

## Nyindu Culture and the Plant World : The Dynamic Relationship between the Knowledge on Plant Use and the Change in House Form

メタデータ	言語: eng 出版者: 公開日: 2009-04-28 キーワード (Ja): キーワード (En): 作成者: 山田, 孝子 メールアドレス: 所属:
URL	<a href="https://doi.org/10.15021/00003317">https://doi.org/10.15021/00003317</a>

## Nyindu Culture and the Plant World: The Dynamic Relationship between the Knowledge on Plant Use and the Change in House Form

TAKAKO YAMADA

*Kyoto University*

This paper is based on ethnobotanical field study undertaken from October 1977 to February 1978 in a village of the Nyindu people of Mwenga District, eastern Zaïre. In this paper, I examine man-plant relationships with special reference to house construction. House construction is an important use of wild plants, since over hundred plants are utilized by the Nyindu for this activity.

In Kilimbwe village, 3 house forms exist: the beehive type (*mushonge*), the cone-cylinder type (*kishenge*), and the gable-rectangular type (*mukumba*). The coexistence of the three forms is the result of historical changes from the beehive type through the cone-cylinder type to the gable-rectangular type.

First, the structure and function of each house form is analyzed, and the technical and functional mechanism of adaptation that control the dynamic changes is examined. Second, the ethnobotanical background of construction materials is analyzed at two levels: Nyindu valuations of plants for construction materials and the actual use of plants. Then, the Nyindu strategy of collecting plant materials for construction is examined. Finally, I analyze the relationship between the changes of house forms and the knowledge of plant use, and show the mechanism of exploring new construction materials and the dynamic process of plant recognition.

### INTRODUCTION

The study of the relationships between man and plants has developed since the end of the nineteenth century under the rubric of ethnobotany [HARSHBERGER 1896; BARRAU 1971; MARTIN 1970], and has become one of the domains of ethnoscience [CONKLIN 1954; STURTEVANT 1964; MATSUI 1979]. However, only structural analyses of folk-botanical classifications through the lexicographical treatment of vernacular names have been attempted [CONKLIN 1962; BERLIN *et al.* 1968, 1973], whereas little attention has been paid to the functional roles of plants in the ecology of local people. Recognition of plants by a local population should be examined in the context of the entire spectrum of human activities.

In this article, I analyze the relationship between the recognition of plants and their economic uses, with special reference to house construction. House con-

struction is an important use of wild plants for the Nyindu people, since over hundred species of plants are used for this activity. A study on house construction may serve to explore the attitudes and relationship of a local people to their natural environment [REYNOLDS 1973: 183]. Most of the ethnographic studies on houses have been done from the viewpoint of either geography, material culture, or social organization [SUGIMOTO 1974; HUNTINGFORD 1961; SUZUKI 1971, 1972; UMESAO 1969; ISHIGE 1971; OLIVER 1971; LEVIN 1971]. However, there are few studies on house construction from an ethnobotanical perspective. In this study, I also examine the changes in the plants used for house construction in relation to historical changes of house forms among the Nyindu.

A field study was conducted for 5 months, from October 1977 to February 1978, among the Nyindu people, swidden cultivators inhabiting eastern Zaïre. The territory of the Nyindu covers an area of approximately 1,023 km<sup>2</sup>, extending over the whole of Luindi Subdistrict of Mwenga District, eastern Zaïre (Fig. 1). I lived mainly in Kilimbwe village.

In daily conversation the Nyindu speak Kinyindu, their tribal language. In some villages Kilega, the tribal language of the Lega, is spoken also. Most are fluent in Kingwana (the Zaïrean dialect of Swahili), a common language among the peoples

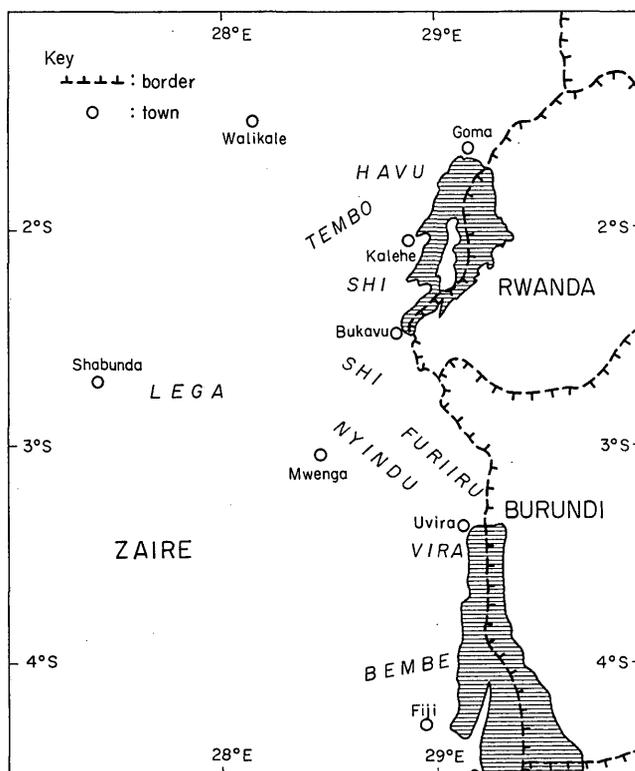


Fig. 1. Territory and neighboring peoples of the Nyindu.

of eastern Zaïre. I made inquiries using Kingwana and collected Kinyindu vocabularies when necessary.

The procedure of my study was as follows:

- (1) Collection of plant specimens and identification of scientific names;
- (2) Ecological description of the local flora;
- (3) While the plant specimens were still fresh, I inquired of two male informants (ages 70 and 47) on their knowledges of plants (e.g., vernacular names, usages). I also asked the reasons why a given plant is used for a particular purpose;
- (4) I recorded when and how plants are used in the context of daily life through active participation in the everyday life of the Nyindu (e.g., living in a traditional Nyindu house and eating together with them). I recorded quantitative data on their utilization of plants;
- (5) I interviewed individually 10 other informants (5 men and 5 women) in order to analyze how knowledge of plants varies among Kilimbwe villagers; and
- (6) I collected data on the spatial pattern of dwellings in relation to kin relationships.

Italics are used for Kinyindu terms. The Kinyindu language employs a different prefix for singular and plural nouns according to noun class. Here, Kinyindu terms are written in the singular.

## 1. OUTLINE OF THE STUDY AREA AND OBJECT

### 1) The Natural Environment

The territory of the Nyindu is bounded by the R. Ulindi in the north, west and south, and by the R. Kilungutwe, a tributary of the R. Ulindi, in the east. It comprises a plateau on the west side of the Eastern Rift Valley with elevations above sea level varying from approximately 1,200 m to 3,000 m. The numerous tributaries of the R. Ulindi, including the Kilungutwe and the Zokwe, have eroded the mountains and formed an extremely varied topography.

The climate of the Nyindu territory is of the moist montane climate type [TSUCHIYA *et al.* 1972: 90–91]. There is little seasonal change in temperature but daily fluctuations are more significant. Mean annual rainfall amounts to 1,314 mm. The dry season lasts for about 4 months, May–August, and the wet season for 8 months, September–April [TSUCHIYA *et al.* 1972]. In general, Nyindu territory exhibits these climatic features, but local variations and peculiar features result from topographical differences.

Nyindu territory belongs to the mountainous area in the African vegetation zone [KINGDON 1971: 22], but its vegetation is more diversified owing to the complicated natural features.

Precise records on the vegetation of the Nyindu territory are lacking. However, based both on my observations and on the descriptions of vegetations in eastern Zaïre and eastern Africa by others [LIND and MORRISON 1974; SHALLER 1963; CASIMIR 1975; GOODALL 1977; ÉVRARD 1968], the major vegetations of the study area can be summarized as follows.

The areas with elevations above sea level between 1,200 m and 1,400 m correspond to the transitional zone between the tropical rain forest and the montane forest. However, most such areas show signs of secondary succession caused by shifting cultivation. In areas where human pressure is high, abandoned fields often revert to *Imperata* grassland and elephant grass thickets, but where human pressure is low, the reversion is often to secondary forests. The dominant tree species are *Maesa laceolata*, *Dichaetanthera corymbosa*, *Macaranga spinosa*, *Harungana* sp., *Trema orientalis*, *Vernonia* sp. Tree vines such as *Alcornea cordifolia*, and herbs such as *Aframomum baumannii* and *Costus* sp. comprise the understory vegetation.

In areas higher than 1,400 m above sea level moist montane forests begin to appear. The dominant tree species are *Podocarpus* sp., *Lobelia gibbenoa*, *Agauria salicifolia*, *Sapium ellipticum*, *Myrica salicifolia*, *Neoboutonia mannii*, *Albizia* sp., *Polyscias fulva*, *Carapa procera*, and *Ensete verticosum*. *Cyathea* sp., *Psychotria* spp., *Lasianthus kilimandscharicus*, and *Urera hypselodendron* form the understory.

In sub-alpine areas, higher than 2,100 m above sea level, alpine bamboo forest exists. It is composed of only alpine bamboo, *Arundinaria alpina*.

The fauna of Nyindu territory is composed mostly of forest species. The major mammals are buffalo (*Syncerus caffer*), bongo (*Boocercus euryceros*), bush-pig (*Potamochoerus porcus*), bushbuck (*Tragelaphus scriptus*), duikers (*Cephalophus* spp.), genets (*Genetta* spp.), tree pangolin (*Manis tricuspis*), giant rat (*Cricetomys emini*) and squirrels. There are also forest primates such as the gorilla (*Gorilla gorilla beringei*), chimpanzee (*Pan troglodytes troglodytes*) and *Cercopithecus* spp. All these mammals are hunted by the Nyindu.

## 2) The Nyindu People

There are no precise ethnological records on the Nyindu. However, Colle [1937], Vansina [1965], and Biebuyck [1973] make brief mentions of them. The Tutsi groups infiltrated the mountainous areas of Buhunde, Buhave, Bifuluru and Bunyindu and founded kingdoms there. The royal dynasty of these kingdoms originated with Nalwindi, the chief of the Banyindu clan [COLLE 1937: 75-76; MOELLER 1936; VANSINA 1965: 204]. On the other hand, Biebuyck [1973: 20-22] observes that the Nyindu are mostly a mixture of aboriginal groups (of M'minje and Lenge origin, but mixed with pygmies) and immigrant offshoots of the Lega and Furiiru-Vira. He also notes that the Nyindu have the closest connections with the Lega cluster, among the groups adjoining the Lega people.

Van Bulck [1948: 228-235] includes the Nyindu language in the subgroup of Lac Kivu of the Young Bantu Group of Northeastern Bantu (Section B). He concludes that the languages spoken by the Shi, the Hunde, the Have, the Tembo and the Ruanda-Urundi belong to the same group and that the Lega language belongs to another group. Vansina [1965: 106] includes the Nyindu language in the Maniema group which is the same as Lega.

A Nyindu tradition claims that the descendants of their first king ruled over neighboring peoples, such as the Shi, Hunde, Furiiru and Vira. On the other hand,

among the Nyindu people who profess to belong to the *kabila ya Banyindu* (Nyindu group), some belonged to the same clans of Lega, such as the Batumba, Balambo, and Banyemganga. The Nyindu have such close cultural and historical relationships with the Shi, the Bembe and the Lega that it is difficult to separate them from the others. In fact, the homogeneity of a tribal culture could be fully understood from an ethnohistorical perspective.

I could not ascertain exactly the total population of the Nyindu since no tribal population census exists for Zaïre. In 1970, the total population of Luindi Sub-district was 14,920 [SAINT MOULIN 1976]. The total population of the Nyindu can be estimated at about 15,000, allowing that people from other tribes live in the Luindi Subdistrict and that some Nyindu people live in other districts. The population density of Luindi Subdistrict is estimated at 14.6/km<sup>2</sup> which indicates that the population density of Nyindu territory is relatively high compared with that in other parts of Zaïre.

The principal subsistence activity of the Nyindu is slash-and-burn agriculture. They grow almost 40 distinct crops, mostly in small quantities. Today, their main crops are cassava, maize, kidney bean and banana. However, the "most traditional food" (*chakula ya asili*) of the Nyindu was finger millet, sorghum and sweet potato, supplemented with banana, yam and taro.

Other subsistence activities are hunting of mammals and birds, and fishing in rivers or streams. Three types of hunting methods are used, communal net-hunting with dogs, spear hunting, and trapping. There is a rich variety of trapping techniques, including spring traps, gravity traps, birdlime traps, pits, and traps with baits. Fishing methods include rod fishing, scoop net fishing, and dams and weir using basket traps, fish poison, scoop nets and scoop baskets.

## 2. NYINDU'S HOUSE AND ITS CHANGE

### 1) Functional Composition of Space

#### (1) A SETTLEMENT

The Nyindu call their settlement *mwingini*, in Kingwana. The size of a settlement varies from the so-called family homestead [MURDOCK 1959] to the village-like settlement. The former consists of one domestic family and the latter is composed of several. Most of the large-sized settlements are administrative centers.

Settlements are formed mostly on slopes along rivers and on ridges. Shifting fields surround the settlement. The Nyindu practise the slash-and-burn cultivation. Cassava fields are abandoned 7-10 years after clearing: after 3 cycles of slash-and-burn. Small sites of former settlements are often encountered in well-developed secondary forest. From this it can be assumed that traditional pattern of Nyindu settlement is the dispersed family homestead, and that the Nyindu relocate their settlement when suitable places for cultivation no longer exist close to the previous site.

The arrangement of dwellings in each settlement lacks regularity and varies corresponding to its size. Fig. 2-a shows the arrangement of K's settlement. In

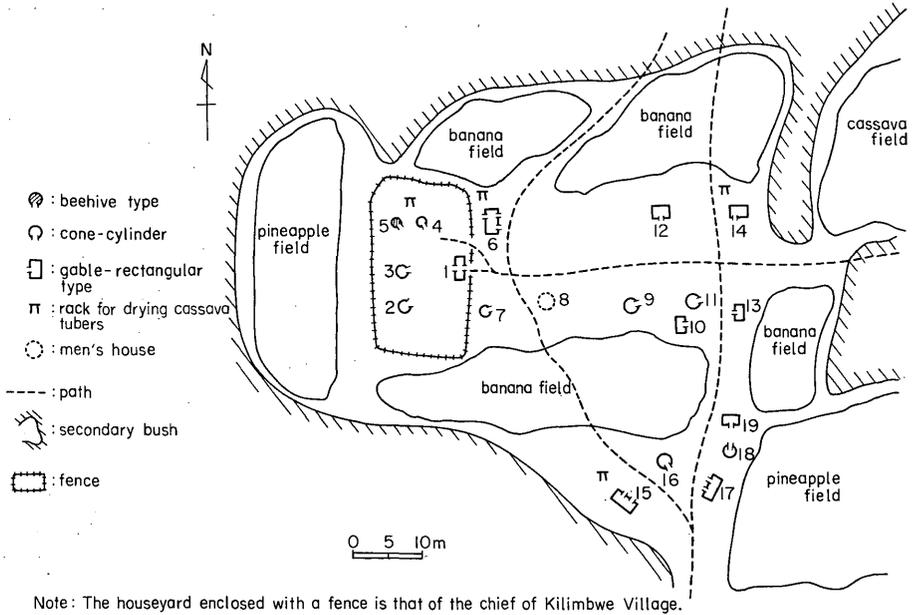
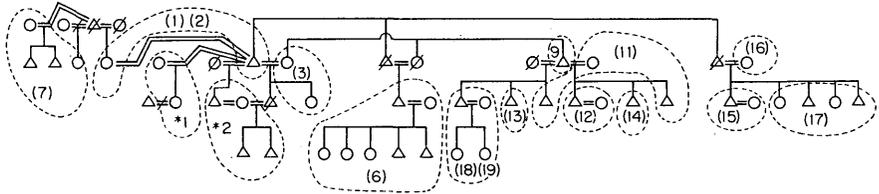


Fig. 2-a. The arrangement of dwellings in K's settlement.



Notes: \*1 and \*2 indicate that the two households live in another settlement; dotted circles with a number indicate the persons who live in the house indicated by the number in Fig. 2-a.

Fig. 2-b. Kin relationship and the allocation of persons to dwellings at Kilimbwe.

general, in relatively large settlements, dwellings are arranged in 2 rows, and the doors face each other across an open space. They can also be arranged in a U-shape with the men's house (*lubunga*), or chief's house, at the bottom of the U. In smaller settlements, dwellings are arranged in a line along a road, or almost in a circle facing an open space.

Settlements are not enclosed and extend continuously over fields and secondary forests. However, some people construct a fence, partly to prevent goats and sheeps from escaping. There is an open space in front of each house, weeded out and treaded hard. There, Nyindu women conduct their various daily activities, such as chopping firewood, pounding cassava and maize, and drying kidney beans in the sun. In the evening, when they rest, the women gather there to chat.

In each settlement, a rack (*luaano*) for sun-drying cassava tubers is constructed by each domestic family. In some settlements there is also a latrine behind the dwelling.

(2) HOUSE INTERIORS

Three kinds of house forms occur in Kilimbwe village: the beehive type (*mushonge*), the cone-cylinder type (*kishenge*), and the gable-rectangular type (*mukumba*).

The beehive type is a single-roomed house. One small section between the stone threshold (*kitalilo*) and a sliding door corresponds to the porch (*bugulilo*). The remaining section forms only a single room (Fig. 3). The fireplace (*hamuliro*) of three stones for cooking is placed, and a rack (*lutanda*) for storing firewood and drying cassava tubers is made above it. Two traditional beds, made of bamboo-like stems, are placed at both sides of a room.

The inside of the cone-cylinder type is divided into 2 rooms by a partition (*kihoma*) (Fig. 4). One is for cooking (*buluuli*) and the other for sleeping (*kakuma*). The attic (*itala*), for storing firewood, is constructed to cover more than half the floor space, and a ladder is installed for access. The appearance of the house interior varies greatly according to the position and status of the owner and his family. However, the interior may be described roughly as follows.

The interior of a cooking room is equipped with a fireplace of 3 stones and a rack for drying cassava or plantains. Cooking utensils, such as pans, pots, spoons for mixing cassava flour, baskets for storing flours and for serving *ugali* (porridge-like food), plates, gourds and small knives, are placed near the fireplace, and convenient for cooking. Wooden mortars and pestles, horticultural tools, such as hoes, machetes, axes and panniers, are placed on one side of the entrance. A water pot is kept on the other side, convenient place for setting down the full pot after returning from the

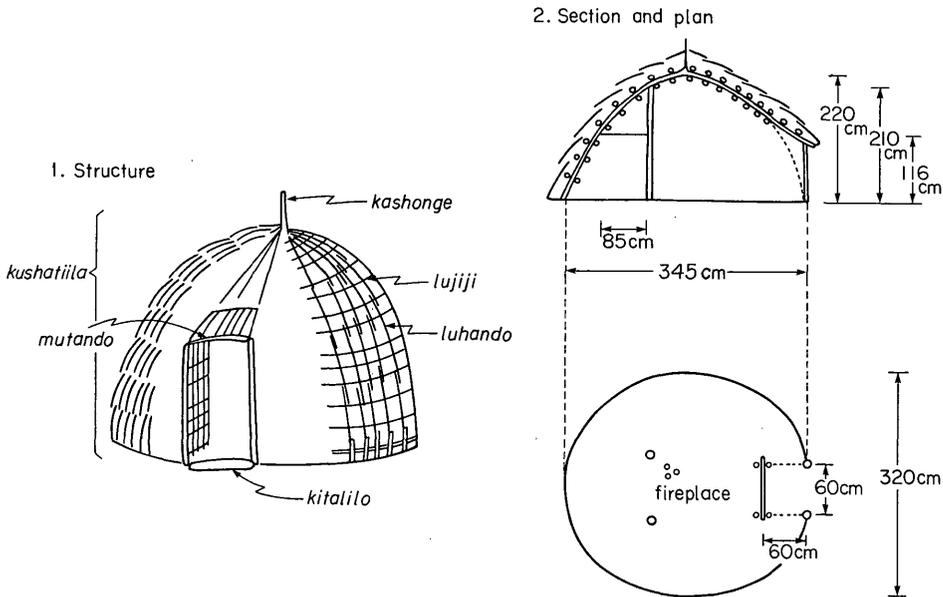


Fig. 3. The beehive type house (*mushonge*)

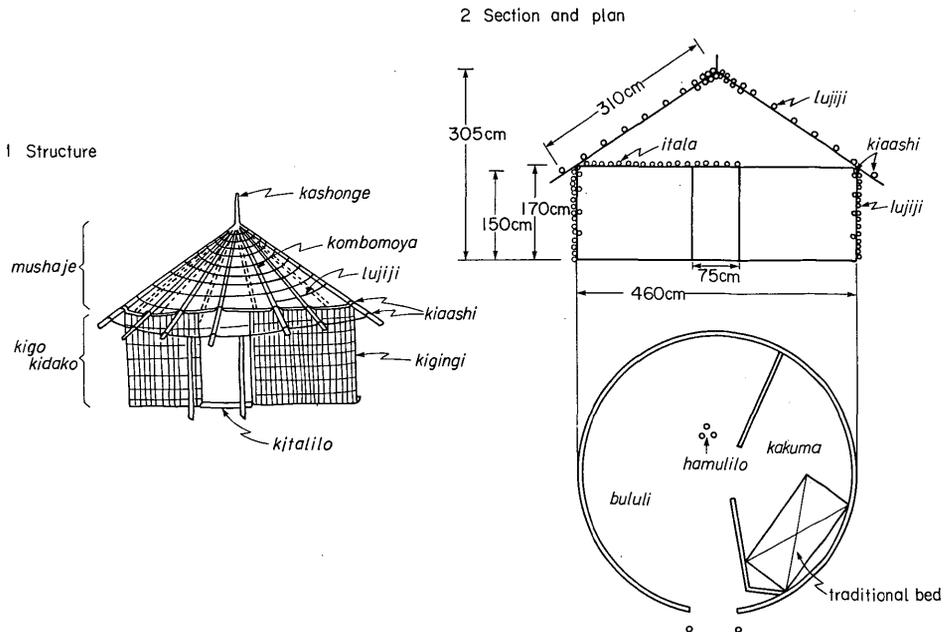


Fig. 4. The cone-cylinder type house (*kishenge*).

stream. Traditional small seats are placed here and there. In some cases hunting tools, such as spears and nets, are also placed inside a cooking room. Chickens and ducks are also kept here during the night.

The interior of a sleeping room (*kakuma*) is equipped with a small traditional bed constructed of bamboo-like stems, covered with either a mat (*mulako*) made of *ishasha* (*Cyperus* sp.) stems, or a mat (*kikanga*) made of *igungu* stems (*Marantaceae*). Recently blankets bought at market are also used. Clothes and valuables are kept in this room.

The allocation of space in a *kishenge* is considered relatively irregular. The cooking room (*buluuli*) may be situated from the entrance either to the left or right. In either case, the *buluuli* is a room leading to the entrance. It is a space where a woman cooks food, where her family eats, and where she entertains visiting relatives<sup>1)</sup>. The *buluuli* is thus, so-to-speak, a space open to the outside, while the *kakuma* (sleeping room) is closed to the exterior since only the family members can enter there.

The spatial composition of the inside of the gable-rectangular type house (*mukumba*) varies greatly, according to size and function. Some interiors are partitioned into 2 rooms, *buluuli* (cooking room) and *kakuma* (sleeping room), others have 2 rooms for sleeping and for receiving visitors, and yet others have 3 rooms for sleeping, for cooking and for receiving visitors. Characteristically, a *mukumba* is

1) The Nyindu frequently prepare a separate place, such as a *lubunga* (men's house), for the entertainment of strangers.

composed so that the space for receiving visitors often forms a separate room. The separation is caused by the functional differentiation of a *buluuli* for cooking and for receiving visitors. Furnishings for the cooking and sleeping rooms are almost the same as those of the cone-cylinder type (*kishenge*). A receiving room is often equipped with table and chairs.

Thus, the shelter of the Nyindu has in general 4 functions: sleeping, cooking, storing firewood and utensils, and receiving visitors. The spatial composition is not clearly determined, and the combinations of these 4 functions lead to variations in the spatial design of a house interior.

## 2) The Structure and Construction of Houses

Before describing the structural characteristics of each house form and the construction process, the following should be mentioned. (1) Tools used for building houses are hoes and machetes; the former for leveling the land and digging holes to erect poles, and the latter for trimming materials. (2) The Nyindu use only machetes for obtaining construction materials. (3) They don't use metal fittings, such as nails, to join house parts, but rather they use bark or vines.<sup>2)</sup>

### (1) THE BEEHIVE TYPE HOUSE (*MUSHONGE*)

The Nyindu no longer build *mushonge* houses in Kilimbwe village. Since two remain, the structure is described based on the example of K's house alone.

The floor plan is almost circular; the longer diameter is 345 cm, narrower 320 cm, and the circumference 1,190 cm. It has a domical structure, like a beehive and the height is 220 cm. The framework of the house is composed of three main parts; arch-like pieces (*luhandu*), cross pieces that fix them (*lujiji*), and one strut (*ngulilo*) which supports the dome (Fig. 3).

The first step in making the *luhandu* is to drive stakes about 20 cm into the ground 6–7 cm apart, along the circumference. The size of a stake is 3–4 cm in diameter and 80–90 cm in length. Stems of elephant grass (*lusheke*) are then tied to the stakes in three rows until they reach the peak. At the peak the *luhandu* (arch-like pieces) are tied together to a short pole (*kashonge*).

The *lujiji* (cross pieces) are tied at 25 cm intervals to both the inside and outside surfaces of the *luhandu*. The framework of a dome is thus made firm. Vines or elephant grass stems are used for the *lujiji* and the bark of *mufunga* (*Triumfetta* sp.) is used for tying materials.

There are two struts inside the dome, one to support the dome directly, and the other is to support a rack (*lutanda*) together with the former.

The entrance has eaves (width 60 cm, depth 60 cm), 135 cm above the ground. The eaves are constructed by first driving in 2 poles on either side of the entrance; then laying a pole (*mutando*) to bridge the upper ends of the two poles; thirdly by laying 6 poles across the dome, from the peak, so that the other end of the poles

2) Recently, swing doors have introduced among the Nyindu. They join a door to the post with strips of used rubber tires and nails, instead metal hinges.

projects about 60 cm from the dome frame; and finally tying these poles to the *mutando*. The entrance is partitioned off on both sides by a wall (*kishiika*) made of elephant grass stems.

For thatching, the surface of the dome framework is first thatched with a grass called *kifuze*. The entire surface is then thatched compactly with another grass (*bukkele*).<sup>3)</sup> *Bukkele* is thatched in 7 rows from the ground to the peak, with a width of about 26 cm. Finally, thatching is completed by pushing a bundle of *bukkele* through the *kashonge* (a short pole at the top).

The entrance has a sliding door made of *Raphia* palm (*ibondo*) leafstalks, about 63 cm wide and 129 cm long. The floor is of compacted earth.

## (2) THE CONE-CYLINDER TYPE HOUSE (*KISHENGE*)

Construction of this type of house was observed during the field study, and that example is used to describe the structure and the method of construction of the *kishenge*.

A *kishenge* is relatively large and has a circular floor plan with a cylindrical wall and a conical roof (Fig. 4). The diameter of the house is about 4.6 m and the circumference is 14.5 m, giving an area of approximately 16.4 m<sup>2</sup>. The height of the wall is 1.7 m, the distance from the ground to the peak 3.05 m, and the length of the roof is 3.1 m. The roof has a gradient of about 30°. The house has a swing door (width 75 cm) and is windowless.

The major structural components are pillars (*kigingi*), studs (*itete*), rafters (*kombomoya*), laths (*lujiji*), *kiaashi* (a piece tied horizontally to the top of pillars and to the lower end of rafters), and *kashonge* (a piece forming the first main support for making the framework of a roof). Inside the house two posts are driven into the ground to support the roof and the attic floor (*itala*).

The house is constructed as follows. After leveling the land, slender poles (diameter 5–8 cm, length 2.0–2.4 m), which become pillars, are driven about 30 cm into the ground at 15 cm intervals around the circumference of a circle. Between the pillars studs are laid compactly, using the 2.0–2.4 m long stems of elephant grass. Slender shrubs and vines are joined horizontally to the pillars and studs with bark strings, and are woven lath-like. The laths (*lujiji*) are woven with spacing of about 12 cm on the outer surface of the pillars, and also woven, spaced 42 cm apart, on the inner part of the pillars. After deciding the height of a wall, the *kiaashi*, made of a bundle of several slender shrubs, are installed at the upper end of the wall-frame (Photo. 1). Aligning the edges of pillars and studs, completes the framework of a wall.

The second step is to make the roof framework. At first this framework is constructed upside down. A short tree (about 7 cm in diameter, and some 60 cm in length) is prepared for the *kashonge*. It is driven into the ground almost in the center of the floor space. The top end of the tree is split and spread, like flower

3) The singular form is *kikkele*, but the plural is always used when the work signifies thatching.



Photo. 1. *Kiaashi* is installed at the upper end of the wall-frame.



Photo. 2. A ring of withered banana leaves (*ngatta*) is tied horizontally to the top of the *kashonge* and pointed ends of rafters radiate from the *ngatta*.

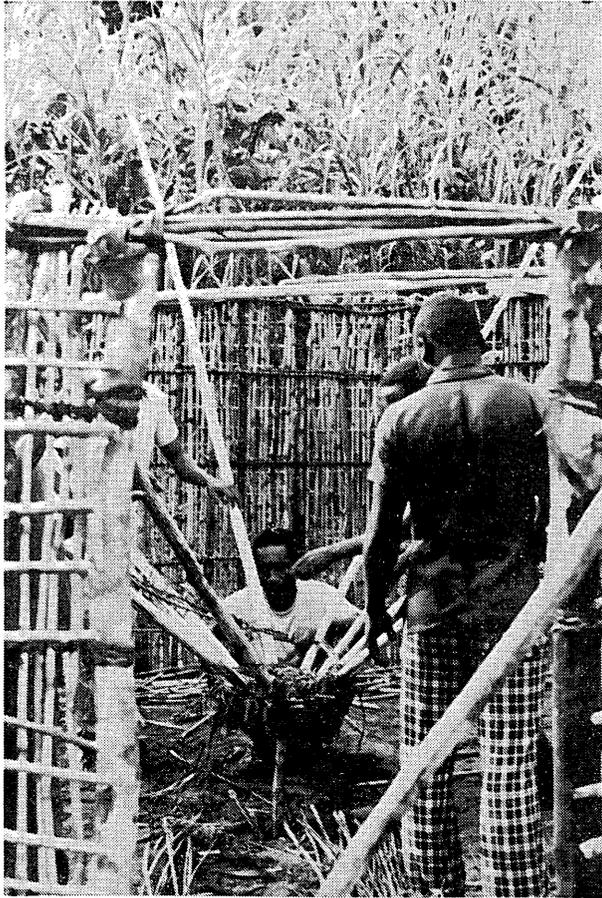


Photo. 3. The lower ends of the rafters rest on the upper edge of the wall-frame.

petals, and a ring of withered banana leaves (*ngatta*) is tied horizontally at the top (Photo. 2). This becomes the peak of the roof. The poles (7–8 cm in diameter, 3.4–4.0 m in length), which are to become the rafters, are sharpened at one end. Then the pointed ends are poked radially into the *ngatta*. The opposite ends of the poles are allowed to rest on the upper edge of the wall-frame, and thus naturally set the gradient of the roof (Photo. 3).

After about 10 poles have been inserted, the lath (*lujiji*) is woven spirally with the rafters and tied. When the rafters are fixed to some extent by the lath (i.e., after the fifth or sixth spiral), the roof-frame is turned over by several men, and set-up in the proper position on the wall (Photo. 4).

More rafters are inserted to fill the gaps. Then the rafters are fastened to the *kiaashi* (Fig. 4) at the top of the wall. The other *kiaashi* is then tied to the lower end of rafters. The lath of the roof is completed and woven spirally, almost with the same spacing, to the lower end of rafters.



**Photo. 4.** The roof-frame is turned over and erected properly on top of the wall frame.

The third step in the construction of a *kishenge* is to make the framework of a partition, in the same way as that of a wall, and to weave an attic floor (*itala*) with stems of elephant grass.

The fourth step is thatching the roof-frame. Gramineous grasses for thatching are generally named *bukkele* (plural of *kikkele*), and consist of several species of Graminae. The grasses, 1.8–2.0 m in length, are cut and kept several days before use. Grasses are bundled and piled from the edge of the roof, *kiaashi*, toward the top and tied to the lath.

The final step is coating the wall-frame with red clay. Clay is dug near the construction site, and mixed with water to make plaster. Coating with earth is done twice. The second layer, which consists of a mixture of red clay and ashes, is applied when the first is dry.

### (3) THE GABLE-RECTANGULAR TYPE HOUSE (*MUKUMBA*)

This type has a rectangular plan with a plastered wall and a gable thatched roof. The *mukumba* varies greatly in size, having a floor area of 8 to 20 m<sup>2</sup>. The roof gradient is about 30°. Fig. 5 shows the plan and section of example which I measured.

The structural components are purlin (*mutambi kijiiwa*), rafter (*kombomoya*), beam (*mutambi kilo*), beam-supporting post (*kigingi*), purlin-supporting post (*kigingi kumikatikati*), stud-like post (*kikili*), and lath (*luji*). The way in which this type is constructed is similar to that of a *kishenge*, in the making of the lath-like framework of the wall and the roof.

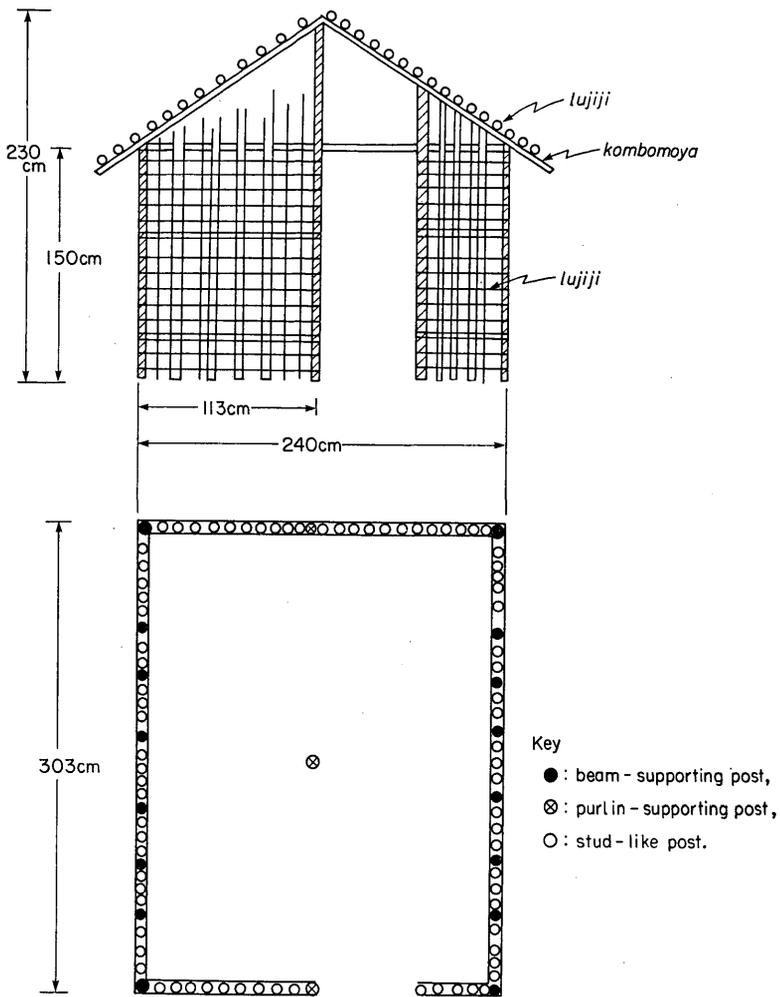


Fig. 5. The gable-rectangular type house (*mukumba*).

The first step is to level the house site. Then, four beam-supporting posts are erected in holes dug about 30 cm deep at each corner. Other beam-supporting posts are driven in at 50–60 cm intervals along a line between the 2 supporting posts at the corner. Three longer poles, which become purlin-supporting posts, are erected in the center of each short side and in the center of the rectangular floor plan. Notches are made at the upper ends of supporting posts (5–10 cm in diameter).

A purlin and beams on both sides are laid in the notches of the posts. More logs, which become stud-like posts, are driven in, with an interval of 6–10 cm between the beam-supporting posts. Rafters are laid, about 15 cm apart, and fastened to the purlin and beams with lashings. Tree trunks with diameter of 3–4 cm are used for rafters.

Poles are driven in inside the house for the framework of a partition. These poles do not support the roof frame, and are often irregular in length. The lath of the wall are woven with spacing of 6–9 cm and that of the roof with spacing of 10 cm, which makes a woven-work framework. The framework of a partition is made in the same way as the wall-frame.

The last step is to thatch the roof frame with graminaceous grasses and to plaster the wall-frame with red clay. The method of thatching and earth-coating is the same as that of a *kishenge*. *Mukumba* houses usually have one small window in the wall of a sleeping room.

### 3) Communal Practices during House Construction

Except for applying the earth-coating, which is women's work, all the tasks of house construction, from the acquisition of materials to the completion of a house, is performed by men. It often takes about one month to complete a house, owing to the large quantity of building materials which must be procured. Occasionally, a house builder himself does most of the construction work.

But there also exist a few occasions on which building a house is communal work (*gabwa sa*). That is, 1) the cone-cylinder type, driving in pillars along its circumference of a plan, 2) the cone-cylinder type, making the frame work of a roof and setting it up in a proper position on the wall, 3) thatching a roof, and 4) earth-coating a wall-frame. Only in plastering a wall-frame do both men and women participate, men mix the plaster, and women supply the water and apply the plaster. After the communal work requested is completed, the householder must entertain all those who participated in the work. He entertains them with *posho*, including banana wine (*kashikishi*) or maize wine (*musululu*), and food consisting of stiff porridge (*ugali*) and a relish (*mboga*). It is said that side dishes are best made of meat. Therefore, it is expensive to prepare *posho*. Recently, the householder who requests communal work can pay the workers with money in lieu of *posho*. A reasonable payment for a day's work for a man is 60 makuta.

During the field study, I observed two cases of communal work. One was the plastering of the wall of rectangular type which a young man was building for himself; occasionally he did the construction work himself until that time. Four men and 3 women took part in this instance. Three of the men were the young man's brothers, one woman his mother, and the other two women his brother's wives. In this instance the work was done only by close relatives.

The other example observed was the making of the roof framework for a cone-cylinder type which a young man was building for his mother. Eight men took part, 3 of them belonged to the same lineage as the young man and the other 4 were his neighbors.

The relationship between a house builder and the people who participate in communal work differs according to the case. Nyindu people explain that in either case a house builder generally requests his *jamaa*<sup>4)</sup> for communal work.

#### 4) Changes of House Forms

##### (1) HISTORY OF CHANGES OF HOUSE FORMS

The beehive house is characteristic of the Ruanda-Uganda cluster of Interlacustrine Bantu; the cone-cylinder house is typically used by the Central Sudanic Peoples and Eastern Nigrific Peoples; and the gable-rectangular house is typical of the Equatorial Bantu, Mongo-Luba and Northeast Coastal Bantu (Table 1; [MURDOCK 1959]).

During the research among the Nyindu it became apparant that the variety of house forms in Kilimbwe village was the result of historical changes. According to their explanation, the traditional house form of the Nyindu is the beehive type (*mushonge*). About 35 years ago (ca. 1942) they learned how to build the cone-cylinder type (*kishenge*) from the Bembe people. Then, the gable-rectangular type (*mukumba*) entered the area since the end of the 1960's, when the Kilimbwe villagers began to return to their former village from the various places in which they had sought refuge from Mulele's rebellion, following Simba's revolution. The gable-rectangular type was introduced by the people who returned from Kashika or Ilangi village, to which it had spread already through the influence of the Lega culture.

Nyindu culture has long had close contacts with the Shi culture (the Interlacustrine Bantu), as their traditions indicate. However, since the territory of the Nyindu is located on the borders of the Shi, the Lega and the Bembe, Nyindu culture has also been influenced recently by the Lega and Bembe cultures, which belong to the Equatorial Bantu. Thus, Nyindu house forms have changed as a consequence of the history of contacts with the Lega and the Bembe.

The rapid spread of the gable-rectangular type over Nyindu territory is also considered to have resulted from both government policy and modernization. The same

**Table 1.** Distribution of house forms among the major cultural provinces in Africa.

cultural province	beehive type	cone-cylinder type	rectangular type	other types
Interlacustrine Bantu	++	+		
Equatorial Bantu	±	±	++	
Mongo & Luba		±	++	
Central Bantu	±	+	+	
Tanganyika Bantu	±		±	++
Northeast Coastal Bantu		±	++	
Central Sudanic People	±	++	±	
Eastern Nigrific People		++	±	
Nilotes	±	++		+

Source: Murdock (1959)

Note: ++ indicates more common, + indicates common, ± indicates a few.

4) *Jamaa* is a Swahili word with broad sense. It signifies a number of persons gathered or collected together, family, society, company, assembly, gathering, and meeting. It generally means the members of a family or kinsmen.

phenomenon can be observed among other tribes. In Legaland, by the 1950's, all compartmentalized longhouses had disappeared, as a direct result of colonial preference for the small compartmentalized, rectangular wattle-and-daub house. Among the Bembe, the cone-cylinder houses which had been prevalent since time immemorial also had gradually been replaced by rectangular structures [BIEBUYCK 1973: 36-7].

## (2) STRUCTURAL AND TECHNICAL CHANGES

As Table 2 indicates, there are some differences in the major house parts of each house form. The most remarkable structural change from the beehive type to the cone-cylinder type is the separation of a wall from the roof. Whereas the fundamental framework of the beehive type is the vertical frame (*luhando*) and the horizontal frame (*lujiji*), in the cone-cylinder type the *luhando* has disappeared and become differentiated into the pillar (*kigingi*) and the rafter (*kombomoya*). Further, a new

**Table 2.** House forms and the kinds of house parts and fixtures.

	<i>mushonge</i> (beehive)	<i>kishenge</i> (cone- cylinder)	<i>mukumba</i> (gable- rectangular)
1) House part			
<i>kashonge</i> (pinnacle)	+	+	
<i>ngatta</i>		+	
<i>luhando</i> (vertical element of a frame)	+		
<i>kigingi</i> (beam-supporting post)		+	+
<i>kigingi kumikatikati</i> (purlin-supporting post)			+
<i>bikili</i> (stud-like post)			+
<i>itete</i> (stud)		+	
<i>lujiji</i> (horizontal element of a frame)	+	+	+
<i>kiaashi</i>		+	
<i>kombomoya</i> (rafter)			+
<i>mutambi kijiwa</i> (purlin)			+
<i>mutambi kilo</i> (beam)			+
<i>ngulilo</i> (dome supporting pole)	+		
<i>lufunga</i> (lashing)	+	+	+
<i>kifuse</i> (thatching)	+		
<i>bukkele</i> (thatching)	+	+	+
<i>idaho</i> (red soil)		+	+
<i>mubu</i> (ash)		+	+
2) Fixture			
<i>kishiika</i> (partition)	+		
<i>kihoma</i> (partition)		+	+
<i>lutanda</i> (shelf)	+	+	+
<i>itala</i> (attic)		+	
<i>kakuma</i> (bed)	+	+	+
<i>luuji</i> (door)	+	+	+
<i>lilisha</i> (window)			+

technical solution is found to the problem of making a roof-frame and setting it on the wall-frame. The Nyindu make the rough frame of a roof on the ground, upside-down, and then several men turn it over and lift it to the correct position. Another new house part, called *kiaashi* (Fig. 4), has come into existence for fixing correctly the roof-frame to the wall-frame.

The most remarkable structural change from the cone-cylinder type to the gable-rectangular type is that the shape of roof changes from a cone to a gable, with the change of floor plan from a circle to a rectangle. As a result, the frame of a roof is made of the purlin, beam and rafter, and the pillar has become differentiated into the beam-supporting post (*kigingi*), the purlin-supporting post (*kigingi kumikatikati*) and the stud-like post (*kikili*). According to the differentiation of the function of the post, the Nyindu names for the post have thus become diversified.

The method of constructing a roof-frame has become so easy that an individual man can set the beam and the purlin on the posts and tie the rafters to beams and purlin. A simple notch is made at the upper end of supporting posts to join them to the purlin or the beam.

Some house parts are common to all three forms. One is the lath-like horizontal frame (*lujiji*), which shows that there is no difference among them in the net-work framed structure. Another is the lashing (*lufunga*), which means that there is no difference in the technique of interconnecting house parts. The other is the thatching (*bukkele*). All roofs are thatched with graminaceous grasses. These three common house parts indicates that no differences exist in the fundamental technique of constructing houses.

There are no house parts in common between the beehive type and the gable-rectangular type, whereas some are common to both the beehive type and the cone-cylinder type, and to the cone-cylinder type and the gable-rectangular type. The transformation of house forms from the beehive through the cone-cylinder to the rectangular might have occurred parallel with the development of house structure, and can be considered a technically natural and gradual progress.

### (3) FUNCTIONAL CHANGES

The Nyindu houses have 4 functional roles: sleeping, cooking, storing firewood and utensils, and receiving visitors. Those functions have remained unchanged despite changes in house forms. However, the structural and technical changes made possible increasingly larger houses and led to further spatial differentiation of house interiors. Namely, the beehive type (*mushonge*) is a one-roomed structure, serving all functions. The cone-cylinder type (*kishenge*) is a two-roomed structure, and the sleeping place forms a separate room. The gable-rectangular type (*mukumba*) has 2-5 rooms, but a three-roomed structure is the commonest. In this case, the place for receiving visitors forms a separate room.

There also exist slight differences in functional roles among the 3 house forms. An examination of the distribution of population among 49 buildings in Kilimbwe village, and the functions of the buildings revealed the following (Table 3).

Two buildings are of the beehive type and are not now in general use but rather

**Table 3.** House forms and their functions.

house form	sleeping & cooking	cooking	sleeping	others for visitors	others lukumba	no use	Total
<i>mushonge</i>				2			2
<i>kishenge</i>	14(11*)	5	1	1	2	2	25
<i>mukumba</i>	7(2*)		15(7**)				22
<b>Total</b>	<b>21(13*)</b>	<b>5</b>	<b>16(7**)</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>49</b>

Notes: \* indicates the number of houses used by married female only.

\*\* indicates the number of houses used by unmarried young male only.

are reserved for visitors. Twenty-five buildings are of the cone-cylinder type. Five of them are used mainly as cooking houses; 14 serve all functions, and 11 of them are used by a co-wife or a widow. Twenty-two buildings are of the rectangular type; 15 are utilized as sleeping and reception places and not as cooking places. Five monogamous households use a cone-cylinder house for cooking and a rectangular house for sleeping, receiving visitors and other purposes.

Some 64 percent of the cone-cylinder houses are under the charge of women, whereas some 68 percent of the rectangular houses do not have a cooking room. Women tend to live in the cone-cylinder house (*kishenge*), and the men in the rectangular house (*mukumba*). On the other hand, since young Nyindu men tend to build rectangular houses prior to marrying, the present situation can be considered as transitional such that the three house forms are merging gradually into the rectangular type.

### 3. ETHNOBOTANICAL BACKGROUND OF CONSTRUCTION MATERIALS

#### 1) Outline of Nyindu Plant Nomenclature and Categorization

Some 400 plants are recognized, categorized, classified, and named by the Nyindu. Several botanical species are categorized under the same Nyindu name, whereas one botanical species is classified into several different categories. Some are not named but are recognized, and some, whose names have been forgotten, are known by their usage only.

Among Nyindu plant names there is no single category which includes all plants, whereas most plants are classified, based on their lifeform, into one of three major categories: *kati* (wood), *kiashi* (grass and herb), or *mujiji* (vine or shrub). A group of plants that is lumped under a single Nyindu name and cannot be subdivided is considered the smallest plant segregation recognized. I call this a specific plant type, borrowing the term from Conklin [1954: 116]. There are some Nyindu names which are clear synonyms: for example, *kioya* and *kanafwoya* (undetermined), *kusena* and *lusiena* (*Mimosa* sp.), and *mulandamoni* and *lubondo* (a Rubiaceae tree). I consider these plants the same specific plant type.

The Nyindu have now forgotten most of the meanings of each plant name, how-

ever, they can explain the meanings of some names. The following examples briefly describe the plant nomenclature of the Nyindu.

Some plants are named after their morphological characteristics. For example: (1) A kind of fig-tree (*Ficus* sp.) is named *mougan jokka*, which means that even snakes (*jokka*) can never climb the tree because of its smooth trunk; (2) An undetermined tree is named *anjooku* ("never falls down") because it remains standing despite the passage of elephants; (3) Two trees (*Milletia* sp. and undetermined species) are named *kabuligaa* and *kashekelela*, respectively, because the former is the host plant of edible caterpillars, called *buligaa*, and the latter of *kashekelela* caterpillars.

Some plants are named for the usages to which they are put. For example: (1) A parasol tree (*Musanga cecropioides*) is named *mushaki* because shields (*mushaki*) are made of it; (2) A climber (*Agelaea deweveri*) is named *kabukusingo*, "the rim of a basket"; (3) A vine (*Ficus* sp.) is named *kalembe kalutonga*, "the twig on which the Nyindu put birdlime"; (4) A shrub (*Triumfetta* sp.), the bark of which is used for lashings, is named *mufunga*, a derivative of *lufunga* (cord).

Some plant names are combinations of the names of other plants and the descriptions of the habitat or characteristics of the plant in question. For example: (1) The name *kineke ki lungwe* (*Lasianthus kilimandscharicus*) is composed of three words (two nouns and one preposition possessive, *ki*) and signifies a *kineke* (a *Psychotria* tree), which grows in a place called *Lungwe*; (2) The name *kifunga jiila* is composed of two words, *kifunga* and *jiila*, and signifies a small *mufunga* which grows on the roadside (*jiila*); (3) The name *kifunga jiila kisoshi* (*Hibiscus macranthus*) is composed of three words (*kifunga*, *jiila* and *kisoshi*), and the former is the name of a shrub, the second signifies the roadside, and the third the male sex.

In some instances the same plant is named differently according to the situations in which it is used. For example, a kind of grass (*Andropogon gayanus*) is called *kadahya* when used in making banana wine, and *bukkele* when used for thatching a roof. *Bukkele* is also a general category for thatching grasses. In another instance also a general category of plants shows a close relationship with usage. Vines and shrubs are grouped as *mujiji*, a derivative of *lujiji* (lath), because they are major construction materials for *lujiji*.

## 2) Major House Parts and Construction Materials: Theory and Practice

### (1) THE NYINDU VALUATION OF PLANTS AS CONSTRUCTION MATERIALS

Most of the materials used in constructing a Nyindu house are derived from plants. Field study revealed that 105 specific plant types are used for house construction. Among them, only 5 were introduced during the colonial period and/or are cultivated for other purposes. Other specific plant types grow naturally. The list of specific plant types used for construction is given in Appendix. The 105 plant types vary greatly in their properties, over-all forms, parts used, and utilization, since the necessary characteristics and properties of house parts differ greatly.

Woody plants are used for pillars and rafters, vines and shrubs for *lujiji* and *kiaashi*, slender vines and bark for tying materials, grasses and palm leaves for

**Table 4.** House parts and plant materials.

house part	plant material	number of kinds
pillar and rafter	wood plant	76 specific plant types
<i>lujiji</i> and <i>kiaashi</i>	vine and shrub	10
partition and stud	plant with bamboo-like stem	3
lashings	vine or bark	9
thatching	graminaceous grass or palm leaf	9
door	palm leafstalk or board	11

thatching materials, and plants with bamboo-like stems for partitions and studs (Table 4). Formerly, the Nyindu made doors by joining leafstalks of a *Raphia* palm with a string, but recently boards are used widely as doors.

i) Plants used for pillars and rafters

Seventy-two wild specific plant types are used for pillars and rafters, which may indicate that the Nyindu choose trees at random for this purpose. However, they do exercise some judgement in choosing the proper trees from among the available plant resources.

Five specific plant types are said to be good for making pillars and rafters, because they have an upright trunk. These are the *gumba* (undetermined), *kakoma* (*Afrardisia* sp.), *kijindama* (*Maesobotrya floribunda*), *kishuu* (undetermined), *mugangu* (*Margaritaria discoidea*). *Mugokwe* (a Sterculiaceae tree) is said to be the best because it is hard and durable, however, when asked to justify the selection of most woods, the Nyindu generally reply that the wood is strong. The reasons for the selection of particular woods are thus uprightness, hardness, strength, or durability. The valuation of trees for pillars and rafters is only roughly refined.

On the other hand, the reasons for not selecting the wood of a particular tree are more readily ascertained. Some plants are restricted in their use for construction by their other uses. For example, the following tree plants have ritual usage, which preclude their use for construction: a *mulyanyama* (*Barteria* sp.), which smells bad, and is used for keeping away evil spirits; a *kabelangwa* (*Tetrorchidium didymostemon*), used as the carrying stick of a coffin; a *muhaatohaati*, a tree planted as a tomb-marker; and a *kashemelangwa* (*Entada* sp.), planted as a charm against lightning. Some *Ficus* trees, such as *mulondo* (*Ficus thonningii*) and *mukobe* (*F. ovata*), which the Nyindu plant for making barkcloth (bark) and for making birdlime (sap), are also not used for construction.

Some tree plants are not utilized because of their characteristics and properties. For example, *mushengele* (*Oncoba spinosa*) and *malofwe* (a Caesalpiniaceae tree) have prickly tunks; *muhingili* (*Grewia* sp.) smells bad; *Ficus* trees, such as *idota* and *kitobolo* (*Ficus vallis-choudae*) do not have fully upright trunks; *luwaji* (*Kotschya africana* var. *bequaertii*) has soft wood; *kashungutti* (*Millettia dura*) is easily eaten by

worms; and *katouza* (*Euphorbia tirucalli*) and *muhamba* (*Euphorbia candelabrum*) have poisonous sap.

Other tree plants are restricted in their use by their limited availability. For example, *mushefu* (undetermined), whose seeds produce cosmetic oil, and *mulumbu* (*Lobelia gibbena*) grow far from the village.

More reasons exist for not selecting than for selecting certain trees. This demonstrates that the choice of trees for pillars and rafters is established on the basis of negative choice. It can be concluded that Nyindu valuation of tree plants based on their appropriateness for construction has not been fully established, and consequently that the choice of tree plants covers a wide range.

ii) Plants used for laths and studs

Since the *lujiji* (lath) forms the woven structure of the round wall-frame and the conical roof-frame, thinness, pliability and flexibility are required. The plants for this purpose are selected from among those grouped under the name "mujiji", because their vines are long and straight, which includes *lugengya* (*Dracaena laxissima*), *kabukusingo* (*Agelaea deweveri*), *kabubi* (undetermined), *kahelele* (*Alchornea hirtella*), *kalembe kalutonga* (*Ficus* sp.), and *lufuse* (*Alchornea cordifolia*). These plants are also used for making baskets, fish traps, and the rim of scoop nets.

A short shrub called *kabubu* (*Sida rhombifolia*) is used especially in making the first step of the *lujiji* of the roof of cone-cylinder type house. The shrub, which is twiggy and pliant with a height of about 1 m, can be tightly coiled and thus prevent worms from entering a house.

Elephant grass stems and stems of *mufunga*, the bark of which is stripped off, are used for studs as well as for laths, because of their bamboo-like properties.

iii) Plants used for lashings

Bark and woody vines are used for lashings. Bark is obtained from *mufunga* (*Triumfetta* sp.) and *kifunga jiila kisoshi* (*Hibiscus macranthus*), and vines from *mukala* (*Hippocratea* sp.), *lugubu* (*Hippocratea* sp.), *kigushu* (*Efulensia montana*), *lushuuli* (*Smilax kraussiana*), *bulondo* (Asclepiadaceae), *shiembe* (*Tetracera* sp.), and *lukongwa* (Compositae).

*Mukala*, *lugubu*, and *kigushu* are classified into the same group (*kabila*). Of these, *mukala* is the best material for lashings, but since *mukala* does not grow near Kilimbwe village, it is seldom used in the village. (Vines of *mukala* and *lushuuli* are also the best materials for making baskets, and specialized basket weavers do not mind travelling to gather them.)

iv) Plants used for thatching

Mostly, graminaceous grasses are used for thatching, and in particular *kadahya* (*Andropogon gyanus*), *kadodokera* (*Trichopeteryx dregeana*), and *mushoobu* (*Imperata cylindrica*) are preferred among *bukkele* grasses. When there are not enough *bukkele*, young grasses of *lusheke* (elephant grass), called *bidoke bi kischeke*, are used also.

In some lowland villages the Nyindu first thatch roughly with *igungu* (*Thaumatococcus danielle*) leaves and then with leaves of *nbiji* (*Sclerosperma mannii*) palm. Some mountain villagers, living at about 2,200 m above sea level, use alpine bamboo

(*muanji*, *Arundinalia alpina*), which is split into 2-3 and placed over the entire surface of a roof.

The Nyindu valuation of plants used for pillars and rafters is quite rough and the plants used vary greatly in kind. On the other hand, the range of plants used for the other construction materials is rather narrow because the close relationships between the properties of plants, and the required qualities of each construction material restricts choice.

## (2) QUANTITATIVE ANALYSIS OF TWO EXAMPLES

Based on two examples the use of plant materials in house construction is described. Table 5 shows the plant types and their proportion in the total number of logs used for each house part for both a cone-cylinder house (*kishenge*) and a gable-rectangular house (*mukumba*).

Example 1: a *kishenge*

Ninety-two logs are needed for *kigingi* (pillar). The number of plant types amounts to 24. Six types account for about 54 percent of all logs used, whereas 11 types are represented by only 1-2 logs.

The *kombomoya* (rafter) consists of 78 logs in total. The number of plant types amounted only 9, and moreover, the *mukoga* (*Macaranga schweinfurthii*) tree accounted for some 74 percent of all logs. Another 6 type accounted for only 10 percent. *Mukoga* is used after being stripped of bark, because it is said to be easily infested with insects, whereas the remainder is used without preparation.

Plants used for the *lujiji* of a roof differ slightly from those for the *lujiji* of a wall. The *lujiji* of a roof is made of a Malvaceae shrub: *kabubu* (*Sida rhombifolia*) and *lufuse* (*Alchornea cordifolia*). The former is used for making the top one-third and the latter for making the bottom two-thirds. The *lujiji* of a wall is made of 12 plant types. Elephant grass (*lusheke*) and *lufuse*, which originally are considered to be good materials for the *lujiji*, account only for 35.3 percent. The remaining 10 plant types, categorized under *kati* (wood), account for 64.7 percent, and 8 plant types among them are also used for pillars.

Nine logs (diameter 5 cm) are used for the *kiaashi*. Nine plant types are used and every plant type is used also for pillars and rafters.

*Gumba* tree (undetermined) is used for the *kashonge* (Fig. 4). Only *lusheke* (elephant grass) is used for studs (340 in total).

For lashings, three plant types, *bulondo* (Asclepiadaceae) *shiembe* (*Tetracera* sp.) and *mufunga* (*Triumfetta* sp.), are used. The former two plant types are used only for tying the *kiaashi* in a proper position, and the latter is used for the other parts. The total length of lashing in the complete framework of a *kishenge* is estimated to be 450-500 m.

Gramineous grasses lumped under the name of *bukkele* are used for thatching. Grasses are cut in fallow land where *kadahya*, *kadodokela*, *mushoobu* and other gramineous grasses grow together. The grasses for thatching are cut without regard to individual distinction. Informants stated that 37-40 armloads (*mafungo*) of grasses are required to thatch a house. One armload is the unit of quantity that

a man can carry at one time. An area of some 10 m<sup>2</sup> is required to provide an armload of grass, thus an estimated 370–400 m<sup>2</sup> of fallow land is needed for thatching a roof.

Example 2: a *mukumba*

Four plant types are used for the beam-supporting post (*kigingi*) erected at each corner. These are *kakoma* (*Afrardisia* sp.), *mushombo* (*Harungana* sp.), *gumba* (undetermined), and *mungubanguba* (*Anthocleista* sp.). Three plant types are used for the purlin-supporting post (*kigingi kumikatikati*); *kashungutti* (*Millettia dura*), *mushiluti* (undetermined), and *mukoga* (*Macaranga schweinfurthii*). The Nyindu do not use distinct plant types for the beam-supporting post, the purlin-supporting post and the stud-like post. One hundred and twelve logs are used for these posts, varying greatly in kind. The number of plant types amounts to twenty-two. Since only 6 plant types, *gumba*, *mushombo*, *mudutuu* (*Dichaetanthera corymbosa*), *kishuu* (undetermined), *kineke* (*Psychotria bagshwei*) and a quinquina tree (*kankina*), account for 64.4 percent of all logs, there are distinct differences in the amount used among these 22 plant types.

*Mukoga* is used for the beams, and *mushiluti* for the purlin. Sixty-two logs are used for rafters and only 3 plant types are used. *Mukoga*, stripped of its bark, amounts to 84 percent of rafters.

The *lujiji* (lath) consists of 200 elephant grass stems. The bark of *mufunga* (*Triumfetta* sp.) and the vine of *mukala* (*Hippocratea* sp.) are used for lashings.

### (3) DISCREPANCIES BETWEEN THE VALUATION AND ACTUAL USE OF PLANTS

Forty-two plant types are utilized in the two cases, excluding thatching materials. All the plant types, except quinquina and bamboo, grow wild around Kilimbwe village. Thirty-four plant types are trees (*kati*), 6 vines (*mujiji*), and 1 grass (*kiasi*).

Quinquina trees are planted by only two families in Kilimbwe, who sell the bark. The owner of the house described in Example 2 is a member of one of the families, and consequently utilized quinquina stems after the bark was removed. Cultivated plants are mentioned only briefly here since the focus is mainly on wild plants.

Thirty-two plant types are utilized for pillars; 12 plant types are used in both examples, another 12 plant types are used only Example 1, and the remaining 8 plant types only in Example 2. In either case, the total number of logs used for pillars is large: 92 for Example 1, and 118 for Example 2.

Among the 32 plant types used for pillars, only 6 are regarded as superior construction materials; *gumba*, *kakoma* (*Afrardisia* sp.), *kijindama* (*Maesobotrya floribunda*), *kishuu*, *mugokwe* (Sterculiaceae), and *mugangu* (*Margaritaria discoidea*). Two plant types, *mugokwe* and *mugangu*, are utilized only in Example 1. Those 6 plant types account for only 27 percent of all logs utilized, and the remaining 73 percent is made up of other plant types with no special valuation.

Since the identification of plants is incomplete, I could not fully support the scientific basis for the use of these plant types as pillars. However, I would like to mention briefly the following. Among the six plant types regarded as being good

materials for pillars, only *kijindama* is reported to have hard sapwood and to be used for roofing pegs [DALE & GREENWAY 1961]. Among the other 26 plant types used for pillars, only three plant types, *mugimbu* (*Bridelia micrantha* and *B. stenocarpa*), *kusena* (*Leucaena guatemalensis*) and *mushebeiyi* (*Albizia gummifera*), are reported to be good materials for house construction. On the other hand, *ifundi* (*Trichilia rubescens*), *mufumbo* (*Podocarpus* sp.) and *mugele gulungwe* (*Antidesma laciniatum* var. *membranaceum*), are reported to have hard wood, but were not used in either example [DALE & GREENWAY 1961].

The qualities required for wood as pillars are not differentiated between the two house types, *kishenge* and *mukumba*. However, the two examples illustrate that the range of the kinds of plant materials used for pillars is wide in each case, and that the kinds vary greatly among cases. It can be concluded that the valuation of trees, with respect to durability and hardness, is not fully reflected in the construction activities of the Nyindu.

The total number of logs used for rafters is large in both examples; 77 logs in Example 1 (the cone-cylinder type), and 62 in Example 2 (the rectangular type). However, only nine plant types are used for rafters; 2 plant types in both examples, and the remaining 7 plant types only in Example 1. Seven of these plant types are also used for pillars.

*Mukoga* (*Macaranga schweinfurthii*) accounts for 74 percent of rafters in Example 1 and 84 percent in Example 2. Moreover, *mukoga*, considered to be easily infested with worms, is the only plant type that is stripped of its bark prior to use. The timbers of the *Macaranga* sp. are regarded as soft and light, easily sawn and worked, easily infested with worms when dry, and less durable [SUDO 1970: 165–166]. *Kashungutti* (*Milletia dura*) and *mukalakala* (*Sapium ellipticum*), regarded to be easily infested with worms, are utilized not for rafters but are used for pillars. Considering this it can be said that the Nyindu select light wood for rafters to lessen the weight of a roof-frame, as well as woods that are resistant to worms.

On the other hand, almost all other plant types are used for pillars also. This means that much of the wood used for rafters compensates for the lack of *mukoga* trees, and that much of the wood is not clearly differentiated into materials for pillars and rafters. Finally, *mukoga* is the only plant type that is highly valued as a material for rafters.

The roof part of the *lujiji* of the cone-cylinder type (Example 1), and the *lujiji* of the rectangular type (Example 2), are made of only these plants considered to be the correct materials for *lujiji*. However, the wall part of the *lujiji* in Example 1 is made partly of the correct *lujiji* materials and partly of plants used for pillars. The former, consisting of 2 plant types, accounts for some 45 percent of all materials, and the latter, consisting of 10 plant types, accounts for the remaining 55 percent.

It can be said that the Nyindu valuations of plants as *lujiji* materials is effectively reflected in the plant types collected from their environment. But when *lujiji* materials are lacking, the Nyindu often supplement them with other construction materials.

**Table 5.** The kinds and quantity (%) of plants used for major house parts of a cone-cylinder house and a gable-rectangular house.

Plant type	Cone-cylinder type						Gable-rectangular type				
	Pillar (N=92)	Rafter (N=78)	Roof part of lath	Wall part of lath (N=53)	<i>Kiaashi</i> (N=9)	Stud (N=340)	Pillar (N=112)	Rafter (N=62)	Beam (N=4)	Purlin (N=1)	Lath (N=200)
<i>mukoga</i>	2.2	73.1			11.1		2.7	83.9	100		
<i>gumba</i>	13.0	2.6			11.1		10.7				
<i>kijindama</i>	13.0			7.5			3.6				
<i>mushombo</i>	8.7	1.3					8.0				
<i>kashungutti</i>	4.3			11.3	11.1		2.7				
<i>ifgwe</i>	4.3	7.7		1.9			2.7				
<i>muhama</i>		9.0					4.5				
<i>muhanga</i>	6.5	1.3					2.7				
<i>kishuu</i>	4.3						5.4				
<i>mudutuu</i>							6.3				
<i>mumbukumbuku</i>	1.1			9.5	11.1		2.7				
<i>kineke</i>							5.4				
<i>mugele</i>	5.4						1.8				
<i>kusena</i>	7.6										
<i>mugangu</i>	3.3			5.7	11.1						
<i>mushebeiyi</i>	1.1						3.6				
<i>kakoma</i>	2.2	2.6			11.1		0.9				
<i>kitegamabole</i>	4.3	1.3			11.1						
<i>mukalakala</i>	4.3	1.3		9.5	11.1						
<i>kakondameeju</i>	2.2			3.8	11.1						
<i>mungubanguba</i>							2.7				
<i>mushiluti</i>							2.7		100		
<i>kishalashala</i>	3.3										
<i>mubiliiji</i>	3.3										
<i>ishaasha</i>	1.1			3.8							
<i>lubondo</i>				1.9			0.9				
<i>mugimbu</i>					11.1		0.9				
<i>kahala</i>	2.2										
<i>kagiji</i>	2.2										
<i>kihona</i>				3.8							
<i>kijoojoo</i>							0.9				
<i>kijiki</i>	1.1										
<i>mugokwe</i>	1.1										
<i>katengetenge</i>		1.3									
<i>kankina</i> *1							28.6	14.5			
<i>mulonge</i> *2							1.8				
<i>lufuse</i>			66.7	13.2							
<i>kabubu</i>			33.3								
<i>lusheke</i>					32.1	100				100	
Total of plant types	24	9	2	12	9	1	22	3	1	1	

Notes: \*1 and \*2 are cultivated species.

The plants used for lashing and thatching materials show no discrepancy between the valuations and the actual use of plants.

### 3) Nyindu's Strategy for Collecting Plant Materials for Construction

In this section another aspect of the Nyindu strategy for collecting plant materials used in construction is discussed, particularly with regard to materials derived from trees. Because the Nyindu do not consider fully such qualities and characteristics as durability, strength and weight of the plants themselves.

I will analyze the Nyindu strategy through the certain attributes of each plant with respect to its ecological and cultural significance for the Nyindu. The three attributes used in the analysis are: (1) habitat of plant (where the materials are obtained); (2) degree of familiarity (to what extent each plant is known); and (3) the economical significance of each plant in the daily life of the Nyindu.

The Nyindu know where to go to obtain familiar plants. For the most part I classified the habitats of plants into four, according to the Nyindu environmental categories: *mwingini* (settlement), *ndalo* (swidden), *mushuka* (fallow land), and *mujito* (forest).

*Mushuka*, the secondary vegetation of abandoned fields, comprises various stages of vegetation corresponding to the number of years after abandonment, and ranges from grassland with saplings and shrubs through secondary forest. From such areas the Nyindu gather thatching materials, elephant grasses and also firewood.

*Mujito* designates a primary or a mature secondary forest, more than 30 years after the abandonment of a shifting field. It is an area where Nyindu men hunt, bury the dead, and where, in the past, young Nyindu men performed the circumcision rite unseen by other villagers. The word "*mujito*" sounds like an impenetrable forest for Nyindu women, who hardly ever enter it. Psychologically, *mujito* is a relatively distant area for the Nyindu.

The Nyindu classification of habitats can be regarded as a rough index of plant habitats. When a certain plant grows in several divisions, I classified it in the division showing greatest abundance.

I evaluated degree of familiarity using data obtained from direct interviews with 8 adults (5 men and 3 women) in Kilimbwe village.

First, I enquired whether each respondent was familiar with plant names already obtained from another informant. If the respondent was familiar with the plants, I encouraged him to expound freely on his knowledge of the particular plant.

Since I had no plant specimens with me during the interview, the validity of the informant's recognition and identification of the plant under discussed might be questioned. But since it was obvious that many plants were used frequently in everyday life, and that an individual could ask another person to collect a certain plant on his behalf, I regarded their familiarity of plant names as proof that particular plants were indeed recognized and identified. The degree of familiarity for a given plant is ranked from 1-9 according to the number of persons who knew the plant name.

Data on other usages of plants used in construction were obtained by both inter-

view and observation. In general, tree plants vary greatly in the parts that can be used, such as trunk, bark, fruit, leaves or saplings. Tree plants are divided largely into three groups, according to their utility: (1) only the trunks are used for construction and fuel; (2) the trunks are utilized also for other purposes (e.g., tool-making); and (3) various other plant parts are used for a variety of purposes (e.g., food, medicine, dying or tool-making).

Forty-six plant types grow in *mushuka*, and 27 plants in *mujito*. The familiarity index for 40 plant types is between 7 and 9, 4-6 for 20 plant types, and 1-3 for 13 plant types. Fourteen plant types are used only for construction and fuel, 17 have trunks which are used for other purpose, such as tool-making. Forty-two plant types are used for multiple purposes (Table 6).

Among the 73 plant types that I was informed were used as construction materials, 34 are actually utilized in Examples 1 and 2. Table 6 shows that the plant types growing in the *mushuka* are more liable to be utilized, and that the greater the degree of familiarity of a plant type, the more often it is used. On the other hand, Table 6 also shows that there is no relationship between the utilization of a plant type and its other usages, and the Nyindu do not hesitate to fell multipurpose trees rather than serving them for a particular important use.

The Nyindu regard 73 tree plant types as construction materials. However, in building houses they tend to select from among the plant types with which they are most familiar through everyday contact. There are distinct differences between Example 1 and Example 2 (Table 5) in the kinds and quantities of tree plants used, although there is no fundamental difference between the criteria for choosing tree plants for the cone-cylinder type (Example 1) and for the rectangular type (Example 2). Such differences might be caused by the normal case-by-case variation in the selection of materials.

An examination was made of the kinds of tree plants likely to be used for pillars and rafters, by a detailed study of Examples 1 and 2. The proportion (%) of each log plant types was calculated using standard procedures. The frequency of use of each plant type varies greatly from plant to plant, with an average frequency of use of 3.0%. Seven tree plant types have frequencies above 3.0%, and are utilized in both examples. These plant types account for 60.7% of the total amount of logs used, and can be regarded as trees commonly used in all house construction.

But, 17 tree plant types have frequencies of use below 0.9%, and the quantities used account for only 9.6% of the total. Only one of these types is used in both examples, and the remaining are utilized in only one example. These plants can be regarded as trees not necessarily used in the construction of all houses. Nine tree plant types have frequencies of use between 1.0 and 2.9%.

Among the seven plant types commonly used in every house construction, only trees, two *gumba* and *kijindama*, are said to be superior construction materials, aside from *mukoga*, which is considered good for making rafters. The other 4 trees are: (1) *ifguwe* (*Ocotea* sp.), a dominant of the montane forest and used to make mortars, chairs, and tubs (*mukenji*) for making banana wine; (2) *muhanga* (*Maesa lanceolata*),

**Table 6.** The attributes of plant type and the observation of use.

	No. of plant types	Habitat		Degree of familiarity			Utility		
		<i>mushuka</i>	<i>mujito</i>	1-3	4-6	7-9	Uh	Ut	Um
Use	34	30	4	2	5	27	8	7	19
Non-use	39	16	23	11	15	13	6	10	23
Total	73	46	27	13	20	40	14	17	42

Notes: Uh indicates house construction and firewood only; Ut indicates house construction and tool-making; Um indicates multi-purpose use besides house construction and tool-making.

which provides a slow-burning firewood and the bark of which yields *dawa ya tumbu* ("medicine for the belly"); (3) *mushombo* (*Harungana* sp.), sprouts of which are used as *dawa ya tumbu*; and (4) *muhama* (*Pittosporum mannii* subsp. *ripixola*), also used as firewood. *Muhanga* and *mushombo*, which enter the vegetation succession early and are thus lightly visible, are dominant species in the secondary vegetation.

Tress with frequencies of use under 0.9% are: (1) 12 plant types are said to provide the best firewood, including *ishaasha* and *katengetenge* (same species: *Macaranga vermoesonii*), *munbukumbuku*, *mugokwe* (Sterculiaceae), *mugangu* (*Margaritaria discoidea*), *mukalakala* (*Sapium ellipticum*), *kakondameeju* (*Xymalos monospora*), *mushiluti*, *kijoojoo* (*Agauria salicifolia*), *mugimbu* (*Bridelia* spp.), *lubondo* (*Psychotria peduncularis* var. *pedunculularis*), and *kijiki* (*Myrica salicifolia*), seven also provide medicine; (2) *kahala* (*Albizia* sp.), which is said to be particularly difficult to fell, is sometimes used to make spoons (*mwiko*); (3) *mungubanguba* (*Anthocleista* sp.) grows mainly in *mujito* and is used also for medicine; (4) *mubiliiji* is a short tree that yields fish poison and medicine, and is used also for firewood; (5) *kagiji* (*Crassocephlum crepidioides*), a herb with a woody stem, used for medicine and food; (6) *kishalashala* (*Spathodea campanulata*) is also used for medicine but only a few specimens are growing around the settlement.

The frequency of use of 33 tree plant types, shows no direct correlation with the Nyindu valuation as construction materials. Rather, since *ifugwe* is a dominant species of the montane forest, and *muhanga* and *mushombo* are dominant species of secondary vegetation, the distribution and the quantity of trees probably influence their selection, whereas the difficulty of felling and utility as firewood might militate against selection.

A large quantity of wood is needed to construct a Nyindu house, and the Nyindu must collect all the construction materials by themselves. Thus after considering all the factors they collect construction wood prior to distinguishing the various types according to their differential qualities as construction materials. As a consequence they make use of various kinds of plants. On the other hand that results in the use of poor quality materials lacking in durability, and Nyindu houses last at most for 6-7 years.

## DISCUSSION AND CONCLUSION

In the preceding sections the Nyindu house forms, the changes which they have

undergone, and the ethnobotanical context of construction materials has been described. There follows in conclusion a discussion of the dynamic relationship between the changes in house forms and the knowledge of plant use.

### 1) Changes in Construction Materials

As shown in Table 7, the materials for *lujiji*, lashings and thatching, such as wood vines, bamboo-like stems, bark and grasses, have been used since time immemorial. However, there are remarkable differences between the beehive type (*mushonge*) and the cone-cylinder type (*kishenge*) in the use of tree trunks.

That is, in constructing the frame structure of a beehive house, stems of elephant grass or woody vines are used mostly, and tree trunks (the diameter of which is at most 3 cm; length is 60–70 cm) are utilized only for making the beginning of the vertical frame (*luhando*). Recently, long, straight poles (5–8 cm in diameter; 2–4 m length) have entered use as pillars and rafters of the cone-cylinder house. The use of large quantities of tree trunks for house construction originates from building the cone-cylinder type.

The second difference is that only the spherical surface of a beehive house was first roughly thatched with the gramineous grass, *kifuze*. Nowadays, grasses are needed only for the roof of a cone-cylinder house because the wall is made wattle-and-daub, whereas the entire spherical surface of a beehive house is thatched. Thus the quantity of grass necessary for thatching a cone-cylinder house is less compared to that for a beehive house.

There are no differences in the materials required for constructing the cone-cylinder type and the gable-rectangular type (*mukumba*), as Table 7 indicates. However, the flexibility of the materials is of little significance for the *lujiji* of a rectangular house. The Nyindu use only the stems of elephant grass for the *lujiji* of a rectangular house. This shows that the plants categorized as *mujiji* (a native category of vines and recognized as materials for the *lujiji*) may lose one of their economic roles.

Table 7. House forms and their construction materials.

construction materials	beehive type	cone-cylinder type	rectangular type
wooden pole	±	+	+
board		+	+
bark	+	+	+
vine	+	+	+
bamboo-like stem	+	+	+
grass	+	+	+
palm leafstalk	+	±	
red soil		+	+
ash		+	+

## 2) Mechanism of Exploring New Construction Materials

I have shown that the man-plant relationship was transformed during the process of cultural change [YAMADA 1977]. The relation between the Nyindu and plants as mediated through houses is by no means an exception to this process.

Recently, tree plants have come into greater use because of the change in house form from the beehive type to the cone-cylinder type. By examining the kinds of tree plants utilized for pillars and rafters, the following facts emerged.

The trees utilized are those growing in the secondary vegetation, familiar to the Nyindu, and those which have long supported their material culture. The availability of each plant type tends to increase its frequency of use for house construction, whereas the difficulties in felling a tree and the utility for firewood reduces the frequency of use. The Nyindu exploit wood resources from the set of already familiar plants which have utility rather than randomly selecting items of the surrounding biota.

Stross [1973: 140] reports that a child's naming abilities begin with culturally important plants, and expand to include less important plants, and then some culturally irrelevant plants. The Nyindu mechanism for exploring plant materials might show an analogous phenomenon. In exploring new materials, people pay attention first to familiar plants, and then extend their attention to other, less familiar or even unfamiliar plants.

## 3) Changes in the People's Knowledge of Plants

Glick [1964: 280] states that plants and animals are significant principally to the extent that human beings find them useful or attractive, and their identities often prove to be a reflection of their function. In fact, the usefulness of tree trunks as construction materials has changed as a direct result of the change in house form.

As mentioned earlier, the positive valuations of tree plants as materials for pillars and rafters have not been as elaborate compared to the valuations of those for the *lujiji*, lashings, thatching. However, there were many reasons for the negative selection of tree plants. Furthermore, even the rough valuations of plants have not strongly influenced their utilization.

The unrefined valuations of trees for pillars by the Nyindu may be related to the wattle-and-daub structure of houses. However, it can be also explained by the shortness of the history of tree plant utilization for house construction.

On the other hand, as the gable-rectangular type (*mukumba*) becomes more popular, woody vines which are categorized under *mujiji*, have been replaced by the stems of elephant grass in making *lujiji*. Although there is a semantic relationship between the *mujiji*, folk-category of plants, and the *lujiji*, folk-category of house parts, it can be assumed that the semantic relationship will change in the future.

In conclusion, the relationship of the Nyindu to plants is dynamic and by no means static. Consequently, the value system for plants might change. The new value system might be formed gradually after the establishment of a new relationship between humans and plants.

### Acknowledgements

The field study on which this article is based was carried out when I was a Research Associate at L'Institut de Recherche Scientifique (I.R.S.), République du Zaïre. I am very grateful to the institute for granting me permission to conduct research and for their kind cooperation during the course of field work.

To those individuals who made this study possible I am even more deeply indebted: to Professor J. Itani who guided me throughout the course of this study; to Professor J. Ikeda and other members of both Laboratory of Physical Anthropology and Laboratory of Human Evolution Studies, Faculty of Science, Kyoto University, who gave me instructive suggestions; to Professor K. Iwatsuki, Department of Botany, Faculty of Science, Kyoto University who made it possible for me to come in contact with the Royal Botanic Gardens; to Professor J. P. M. Brenan, Director of the Royal Botanic Gardens, and all staffs members for carefully determining my collections of Nyindu plants. I am also indebted to Professor Y. Tani, Kyoto University for many stimulating discussions and criticisms.

Lastly, I wish to thank Mr. Kamumbanyungu, Chief of Kilimbwe Village, and all other Kilimbwe villagers from the bottom of my heart for their help and their many kindness to me during the course of my research.

### APPENDIX: List of Nyindu plant types used for construction

The materials are alphabetically arranged by their Nyindu names. Each entry consists of two parts and contains, correspondingly, two kinds of information: botanical and ethnographic.

#### 1. Botanical names associated with Nyindu plant names.

The first item of each entry consists of the Latin binomials of plant specimens known to the Nyindu by the listed plant type name. In the few cases where generic or specific determinations have not been made, families or higher taxa are indicated. Where such botanical taxa have not been ascertained, the remark that the plant type name refers to an as yet undetermined tree, vine, or herb is placed. The standard family abbreviations are written in parentheses following each complete binomial or generic name.

All scientific determinations made from dried botanical specimens collected in the Nyindu area are followed by the herbarium or field number. Numbers beginning with H are those of the permanently deposited specimens in the Royal Botanic Gardens. The few specimens not collected and determined in the field are indicated with numbers beginning with A.

#### 2. Ethnographic significance of plants.

The data used in assessing the cultural importance of each plant type are summarized in four units. The first three units are designated by letter abbreviations and placed in brackets immediately after the field or herbarium number. The last unit indicates the principal areas of utility of each plant type.

#### Key to Bracketed Abbreviations

Position one: kind of plant

T: tree

V: vine or shrub

H: herb

Position two: habitat

P: primary forest, or mature secondary forest

- 2: secondary vegetation  
 S: swidden  
 M: marsh  
 Y: village site

Position three: degree of familiarity

- W: well-known (degree of familiarity 7-9)  
 K: known (4-6)  
 R: rarely known (1-3)

#### Nyindu Plant Types

- anjooku Undetermined tree H835/79/327 [TPR] Pillars, firewood, material for hunting traps.
- bangeluguma *Tabernaemontana johnstonii* Stapf. (Apocynac.) H835/79/74; H835/79/390 [TPR] Medicine, firewood, combs, pillars.
- bulondo Asclepiadaceae H835/79/377 [VPR] Medicine, lashings.
- fulubili *Morinda titanophylla* Petit (Rubiace.) H835/79/217 [TPR] Firewood, medicine, pillars.
- gelebeeliya *Grevillea robusta* A. Cunn. (Proteac.) H835/79/442 [TYR] Boards.
- gumba Undetermined tree H835/79/270 [T2(P)W] Firewood, medicine, pillars.
- ibondo *Raphia* sp. (Palm.) A-188 [T2(P)W] Palm wine from sap, cords from epithelium of young leaves, traps and baskets from fibers of sheaths, brooms from rachides, doors from leafstalks.
- ibugga Rubiaceae H835/79/382 [TPK] Pillars, firewood, walking sticks, spears shafts, trap poles.
- ifugwe *Ocotea* sp. (Laurac.) A-284 [TPW] Pillars, firewood, traditional seats, tubs for making banana wine, mortars, coffins.
- ifundi *Trichilia* cf. *rubescens* Oliv. (Meliac.) H835/79/383 [TPR] Firewood, pillars.
- igungu *Thaumatococcus daniellii* (Bennet) Benth. (Maranthac.) H835/79/444 [HPW] Thatching, mats, wrapping.
- ishaasha *Macaranga vermoeseni* de Wild. (Euphorbiac.) H835/79/49 [T2(P)W] Pillars, firewood.
- kabaka *Thephrosia vogelii* Hook. f. (Papilionac.) H835/79/342 [T2W] Pillars, fish poison.
- kabubi Undetermined shrub H835/79/320 [V2R] *Lujiji* (lath), rims of panniers and fish traps.
- kabusu *Sida rhombifolia* L. (Malvac.) H835/79/174 [V2W] Lath (*lujiji*), brooms, medicine.
- kabukusingo *Agelaea deweveri* De Wild. and Th. Dur. (Connarac.) H835/79/285 [V2R] Lath, panniers, rims of fish traps.
- kabuligaa *Millettia* sp. (Papilionac.) H835/79/288 [T2W] Pillars, firewood, pounders.
- kadahya *Andropogon gayanus* Kunth? (Gramin.) H835/79/252 [H2W] Thatch, extracting banana juice.
- kadodokela *Trichopteryx dregeana* Nees (Gramin.) H835/79/357 [H2W] Thatch.
- kagiji *Crassocephalum crepidioides* (Benth.) S. Moore (Composit.) H835/79/77 [V2K] House poles, medicine, food.
- kagushe Undetermined tree H835/79/297 [T2R] House poles, traditional spoons, firewood.
- kahala *Albizia* sp.? (Mimosac.) H835/79/220 [T2(P)W] House poles, firewood.

- kahelele *Alchornea hirtella* Benth. forma *glabrata* (Muell. Arg.) Pax & K. Hoffm. (Euphorbiac.) H835/79/272 [V2K] Laths (*luji*), rims of baskets.
- kaho Undetermined tree H835/79/392 [TPK] Walking sticks, poles of spring traps, helms of axes, spear shafts, house poles.
- kakoma *Afrardisia* sp. (Myrsinac.) H835/79/279 [T2(P)W] House poles, firewood.
- kakondameeju *Xymalos monospora* (Harv.) Baill. (Monimiaceae) H835/79/51 [T2W] House poles, traditional spoons.
- kalande *Oxyanthus formosus* Hook. f. (Rubiaceae) H835/79/434 [TPR] House poles, firewood, poles of spring traps.
- kalembe kalutonga *Ficus urceolans* Welw. ex Hiern (Moraceae) H835/79/203; *Agelaea deweveri* De Wild. & Th. Dur. (Connaraceae) A-30 [V2R] Laths (*luji*), rims of hand nets for fishing, twigs for application of birdlime.
- kanafwoya Undetermined tree H835/79/396 [TPR] House poles, firewood.
- kankina *Cinchona ledgeriana* Moens (Rubiaceae) A-447 [TSW] Cultivated, used for house poles, bark stripped and sold.
- kanyabumbu *Zanthoxylum* sp. (Rutaceae) H835/79/405 [TPK] House poles, medicine, large trees sawn into boards.
- kashekelela Undetermined tree H835/79/216; *Allophylus kiwuensis* Gilg. (Sapindaceae) H835/79/368 [T2W] House poles, firewood, baskets rims.
- kashikilonge *Phragmites mauritanus* Kunth (Gramineae) H835/79/313 [HMW] Stems (*itete*), lath and partitions of houses, drinking straw for banana wine.
- kashungutti *Millettia dura* Dunn (Papilionaceae) H835/79/107 [T2W] Pillars, helms of axes, shafts of hoes, pounders, firewood.
- katengetenge *Macaranga vermoesenii* de Wild. (Euphorbiaceae) H835/79/281; H835/79/344 [T2W] House poles, firewood.
- kibubu *Neoboutonia mannii* Benth. gens. ampl. (Euphorbiaceae) H835/79/294 [T2K] House poles, firewood.
- kifunga jiila kisoshi *Hibiscus macranthus* Hochst. (Malvaceae) H835/79/381 [VYW] Bark used for lashings, young shoots for medicine.
- kifuze *Panicum trichocladum* Hack. ex Schum. (Gramineae) H835/79/182 [HS(Y)W] First rough thatching of a beehive house.
- kigushu *Efulensia montana* de Wilde (Passifloraceae) H835/79/403; undetermined vine H835/79/423 [VPK] Lashings of houses, of other purposes.
- kihona undetermined tree H835/79/201; H835/79/308 [T2(P)W] House poles, firewood.
- kijiki *Myrica salicifolia* Hochst. ex A. Rich. ssp. *mildbraedii* (Engl.) Polhill (Myricaceae) H835/79/280 [T2W] House poles, firewood, bark used for medicine and coloring baskets.
- kijindama *Maesobotrya* sp., cf. *M. floribunda* Benth. (Euphorbiaceae) H835/79/227; undetermined tree H835/79/52 [T2(P)W] House poles, not good for firewood because of burning badly.
- kijoojoo *Agauria salicifolia* (Comm.) Hook. f. ex Oliv. (Ericaceae) H835/79/120 [T2W] House poles, firewood, medicine.
- kikajilembwe Undetermined tree H835/79/399 [TPK] House poles, firewood, shafts of spears, walking sticks, poles of spring traps.
- kineke *Psychotria* sp. (Rubiaceae) H835/79/94; *Psychotria bagshawei* Petit H835/79/202 [T2W] House poles, firewood, medicine.
- kineke kilungwe *Lasianthus kilimandscharicus* K. Schum. ssp. *kilimandscharicus* (Rubiaceae) H835/79/384. [TPK] House poles, firewood, medicine.

- kishaani *Setaria megaphylla* (Steud.) Dur. & Schinz (Gramin.) H835/79/46 [H2(Y)W]  
Thatching, extracting banana juice.
- kishalashala *Spathodea campanulata* P. Beauv. (Bignoniac.) H835/79/190 [TYW] House  
poles, medicine.
- kishanda Undetermined tree H835/79/411 [TPK] House poles, bark used for medicine  
and fish poison.
- kishiembe *Cyathea manniana* H.K. (Cyatheac.) A-32 [T2(P)W] Pillars.
- kishuu Myrtaceae H835/79/271 [T2(P)K] House poles, firewood.
- kisike *Myrianthus preussii* Engler ssp. *seretii* (De Wild.) de Ruiters (Morac.) H835/79/325  
[TPW] Pillars, firewood, medicine, fruits edible.
- kitegamabole *Psychotria succulenta* (Hiern) Petit (Rubiaceae) H835/79/282 [T2K] Pillars,  
firewood, spoons.
- kusena *Leucaena guatemalensis* Britton & Rose (Mimosac.) H835/79/20 [T2K] House  
poles, firewood.
- kyalemba Undetermined shrub H835/79/417 [VPR] *Kiaashi*, lath of cone-cylinder  
houses, the rims of fish traps.
- kyoshosshi Guttiferae H835/79/410 [TPK] House poles, firewood, sawn into boards  
when large.
- lubondo *Psychotria peduncularis* (Salisb.) Steyerl. var. *peduncularis* (Rubiaceae) H835/  
79/47 [T2K] House poles, firewood, medicine.
- lufuse *Alchornea cordifolia* (Schum. & Thonn.) Muell. Arg. (Euphorbiac.) H835/79/41;  
H835/79/249 [V2W] Lath, firewood, medicine.
- lugengya *Dracaena? laxissima* Engl. (Agavac.) H835/79/213 [V2W] Lath of a roof,  
panniers, traditional beds, fish traps.
- luggoji Pittosporaceae H835/79/401 [TPR] House poles, firewood.
- lugodoka *Macaranga spinosa* Muell. Arg. (Euphorbiac.) H835/79/321 [T2R] House  
poles, firewood, medicine.
- lugubu *Hippocratea* sp. (Hippocrateac.) H835/79/445 [VP/] Lashings of houses, panniers,  
baskets.
- lukenga *Ficus exasperata* Vahl (Morac.) H835/79/254 [T2(P)W] House poles, firewood,  
tubs for making banana wine, medicine, leaves used for polishing boards and  
bracelets.
- lukongwa Compositae H835/79/54; undetermined shrub H835/79/239 [V2R] Lashings  
of houses.
- lungo *Polyscias fulva* (Hiern) Harms (Araliac.) H835/79/286 [TP(2)K] House poles,  
medicine, beehive, sawn into boards when large.
- lusheke *Pennisetum purpureum* Schum. (Gramin.) A-189 [H2W] Studs, lath of houses.
- lushuli *Smilax kraussiana* Meissner (Liliac.) H835/79/33 [V2W] Lashings of houses,  
panniers, fish-scoop baskets.
- luweeyo Undetermined tree H835/79/385; H835/79/435 [TP(2)K] House poles, shafts  
of spears, poles of spring traps, walking sticks.
- mougan jokka *Ficus* sp. (Morac.) A-312 [T2W] House poles, firewood, medicine.
- mubiliiji Undetermined tree H835/79/333 [T2W] House poles, firewood, medicine,  
leaves used for polishing and fish poison.
- mubugangoma *Clerodendrum* sp. (Verbenac.) H835/79/232 [T2R] House poles, firewood.
- mudutuu *Dichaetanthera corymbosa* (Cogn.) Jacq.-Félix (Melastomatac.) H85/79/96  
[T2W] House poles, firewood, medicine.

- mufumbo *Podocarpus* sp. (Podocarpaceae) H835/79/27 [TYK] Planted in houseyards, trunks sawn into boards.
- mufunga *Triumfetta* sp. (Tiliaceae) H835/79/83; H835/79/247; H835/79/248; H835/79/277 [T2W] Lashings for houses and other uses, leaves for toilet paper and pot cleaner. Stems stripped of its bark are hollowed and used as a pipe for gathering birdlime, and are also used for partitions of houses because of its bamboo-like qualities.
- mugangu *Margaritaria discoidea* (Baill.) Webster (Euphorbiaceae) H835/79/86 [T2W] House poles, firewood, charcoals, medicine.
- mugele *Nuxia congesta* R. Br. ex Fresen. (Loganiaceae) H835/79/275 [T2W] House poles, firewood, pounders.
- mugele gulungwe *Antidesma laciniatum* Muell. Arg. var. *membranaceum* Muell.-Arg. (Euphorbiaceae) H835/79/53 [T2K] House poles, firewood, charcoals.
- mugimbu *Bridelia micrantha* (Hochst.) Baill. (Euphorbiaceae) H835/79/121; *Bridelia stenocarpa* Muell. Arg. (Euphorbiaceae) H835/79/194 [T2(P)W] House poles, medicine, firewood, charcoals, bark for coloring baskets.
- mugokwe Sterculiaceae H835/79/84 [TP(2)W] House poles, firewood.
- mugugu *Cyperus* sp. (Cyperaceae) H835/79/212; *Cyperus renschii* Boeck. (Cyperaceae) H835/79/412 [HMR] Thatching field huts only.
- muhama *Pittosporum mannii* Hook. f. subsp. *ripicola* (Leon.) Cuf. (Pittosporaceae) H835/79/274 [T2(P)R] House poles, firewood.
- muhanga *Maesa lanceolata* Forssk. (Myrsinaceae) H835/79/93; H835/79/193; H835/79/198 [T2W] House poles, firewood, medicine.
- muhobu *Vernonia* sp. (Compositae) H835/79/341; H835/79/340 [T2W] Pillars, firewood, leaves for sanitary napkin.
- muhohu Apocynaceae H835/79/87 [T2W] House poles, medicine, boards as slates for children, birdlime from sap.
- mukala *Hippocratea* sp. (Hippocrateaceae) A-442 [VPW] Lashings, baskets, panniers.
- mukalakala *Sapium ellipticum* (Hochst. ex Krauss) Pax (Euphorbiaceae) H835/79/125; H835/79/45 [T2W] Pillars, firewood, medicine.
- mukoga *Macaranga schweinfurthii* Pax (Euphorbiaceae) H835/79/42 [T2W] Rafters, pillars, firewood, large leaves to wrap peanuts seeds for storing.
- mukombwe Sterculiaceae H835/79/214; *Mitragyne rubrostipulata* (K. Schum.) Havil. (Rubiaceae) H835/79/338 [T2(P)K] House poles, firewood, medicine, spoons.
- mukwe *Carapa procera* DC. (Meliaceae) H835/79/363 [TPK] House poles, spoons, medicine, cosmetic oil from seeds.
- mulungu Guttiferae H835/79/398 [TPK] House poles, large trunks sawn into boards, glue from sap.
- mumbukumbuku Undetermined tree H835/79/31 [T2(P)W] House poles, firewood, medicine.
- mungubanguba *Anthocleista* sp. (Loganiaceae) H835/79/278 [TP(2)W] House poles, ritual.
- mulembwe *Magnistipula* sp. (Rosaceae) H835/79/432 [TPR] Walking sticks, spear shafts, poles of traps, firewood, house poles.
- mushaki *Musanga cecropioides* R. Br. (Moraceae) A-48 [T2W] House poles, shields.
- mushebeiyi *Albizia* sp. (Mimosaceae) H835/79/222 [T2W] House poles, firewood, racks for drying cassava tubers.
- mushingo Tiliaceae H835/79/328 [TPK] House poles, firewood, fire sticks.

- mushiluti Undetermined tree H835/79/292 [TP(2)W] House poles, firewood, sawn into boards when large, bark for coloring baskets.
- mushobu *Imperata cylindrica* (L.) Raeuschel (Gramin.) H835/79/250 [H2W] Thatching, extracting banana juice.
- mushombo *Harungana* sp. (Gutiffer.) A-104 [T2W] House poles, firewood, medicine.
- muzugu Undetermined tree H835/79/302 [TP(2)R] House poles, sawn into boards, hafts of knives, helms of traditional axes, firewood.
- nabafomeeka *Trema orientalis* (L.) Blume (Ulmac.) H835/79/293 [T2(P)W] House poles, firewood, medicine.
- nbiji *Sclerosperma mannii* H. Wendl. (Palm.) H835/79/500 [HPW] Thatching. (It is not growing in Kilimbwe village, but in villages near the Legaland.)
- niitie *Podocarpus* sp. (Podocarpaceae) H835/79/402 [TPW] House poles, firewood, charcoal, bark for coloring baskets.
- pamba *Ceiba pentandra* (L.) Gaertn. (Bombacac.) H835/79/337 [TYW] Planted in village sites, boards for doors, firewood, cotton from seeds.
- shiembe *Tetracera* sp. (Delleniac.) H835/79/226 [V2(P)K] Lashings of houses, vines containing much drinkable water, water for medicine.
- shindano *Juniperus* sp. (Juniperac.) H835/79/335; H835/79/443 [TYW] Introduced plant, and planted in village sites, rafters, pillars, firewood, sawn into boards.

## BIBLIOGRAPHY

BARRAU, Jacques

- 1971 L'Ethnobotanique au carrefour des sciences naturelles et des sciences humaines. *Bulletin de la Société botanique de France* 118(3-4): 237-248.

BERLIN, Brent, Dennis E. BREEDLOVE & Peter H. RAVEN

- 1968 Covert categories and Folk Taxonomies. *American Anthropologist* 70(2): 290-299.
- 1973 General Principles of Classification and Nomenclature in Folk Biology. *American Anthropologist* 75(2): 214-242.

BIEBUYCK, Daniel

- 1973 *Lega Culture: Art, Initiation, and Moral Philosophy among a Central African People*. University of California Press.

CASIMIR, Michael J.

- 1975 Feeding Ecology and Nutrition of an Eastern Gorilla Group in the Mt. Kahuzi Region (République du Zaïre). *Folia Primatologica* 24: 81-136.

COLLE, Pere Pierre

- 1937 *Essai de Monographie des Bashi*. 2nd ed. 1971, Centre d'Étude de Langues Africaines.

CONKLIN, H. C.

- 1954 *The Relation of Hanunóo Culture to the Plant World*. Ph.D. dissertation in Anthropology, Yale University.
- 1962 Lexicographical Treatment of Folk Taxonomies. *International Journal of American Linguistics* 28(2-4): 119-141.

DALE, Ivan R. & P. J. GREENWAY

- 1961 *Kenya Trees and Shrubs*. Buchanan's Kenya Estates Lt.

DE SAINT MOULIN, Léon

- 1976 *Atlas des Collectivités du Zaïre*. Presses Universitaires du Zaïre.

- DORST, Jean & Pierre DANDELLOT  
1970 *A Field Guide to the Larger Mammals of Africa*. Collins.
- ÉVRARD, C.  
1968 *Recherches écologiques sur le Peuplement forestier des Sols hydromorphes de la Cuvette centrale congolaise*. Publications de L'Institut National pour l'Étude Agronomique de Congo, Série Scientifique No. 110, Ministère Belge de l'Éducation National et de la Culture.
- GLICK, Leonard B.  
1964 Categories and Relations in Gimi Natural Science. *American Anthropologist* 66(4-2): 273-280.
- GOODALL, Alan G.  
1977 Feeding and ranging behaviour of a montain gorilla group (*Gorilla gorilla beringei*) in the Tshibinda-Kahizi region (Zaire). In T. H. Clutton-Brook (ed.), *Primate Ecology, Studies of Feeding and Ranging Behaviour in Lemurs, Monkeys and Apes*, Academic Press, pp. 449-479.
- GUTHRIE, Malcolm  
1967 *Comparative Bantu: An Introduction to the Comparative Linguistics and Pre-history of the Bantu Languages, Part I, vol. 1*. Gregg Press.  
1970 *Comparative Bantu, Part II, vol. 3 & 4*. Gregg International Pub.  
1971 *Comparative Bantu, Part I, vol. 2*. Gregg International Pub.
- HARSHBERGER, J. W.  
1896 The purpose of ethnobotany. *American Antiquarian* 17(2): 73-81.
- HUNTINGFORD, G. W. B.  
1961 The distribution of certain culture elements in East Africa. *The Journal of the Royal Anthropological Institute* 91(2): 251-295.
- IRVINE, F. R.  
1961 *Woody Plants of Ghana: with special reference to their uses*. Oxford University Press.
- 石毛 直道 (ISHIGE, Naomichi)  
1971 『住居空間の人類学』鹿島出版会。  
女子栄養大学出版部 (JYOSHIHEYODAIGAKU-SHUPPANBU)  
1972 『食用植物図説』女子栄養大学出版部。
- KINGDON, J.  
1971 *East African Mammals: An Atlas of Evolution in Africa*. Academic Press.
- LEVIN, Michael D.  
1971 House form and social structure in Bakosi. In Paul Oliver (ed.), *Shelter in Africa*, Barrie & Jenkins, pp. 143-152.
- LIND, E. M. & M. E. S. MORRISON  
1974 *East African Vegetation*. Longmans.
- MARTIN, M.  
1970 L'Ethnobotanique. *Sciences* 66-67: 35-43.
- 松井 健 (MATSUI, Takeshi)  
1979 「エスノ・サイエンスとフォーク・タクソノミー——その方法論的諸問題」  
谷 泰編『人類学方法論の研究』京都大学人文科学研究所研究報告, pp. 1-64.
- MOELLER, A.  
1936 *Les Grand Lignes de Migration des Bantous de la Province orientale du Congo Belge*. A.R.S.O.M.

- MURDOCK, George P.  
1959 *Africa—its peoples and their cultural history*. McGraw-Hill Book Co.
- OLIVER, Paul (ed.)  
1971 *Shelter in Africa*. Barrie & Jenkins.
- REYNOLDS, Barrie  
1973 Houses in East Africa: A comment. *Kyoto University African Studies* 8: 183–185.
- SHALLER, G. B.  
1963 *The Mountain Gorilla*. Chicago University Press.
- STROSS, Brian  
1973 How Tzeltal children learn botanical terminology. In M. S. Edmonson (ed.), *Meaning in Mayan Languages*, Mouton, pp. 107–141.
- STURTEVANT, William  
1964 Studies in ethnoscience. *American Anthropologist* 66(3-2): 99–131.
- 須藤 彰司 (SUDO, Shoji)  
1970 『南洋材』地球社。
- 杉本 尚次 (SUGIMOTO, Hisatsugu)  
1974 『日本民家探訪—民俗・地理学的考察』創元社。
- SUZUKI, Takako  
1971 Preliminary report on the houses in East Africa. *Kyoto University African Studies* 6: 53–137.  
1972 The houses in East Africa. *Kyoto University African Studies* 7: 227–267.
- 土屋 巖他 (TSUCHIYA, Iwao, and others)  
1972 『アフリカの気候』古今書院。
- UMESAO, Tadao  
1969 The meaning and the structure on the dwellings of the Datoga. *Kyoto University African Studies* 3: 55–76.
- VAN BULCK, S. J.  
1948 *Les Recherches Linguistiques au Congo Belge*. Mem. L'Institut Royal Colonial Belge.
- VANSINA, Jan  
1965 *Introduction à L'Ethnographie du Congo*. Universitaire du Congo.
- WILLIS, J. C. (revised by H. K. Airy SHAW)  
1966 *A Dictionary of the Flowering Plants and Ferns*. 7th edition. Cambridge University Press.
- 山田 孝子 (YAMADA, Takako)  
1977 「鳩間島における民族植物学的研究」伊谷純一郎・原子令三編『人類の自然誌』雄山閣, pp. 241–300.

