Journal of Ethnobiology 24(2): 307–327 Fall/Winter 2004

LOCAL USE OF CLIMBING PLANTS OF BUDONGO FOREST RESERVE, WESTERN UGANDA

GERALD EILU[a] and REMIGIUS BUKENYA-ZIRABA[b]
[a]*Department of Forest Biology and Ecosystems Management, Makerere University, P.O. Box 7062, Kampala, Uganda*
<eilu@forest.mak.ac.ug>
[b]*Department of Botany, Makerere University, P.O. Box 7062, Kampala, Uganda*

ABSTRACT.—We investigated the use of climbing plants in and around Budongo Forest Reserve (BFR) in terms of their abundance in the forest and the cultural preferences and socioeconomic characteristics of the local population. We randomly issued questionnaires to 127 respondents in nine villages. From each of 18 ethnic groups, one respondent who was most knowledgeable about climbers was selected and asked to identify species in three 1-ha forest plots. Of the 142 species of climbers known to occur in mature forest of BFR, the local people use 63 species (44%) from 52 genera and 36 families. After trees/poles, the greatest number of respondents rank climbers as the most used plant growth form. The most frequent uses of climbers, in order, are medicine, construction materials, and food. Use patterns are related to socioeconomic characteristics. The species of climbers used most occur at low densities. To conserve rare taxa, people should be encouraged to use alternative closely related species that occur at higher densities.

Key words: Budongo Forest Reserve, ethnobotany, traditional use, lianas, climbers.

RESUMEN.—Se ha investigado el uso de plantas trepadoras en la Reserva Forestal Budongo (RFB) y en sus alrededores, atendiendo a su abundancia en el bosque, a las preferencias culturales y a las características socioeconómicas de la población local. Se realizaron aleatoriamente 127 cuestionarios a personas de nueve pueblos. Además se seleccionó a la persona de cada una de los 18 etnias que tenía más conocimientos sobre plantas trepadoras y se le pidió que identificara las especies de tres parcelas de bosque de 1 ha. De las 142 especies de trepadoras que aparecen en un bosque maduro de RFB, la población local utiliza 63 especies (44%), pertenecientes a 52 géneros y 36 familias. Según la mayoría de los encuestados la forma de crecimiento más utilizada son los árboles y después las trepadoras. Los usos más frecuentes de las trepadoras son, en orden de importancia, como medicina, material de construcción y alimento. Los patrones de uso se relacionan con las condiciones socioeconómicas. La mayoría de las especies trepadoras que se utilizan solo aparecen en el bosque en bajas densidades. Para la conservación de táxones raros, se debería animar a la gente a que utilice especies similares que aparecen en densidades mayores.

RÉSUMÉ.—Dans les alentours immédiats et au sein du réserve forestière du Budongo (RFB), nous avons étudié l'utilisation des plantes grimpantes en tenant compte de leur abondance en milieu forestier ainsi que des préférences culturelles et des caractéristiques socioéconomiques de la population locale. Nous avons distribué des questionnaires de façon aléatoire à 127 répondants situés dans neuf villages. Pour chacun des 18 groupes ethniques, un répondant était sélectionné,

soit celui qui possédait le plus de connaissances quant aux plantes grimpantes. Ceux-ci devaient identifier les espèces sur trois parcelles de forêt ayant une superficie d'un hectare. Parmi les 142 espèces de plantes grimpantes présentes dans les forêts matures du RFB, 63 espèces (44%) réparties dans 52 genres et 36 familles sont utilisées par la population locale. La majeure partie des répondants placent les plantes grimpantes au second rang après les arbres ou plantes à port arborescent en ce qui a trait au plus grand nombre d'utilisations parmi les différents habitus. Les plantes grimpantes sont surtout utilisées comme plantes médicinales, puis comme matériaux de construction et, finalement, comme aliments. Les différents types d'utilisations sont structurés selon les caractéristiques socioéconomiques. La densité des plantes grimpantes les plus utilisées demeure faible. Aussi, afin de conserver les taxons rares, la population devrait être sensibilisée à choisir davantage des espèces qui leur sont proches parentes et dont la densité est élevée.

INTRODUCTION

In Uganda, assessments of plants used by local people often lump together various growth forms and fail to highlight the contribution of climbing plants. Yet each growth form requires specific management strategies. Climbers are considered a nuisance by professional foresters and are commonly cut in forests managed for timber production. Studies focusing on the use of climbers in Uganda in recent years (e.g., Muhweezi 1999; Obua et al. 2000) were carried out around Bwindi Impenetrable National Park. The study of climbers in Budongo Forest Reserve (BFR) (e.g., Babweteera et al. 2000; Eilu 1999, 2000) has focused on ecology and taxonomy. Recent studies of community use of wild natural resources in BFR addressed general aspects on use of forest products without considering their impact on plant life forms (Johnson 1993; Lauridsen 1999; Ndemere 1997).

In this paper, we report ethnobotanical information collected on climbing plants in and around BFR. The aims of this study were: to investigate the patterns of forest resource use in relation to socioeconomic factors such as age, gender, education level, ethnic group, economic status, and distance of residence from the forest; to relate the patterns of use of climbers to quantitative plot data of climbers from BFR; to investigate whether there is preferential use of plant life forms such as climbers; and to assess the reasons favoring or discouraging the use of particular plant growth forms. The growth form of climbers has implications for management that have been neglected in the past.

BFR is a tropical rainforest in Uganda surrounded by settlements of local people involved in small-scale subsistence cultivation. Local communities obtain wild natural resources from forests in Uganda in spite of regulations restricting access to such resources. Currently, the National Forest Authority is exploring the best ways to involve communities in forest use and management, inspired in part by arrangements developed by the Uganda Wildlife Authority in Bwindi Impenetrable National Park (Cunningham 1996; Wild and Mutebi 1996).

THE STUDY AREA

Budongo Forest Reserve (BFR) is located in western Uganda between lat. 1°37′–2°03′N and long. 31°22′–31°46′E (Figure 1). It is a medium-altitude moist

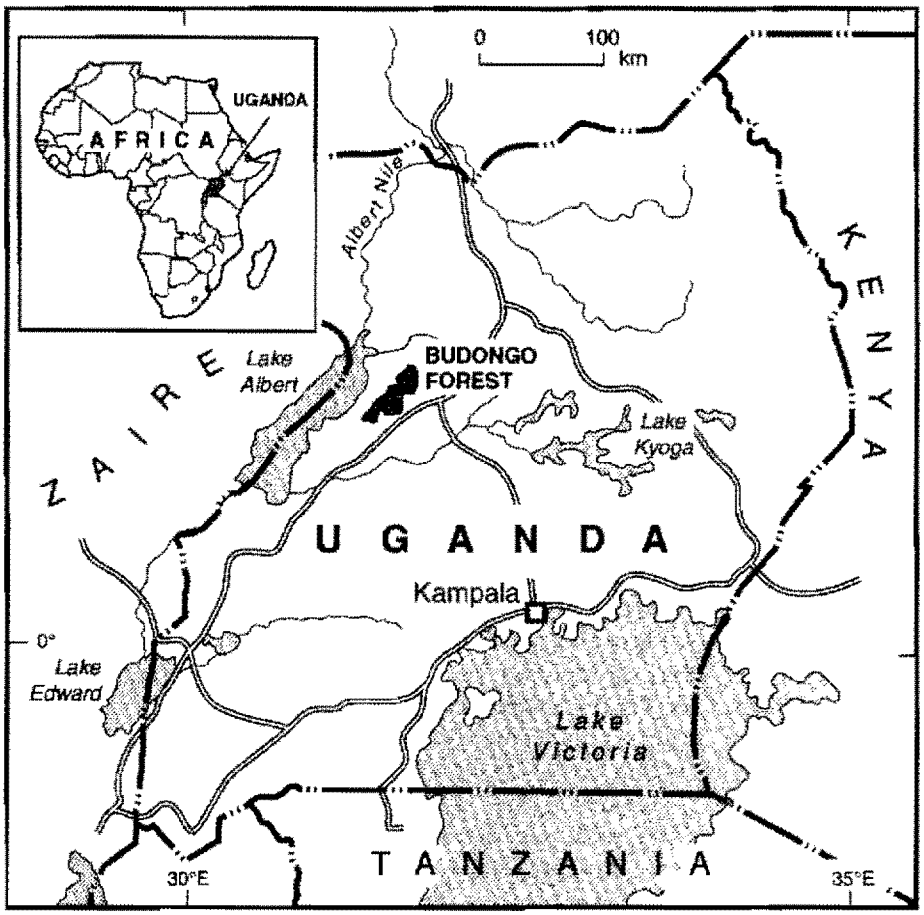

FIGURE 1.—Location of Budongo Forest Reserve.

semideciduous forest (Langdale-Brown et al. 1964) covering 793 km². It is dominated by *Cynometra* and *Celtis* spp. at elevations between 700 and 1000 m. The reserve is the largest block of this type of forest remaining in Uganda, but it is now degraded by timber harvesting. Intact forest constitutes only about 4% of the reserve. The forest is important for conservation of biodiversity and provides both timber and non-timber forest products to local communities. A total of 465 taxa of trees and shrubs occur in the forest (Howard et al. 1996), including *Entandrophragma* spp. and *Khaya* spp. that are on the world list of threatened species (IUCN 2003). In addition, the forest supports about 500 endangered chimpanzees (*Pan troglodytes*), 359 species of birds, and 289 species of butterflies (Howard et al. 1996). The main ethnic groups around BFR are the Banyoro, Lugbara, Alur, Lendu, and Okebo. The Banyoro are the indigenous inhabitants of the Kingdom of Bunyoro, where BFR is located (Johnson 1993). The Lugbara, Alur, Lendu, and Okebo immigrated to the Budongo area from the West Nile region in northwest Uganda and from the east to northeast of the Democratic Republic of Congo (Southall 1956). Other ethnic groups encountered in this study include Acholi,

Baganda, Bagungu, Bakiga, Bakonjo, Batooro, Bare, Iteso, Jopadhola, Kakwa, Langi, Logo, and Madi.

Three blocks of the forest Nyakafunjo (a nature reserve), Kaniyo-Pabidi, and Busingiro were studied. Local communities living on the periphery of these blocks in nine villages were interviewed (Busingiro, Nyakafunjo, Kasenyi-Bokwe, Kigaragara, Siiba, Nyantonzi, Kanyege, Kituka, and Kadukuru).

METHODS

Questionnaires and in-forest interviews were used to obtain socioeconomic data and information on the use of wild natural resources in BFR. We used household census lists maintained by local council officials to select respondents; a household in the study area is comprised of an average of five people (MFEP 1991). We randomly issued questionnaires to 127 heads of households out of 11,373 (1.1%) in communities living in nine villages around BFR. We interviewed household heads found at or near their homes at the time of interview. We did not make return visits to the households. This ensured that individuals who were already interviewed did not influence the views of subsequent respondents. The questionnaire was divided into three sections (i, ii, and iii). In the first section, demographic information was collected in order to determine the age structure, educational status, ethnic group, financial status, occupation, and land ownership. The second section recorded information on use of natural resources in general. Respondents were asked to name the resources they use, where they collect the resources, and how far they travel into the forest to collect them. In addition, they were asked to rank the resources they use in order of importance (to livelihood) beginning with "1" as the most important. The third section recorded information on use of climbing plants. Respondents were asked to state: if they know climbing plants; the local names of climbers (as opposed to epiphytes); uses of climbers (categorized as food, medicine, firewood, construction, craft, cultural use—i.e., use in traditional ceremonies—or others), reasons for using climbers, and availability. Respondents were asked to assign ranks to the seven use categories of climbers based on importance they attached to each, with "1" as the most important and "7" the least.

Of the total 127 respondents, one respondent was selected from each of the 18 ethnic groups to help identify climbers in the forest. For each ethnic group, we selected a respondent who could identify climbers and was knowledgeable on local uses of climbers. The 18 knowledgeable people identified climbers in three study plots (each 20 × 500 m), or from specimens collected in the sample plots and brought back to the camps outside the forest. The flora of climbers in the plots and surrounding areas had been assessed in earlier botanical studies (Eilu 1999, 2000). The plots were located in sites of relatively intact forest. They represented a full range of topographical variation and habitats, from valley bottom to ridge top. The data for climbing plants of diameter ≥1 cm (measured at breast height or 130 cm from the base at ground level) and rooted in the 20 × 500 m plots were recorded. From the plot data, relative density (*RD*) was determined using the formula: *RD* = Number of individuals of a species per ha/total number of individuals in the 1-ha (20 × 500 m) plot × 100. Relative density was not

determined for climbers of diameter less than 1 cm. Presence only of these in the plots was recorded and *RD* is indicated as "not determined" (ND). Vouchers were deposited in the herbaria at the Botanical Museum University of Copenhagen (C), Royal Botanic Gardens, Kew, and Makerere University (MHU).

The Spearman Rank Correlation, the Kruskal-Wallis *K* and the Mann-Whitney *U* tests (Fowler et al. 1998; Höft et al. 1999) were used to investigate the relationships between socioeconomic characteristics of respondents and use of climbers. The non-parametric tests were chosen because the data were comprised of counts and proportions. Non-parametric tests do not require the data to be normally distributed or to have homogeneous variance. Bivariate Spearman Rank Correlation tests were performed to assess the relationships between the respondents in different age groups and the way they used climbers. To compare the use of climbers for various purposes by respondents of different marital status, occupation, income levels, education levels and ownership of different sizes of land, the Kruskal-Wallis test was used. The test is appropriate if a socioeconomic characteristic (e.g., income level) can have three or more values. The Mann-Whitney test was used to compare the use of climbers for different purposes by respondents who own land and those who do not. The test compared two unmatched categories. Because sample sizes of some ethnic groups are very small, groups with <3% of total respondents are grouped together as "others."

RESULTS

Socioeconomic Characteristics.—Of the 127 respondents, 80% are male and 20% are female; they are distributed among nine villages and eighteen ethnic groups. The best-represented ethnic groups are Banyoro (27%), Lugbara (23%), Alur (15%), Lendu (12%), and Bagungu and Okebo (3% each). Other ethnic groups are Bakonjo, Logo, Langi, Baganda, and Batooro (2% each) and Acholi, Bare, Iteso, Kakwa, Madi, Adhola, and Bakiga (1% each). These are referred to as "others" in subsequent analyses.

The 127 respondents were grouped by age: 15–25 years (9%), 26–35 years (23%), 36–45 years (34%), and over 45 years (34%). About 79% are married, 9% are divorced or separated, 6% are widowed, and 6% are not married. About 57% of the respondents have been to primary school. Relatively few (20%) have been to secondary school and even fewer have attained advanced level secondary school education (2%). None of the respondents have diplomas or university degrees, and 21% have never been to school. Most respondents (94%) earn the equivalent of less than US $30 per month. A small fraction (5%) earn $30–60 and only 1% earned $61–90. About 85% of respondents own land. A large proportion of the landowners (43%) possess more than 4 ha, 28% possess 1–2 ha, 15% possess 3–4 ha, and 14% possess 2–3 ha. About 79% are subsistence farmers, and 1% of these are also traditional herbalists or tradespeople (1%). Other respondents are involved in timber extraction (5%), carpentry (4%), employees of government or nongovernmental organizations (NGOs) (4%), mechanics, clergy, and students (3%), artisans (2%), and traditional herbalists (2%). No hunters were reported.

Patterns of Use of Forest Resources.—The wild natural resources used by the highest proportion of respondents are trees/poles (44%), climbers (30%), and herbs (14%).

Only 1% said they use wild animals. Up to 8% of the people use "other" wild natural resources such as water and honey from the forest, and 3% collect mushrooms from the forest. About 80% of the respondents collect wild natural resources from the forest, 2% from outside the forest, and 18% from both inside and outside the forest, mainly from savanna. To collect wild natural resources from the forest, most respondents (63%) travel 1–5 km into the forest. Only 2% of respondents move over distances longer than 6 km to collect resources. Up to 35% of the respondents move within 1 km of the forest edge.

Use of Climbers.—A total of 63 climber species (Table 1) representing 44% of the 142 climber species recorded from BFR (Eilu 1999) are used. The species belong to 52 genera and 36 families. The respondents use the climbers mainly for medicine (19 genera), construction (11 genera), cultural use (9 genera), craft (15 genera), food (11 genera), other uses (4 genera) and firewood (1 genus). No respondent reported the use of climbers as ornamentals, although this was observed in some homesteads and the species noted. Seventy-nine species are not used. Species such as *Calamus deeratus* Mann & H. Wendl. and *Pyrenacantha* spp. are frequently used by respondents but occur at lower relative densities (< 4.5 individuals/ha) than the less used species (e.g., *Pristimera plumbea* (Blakelock & R. Wilczek) N. Hallé), which had a density of >10 individuals/ha.

Reasons Favoring or Discouraging the Use of Climbers.—Respondents gave various reasons for using climbing plants, including medicine, food, construction, and crafts. Climbers are used for medicine because respondents are unable to purchase modern medicine, they are effective against a particular ailment, they are sometimes more readily available than modern medicine, they have a long history of traditional use, and as alternatives to modern medicine. Non-climber alternatives are not used for traditional medicine because they are scarce, rare, or difficult to collect.

People say they eat fruits, leaves, or tubers of climbers during times of shortage, because they are delicious and nutritious, when a person cannot afford to buy food, because of scarcity of alternatives, for a change of diet, and as part of traditional practice. Climbers are sometimes preferred because the non-climber alternative foods are scarce, require longer preparation time, are difficult to collect, or do not taste as good.

Climbers are used for house construction because they are strong and resist insect (termite) attack. Although some other construction materials share these traits, some non-climbers are not used for house construction because they are easily damaged by insects or break easily.

Climbers for crafts are used because they make durable crafts (Figure 2), generate income (Figure 3), and are relatively more available. Non-climber alternatives are not used for craft because their collection involves travel over long distances, they are difficult to work with, and children find them difficult to collect.

Climbers are used for cultural purposes (i.e., in practices specific to the culture of an ethnic group) because they have been traditionally used, are effective against evil spirits, and have neither known nor available alternatives. They are used for firewood because they burn more slowly and are good fuels. Alternative

fuel-wood (trees/poles) were at times not used because some respondents are too old to cut the trees/poles or because it takes more time to cut, split and dry firewood.

Problems encountered in collection of some climbers include dangerous wild animals and insects, injurious/harmful plant parts, persecution by the authorities managing the forests, scarcity, and discomfort from rain or dew considered unpleasant by some respondents. Problems encountered in use of some climbers included injury from thorns/hooks of some species, harmful insects nesting in some species, long cooking time for the edible species, and pretreatment required before use. Herbalists cited lack of standard dosages as a major problem. Storage was considered a problem mainly in the case of climbers used for medicine when fresh. Lack of information sharing between the traditional herbalists was also noted as a problem.

Preference of the Use of Climbers.—Of the wild natural resources used, in terms of importance to local livelihood, the most highly ranked (Rank 1) are trees and poles (Figure 4). Most respondents ranked the climbers second. Some respondents of all ethnic groups knew general terms for "climber," but a few from two ethnic groups (Table 2) knew no word for "epiphyte." A total of 99% of the respondents did not know of any "undesirable effects" of climbers on the forest and 96% knew of uses for climbers and had actually used them.

Bivariate correlation of number of respondents in four age groups (15–25, 26–35, 36–45, and over 45 years) that use climbers for medicine, house construction, cultural purposes, craft, food, firewood and other uses showed that the older people mainly use climbers for medicine (1.00, $P < 0.001$, Spearman Rank Correlation) and house construction (0.400, $P< 0.60$). Younger people use them for "other uses" (1.00, $P < 0.001$), crafts/fibers (0.800, $P < 0.20$), firewood (0.800 $P < 0.20$), food (0.800, $P < 0.20$) and cultural/spiritual purposes (0.400 $P < 0.60$).

Proportionately more females than males collect edible parts of climbers from the forest for food (Table 3) and there was no significant difference in the use of climbers by respondents of the four marital categories ($K = 0.008$, $df = 3$, $P > 0.05$; Kruskal-Wallis test). Respondents of the nine occupations use climbers for different purposes ($K = 14.697$, $df = 8$, $P < 0.065$). The carpenters use climbers mainly for house construction and for food, while the craftspeople, as would be expected, use climbers mainly for their craft products. Traditional herbalists use climbers mainly for medicine and for cultural purposes, while government or NGO employees use them mainly for house construction. Tradespeople mainly use climbers for food. The rest of the respondents were grouped together as "others" and collectively use climbers mainly for house construction.

Respondents with different income levels use climbers for different purposes ($K = 16.650$, $df = 4$, $P < 0.05$). Respondents with low incomes use climbers mainly for food and for house construction (Table 3). Respondents with comparatively higher incomes (US $61–90) recorded relatively higher proportions of use of climbers for crafts. Respondents in the "high" income group never used climbers for medicine, firewood, cultural purposes and "other" uses. Respondents of different education levels used climbers for different purposes ($K = 24.613$, $df = 6$, $P < 0.002$). The least educated people use the climbers for cultural purposes

TABLE 1.—List of climbers recorded from Budongo Forest and some uses. Abbreviations of ethnic groups were Alu: Alur; Lan: Langi; Len: Lendu; Lug: Lugbara; Nyo: Runyoro. Rel. D: Relative density; ND: not determined.

Taxon	Voucher	Local name	Uses	Rel. D
ACANTHACEAE				
Barleria brownii S. Moore	Eilu 6-490	—	Ornamental	0.4
Pseuderanthemum hudovicianum (Buettn.) Lindau	Eilu 096	—	Ornamental	ND
Thunbergia alata Boj. ex Sims	—	*lolobi, putepute* (Lug), *nyaamkura* (Nyo)	Medicine: leaves treat stomach- and backache	ND
T. vogeliana Benth.	Eilu 145	—	Ornamental	ND
Whitfieldia elongata C.B Clarke	Eilu 452	—	Ornamental	0.2
ANNONACEAE				
Artabotrys velutinus S. Elliot	Eilu 263	*ombeni* (Lug)	Construction	1.4
Monanthotaxis ferruginea (Oliv.) Verdc.	Eilu 169	*geumbwe* (Len), *achebi* (Lug), *ntera ye nkwiri* (Nyo)	Other: catch ants for food	ND
M. littoralis (Bagshawe & Bak. f.) Verdc.	Eilu 168	*ombe* (Lug)	Craft	1.0
APOCYNACEAE				
Landolphia landolphioides (Hall. f.) Chev.	Eilu 305	—	Food (fruits)	2.3
Motandra guineensis (Thonn.) A. DC.	Eilu 115	*eyi* (Len)	Medicine: treat scabies and stop diarrhea	0.9
Oncinotis glabrata (Baill.) Stapf ex Hiern	Eilu 020	*mindre mindre* (Len/Lug)	Medicine: Dried bark relieves pain of bones	ND
Saba comorensis (Boj.) Pichon	Eilu 43, 46, 421	*ndrigada* (Len)	Food (fruits)	0.1
ARACEAE				
Culcasia falcifolia Engl.	Eilu 034	*elulu* (Lug)	Construction	ND

TABLE 1.—Continued.

Taxon	Voucher	Local name	Uses	Rel. D
ARECACEAE				
Calamus deeratus Mann & H. Wendl.	Eilu 147	*kerekere* (Alu), *ngei* (Len), *ngei, kazarani* (Lug), *rugayi* (Nyo)	Craft. Other: cane used as whip	4.4
ASCLEPIADACEAE				
Mondia whytei (Hook.f.) Skeels.	—	*morundu* (Len), *gatinwa* (Lug), *omurondwa* (Nyo)	Medicine: aphrodisiac and appetizer	ND
Periploca linearifolia Dillon & A. Rich.	Eilu 212	*ma* (Len), *eji* (Lug)	Medicine: prevents growth of 'false teeth'	ND
Secamone africana (Oliv.) Bullock.	Eilu 195	*akanyamata* (Nyo)	Construction. Cultural: treats circumcision wounds	ND
ASTERACEAE				
Gynura scandens O. Hoffm.	Eilu 130	—	Medicine: leaves used to treat fever	ND
BASELLACEAE				
Basella alba L.	Eilu 136, 297	*kurekure, ndera* (Alu), *enderema* (Nyo), ndoge (Len)	Food (leaves). Medicine: induces childbirth	ND
CAPPARACEAE				
Capparis erythrocarpos Isert.	Eilu 429	—	Food (fruits)	0.2
CELASTRACEAE				
Pristimera andongensis (Oliv.) N. Hallé	Eilu 158	*kasingi* (Len), *runyangaro* (Nyo)	Construction. Firewood. Craft	1.1
P. graciliflora (Welw. Ex Oliv.) N. Hallé	Eilu 6-267	*kasingi* (Len), *runyangaro* (Nyo)	Construction. Firewood. Craft	2.7
P. plumbea (Blakelock & R. Wilczek) N. Hallé	Eilu 160	*kasingi* (Len), *runyangaro* (Nyo)	Construction. Firewood. Craft	10.1
P. polyantha (Loes.) N. Hallé.	Eilu 12-464	*kasingi* (Len), *runyangaro* (Nyo)	Construction. Firewood. Craft	ND
Salacia cerasifera Welw. ex Oliv.	Eilu 4-203	—	Food (fruits). Craft	3.7

TABLE 1.—Continued.

Taxon	Voucher	Local name	Uses	Rel. D
S. elegans Oliv.	Eilu 079	—	Food. Craft. Construction	1.7
Simicratea welwitschii (Oliv.) N. Hallé	Eilu 268	—	Construction	0.1
Simirestis dewildemaniana N. Hallé	Eilu 075	*zombinga* (Len)	Craft	ND
COMBRETACEAE				
Combretum cinereopetalum Engl. & Diels.	Eilu 274	*ayi* (Len), *eyara kombe* (Lug), *orukoraigo, kibambanjobe* (Nyo)	Medicine. Craft	0.1
CONNARACEAE				
Agelaea pentagyna (Lam.) Baill.	Eilu 295	*rikba* (Len)	Medicine: leaves used to treat mental disorder or fever	0.3
Connarus longistipitatus Gilg.	Eilu 279, 433	—	Craft	0.2
CUCURBITACEAE				
Momordica foetida Schumach.	Eilu 039	*jorro ngua-kua ngua* (Len)	Medicine: treat cough, fever and stomachache; induce abortion. Cultural: celebrate childbirth	ND
DILLENIACEAE				
Tetracera potatoria Afzel. ex G. Don.	Eilu 317	*njaa* (Len)	Medicine: roots used to treat body pain. Other: cut stems provide drinking water	4.4
DIOSCOREACEAE				
Dioscorea cayenensis Lam.	Eilu 078	*mulugu* (Alu), *luliga, ndoo, ayu* (Len), *endale* (Nyo)	Food (root tubers)	ND
D. odoratissima Pax.	Eilu 199, 201, 233, 328	*mulugu* (Alu), *luliga, ndoo, ayu* (Len), *endale* (Nyo)	Food (root tubers)	ND

TABLE 1.—Continued.

Taxon	Voucher	Local name	Uses	Rel. D
EUPHORBIACEAE				
Tragia brevipes Pax.	Eilu 338	*ewu, nyai nyai* (Len), *haka-haka* (Lug), *rugenyi* (Nyo), *ayila-yila* (Lan)	Medicine: leaves used to treat stomachache or boils and wounds, and settle domestic disputes; roots used to induce childbirth. Cultural	ND
FABACEAE				
Entada rheedei Spreng.	Eilu 051	*imira* (Nyo)	Cultural	ND
HERNANDIACEAE				
Illigera pentaphylla Welw.	Eilu 106, 185	*tago chinge* (Alu)	Cultural: to win cases in court	0.9
ICACINACEAE				
Iodes sp.	Eilu 007	*zukuu* (Len), *baabi* (Lug), *bebua, nyinabarongo, banda barogo* (Nyo)	Cultural: repulse evil spirits and enemies; win cases in court. Construction	0.8
Pyrenacantha sylvestris S. Moore	Eilu 001, 017	*kateganende, haulambue* (Len)	Construction. Craft: traps	ND
Pyrenacantha sp. 1, sp. 2	Eilu 095, 006	*kateganende, haulambue* (Len)	Construction. Craft: traps	0.2
LILIACEAE				
Gloriosa superba L.	Eilu 066	—	Ornamental	ND
LINACEAE				
Hugonia platysepala Oliv.	Eilu 428	—	Ornamental	0.3
LOGANIACEAE				
Strychnos congolana Gilg	Eilu 7-096	*tha* (Len)	Firewood	0.2

TABLE 1.—Continued.

Taxon	Voucher	Local name	Uses	Rel. D
MALVACEAE				
Hibiscus calyphyllus Cav.	Eilu 430	—	Food (leaves)	ND
MENISPERMACEAE				
Triclisia sacleuxii (Pierre) Diels	Eilu 008, 041, & 148	*jor* (Len)	Cultural: chase evil spirits during burial	0.1
MORACEAE				
Ficus asperifolia Miq.	Eilu 070	*ka* (Len, *eka* (Lug), *munyamata* (Nyo)	Food (fruits)	0.1
NYCTAGINACEAE				
Pisonia aculeata L.	Eilu 173	—	Construction. Cultural: chase predators from domestic animals and birds	0.2
PASSIFLORACEAE				
Adenia tricostata de Wilde	Eilu 440	*esuale* (Lug)	Construction: termite control	0.2
PIPERACEAE				
Piper guineense Thonn.	Eilu 142	*rukokota* (Nyo)	Medicine: seeds used to treat hypertension and stomach-ache. Other: spice (seeds)	1.1
ROSACEAE				
Rubus apetalus Poir.	—	*kaa* (Len), *ewandwandwa* (Lug), *amakerre* (Nyo)	Food (fruits). Cultural	ND
RUBIACEAE				
Chassalia cristata (Hiern.) Bremek.	Eilu 128	*elelu* (Lug)	Craft	0.2
Keetia gueinzii (Sond.) Bridson.	Eilu 363	—	Food (fruits)	0.3

TABLE 1.—Continued.

Taxon	Voucher	Local name	Uses	Rel. D
RUTACEAE				
Toddalia asiatica (L.) Lam.		*oriro* (Len)	Craft. Medicine: fruits used to treat cough	0.4
SAPINDACEAE				
Cardiospermum grandiflorum Sw.	Eilu 144	*ozozua* (Lug)	Medicine: leaves used to treat boils, ringworm or fever	ND
Paullinia pinnata L.	—	*choko choko* (Len), *kabugu, omunyampatar* (Nyo)	Craft. Medicine: treat diarrhea	0.1
SMILACACEAE				
Smilax anceps Willd.	Eilu 124	*boo, buu* (Len), *eya* (Lug)	Craft	0.2
URTICACEAE				
Urera hypseloderidron (A. Rich.) Wedd.	Eilu 319	*oii* (Len), *nyakatoma* (Nyo), *odiki* (Lug)	Construction. Craft	ND
Urera trinervis (Hochst.) Friis & Immelman	Eilu 111	*oii* (Len), *nyakatoma* (Nyo), *odiki* (Lug)	Construction. Craft. Medicine: aphrodisiac	0.8
VERBENACEAE				
Clerodendrum formicarum Guerke	Eilu 189, 257, 383	*ruseke* (Alu), *luseke* (Len, Lug), *lusekeseke* (Nyo)	Craft: drinking straws	ND
C. schweinfurthii Guerke	Eilu 242	—	Medicine: relieves hypertension	ND
VITACEAE				
Cissus producta Afzel.	Eilu 6-224	*ladoro, ororo* (Lug), *tundenge* (Len), *kinya* (Nyo)	Medicine: treat diarrhea and boils. Construction	1.2

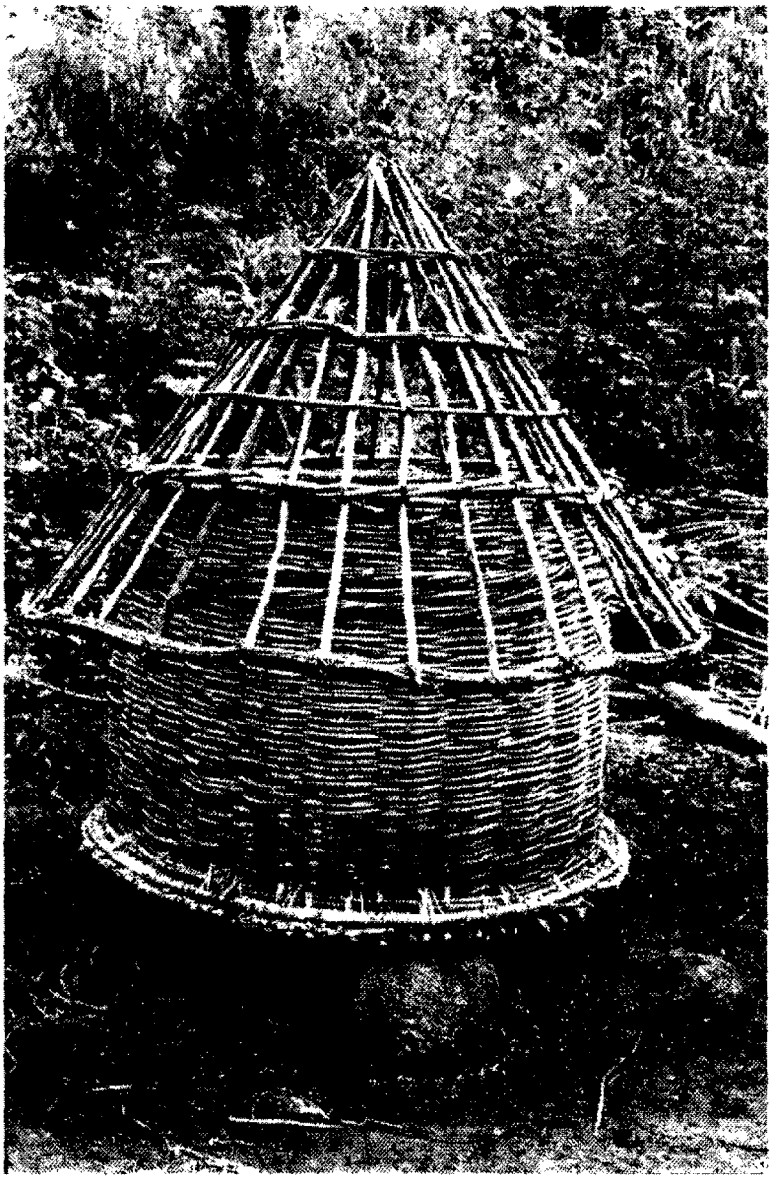

FIGURE 2.—Granary made using strong ropes of *Pyrenacantha* sp. to tie the sticks together.

as well as for medicine. Indeed the largest proportion of use for cultural purposes, in relation to education level, was among the group that had never been to school (Table 3). In addition, the largest proportion who use climbers for house construction belong to the group that has never been to school.

All ethnic groups collect and use some forest climbers (Figure 5) for medicine and for construction. Only the Bagungu, the Alur, the Lugbara and the Banyoro use the forest for cultural purposes. Respondents who own land use climbers more than those who do not ($U = 6.5$; $P < 0.05$, n_1 and $n_2 = 7$, Mann-Whitney

FIGURE 3.—Stools made from rattan canes (*Calamus deeratus*) on sale at the roadside to generate household income.

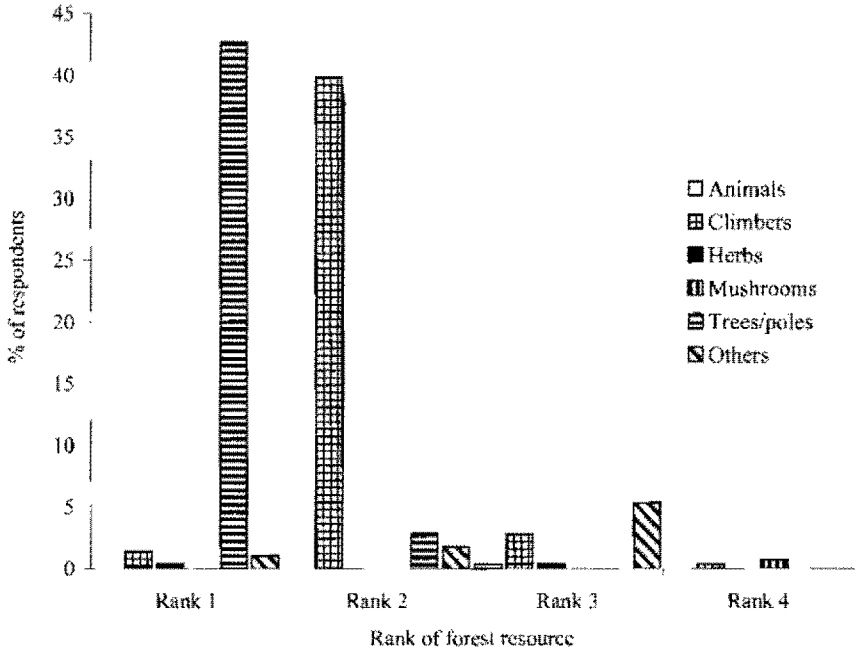

FIGURE 4.—Wild natural resources used by the communities around Budongo Forest Reserve. Rank 1 represents the resource perceived by respondents to be most important to household livelihood and rank 4 the least important.

TABLE 2.—Local terms for "climber" and "epiphyte" according to the different ethnic groups.

Ethnic group	% respondents (n = 127)	Climber	Epiphyte
Alur	15	*tol*	*aturuhomba, obendoyaii*
Bagungu	3	*bihururwa, bikosi*	none
Banyoro	27	*bihururwa, ebiguha, ebigoye*	*ebitaama, engurukii, engurukizi*
Lendu	12	*baa, jorro, mbicha, mbii, mbui, ngai*	*banju, gwi, mbutekutha, satha*
Lugbara	23	*baka, bakaraza, kalia, patiraza*	*ebikobi, lari, laro, laru, patiabi*
Okebo	3	*baabu, kaba, onou*	none
Others	17	—	—

test). However, there was no significant difference in use of climbers by respondents who own different amounts of land ($K = 0.020$, df = 3, $P > 0.05$; Kruskal-Wallis test).

DISCUSSION

Climbing plants have an extraordinary range of uses (Phillips 1991). Among the natural resources desired by the communities from BFR, most respondents ranked climbers second only to "trees and poles." The 63 species of climbers used represent only a small proportion of the climber species recorded from BFR (Eilu 1999) compared for example to 80% use of the climber flora by Ecuadorian lowland peoples (Kvist and Holm-Nielsen 1987). This apparent underutilization of climbers in BFR suggests that the use of climbers could be greatly expanded. Most respondents used climbers for medicine, as was reported to be the case for the Siona-Secoya Indians from Amazonian Ecuador (Paz y Miño et al. 1995). More people knew what climbers were, as opposed to those who knew what epiphytes were. This suggests people recognize and value the climber life form.

Whereas some respondents indicated that they used the climber *Pyrenacantha* sp. for ropes and to make traps, none acknowledged their own involvement in hunting. The question about hunting was not answered honestly because it is illegal in BFR and other protected areas in Uganda. The majority of respondents obtain most of the wild plants they use from the forest, which shows that the local people rely heavily on the forest and cannot resist entering it illegally. Reasons advanced for using climbing plants (e.g., lack of alternatives, preference, and traditional practice) support this observation. The implication for management of protected areas is that mechanisms that give local communities access to the most desired products are urgently needed.

Most respondents traveled 1–5 km into the forest to collect some natural resources; very few traveled over 5 km. The forest edge is therefore the most utilized and degraded part of the forest. Conservation might be encouraged if this area were demarcated and the local people permitted to harvest selected non-timber resources from it in a regulated manner.

Older people mainly use the climbers for traditional medicine. Only rarely do they use them for food, crafts, or firewood. Young people, some of whom

TABLE 3.—Socioeconomic characteristics of respondents who reported climber use. Values indicate the number of times each category of climber use was reported by respondents.

Socioeconoimic characteristic	Number of respondents	Food	Medicine	Firewood	Construction	Craft	Cultural	Other[2]
Sex								
Male	102	80	43	33	82	59	10	4
Female	25	24	8	3	13	9	2	0
Marital status								
Unmarried	8	4	3	3	7	5	12	3
Married	100	84	41	28	76	55	12	3
Divorced/separated	11	8	4	3	9	4	0	0
Widowed	8	6	3	2	5	4	0	1
Occupation								
Subsistence farmers	100	79	36	24	70	52	8	3
Timber extractors	6	6	6	5	4	2	0	0
Carpenters	5	5	4	2	5	3	2	0
Artisans	3	1	0	1	2	3	0	0
Traditional herbalists	3	2	3	0	2	1	3	0
Government/NGO[1] employees	5	3	2	1	5	3	0	1
Tradespeople	1	1	0	0	0	0	0	0
Other	4	2	2	1	4	2	1	0
Income (monthly; US$)								
<30	120	95	47	34	87	65	12	4
30–60	6	5	3	1	4	1	0	0
61–90	1	1	0	0	1	1	0	0
Education								
Secondary, advanced level	3	2	0	1	2	2	0	1
Secondary, ordinary level	25	19	7	7	18	14	0	0
Primary level	72	62	11	20	8	40	2	2
Never been to school	27	5	23	2	58	4	7	0

[1] NGO: Nongovernmental organization.
[2] Other: Water, honey, and mushrooms.

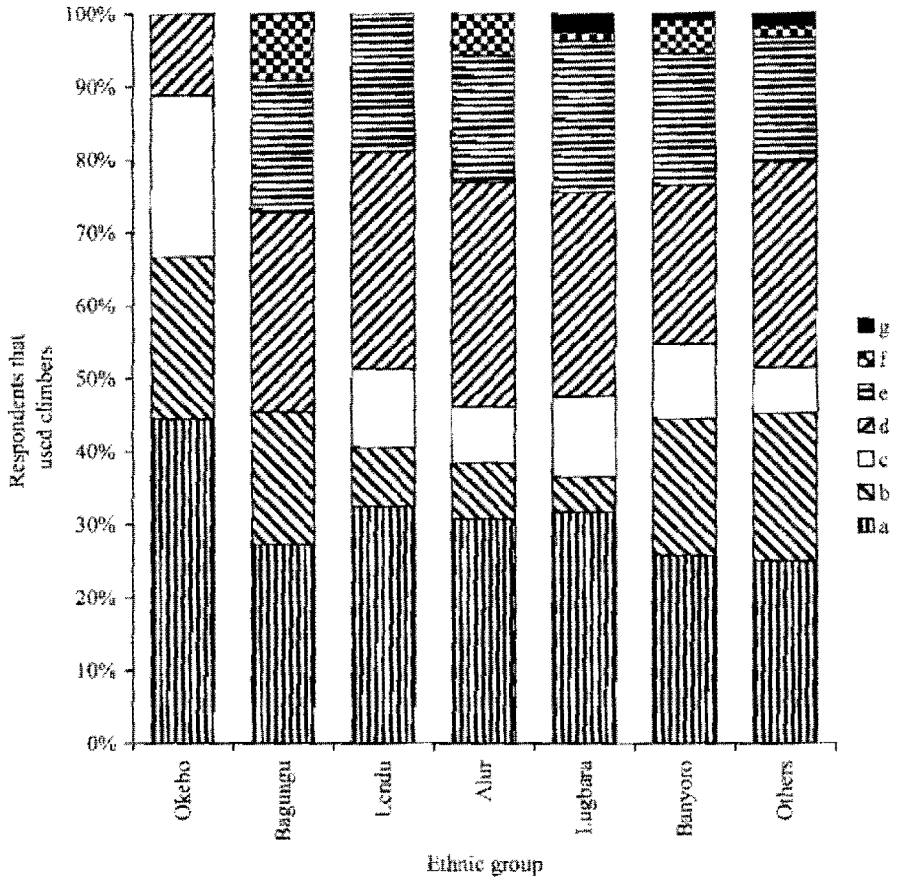

FIGURE 5.—Relationship between ethnic group and main categories of climbers used. The categories are represented as: a (food); b (medicine); c (firewood); d (construction); e (craft); f (cultural purposes); and g (others). Ethnic groups used climbers for more than one purpose.

engage in hunting, consume wild edible species casually as they pursue other activities (see also Johns et al. 1996). Those who have been to school consider the use of medicinal plants a primitive practice, but they turn to cultural uses of climbers in an attempt to solve social and economic problems. Young people have more energy and therefore spend more time collecting firewood and materials for crafts from the forest. More females collected climbers from the forest for food than did the males because their traditional role includes preparing food for their families; when they go to the forest for firewood and materials for crafts, they are more likely to collect some fruits, too.

Phillips et al. (1994) have shown that the notion of what plants are useful varies from culture to culture. However, the different ethnic groups live together around BFR and a number of plant uses are common to all the groups, which indicates knowledge is exchanged between groups. Concerning occupation and climber use, the carpenters ate some fruits from climbers as they went about collecting timber and construction materials, and probably pitsawing. Traditional

herbalists made most use of climbers for cultural purposes, because herbal medicine is often administered along with spiritual and mystical powers that do not directly treat ailments but create faith in the treatment.

Poor people generally used climbers to supplement their diet and as an alternative to spending cash on food items (similarly, Somnasang and Moreno-Black (2000) found that in Thailand, one of the reasons that wild food was preferred over cultivated food was to save money). The poor use climbers for house construction whereas the relatively higher income earners use the more expensive bricks and iron sheets. Respondents with relatively high income use the climbers mainly for handicrafts/fibers, which suggests that sale of crafts raises income. One of the climbers (*Calamus deeratus*) is used to make stools and chairs sold on a commercial scale and could indeed make a major contribution to income (Stockdale and Power 1994).

Respondents with relatively higher incomes can afford alternatives, and therefore none use climbers for medicine, cultural purposes or firewood. Only the least educated people use the climbers for medicine and for cultural purposes, indicating that the uneducated continue to follow traditional practices more than educated people do.

Most of the problems encountered in collecting and using climbers relate to injury sustained from thorns (in the forest) and hooks (on some climber species, such as *Calamus deeratus*), wild animals, and injurious insects. These, together with the fear of park and forest officers, serve as deterrents and may partly help protect the forest until proper measures are put in place to regulate harvesting.

Some climbers used for cultural purposes (e.g., *Entada rheedei* Spreng. and *Iodes* spp.) have no known alternatives and illegal use is likely to continue. Others are threatened by uncontrolled commercial use (e.g., *Calamus deeratus*, which is used by most respondents). Some plants may be amenable to cultivation. For example, respondents tolds us that *Pyrenacantha* spp. are becoming difficult to find, so planting *Pyrenacantha* spp. (and other scarce species) by the local people should be investigated and encouraged outside the forest. Similarly, improved cultivars of edible climbers such as *Dioscorea* spp. might be developed; cooking time of wild *Dioscorea* spp. was reported to be longer than for other foodstuffs (mainly potatoes and cassava). Studies to propagate these species and improve the varieties to shorten cooking time should be pursued. This would be a step towards addressing the food security situation, since it was indicated these species are eaten mainly during times of drought and food scarcity. Ultimately, however, if preferred, but stressed climber species are to be protected, the major reasons against using alternatives need to be addressed.

Inability to standardize dosages of herbal medicine, and lack of proper storage facilities or preservatives (particularly for medicinal plants used fresh), are major problems that require attention. The challenges, when addressed will ease pressure on some of the affected plants. The best immediate option is to design strategies for controlled use. Information sharing among the traditional herbalists is proposed as one of the initial steps towards addressing problems in plant use in relation to dosage, intellectual property rights and conservation measures. The various practitioners who worked together during the present study acknowledged having learnt from each other and wish to collaborate in the future.

CONCLUSION

This study showed that most of the local people around BFR are familiar with the climber growth form and use climbers. The local people did not use 56% of the climber species recorded from BFR. The unused species are potential alternatives to some closely related preferred species. Regulating the use of plant resources based on growth forms is encouraged as a means of conserving rare species. The formation of local plant user groups should take into account aspects such as age, sex, and occupation because these social variables have a bearing on how people harvest and use plants. Most respondents had positive views about climbers as a growth form, and this attitude should be exploited to encourage planting of useful climbers on privately owned land. In addition availability of climbers outside the forest requires investigation and increased use of such climbers could ease pressure on forest climbers.

Medicinal plants constitute the major non-timber resource that people around BFR obtain from the forest. Only very few people (traditional herbalists and birth attendants) collect them. The medicinal plants may withstand the pressure of this extraction for some time, but the status of the individual species needs to be assessed. For each plant resource, there is a need to study in detail the methods of harvesting to identify which methods are sustainable. Related to this is the need to determine the quantities (and parts) harvested for each climber on a daily, monthly or yearly basis for purposes of economically valuing the resource. Establishment of use zones in BFR permitting collection of the most highly ranked resources within 5 km of the forest edge might provide economic benefits to the local population without disturbing the inner forest. These are some of the important issues that need to be addressed before policies are formulated on the use of climbers from the forest.

ACKNOWLEDGMENTS

This study was funded by the WWF (UK) through a grant to the Uganda Group of the African Network of Ethnobotany/Ethnoecology (UGANEB). We acknowledge the Uganda National Council for Science and Technology (UNCST) and the Uganda Forest Department (UFD), now National Forest Authority (NFA), for permission given for the study to be conducted in Budongo. We thank research assistants James Kyomuhendo, Joseph Oriekot, and Paul Ssegawa for translating the questionnaires. We also thank the respondents for their active involvement in the fieldwork.

REFERENCES CITED

Babweteera, F., A. Plumptre and J. Obua. 2000. Effect of gap size and age on climber abundance and diversity in Budongo Forest Reserve, Uganda. *African Journal of Ecology* 38:238–247.

Cunningham, A.B. 1996. *People, Park and Plant Use. Recommendations for Multiple-use Zones and Development Alternatives around Bwindi Impenetrable National Park, Uganda.* People and Plants Working Paper 4. UNESCO, Paris.

Eilu, G. 1999. Climbers from tropical rain forests at the Albertine Rift, Western Uganda. *Lidia* 4(4):93–120.

———. 2000. Liana abundance in three tropical rain forests of western Uganda. *Selbyana* 21(1,2):30–37.

Fowler, J., L. Cohen, and P. Jarvis. 1998. *Practical Statistics for Field Biology.* John Wiley and Sons, Chichester.

Höft, M., S.K. Barik, and A.M. Lykke. 1999. *Quantitative Ethnobotany. Applications of Multivariate and Statistical Analyses in Ethnobotany.* People and Plants Working Paper 6. UNESCO, Paris.

Howard, P., T. Davenport, and R. Mathews. 1996. *Biodiversity Reports* Numbers 1–33. Forest Department, Kampala.

IUCN. 2003. 2003 IUCN Red List of Threatened Species [online database]. Available at www.redlist.org/ (downloaded April 29, 2004). International Union for Conservation of Nature and Natural Resources.

Johns, T., E.B. Mhoro, and P. Sanaya. 1996. Food plants and masticants of the Batemi of Ngorongoro District, Tanzania. *Economic Botany* 50:115–121.

Johnson, K.R. 1993. Local Use of Budongo's Forest Products. MSc. Thesis, Institute of Anthropology, Oxford University.

Kvist, L.P. and L.B. Holm-Nielsen. 1987. Ethnobotanical aspects of lowland Ecuador. *Opera Botanica* 92:83–107.

Langdale-Brown, I., H.A. Osmaston, and J.G.Wilson. 1964. *The Vegetation of Uganda and Its Bearing on Land Use.* Government of Uganda, Entebbe.

Lauridsen, M. 1999. Workers in a Forest: Understanding the Complexity of Incorporating Local People in Modern Management. A Case Study of Nyabyeya Parish, in Western Uganda. MSc. Thesis, Institute of Anthropology, University of Copenhagen.

MFEP-Ministry of Finance and Economic Planning. 1991. *The 1991 Population and Housing Census. District Summary series.* Masindi District. Statistics Department, Ministry of Finance and Economic Planning. The Republic of Uganda.

Muhweezi, O. 1999. The use of *Loeseneriella apocynoides* around Bwindi Impenetrable National Park, southwest Uganda. In *African Plants: Biodiversity, Taxonomy and Uses*, eds. J. Timberlake and S. Kativu, pp. 523–527. Proceedings of the 1997 AETFAT Congress, Harare, Zimbabwe. Royal Botanic Gardens, Kew.

Ndemere, P. 1997. Multiple-use Values, Silvicultural Impacts of Timber Management, and Sustainability of Forest Management in Uganda's Budongo and Mabira Forest Reserves. Ph.D. Dissertation, State University of New York, College of Environmental Science and Forestry Syracuse, New York.

Obua, J., S.F.M Ogwal,. and D. Mosango. 2000. Ecology, utilisation and conservation of *Smilax kraussiana* in Bwindi Impenetrable National Park, Uganda. *Journal of Tropical Forest Science* 12(3): 542–551.

Paz y Miño, C.G., H. Balslev, and R. Valencia. 1995. Useful lianas of the Siona-Secoya Indians from Amazonian Ecuador. *Economic Botany* 49(3):269–275.

Phillips, O. 1991. The ethnobotany and economic botany of tropical vines. In *The Biology of Vines*, eds. F. E. Putz and H. A. Mooney, pp. 427–475. Cambridge University Press, Cambridge.

Phillips, O., A.H. Gentry, C. Reynel, P. Wilkin, and C.B. Galvez-Durand. 1994. Quantitative ethnobotany and Amazonian conservation. *Conservation Biology* 8(1):225–248.

Somnasang, P. and Moreno-Black, G. 2000. Knowing, gathering and eating: knowledge and attitudes about wild food in an Isan village in Northeastern Thailand. *Journal of Ethnobiology* 20:197–216.

Southall, A.W. 1956. *Alur Society. A Study in Processes and Types of Domination.* W. Heffer and Sons, Cambridge.

Stockdale, M. C. and J.D. Power. 1994. Estimating the length of rattan stems. *Forest Ecology and Management* 64:47–57.

Wild, R.G. and J. Mutebi. 1996. *Conservation through Community Use of Plant Resources. Establishing Collaborative Management at Bwindi Impenetrable and Mgahinga Gorilla National Parks, Uganda.* People and Plants Working Paper 5. UNESCO, Paris.