina* (K.Schum.) C.S. Chao & Renvoize	Indian bamboo
		012	*Sporobolus pyramidalis* P. Beauv	Long red seed cow grass, kohteh (Bamunka)
		130	*Sorghum bicolor* (L.) Moench	Guinea corn, soohyea (Bamunka)
		020	*Zea mays* L.	Corn, so-oh (Bamunka)
33	Portulacaceae	118	*Portulaca oleracea* Linn	Pigweed
34	Polygalaceae	028	*Polygala acicularis* Oliv.	
35	Proteaceae	076	*Protea argyrophaea* Hutch	Debroky (Mbororo)
36	Rubiaceae	042	*Crosopteryx febrifuga* (Afzel. ex G. Don) Benth	Shunih (Mbororo)
		084	*Crosopteryx* sp	
		058	*Gardenia ternifolia* Schum & Thonn	
		067	*Tricalysia okelensis* Hiern	Niebon (Mbororo)
37	Rutaceae	150	*Citrus sinensis* (L.) Osbeck	Orange, Lamashi (Bamunka)
38	Sapotaceae	033	*Vitellaria paradoxa* Gaertn.f	Bush mango, Carihy (Mbororo)
39	Solanaceae	139	*Solanum scabrum* Mill.	Huckle berry, sibeh (Bamunka)
40	Smilacaceae	008	*Smilax kraussiana* Meisn	Cow grass, Niaraniarageh (Mbororo)
41	Sterculiaceae	146	*Cola nitida* (Vent.) Schott & Endl.	Beih (Bamunka)
42	Tiliaceae	064	*Triumfetta annua* L.f	Niakahmeh/niakahrey (Mbororo)
		091	*Christiana africana* DC	
43	Verbenaceae	128	*Lantana camara* L.	Married flower
		035	*Vitex doniana* Sweet	Bih (Bamunka)
		045	*Vitex madiensis* Oliv.	Njoboh (Bamunka)

No.	Family	Collection No.	Species	Common/Vernacular name
		068	*Vitex* sp.	Buhmehih (Mbororo)
		053	*Voacanga africana* Stapf ex Scott-Elliot	Teuneh(Bamunka), Bohmejeh (Mbororo)
44	Zingiberaceae	036	*Aframomum danielli* K. Schum	Kenchou, Chukeh (Bamunka), bush pepper

Appendix 2: Life forms, parts used and animals.

S. No	Species	Life forms	Part(s) used	Animal (s)
1	*Dychoriste perrotteti* (Nees) O. Ktze	Herb	Leaves/stalk	Goat, sheep
2	*Amaranthus hybridus* L.	Herb	Leaves/stalk	Cattle, goats, horse, sheep, pig
3	*Amaranthus spinosus* L.	Herb	Leaves	Cattle, goats,sheep, horse
4	*Scadoxus multiflorus* (Martyn) Raf.	Herb	Leaves	Goat, sheep
5	*Mangifera indica* L.	Tree	Leaves, fruits	Cattle, goats,sheep,bats, birds, snakes
6	*Annona senegalensis* Pers	Shrub	Leaves, fruits	Cattle, goats, sheep, horse, rodents Monkey, chimpanzees, Gorilla, squirel, bird, bat
7	*Colocasia esculenta*Schott	Tuber	Tuber	Pigs, chickens, cattle, goats,sheep
8	*Xanthosoma sagittifolium* K.Koch	Tuber	Tuber	Pigs, chickens, cattle, goats,sheep
9	*Cussonia arborea* Hochst. Ex A Rich	Shrub	Leaves	Cattle, horse, sheep, goat
10	*Cussonia djalonensis* A.Chev	Shrub	Leaves	Cattle, horse, sheep, goat
11	*Cocos nucifera* L.	Tree	Leaves	Cattle, goats,sheep, horse
12	*Elaeis guineensis* Jacq	Tree	Leaves	Cattle, goats,sheep, horse, grass cutter, squirel
13	*Phoenix reclinata* Jacq. Var. reclinata	Tree	Leaves, date	Monkeys, cattle, goats, sheep, horse
14	*Ageratum conyzoides* L.	Herb	Leaves/stalk	Goats
15	*Aspilia africana* (Pers.) C.D. Adams	Herb	Leaves/stalk	Goats, sheep, rabbit, cattle, guinea pig, horses
16	*Bidens pilosa* L.	Herb	Leaves/stalk	Cattle, goats,sheep,pigs
17	*Echinops gracilis* O. Hoffm	Herb	Leaves, fruit	Monkeys, goats
18	*Echinops lanceolatus* Mattf.	Herb	Leaves, fruit	Monkeys, goats
19	*Emilia coccinea* (Sims.) G. Don	Herb	Leaves/stalk	Goats, sheep
20	*Helichrysum* sp	Herb	Leaves	Goats, sheep
21	*Spilanthes filicaulis* (Schumach. & Thonn.) C.D.Adams.	Herb	Leaves/stalk	Goats, sheep, chicken, cattle
22	*Tithonia diversifolia* A. Gray.	Shrub	Leaves	Cattle, goats, sheep
23	*Vernonia guineensis* Benth	Herb	Entire plant	Cattle, goats, sheep, rodents
24	*Vernonia ambigua* Kotschy & Peyr	Herb	Leaves/stalk	Goats, sheep
25	*Vernonia amygdalina* Del	Shrub	Leaves	Cattle, goats,sheep,pigs
26	*Vernonia* sp	Herb	Leaves	Goats, sheep
27	*Vernonia* sp.	Herb	Leaves	Goats, sheep
28	*Polyscias fulva* (Hiern). Harms	Shrub	Leaves	Cattle, horse, goats, sheep
29	*Azolla africana* Desv.	Fern	Entire plant	Chicken, pig, sheep, goat, cattle, horse
30	*Canarium schweinfurtii* Engl.	Tree	Leaves, fruits	Cattle, sheep, goats, rodents
31	*Cassia mimosoides* L.	Shrub	Leaves	Cattle, horse, goats, sheep
32	*Cassia siamea* Lam.	Shrub	Leaves, fruits	Cattle, horse, goats, sheep

S. No	Species	Life forms	Part(s) used	Animal (s)
33	*Piliostigma thonningii* (Schum.) Milne-Red head	Shrub	Leaves, fruits	Cattle, horse, goats, sheep
34	*Combretum glutinosum* Perr ex. DC	Tree	Leaves	Cattle, horse, goats, sheep
35	*Terminalia laxifolia* Engl. & Diels	Tree	Leaves	Cattle, horse, goats, sheep
36	*Terminalia glaucescens* Planch ex. Benth	Tree	Leaves	Cattle, horse, goats, sheep
37	*Ipomoea batatas* (L.) Lam.	Tuber	Tuber, leaves	Cattle, horse, goats,sheep,pigs, rabbit, squirrel, grass cutter
38	*Cucurbita mixta*Pang.	Climber	Leaves, fruits	Pig, goats
39	*Cyperus difformis* L.	Sedge	Leaves/stalk	Cattle, horse, goats, sheep
40	*Fimbristylis ferruginea* (L.) Vahl.	Sedge	Leaves/stalk	Cattle, horse, goats, sheep
41	*Fimbristylis littoralis* Gaudet	Sedge	Leaves/stalk	Cattle, horse, goats, sheep
42	*Alchornea cordifolia* Schum and Thonn	Herb	Leaves	Cattle, sheep, goats
43	*Croton macrostachyus* Hochst. Ex. Del.	Tree	Leaves	Cattle, sheep, goats
44	*Manihot esculenta* Crantz	Tuber	Leaves, tuber	Goat, sheep, cow, horse, monkey, rodents
45	*Arachis hypogea* L.	Herb	Leaves/stalk	Cattle, sheep, goats, horse, rodents
46	*Cajanus cajan* (L.) Millsp.	Herb	Leaves/stalk	Cattle, sheep, goats
47	*Calliandra calothyrsus* Meisn	Shrub	Leaves, twigs	Cattle, sheep, goats
48	*Calopogonium mucunoides Desv.*	Shrub	Leaves	Cattle, sheep, goats
49	*Dalbergia lactea* Vatke	Shrub	Leaves	Cattle, sheep, goats
50	Desmodium ascendens (Sw.) DC	Herb	Leaves/stalk	Cattle, sheep, goats
51	*Desmodium repandum* (Vahl.). De	Herb	Leaves/stalk	Cattle, sheep, goats
52	Desmodium canum (J.F. (Jmel.) Schinz & Thell	Herb	Leaves/stalk	Cattle, sheep, goats
53	*Entada abyssinica* Steud. ex A. Rich.	Shrub	Leaves	Cattle, horse, goats, sheep
54	*Entada africana* Guill & Perr.	Shrub	Leaves, fruits	Cattle, sheep, goats, monkeys
55	*Erythrina sigmoidea* Hua	Shrub	Leaves	Cattle, sheep, goats, monkeys
56	*Gliricidia sepium* (Jacq.) Walp.	Shrub	Leaves	Cattle, sheep, goats
57	*Glycine max* (L.) Merr.	Herb	Leaves/stalk	Cattle, sheep, goats,pigs,chickens
58	*Kotschya schweinfurthii* (Taub.) Dewit & Duvign	Tree	Leaves, fruits	Cattle, sheep, goats, rodents
59	*Leucaena leucocephala* (Lam.) de Wit.	Shrub	Leaves	Cattle, sheep, goats
60	*Phaseolus vulgaris* L.	Herb	Leaves/stalk	Cattle, sheep, goats,pigs,chickens
61	*Pseudarthria hookeri* Wight et Arn	Shrub	Leaves	Cattle, sheep, goats
62	*Sesbania macrantha* Phil. & Hutch	Shrub	Leaves	Cattle, sheep, goats
63	*Vigna multineruis* Hutch et Dalz	Climber	Leaves/stalk	Cattle, sheep, goats, horses
64	*Vigna nigritia* Hook. f	Climber	Leaves/stalk	Cattle, sheep, goats, horses
65	*Vigna subterranea* (L.) Verdc.	Herb	Leaves/stalk	Cattle
66	*Vigna unguiculata* (L.) Walp.	Herb	Leaves/stalk	Cattle, goat, horse, sheep
67	*Hymenocardia cacida* Tul.	Shrub	Leaves	Cattle, goat, horse, sheep
68	*Harungana madagascariensis* Lam. ex Poir	Shrub	Leaves/bark	Cattle, goat, horse, sheep
69	*Anthocleista djalonensis* A. Chev	Shrub	Leaves	Cattle, goat, horse, sheep
70	*Hyptis lanceolata* Poir	Herb	Leaves/stalk	Cattle, goat, horse, sheep
71	*Persea americana* Mill.	Tree	Leaves, twigs, fruits	Cattle, sheep, goat, pig, horse
72	*Hibiscus rosa-sinensis* L.	Shrub	Leaves	Goats

S. No	Species	Life forms	Part(s) used	Animal (s)
73	*Malvaviscus arboreus* var. *drummondii*	Shrub	Leaves	Goats
74	*Sida acuta* Burm.f	Herb	Leaves/stalk	Cattle, goat, horse, sheep
75	*Sida rhombifolia* L.	Herb	Leaves/stalk	Cattle, goat, horse, sheep
76	*Urena lobata* Linn	Herb	Leaves/stalk	Cattle, goat, horse, sheep
77	*Marchantia polymorpha* L.	Liverwort	Entire	Cattle
78	*Albizia adianthifolia* (Schumach.) W.F. Wight	Tree	Leaves	Cattle, goat, horse, sheep
79	*Albizia gummifera* (J.F. Gmel.) C.A.Sm.	Tree	Leaves	Cattle, goat, horse, sheep
80	*Albizia zygia* (DC.) JF Macbride	Tree	Leaves	Cattle, goat, horse, sheep
81	*Ficus abutilifolia* (Miq.) Miq.	Shrub	Leaves	Cattle, goat, sheep
82	*Ficus benghalensis* L.	Tree	Leaves	Cattle, goat, sheep
83	*Ficus exasperata* Vahl	Shrub	Leaves	Cattle, goat, sheep
84	*Ficus ingens* (Miq.) Miq.	Shrub	Leaves	Cattle, goat, sheep, rodents
85	*Ficus ovata* Vahl	Tree	Leaves	Cattle, goat, sheep, rodents
86	*Ficus vogelii* (Miq.) Miq.	Tree	Leaves	Cattle, goat, sheep
87	*Ensete gilletii* (De Wild.) E.E. Cheesm	Shrub	Fruits, leaves	Cattle, goat, sheep, monkeys, rodents
88	*Musa sapientum* L.	Tree	Fruits, leaves	Cattle, goat, sheep, monkeys, rodents
89	*Musa paradisiaca* L.	Tree	Leaves, fruits	Cattle, goat, sheep, horse, bat, bird
90	*Eucalyptus globulus* Labill.	Tree	Leaves	Goat,sheep
91	*Psidium guajaba* Linn	Shrub	Fruits, leaves	Cattle, goat, sheep, horse, bat, bird
92	*Syzygium guineense* (Willd.) DC	Tree	Leaves, fruits	Cattle, goat, sheep, horse, bat, bird
93	*Syzygium guineense* var. *guineense* (Willd.) DC.	Tree	Leaves, fruits	Cattle, goat, sheep, horse, bat, bird
94	*Syzygium guineense* var. *macrocarpum* (Engl.) F.	Tree	Leaves, fruits	Cattle, goat, sheep, horse, bat, bird
95	*Syzygium* sp.	Tree	Leaves, fruits	Cattle, goat, sheep, horse, bat, bird
96	*Bridelia ferruginea* Benth.	Tree	Leaves, twigs	Cattle, goat, sheep
97	*Bridelia micrantha* (Hochst.) Baill	Shrub	Leaves and twigs	Cattle, goat, sheep
98	*Bridelia speciosa* Müll.Arg.	Shrub	Leaves and twigs	Cattle, goat, sheep
99	*Phyllanthus amarus* Schumacher et Thonning	Herb	Leaves/stalk	Sheep, goats
100	*Phyllanthus muellerianus* (O. Kze) Exell	Herb	Leaves/stalk	Sheep, goats
101	*Andropogon tectorum* Schum. & Thonn.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
102	*Brachiaria deflexa* (Schumach) C.E Hubbard ex. Robyns	Herb	Leaves/stalk	Cattle
103	*Brachiaria lata* (Schumach) C.E Hubbard	Herb	Leaves/stalk	Cattle, goat, sheep, horse
104	*Brachiaria ruziziensis* R. Germ. & C.M. Evrard	Herb	Leaves/stalk	Cattle, goat, sheep, horse
105	*Cymbopogon citratus* L.	Herb	Leaves/stalk	Goats
106	*Echinochloa pyramidalis* (Lam.) Hitchc. And Chase	Herb	Leaves/stalk	Cattle, sheep, goats,fish, grasscutter
107	*Eleusine indica* L.	Herb	Leaves/stalk	Cattle
108	*Eragrostis atrovirens* (Desf) Trin. ex Steud.	Herb	Leaves/stalk	Cattle
109	*Eragrostis ciliaris* (Linn.) R. Br.	Herb	Leaves/stalk	Cattle
110	*Eragrostis tremula* Hochst. Ex Steud	Herb	Leaves/stalk	Sheep, goats
111	*Eragrostis tenella* (Linn.) P. Beauv. ex Roem & Schult	Herb	Leaves/stalk	Cattle, goat, sheep, horse
112	*Hyparrhenia cymbaria* (Linn.) Stapf.	Herb	Leaves/stalk	Cattle, goat, sheep, horse

S. No	Species	Life forms	Part(s) used	Animal (s)
113	*Hyparrhenia dissoluta* (Nees ex Steud.) C.E. Hubb	Herb	Leaves/stalk	Cattle, goat, sheep, horse
114	*Hyparrhenia involucrata* Stapf.	Herb	Leaves/stalk	Cattle
115	*Hyparrhenia rufa* (Nees) Stapf.	Herb	Leaves/stalk	Cattle, goat, sheep, antelope
116	*Imperata cylindrica* L.	Herb	Leaves/stalk	Cattle, sheep, goat,donkey,grasscutter,squirrel, giant rat
117	*Oryza sativa* L.	Herb	Leaves/stalk	Cattle,sheep, goats, pig, grasscutter, horse, giant rat, rats
118	*Panicum maximum* Jacq.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
119	*Panicum repens* Linn	Herb	Leaves/stalk	Cattle
120	*Paspalum distichum* L.	Herb	Leaves/stalk	Cattle, goat, sheep, antelope
121	*Pennisetum pedicellatum* Trin.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
122	*Pennisetum polystachion* (L.) Schult.	Herb	Leaves/stalk	Cattle, sheep, goats
123	*Pennisetum purpureum* K. Schumach	Herb	Leaves/stalk	Cattle,sheep, goats, pig, grasscutter
124	*Pennisetum violaceum* (Lam.) Rich.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
125	*Peratis indica* L.	Herb	Leaves/stalk	Cattle, sheep, goats
126	*Saccharum officinarum* L.	Herb	Leaves/stalk	Cattle, goats, sheep, pigs, grass cutter
127	*Setaria longiseta* P.Beauv.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
128	*Sinarundinaria alpina* (K.Schum.)C.S. Chao & Renvoize	Shrub	Leaves	Cattle, sheep, goats
129	*Sporobolus pyramidalis* P. Beauv.	Herb	Leaves/stalk	Pigs, goats, sheep, chicken
130	*Sorghum bicolor* (L.) Moench	Herb	Leaves/stalk	Cattle, goats, sheep, rabbit, grass cutter,squirel, giant rat
131	*Zea mays* L.	Herb	Leaves/stalk	Cattle, sheep, goats,grass cutter, giant rat
132	*Portulaca oleracea* Linn.	Herb	Leaves/stalk	Cattle
133	*Polygala acicularis* Oliv.	Herb	Leaves/stalk	Cattle, goat, sheep, horse
134	*Protea argyrophaea* Hutch.	Shrub	Leaves	Cattle
135	*Crosopteryx febrifuga* (Afzel. ex G. Don) Benth	Shrub	Leaves, fruits	Cattle, sheep, goats, rodents
136	*Crosopteryx* sp.	Shrub	Leaves and twigs	Cattle, sheep, goats, rodents
137	*Gardenia ternifolia* Schum & Thonn.	Shrub	Leaves, twigs	Cattle, sheep, goats, rodents
138	*Tricalysia okelensis* Hiern.	Shrub	Leaves	Cattle, sheep, goats, rodents
139	*Citrus sinensis* (L.) Osbeck	Tree	Leaves	Goats
140	*Vitellaria paradoxa* Gaertn.f	Tree	Leaves, twigs, fruits	Cattle, sheep, goats, rodents
141	*Solanum scabrum* Mill.	Herb	Leaves/stalk	Cattle, horse
142	*Smilax kraussiana* Meisn	Herb	Leaves/stalk	Cattle, sheep, goats
143	*Cola nitida* (Vent.) Schott & Endl.	Tree	Leaves and twigs	Cattle, sheep, goats, rodents, bat
144	*Triumfetta annua* L.f.	Herb	Leaves	Cattle, sheep, goats, rodents
145	*Christiana africana* DC	Herb	Leaves/stalk	Goats
146	*Lantana camara* L.	Shrub	Leaves	Goats, sheep, rodents
147	*Vitex doniana* Sweet	Tree	Leaves, twigs	Goats, cattle
148	*Vitex madiensis* Oliv.	Tree	Leaves, twigs	Cattle, goats
149	*Vitex* sp.	Shrub	Leaves	Cattle, goats
150	*Voacanga africana* Stapf ex Scott-Elliot	Shrub	Fruits, leaves	Cattle,goat,sheep,bat
151	*Aframomum danielli* K. Schum	Herb	Fruits, leaves	Goat,sheep

Appendix 3: The frequency of the fodder/forage plants in Ngoketunjia.

Species	Frequency
Pennisetum purpureum K. Schumach	450
Brachiaria lata (Schumach) C.E Hubbard	410
Oryza sativa L.	408
Zea mays L.	405
Brachiaria deflexa (Schumach) C.E Hubbard ex. Robyns	255
Hyparrhenia rufa (Nees) Stapf.	230
Terminalia glaucescens Planch ex. Benth	215
Hyparrhenia dissoluta (Nees ex Steud.) C.E. Hubb	214
Terminalia laxifolia Engl. & Diels	212
Hyparrhenia involucrata Stapf	210
Combretum glutinosum Perr ex. DC	205
Hyparrhenia cymbaria (Linn.) Stapf.	205
Piliostigma thonningii (Schum.) Milne-Red head	200
Entada africana Guill & Perr	112
Panicum repens Linn	109
Sporobolus pyramidalis P. Beauv	108
Phaseolus vulgaris L.	107
Panicum maximum Jacq.	104
Annona senegalensis Pers	100
Entada abyssinica Steud. ex A. Rich.	100
Vernonia amygdalina Del	85
Eragrostis atrovirens (Desf) Trin. ex Steud.	85
Eleusine indica L.	80
Eragrostis tenella (Linn.) P. Beauv. ex Roem & Schult	78
Eragrostis tremula Hochst. Ex Steud	77
Elaeis guineensis Jacq	72
Eragrostis ciliaris (Linn.) R. Br.	70
Phoenix reclinata Jacq. Var. reclinata	65
Sida rhombifolia L.	65
Amaranthus spinosus L.	60
Cussonia djalonensis A.Chev	60
Sida acuta Burm.f	60
Vitellaria paradoxa Gaertn.f	60
Cussonia arborea Hochst. Ex A Rich	55
Canarium schweinfurtii Engl.	51
Amaranthus hybridus L.	50
Leucaena leucocephala (Lam.) de Wit.	44
Echinops gracilis O. Hoffm	42
Mangifera indica L.	40
Cocos nucifera L.	40
Vigna multineruis Hutch et Dalz	40
Urena lobata Linn.	40
Brachiaria ruziziensis R. Germ. & C.M. Evrard	40
Echinops lanceolatus Mattf.	39
Ipomoea batatas (L.) Lam.	35
Manihot esculenta Crantz	35
Vigna nigritia Hook. f	35
Tithonia diversifolia A. Gray.	34
Vigna unguiculata (L.) Walp.	32
Calliandra calothyrsus Meisn	30
Vigna subterranea (L.) Verdc.	30
Persea americana Mill.	30
Ficus benghalensis L.	30
Solanum scabrum Mill.	30
Spilanthes filicaulis (Schumach. & Thonn.) C.D.Adams.	28

Species	Frequency
Ficus exasperata Vahl.	26
Fimbristylis littoralis Gaudet	25
Arachis hypogea L.	25
Ficus ovata Vahl.	25
Vitex doniana Sweet	25
Ficus vogelii (Miq.) Miq.	22
Saccharum officinarum L.	22
Vitex madiensis Oliv.	22
Fimbristylis ferruginea (L.) Vahl.	20
Cajanus cajan (L.) Millsp.	20
Erythrina sigmoidea Hua	20
Pennisetum violaceum (Lam.) Rich.	20
Helichrysum sp.	18
Emilia coccinea (Sims.) G. Don.	17
Vitex sp.	17
Albizia gummifera (J.F. Gmel.) C.A.Sm.	16
Psidium guajaba Linn.	16
Aspilia africana (Pers.) C.D. Adams	15
Vernonia guineensis Benth.	15
Desmodium ascendens (Sw.) DC	15
Harungana madagascariensis Lam. ex Poir	15
Ficus ingens (Miq.) Miq.	15
Pennisetum pedicellatum Trin.	15
Dychoriste perrotteti (Nees) O. Ktze.	14
Cyperus difformis L.	14
Calopogonium mucunoides Desv.	14
Kotschya schweinfurthii (Taub.) Dewit & Duvign	14
Albizia adianthifolia (Schumach.) W.F. Wight	14
Polygala acicularis Oliv.	14
Vernonia ambigua Kotschy & Peyr.	13
Albizia zygia (DC.) JF Macbride	13
Desmodium repandum (Vahl.). De	12
Sesbania macrantha Phil. & Hutch	12
Hibiscus rosa-sinensis L.	12
Pennisetum polystachion (L.) Schult.	12
Scadoxus multiflorus (Martyn) Raf.	11
Ageratum conyzoides L.	10
Desmodium canum (J.F. (Jmel.) Schinz & Thell	10
Malvaviscus arboreus var. *drummondii*.	10
Ficus abutilifolia (Miq.) Miq	10
Syzygium guineense (Willd.) DC	10
Voacanga africana Stapf. ex Scott-Elliot	10
Alchornea cordifolia Schum and Thonn.	9
Dalbergia lactea Vatke	9
Syzygium sp.	9
Sinarundinaria alpina (K.Schum.) C.S. Chao & Renvoize	9
Crosopteryx febrifuga (Afzel. ex G. Don) Benth.	9
Citrus sinensis (L.) Osbeck	9
Bidens pilosa L.	8
Vernonia sp.	8
Cucurbita mixta Pang.	8
Croton macrostachyus Hochst. Ex. Del.	8
Gliricidia sepium (Jacq.) Walp.	8
Syzygium guineense var. guineense (Willd.) DC.	8
Bridelia ferruginea Benth.	8
Paspalum distichum L.	8

Species	Frequency
Crosopteryx sp.	8
Vernonia sp.	7
Azolla africana Desv.	7
Glycine max (L.) Merr.	7
Pseudarthria hookeri Wight et Arn.	7
Anthocleista djalonensis A. Chev.	7
Syzygium guineense var. macrocarpum (Engl.) F.	7
Imperata cylindrica L.	7
Setaria longiseta P.Beauv	7
Protea argyrophaea Hutch.	7
Colocasia esculenta Schott	6
Polyscias fulva (Hiern). Harms.	6
Cassia mimosoides L.	6
Musa sapientum L.	6
Bridelia micrantha (Hochst.) Baill	6
Bridelia speciosa Müll.Arg.	6
Andropogon tectorum Schum. & Thonn.	6
Tricalysia okelensis Hiern.	6
Triumfetta annua L.f.	6
Xanthosoma sagittifolium K.Koch	5
Cassia siamea Lam.	5
Hyptis lanceolata Poir.	5
Musa paradisiaca L.	5
Echinochloa pyramidalis (Lam.) Hitchc. And Chase	5
Peratis indica L.	5
Cola nitida (Vent.) Schott & Endl.	5
Christiana africana DC	5
Hymenocardia cacida Tul.	4
Ensete gilletii (De Wild.) E.E. Cheesm	4
Phyllanthus amarus Schumacher et Thonning	4
Phyllanthus muellerianus (O. Kze) Exell	4
Sorghum bicolor (L.) Moench.	4
Smilax kraussiana Meisn.	4
Aframomum danielli K. Schum.	4
Marchantia polymorpha L.	3
Eucalyptus globulus Labill.	3
Cymbopogon citratus L.	3
Portulaca oleracea Linn.	3
Gardenia ternifolia Schum & Thonn.	3
Lantana camara L.	3

The frequency of the fodder/forage plants is the number of times the plant was mentioned or shown as plants used as fodder/forage in Ndop. This does not mean they are the most utilized plants. They are the plants commonly known as Fodder/forage by a majority of the people interviewed.