VEGETATION STUDIES OF GASHAKA GUMTI NATIONAL PARK, NIGERIA
1. ETHNOBOTANY

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Gashaka Gumti National Park (GGNP) can be regarded as Nigeria's remaining wilderness because it is in a remote location . It is largely inaccessible due to lack of roads and its rugged mountainous terrain. Thus, the biotic integrity of GGNP is preserved. The population density is low and the major ethnic groups living in the Park enclaves are the Jibu, Chamba, Ndoro, Gbaya and Fulani (Dunn, 1999). As a result of limited contact with the rest of the country, their history and culture have been coupled with their environmental resources, the major component being plants. The inhabitants have been able to survive in their environment by using the resources in a variety of ways. In this study, an investigation was carried out on how the inhabitants have used plants to serve their needs.

Study area

GGNP, which is the largest National Park in Nigeria lies between 6-8^{0}N latitude and 11-12^{0}E longitude and covers an area of 6, 402. 5 km^2. The northern part of the park is known as the Gumti sector and it is located in Adamawa State while the southern Gashaka sector is located in Taraba State (Fig. 1). While the vegetation type in the Gumti sector is savanna, the Gashaka sector has a combination of lowland gallery forests, savanna, montane forests and montane grassland (Akinsoji, 1994). Fig. 2 shows the vegetation of some selected sites.'' The inhabitants of the enclaves engage in subsistence farming and cattle rearing. Movement within the park is by trekking on the footpaths and it may take up to seven or eight days from the nearest motorable road to traverse the park.

Methodology

The survey was carried on from March to July 1996. Data was gathered in the enclaves shown in Fig. 1 using Participatory Rural Appraisal techniques (Martin, 1995); Freudenthal and Narrowe (1991); McCracken *et al.*, (1998), Mendelsohn, (1993); Watts and Akogo, (1994). Interviews were conducted with groups comprising 5-8 elders in the community. One-on-one informal interviews were also held with individuals about uses of certain plants, some of which are cultivated around the settlements. As a result of inter-enclave similarities in use of plant resources in a pilot study, data for the enclaves were pooled. The validity of the information collected was verified by triangulation (Walter, 1998). After data collation, the results and the significance were discussed with the participating communities. Specimens were identified using Keay *et al.* (1960,1964) and Gbile (1980). Identifications were confirmed at the Forestry Herbarium, Ibadan where a set of specimens was deposited. A set was also deposited at the Gashaka Herbarium initiated by the author.

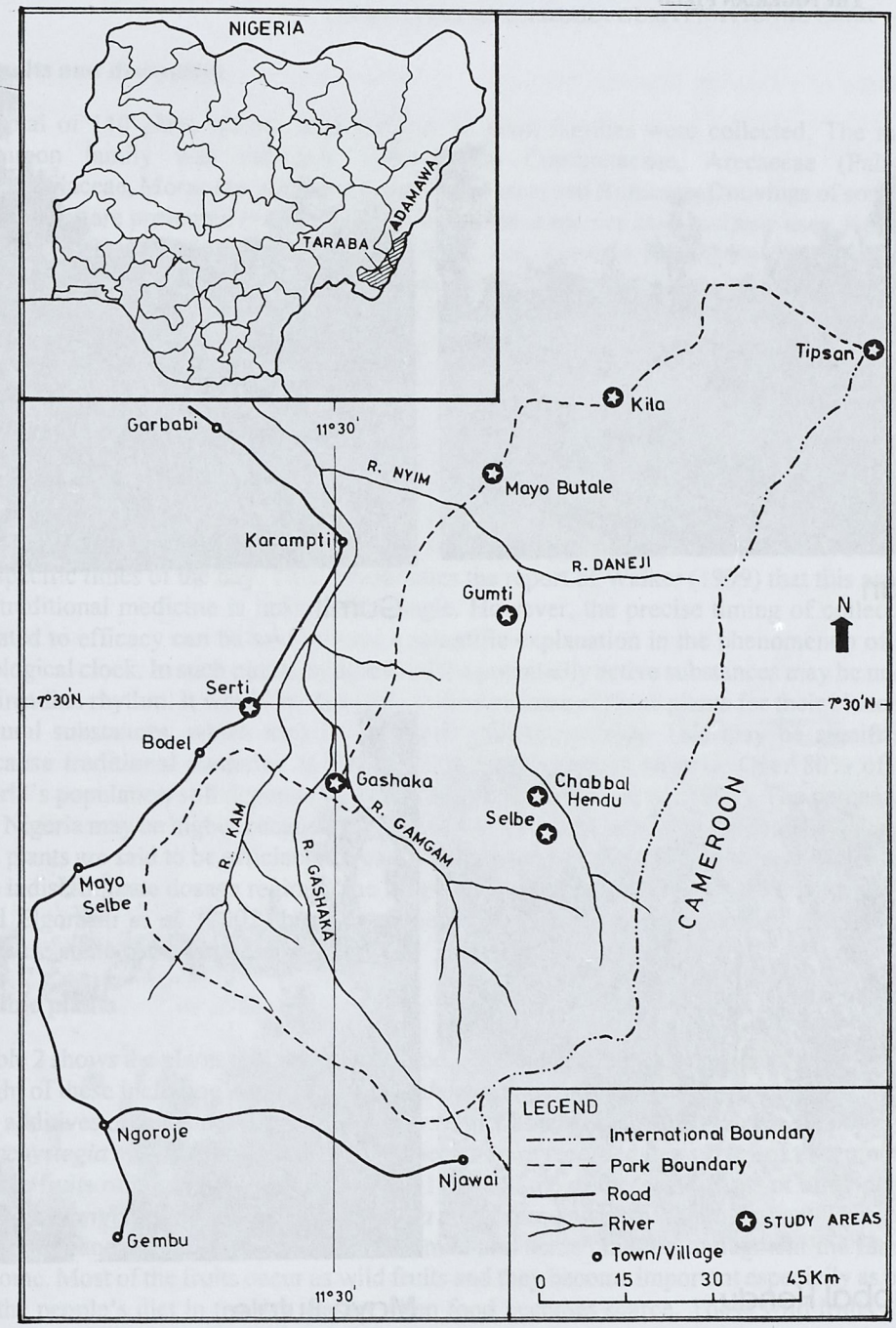

Fig 1 Location of Gashaka Gumti National Park, Nigeria

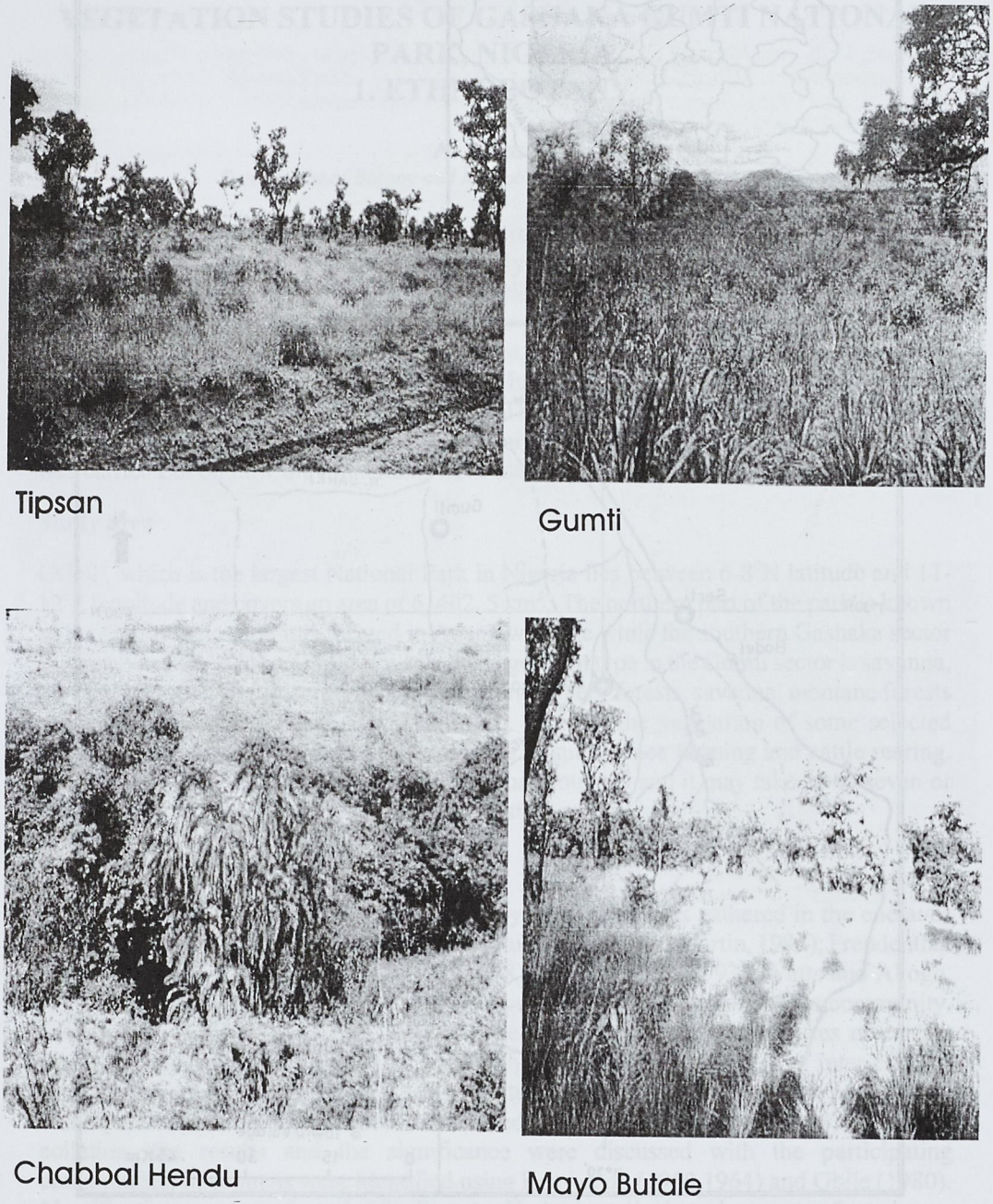

Fig. 2. Vegetation of selected study sites

Results and discussion

A total of 140 plant species belonging to 56 plant families were collected. The most common family was Fabaceae followed by Combretaceae, Arecaceae (Palms), Anacardiaceae, Moraceae, Araceae, Poaceae (grasses) and Rutaceae. Drawings of some of the species are presented in Figures 3-9. Most of these species have multiple uses. Karachi et al; (1991) Maghembe and Seyani (1991); and Rondolo (2000) also made similar observations in western Tanzania, Malawi, and Philippines respectively. Of these plants, 92 (67. 15%) were for medicinal uses; 42 (30. 65%) were for food, 39 (28. 46%) were used for construction purposes while less than 10% were used for other purposes.

Medicinal plants

Table 1 shows the medicinal plants and the parts used for different ailments. In most cases the plant parts are not used directly but decoctions are prepared with potash and in a few cases (balms), they are mixed with oils. It was said that for some plants to be efficacious, incantations are recited before collecting them, while for others, collection must be done at specific times of the day. This corroborates the report of Walker (1999) that this aspect of traditional medicine is linked with magic. However, the precise timing of collection related to efficacy can be said to have a scientific explanation in the phenomenon of the biological clock. In such plants, synthesis of the potentially active substances may be under a circadian rhythm. It would be desirable to screen some of these plants for their bioactive natural substances, which may be useful as pharmaceuticals. This may be significant because traditional medicine is now gaining prominence in Nigeria. Over 80% of the world's population still depends on medicinal plants (WHO, *et al.*, 1993). The percentage for Nigeria may be higher because of the high cost of orthodox healthcare delivery. Though the plants are said to be efficiacious, care should be exercised in administration because of the indiscriminate dosage regime. The long-term effects of these plants are not yet known and Elgorashi *et al.* (2002) have cautioned about the long-term safety of these plants because some have genotoxic properties.

Edible plants

Table 2 shows the plants that are used as food items either as leafy-vegetables, fruit or seed. Eight of these including *Amaranthus, Corchorus*, and *Celosia* are leafy vegetables. Some are additives or thickeners of soup and stews either as leaves or seeds (*Parkia, Thonningia, Brachystegia and Prosopis)*. 21 of these species were recorded in a survey of the common edible fruits of Nigeria by Isawumi (1993,1994). Some of these and fruits of other plants such as *Mangifera, Anacardium* and *Parkia* are of some economic significance. These are harvested and sold on market days by women and some children to augment the family income. Most of the fruits occur as wild fruits and they become important especially as part of the people's diet in the dry season when food becomes scarce. These wild fruits also provide food for the abundant wildlife of the park. Campbell (1987) recorded a similar observation in Zimbabwe. Many of these species are sustainably harvested and thus pose

no threat of extinction. Some of the plants e. g. *Daniellia, Elaeis, Vitellaria* and *Balanites* produce copious seeds, which either rot away or are afflicted with heavy seedling mortality. These plants can be used in small scale vegetable oil extraction (Akinsoji, 1996)

Plants used for construction

Table 3 shows the plants that are used for construction which includes housing, agricultural and household utensils, and furniture items. Seventeen of the plants are used in housing construction either as leaves or stems: Houses are made of mudbricks but roofing materials are sourced from branches, stems and leaves of trees and grasses (*Imperata*, *Andropogon*). Where barks are used they are used as ropes to tie pieces of wood together. Lianas are also used as rope. The plants used for furniture are mainly soft wooded plants and members of the grass family (*Oxytenanthera abyssinica*, and *Phragmites*) and palms (*Raphia*, *Phoenix* and *Laccosperma*). The furniture items include beds, chairs, mats and window curtains. Many of these furniture items are made colourful with plant dyes. This can be developed into a viable small-scale industry to produce items for tourists to buy as souvenirs.

Plants for other uses

These are listed in Table 4. Their uses are not regarded as crucial to human survival as they are mainly cosmetic. Except for *Khaya senegalensis* whose rootlets are used as chewing sticks and *Moringa oleifera* whose seeds are used in water purification, the others are merely for decorative purposes. Although some plant species are noted for use as fuel wood, it is not uncommon to find dead trees of many species which dry up used as fuel wood. *Panicum*, *Phragmites* and *Tephrosia* are regarded as soil conditioners because they are believed to be indicators of fertile soil. Moreover, *Tephrosia* is a legume and can improve soil fertility through nitrogen fixation.

Although over 80% of the plants are for self-consumption, there is potential for commercializing the utilization of some of the plants to create jobs locally and boost income. This idea was discussed at length with participants at the post-survey discussion in each of the enclaves. The need to use the plant resources of the park sustainably was also stressed as this is a potent strategy to involve the people in the protection of the park.

Acknowledgements

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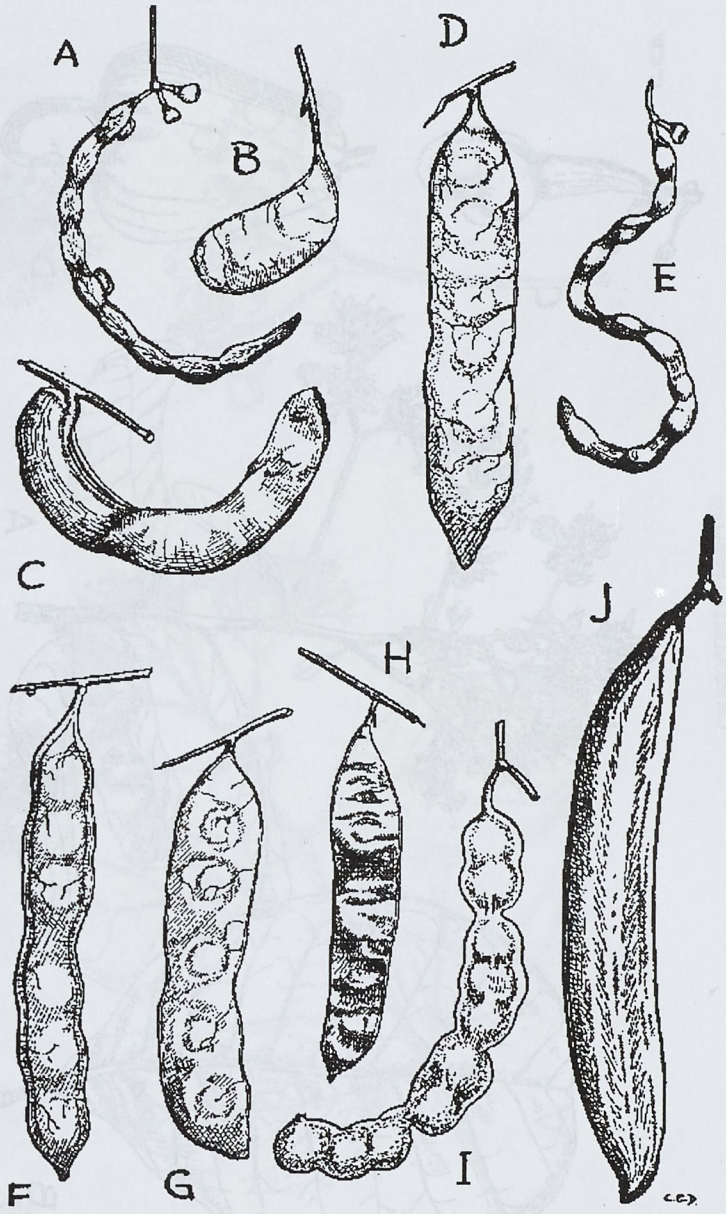
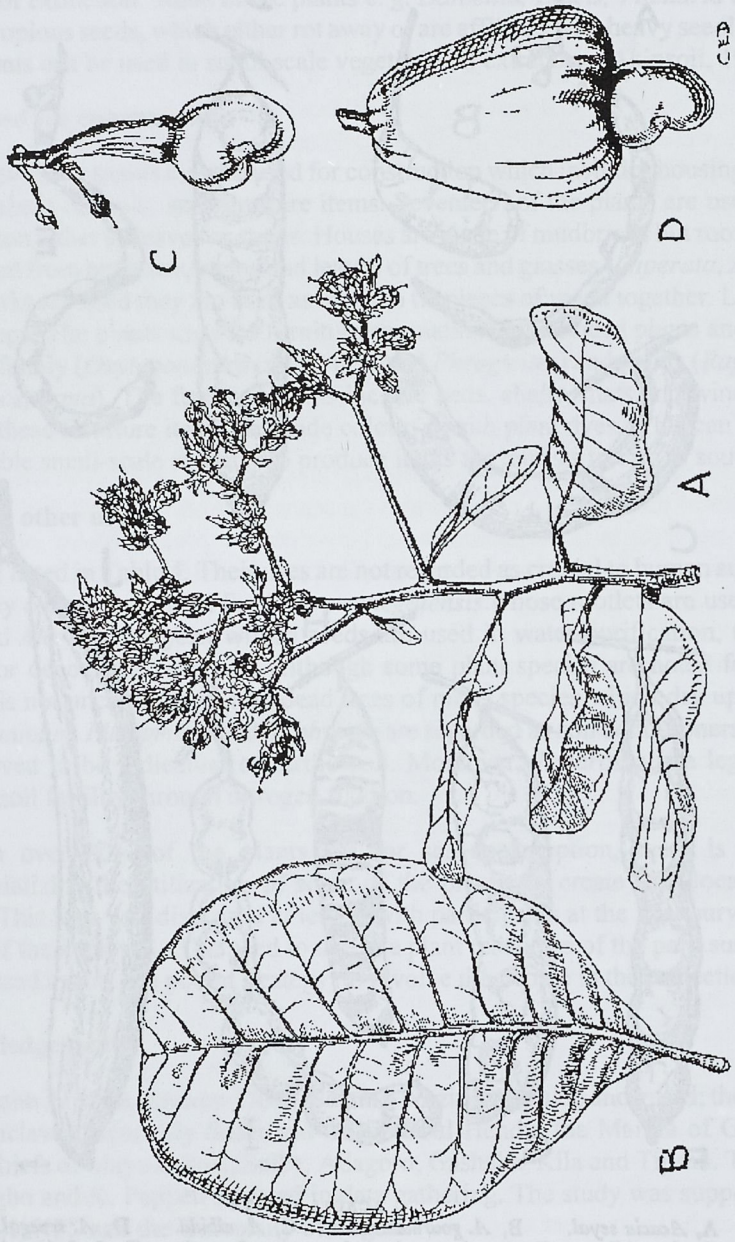


ACACIA FRUITS

A, *Acacia seyal*. B, *A. gourmanensis*. C, *A. albida*. D, *A. senegal*. E, *A. raddiana*. F, *A. polyacantha*. subsp. *campylacantha*. G, *A. dudgeoni*. H, *A. ataxacantha*. I, *A. nilotica*. J, *A. sieberiana*. All x $\frac{2}{3}$.

Fig 3. from Keay et al. 1964, p. 85



ANACARDIUM OCCIDENTALE

A, flowering shoot; B, leaf; C, young fruit; D, ripe fruit: All × $\frac{1}{6}$.

Fig. 4, from Keay et al. 1964, p. 305

CROSSOPTERTX FEBRIFUGA

A, flowering shoot, × ⅜. B, flower, × 3. C, fruits, × ⅜. D, seed, × 7.

Fig. 5, from Keay, 1964, p. 409

KIGELIA AFRICANA

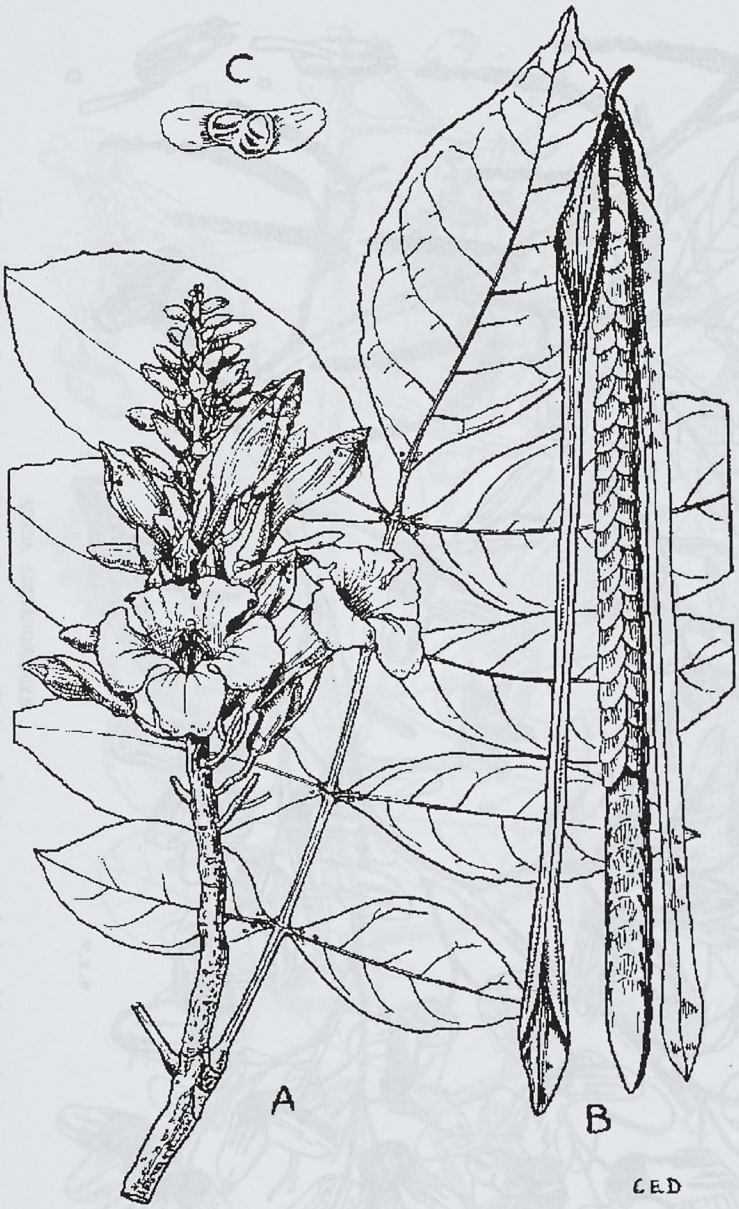
A, leaf, X $\frac{1}{6}$. B, inflorescence, X $\frac{2}{5}$. C, fruit, X $\frac{1}{5}$.

Fig. 6, from Keay, 1964, p. 425

HYMENOCARDIA ACIDA

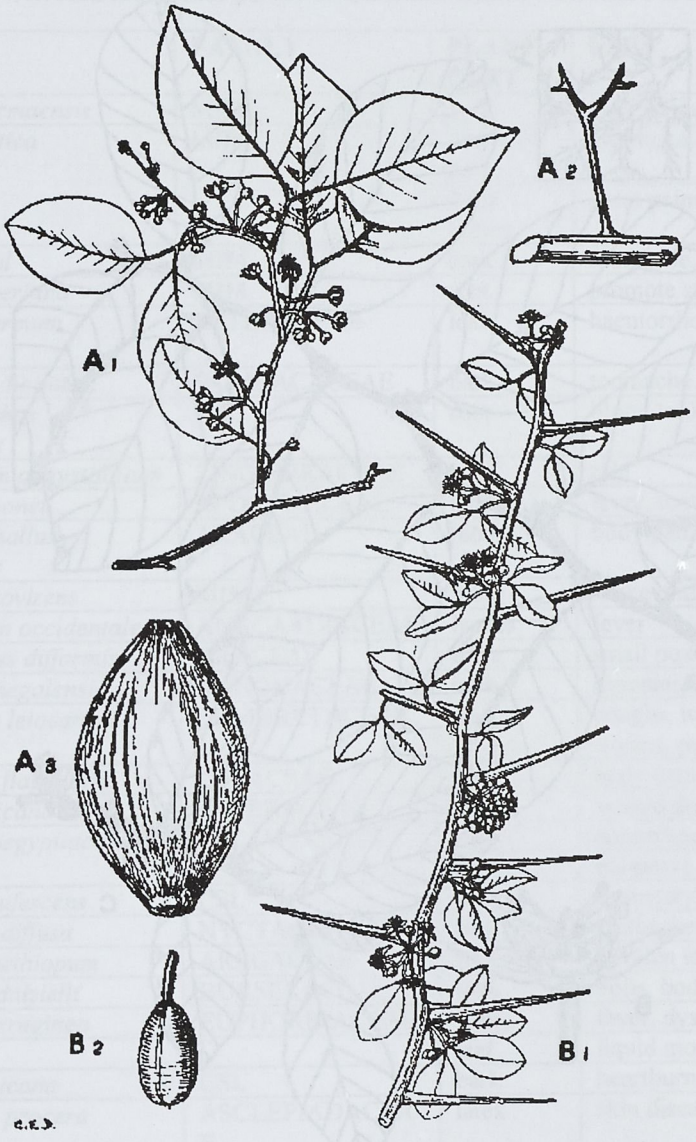
A, shoot with male flowers, x ½. B, male flower, x 4. C and D, stamens back and front, x 18
E, shoot with female flowers, x ½. F, female flower, x 3. G, fruiting branch, x ⅛.

Fig. 7, from Keay, 1964, p. 409



NEWBOULDIA LAEVIS
A, flowering shoots B, fruit; C, seed: All × ⅔.

Fig. 8, from Keay, 1964, p. 429



BALANITES SPP.

Balanites wilsoniana : A1, flowering shoot, × ½ A2, forked spine, × ½. A3, stone of fruit, × 1.

Balanites aegyptiaca : B1, flowering shoot, × ⅛ B2, fruit, × ½

Fig. 9, from Keay, 1960, p. 248

BRIDELIA FERRUGINEA

A, flowering shoot, x ⅔. B, male flower, x 8. C, shoot with fruits x ½. D, portion of undersurface of leaf, x 50.

Fig. 10, from Keay, 1960, p. 271

Table 1: Selected medicinal plants of Gashaka Gumti National Park, Nigeria

SPECIES	FAMILY	PLANT PART	USES
Acacia gourmaensis	MIM	bark	body pains
Acacia nilotica	MIM	leaves of bark	diarrhoea, dysentery
		fresh leaves	chest pains
Acacia seyal	MIM	bark	toothache, aphrodisiac
Acacia sieberiana	MIM	root	promote strong bones
Acanthospermum hispidum	ASTERACEAE	leaf	haemorrhoids
Adansonia digitata	BOMBACACEAE	bark	toothache
Adenodolichos paniculatus	PPL	root	blood tonic
Aframomum angustifolium	ZINGIBERACEAE	seed	pile
Alstonia boonei	APOCYNACEAE	bark	fever, toothache
Amorphophallus abyssinicus	ARACEAE	tuber	body pains
Acacia flavovirens	MIM	tuber	snake antidote
Anacardium occidentale	ANACARDIACEAE	leaves	fever
Anchomanes difformis	ARACEAE	tuber	small pox
Annona senegalensis	ANNONACEAE	bark	dysentery
Anogeissus leiocarpus	COMBRETACEAE	bark	coughs, intestinal worms, purgative
Asparagus flagellaris	LILIACEAE	root	body detoxification
Aspilia africana	ASTERACEAE	leaves	wound dressing
Balanites aegyptiaca	*BALANITACEAE*	root	gonorrhoea
		fruit	purgative
Bauhinia rufescens	CSL	leaf	dysentery
Boerhavia diffusa	NYCTAGINACEAE	root	toothache
Borassus aethiopum	ARECACEAE	root	swollen testicles
Boswellia dalzielli	BURSERACEAE	bark	boils, body pains
Bridelia ferruginea	EUPHORBIACEAE	bark	fever, dysentery
		leaf	liquid mouthwash
Burkea africana	CSL	bark	heartburn leprosy
Calotropis procera	ASCLEPIADACEAE	latex	skin diseases
Canarium schweinfurthii	BURSERACEAE	bark	dysentery, toothache
Carica papaya	*CARICACEAE*	*leaf*	*fever*
		fruit (unripe)	*antibiotic, body pains*
Carissa edulis	*APOCYNACEAE*	*root*	*body tonic*
Citrus aurantifolia	*RUTACEAE*	*fruit juice*	*cough*

Ceiba pentandra	*BOMBACACEAE*	*bark*	*toothache*
Cochlospermum planchonii	*COCHLOSPERMACEAE*	*root*	*yellow fever*
Cola hispida	*STERCULIACEAE*	*leaf & bark*	*used as incense*
Combretum molle	*COMBRETACEAE*	*leaf*	*intestinal infections*
Commiphora kerstingii	*BURSERACEAE*	*leaf*	*fever*
Cordia africana	*BORAGINACEAE*	*leaf*	*whooping cough*
Costus afer	*COSTACEAE*	*stem*	*cough*
Crossopteryx febrifuga	*RUBIACEAE*	*leaf, root*	*fever*
Crinum zeylanicum	*AMARYLLIDACEAE*	*fruit*	*skin diseases*
Curculigo pilosa	*HYPOXIDACEAE*	*tuber*	*purgative*
Cussonia arborea	*ARALIACEAE*	*leaf*	*purgative*
		root	*cold*
Daniellia oliveri	*CSL*	*bark*	**breaking charms*
Detarium microcarpum	*CSL*	*bark*	*dysentery, haemorrhoids*
Dichrostachys cinerea	*MIM*	*leaf*	*dysentery*
Entada africana	*MIM*	*root*	*gonorrhoea*
Erythrina senegalensis	*PPL*	*bark*	*jaundice*
Erythrophleum suaveolens	*CSL*	*bark*	** spiritual application (Magical)*
Erythrina sigmoidea	*PPL*	*bark*	*jaundice*
Euphorbia hirta	*EUPHORBIACEAE*	*yap*	*skin disease*
Ficus sur	*MORACEAE*	*root*	*intestinal worms*
Ficus iteophylla	*MORACEAE*	*leaf*	*dysentery*
Ficus sycomorus	*MORACEAE*	*root sap*	*cough*
Gardenia erubescens	*RUBIACEAE*	*root*	*gonnorhoca*
Gladiolus primulinus	*IRIDACEAE*	*corm*	*not specified*
Guiera senegalensis	*COMBRETACEAE*	*root*	*haemorrhoids*
		leaf	*cough*
Haematostaphis barteri	*ANACARDIACEAE*	*leaf, bark*	*blood tonic*
Hymenocardia acida	*HYMENOCARDIACEAE*	*bark*	*fresh wound*
Jatropha curcas	*EUPHORBIACEAE*	*leaf extract*	*fresh wound + mouth sores*
		root & bark	*gonorrhoea*
Khaya senegalensis	*MELIACEAE*	*bark*	*purgative*
Kigelia africana	*BIGNONIACEAE*	*root bark*	*stomach pains*
Lannea barteri	*ANACARDIACEAE*	*root*	*diarrhoea*
Lannea schimperi	*ANACARDIACEAE*	*seed*	*worm expeller*
Lawsonia inermis	*LYTHRACEAE*	*root*	*procure abortion*
Lophira lanceolata	*OCHNACEAE*	*root*	*stomach ache*
Mangifera indica	*ANACARDIACEAE*	*root, leaf*	*fever*

		bark	*diarrhea and dysentery*
Moringa oleifera	*MORINGACEAE*	*leaf*	*eye drops*
		seed	*water purification*
Napoleona vogelii	*LECYTHIDACEAE*	*root*	*fever*
Newbouldia laevis	*BIGNONIACEAE*	*leaf*	*baby washing*
Piliostigma thonningii	*CSL*	*root*	*yellow fever, chest pain*
		leaf	*cough, toothache*
Prosopis africana	*MIM*	*bark*	*baby washing*
Pseudocedrela kotschyii	*MELIACEAE*	*bark*	*fever, stomach ache*
Ricinus communis	*EUPHORBIACEAE*	*root*	*yellow fever*
Salvadora persica	*SALVADORACEAE*	*root*	*gonorrhoea*
Sarcocephalus latifolius	*RUBIACEAE*	*root*	*gonorrhoea, stomach upset*
Securidaca longepedunculata	*POLYGALACEAE*	*root*	**spiritual application (Magical)*
Senna alata	*CSL*	*leaf*	*skin diseases*
Senna occidentalis	*CSL*	*leaf*	*ring worm*
		root	*stomach ache*
Solanum aculeastrum	*SOLANACEAE*	*fruit*	*skin diseases*
Sterculia setigera	*STERCULIACEAE*	*bark*	*clearing uterus of blood after child birth*
Stereospermum kunthianum	*BIGNONIACEAE*	*bark*	*dysentery, dizziness*
Strychnos innocua	*LOGANIACEAE*	*fruit*	*swollen testicles*
Syzygium guineense	*MYRTACEAE*	*bark*	*wound dressing*
Tamarindus indica	*CSL*	*bark*	*blood tonic*
		fruit pulp	*wound dressing*
Terminalia avicennioides	*COMBRETACEAE*	*root, bark*	*diarrhoea*
Terminalia schimperiana	*COMBRETACEAE*	*root*	*constipation*
Terminalia laxiflora	*COMBRETACEAE*	*root*	*hypertension*
Terminalia macroptera	*COMBRETACEAE*	*bark*	*dysentery*
Tephrosia vogelii	*PPL*	*leaf*	*fish poison*
Vernonia amygdalina	*ASTERACEAE*	*leaf*	*fever, stomach ache, skin diseases*
Vitellaria paradoxa	*SAPOTACEAE*	*seed oil*	*sprains & fractures*
Vitex doniana	*VERBENACEAE*	*bark*	*yellow fever*
		leaf	*dysentery*
Ximenia americana	*OLACACEAE*	*root*	*stomac ache*
Zanthoxylum zanthoxyloides	*RUTACEAE*	*root*	*sickle-cell anemia*
Zizyphus spina-christi	*RHAMNACEAE*	*leaf*	*chicken pox*

*CSL–FAbaceae-caesalpinioideae. **MIM**–Fabaceae-mimosoideae. **PPL**–Fabaceae-papilionoideae.

TABLE 2: EDIBLE PLANTS OF GASHAKA GUMTI NATIONAL PARK

	FAMILY	Leaf	Fruit	Seed	Bark	Root	Sap	Tuber
Adansonia digitata	*BOM*	+	+					
Amaranthus spinosus	*AMA*	+						
Amorphophallus abyssinicus	*ARA*							+
Anacardium occidentale	*ANA*		+	+				
Annona senegalensis	*ANN*		+					
Balanites aegyptiaca	*BAL*	+	+					
Brachystegia eurycoma	*CSL*			c				
Carica papaya	*CAR*		+					
Carissa edulis	*APO*		+					
Celosia trigyna	*AMA*	+						
Cleome spp	*CLM*	+						
Corchorus olitorius	*TIL*	+						
Cyperus esculentus	*CYP*							+
Detarium microcarpum	*CSL*		+					
Diospyros mespiliformis	*EBE*		+					
Elaeis guineensis	*PLM*		+	+			+*	
Ensete gillettii	*MUS*		+					
Ficus thonningii	*MOR*		+					
Grewia mollis	*TIL*				+			
Haematostaphis barteri	*ANA*		+					
Hymenocardia acida	*HYM*				a			
Mangifera indica	*ANA*		+					
Moringa oleifera	*MOR*	+						
Musa sapientum	*MUS*		+					
Newbouldia laevis	*BIG*	+a						
Parinari curatellifolia	*CHB*		+					
Parkia biglobosa	*MIM*		+	c				
Phoenix reclinata	*PLM*		+					
Prosopis africana	*MIM*		+	+				
Raphia hookeri	*PLM*						+	
Sterculia setigera	*STR*			+				
Strychnos spinosa	*LOG*			+				
Syzygium microcarpum	*MYR*		+					

Tamarindus indica	*CSL*	+	+					
Tacca involucrata	*TAC*							+
Thonningia sanguinea	*BLP*	a						
Uapaca togoensis	*EUP*			+				
Vernonia amygdalina	*AST*	+						
Vitellaria paradoxa	*SAP*		+					
Vitex doniana	*VER*		+					
Ximenia americana	*OLA*		+					
Zanthoxylum zanthoxyloides	*RUT*				a			
Zizyphus spina-christi	RHM		+					

* *Sap is taken as palm wine.*
a *Additive to food items such as drinks.*
c *Condiment for soups and stews.*
@ Family abbreviations follow Weber (1982)

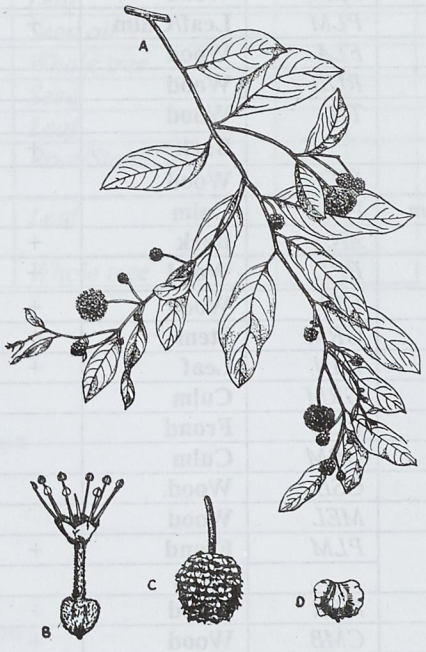


Fig. 11.—ANOGEISSUS LEIOCARPUS

A, flowering shoot, $\times \frac{3}{5}$.
B, flower, $\times 12$.
C, fruiting head, $\times 1$.
D, fruit, $\times 2$.

TABLE 3: PLANTS OF GASHAKA GUMTI NATIONAL PARK USED FOR CONSTRUCTION PURPOSES

SPECIES	FAMILY	PP	HG	FN	AH	B/ A
Adansonia digitata	*BOM*	**Bark**	+			
		Wood		+		
Afzelia africana	*CSL*	**Wood**			+	
Anogeissus leiocarpus	*CMB*	**Wood**	+		+	+
Balanities aegyptiaca	*BAL*	**Wood**			+	
Bauhinia rufescens	*CSL*	**Bark**	+			
Borassus aethiopum	*PLM*	**Wood**	+			
Brachystegia eurycoma	*CSL*	**Bark**	+			
Calotropis procera	*ASC*	**Bark**	+			
Cochlospermum planchonii	*CCH*	**Bark**	+			
Combretum fragrans	*CMB*	**Wood**	+			
Combretum nigricans	*CMB*	**Wood**	+			
Crossopteryx febrifuga	*RUB*	**Wood**			+	
Daniellia oliveri	*CSL*	**Wood**	+		+	
Dichrostachys cinerea	*MIM*	**Wood**	+			
Elaeis guineensis	*PLM*	**Leaf/Culm**	+			
Flacourtia flavescens	*FLA*	**Wood**			+	
Gardenia erubescens	*RUB*	**Wood**			+	
Grewia mollis	*TIL*	**Wood**				+
		Bark	+			
Kigelia africana	*BIG*	**Wood**			+	
Laccosperma secundiflorum	PLM	**Culm**		+		
Lannea schimperi	*ANA*	**Bark**	+			
Millettia thonningii	*PPL*	**Wood**	+			
Monotes kerstingii	*DIP*	**Wood**	+		+	
Oxytenanthera abyssinica	*GRM*	**Stem**	+			
Pandanus candelabrum	*PAN*	**Leaf**	+	+		
Panicum maximum	*GRM*	**Culm**		+	+	
Phoenix reclinata	*PLM*	**Frond**		+	+	
Phragmites karka	*GRM*	**Culm**		+		
Piliostigma thonningii	*GSL*	**Wood**			+	
Pseudocedrela kotschyii	*MEL*	**Wood**			+	
Raphia sudanica	*PLM*	**Frond**	+			
		Culm				
Syzygium guineense	*MYR*	**Wood**	+			
Terminalia spp	*CMB*	**Wood**	+			
Vitex doniana	*VER*	**Wood**			+	
Zanthoxylum zanthoxyloides	*RUT*	**Wood**		+		
Zizyphus spina-christi	*RHM*	**Wood**			+	

P Parts of plants, **HG** Housing Construction, **FN** Furniture, **AH** Agric. Implements/Household utensils, **B/A** Bow & Arrows, **Wood** Main stem or branches of trees and shrubs, @ Family abbreviations follow Weber (1982)

TABLE 4: PLANTS OF GASHAKA GUMTI NATIONAL PARK FOR MISCELLANEOUS USES

SPECIES	*PP*	*Cos*	*stp*	*ptp*	*shd*	*chs*	*wtp*	*wp*
Albizia zygia	*Whole tree*				+			
Anacardium occidentale	*Seed exudates*	+						
Balanites aegyptiaca	*Thorns as eye pencil*	+	+					
Bombax costatum	*Fruit floss*		+					
Borassus aethiopum	*Fruit fibre*	+						
Bridelia ferruginea	*Bark*			+				
Calotropis procera	*Fruit floss*		+					
Ceiba pentandra	*Fruit floss*		+					
Ficus thonningii	*Whole tree*				+			
Gardenia erubescens	*Fruit*	+						
Khaya senegalensis	*Rootless*					+		
Lawsonia inermis	*Leaf*	+						
Lophira lanceolata	*Seed oil* +							
Mangifera indica	*Whole tree*				+			
Moringa oleifera	*Seed*						+	
Parkia biglobosa	*Leaf*							+
Piliostigma thonningii	*Root/Stem*			+				
Rothmannia whitfieldii	*Leaf*			+				
Tamarindus indica	*Whole tree*				+			

PP *Parts of plant*

Cos *Cosmetics*

Stp *Stuffing for pillows*

Ptp *Pottery Paints*

Shd *Shade*

Chs *Chewing stick*

Wtp *Water purification*

Wp *Wall paint*

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