

***Citemene*, Finger Millet and Bemba Culture: A Socio-ecological Study of Slash-and-burn Cultivation in Northeastern Zambia**

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ABSTRACT The *citemene* system, a unique slash-and-burn horticulture to cultivate finger millet and cassava as the main crops, developed by the Bemba living in the miombo woodland in northeastern Zambia is analyzed from a socio-ecological viewpoint, based primarily on the data obtained from a three and half month field study. This paper concentrates on the activities and their results involved in *citemene* cultivation in a small village.

After brief description of the annual work, some ecological features of the *citemene* field and its surrounding woodland, and the *citemene* system as a subsistence strategy are analyzed.

Each household uses a subsistence strategy to adjust the acreage of the *citemene* fields and mound fields over the course of several years, according to the characteristics of its composition and social conditions. Traditions such as bride-service and polygamy have a strong influence on this strategy. While cassava is very important as a subsidiary staple crop, people give high value to finger millet not only as a staple crop but also as a material used in the manufacture of local beer which is indispensable for rituals, asking for joint work and communal drinking. Heavy attachment to finger millet is deep-rooted in Bemba culture. It helps to preserve the *citemene* system and conserve the traditional communal way of life at the village level.

INTRODUCTION

The Bemba¹⁾ who live in the woodland in northeastern Zambia have developed a unique slash-and-burn horticulture called *citemene*²⁾ system, and have been cultivating finger millet, a crop of African origin. In the *citemene* system, men climb up trees to lop off the branches without cutting down the trees, and women gather the branches into the center of the cleared area. They then set fire to the branches to make swidden fields. Today, the *citemene* system faces criticisms partly because it remains at the stage of subsistence agriculture with low productivity, and partly because it is regarded as a cause of deforestation.

This paper presents a general view of the socio-ecological characteristics of the *citemene* system, based on the results of field work carried out from August to December in 1983. It attempts to provide basic data in order to grasp the actual conditions of agriculture in an area in modern Africa undergoing drastic changes, and to predict the future of a community which is confronted with a conflict between tradition and modernization.

Obviously, such a theme would require a longer-term research with a wide perspective. At the time of our field work, only a short-term research was carried out, which substantially lasted less than four months. However, it can be considered the first step in a three-year study which will be called the "Woodland Project" (Kakeya and

Ichikawa, 1983).

The village focused on this study is called Mulenga-Kapuri in the territory of Chief Luchembe, Mpika District, Northern Province, Zambia (Fig. 1). The area was chosen after a preliminary survey in 1982 (Kakeya and Ichikawa, 1983) and an extensive survey around Mpika in late August, 1983. The research concentrates on the activities and their results involved in *citemene* cultivation in Mulenga-Kapri village, though a comparison with neighbouring villages is also attempted. By looking deeper into the actual condition in the small village, we tried to analyze the basic characteristics of the *citemene* system and to reveal the problems of the system.



▲: Place of Mulenga-Kapri village.

Fig. 1. Research Area.

GENERAL FEATURES OF THE STUDY AREA

1. Topography and Climate

The greater part of the Bemba land, which is spread in the Northern Province, belongs to a plateau between 900m and 1500m above sea level. Rivers with many tributaries, such as the Chambeshi, Lubansenshi, and Kanchibiya form a complex water system, and empty into the Bangweulu swamp. Riverine forests are not well developed. Especially along the tributaries, the seasonally wet drainage plain called *dambo* consists of grassland, and between rivers there stretches woodland.

A year is clearly divided into three seasons: a cool dry season from May to August, a hot dry season from mid-August to October, and a rainy season from November to April. Fig. 2 shows the monthly temperature and rainfall in Mpika near the study area. The rainfall is concentrated in the rainy season, and the annual rainfall in Mpika reaches 1065mm (Meteorological Department, 1971). Generally speaking, the amount of rainfall decreases as one moves to the south, and Bemba land is located in an area with annual rainfall between 800mm and 1200mm.

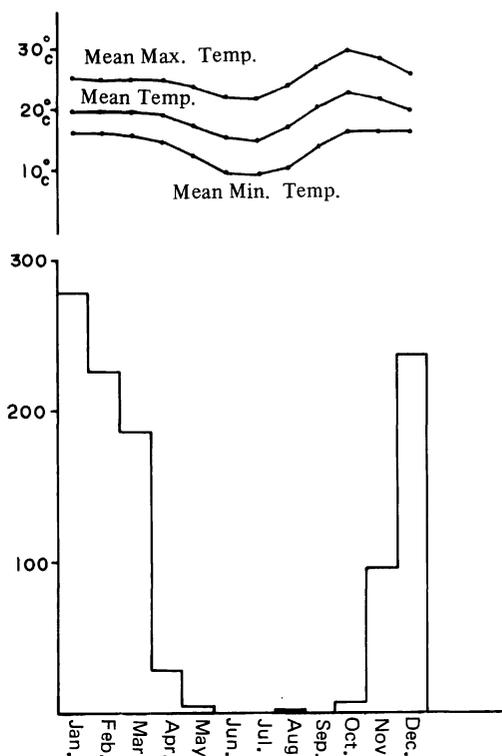


Fig. 2. Temperature and rainfall at Mpika (after Meteorological Department, 1970).

2. Miombo Woodland

Bemba land is covered with typical woodland, in which the dominant trees are *Brachystegia*, *Julbernardia*, and *Isoberlinia*. These trees belong to Caesalpinioidea and are called miombo in the generic local term, so this type of woodland can be called miombo woodland. In miombo woodland tree heights are seldom over 20m, and the distance between the trees is about three to five meters. It is known that miombo woodlands are divided into many sub-types according to their component species (Trapnell, 1943; Fanshawe, 1969).

As the basis for an ecological study, we would like to introduce the result of a vegetation analysis based on a survey in the Forest Reserve, which is located about 20km west of Mulenga-Kapri village. The Forest Reserve presents the characteristics of a mature miombo woodland, as it has not been lumbered for at least thirty years. The survey was carried out by establishing ten quadrats of ten meter square³⁾, and by recording all of the trees with a D. B. H.⁴⁾ (Diameter at breast height) greater than 2.5cm. Table 1 shows the distribution pattern of tree height⁵⁾ and composition of the species of trees. The tree species in the woodland can be divided into two groups: the higher storey consists of trees more than 7m high, and the lower storey of trees less than 7m. *Brachystegia floribunda* predominates in the higher storey, and *Julbernardia paniculata* together with *Brachystegia utilis* are the next most popular species. The major species in the lower storey are *Uapaca*

Table 1. Distribution pattern of tree height and composition of the species of trees in Forest Reserve.

		Tree height (m)															Total	
Tree species	Scientific name	Varnacular name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
	<i>Brachystegia floribunda</i>	<i>musompa</i>					1				2	2	2	5		4	4	20
	<i>Julbernardia paniculata</i>	<i>mutondo</i>							1				4	1		1		7
	<i>Brachystegia utilis</i>	<i>musaka</i>									2	2				1	1	6
	<i>Afromosia angolensis</i>	<i>mubanga</i>					2		1	1				1				5
	<i>Burkea africana</i>	<i>kapanga</i>								1							1	2
	<i>Ochthocosmos gillettiae</i>	<i>munpombwe</i>								1								1
	<i>Brachystegia longifolia</i>	<i>mwombo</i>	1	2		1		4	1	2	3	1						15
	<i>Uapaca kirkiana</i>	<i>musuku</i>				2	1	2	2									7
	<i>Faurea saligna</i>	<i>sanginga</i>			3	2			1									6
	<i>Ochna schweinfurthiana</i>	<i>munawe</i>		1	1	3		1										6
	<i>Monotes africanus</i>	<i>cimpampa</i>		2	1	1	1											5
	<i>Protea</i> sp.	<i>musoso</i>		2		2												4
	Not identified	<i>musolo</i>			1		1	1										3
	Not identified	<i>mupangwa</i>			1		1		1									3
	<i>Bryocarpus orientalis</i>	<i>kapululambushi</i>	2															2
	<i>Pavetta schummaniane</i>	<i>sweba</i>							2									2
	<i>Parinari uratellifolia</i>	<i>mupundu</i>		1														1
	<i>Syzygium guineense</i>	<i>musafwa</i>					1											1
	Not identified	—						1										1
	<i>Anisophyllea boehmii</i>	<i>mufungo</i>							1									1
Total			3	11	8	9	9	12	6	3	7	5	6	7	0	6	6	98

kirkiana, *Ochna schweinfurthiana*, *Faurea saligna*, and *Monotes africanus*. A characteristic of the lower storey is an abundance of *Brachystegia longifolia* trees, some of which are included in the higher storey.

In short, the miombo woodland in the area can be considered to be a *Brachystegia—Julbernardia paniculata* type.

The distribution of the D. B. H. of the trees is shown in Fig. 3. The total number of trees is different from that of tree height, because, for D. B. H., every branch is counted and measured if the tree trunk branches out at the breast height, while tree heights are measured by taking individual tree as a unit. The D. B. H. distribution peaks between 5-10cm in diameter, and the biggest tree is a *Brachystegia utilis* with a D. B. H. of 35cm.

3. Mulenga-Kapri Village: Its History and People

Mulenga-Kapri village, is located 26km west of the District center, Mpika town, and consists of 12 households with a population of 50 people. Another village called Ndonga borders on the east of Mulenga-Kapri village. Mulenga-Kapri is on a road from Mpika to Kopa, where Bisa people live. The road is not tared, but there is bus transportation twice a week between Mpika and Chalabesa, where there is a Roman Catholic Mission, via Kopa. Also, the villagers can make a day trip to Mpika by bicycle.

The history of the village started around 1958 when Mulenga Kapri, the present village senior (the village was named after him), came back from Copperbelt and founded the village. At that time, it was located a short distance from the site of today's village, and

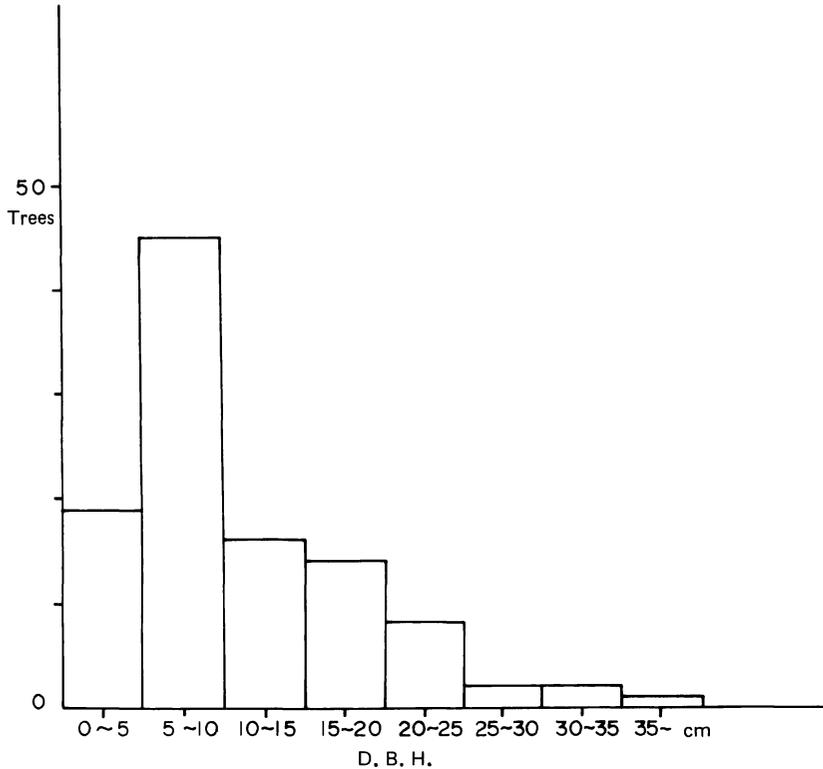


Fig. 3. Distribution of the D.B.H. of the trees in Forest Reserve.

the original site is now consist of crop gardens. Mulenga Kapri became the chief of the village (*Mwinemushi*), summoned 10 relatives and got permission from Chief Luchembe to build a village. When Zambia became independent in 1964, L. P. , the present *Mwinemushi* and the younger brother of Mulenga Kapri, came back from Copperbelt. Two years later, in 1966, they moved to the present village.

Table 2 shows the population composition and Fig. 4 shows the kinship relations of the villagers. The village consists of a kinship group which tends to be matrilineal. The core members are siblings of the founder (1-h), and a remote relative (12-h) also has come and settled in the village.

The Bemba have traditionally practiced uxorilocal residence, and have retained a bride-service tradition in which the husband works for his wife's parents for a certain period of time. After one or two children are born, the husband must decide whether he should continue living with his wife's family or going back to his home village, after considering various conditions and his own preference. Although the bride-service system has changed drastically, it still retains an influence on Bemba society. 9-h as well as 1-h lived and worked in a town in Copperbelt. He (9-h) happened to know 9-w (1-h's sister), who lived in 1-h's house, and married her. He came back to Mulenga-Kapri with his wife in 1959, and has been living there ever since. 6-h is under bride-service. 8-h finished his bride-service and came back to the village in 1983. 11-h married a girl in the neighbouring village in 1981, and is now under bride-service, but he set up house in his own village. 2-w, 4-w, and 5-w are widows. 7-w and 10-w have recently divorced their husband.

Table 2. Population composition in Mulenga-Kapri village.

Age grade	Male	Female	Total
over 60	2	0	2
20-59	6	12	18
15-19	2	2	4
1-14	10	14	24
under 1	1	1	2
Total	21	29	50

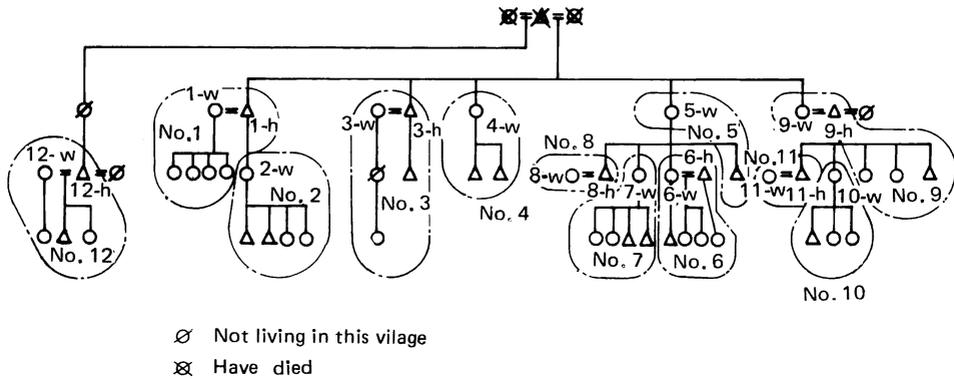


Fig. 4. Kinship relations of the village.

Polygamy is fairly popular among the Bemba. In Mulenga-Kapri, 9-h and 12-h have two wives. Both of them got their second wives because they followed a tradition called *bupyani*, in which a man inherits the wife of a male member of the same lineage when he dies. However, because of the matrilineal tendency of Bemba society, the first and second wives do not live in the same village. Usually, the second wife lives with her brothers. To be more precise, the second wives of 9-h and 12-h live in other village far from Mulenga-Kapri.

ANNUAL WORK IN THE CITEMENE SYSTEM: AN OVERVIEW

The citemene system forms the foundation of life in Mulenga-Kapri. The aim here is to describe the details of the yearly work cycle of the *citemene* system. Surprisingly, the work has changed very little from the time when A. Richards conducted her research in the 1930s (Richards, 1939). Therefore, only a brief description necessary for understanding the analysis in the next chapter will be given here. Of course, the major crop cultivated in the region is finger millet. Cassava is also very important and can be considered as another major crop. Although it is essential to describe and analyze all the crops, including the two major ones, this task will be reserved for another paper. A list of crops with their vernacular names is given in Table 3. Also, Fig. 5 shows an agricultural calendar, summarizing the content of this section.

The data from September to early December are based on direct observation, but

Table 3. Crops cultivated in Mulenga-Kapri village.

English	Scientific name	Bemba name
< Cereals >		
Finger millet	<i>Eleusine coracana</i>	<i>amale</i>
Kaffir corn	<i>Sorghum</i> spp.	<i>amasaka</i> <i>sonkwe</i> <i>kancebele</i>
(Saccharine)		<i>cisale</i>
Maize	<i>Zea mays</i>	<i>nyanje</i>
< Root crops >		
Cassava	<i>Manihot</i> sp.	<i>kalundwe</i>
Sweet potato	<i>Ipomoea batatas</i>	<i>cumbu</i>
< Pulses >		
Ground-nut	<i>Arachis hypogaea</i>	<i>mbalala</i>
Beans	<i>Phaseolus</i> sp.	<i>cilemba</i>
Cowpea	<i>Vigna unguiculata</i>	<i>lilanda</i>
European pea	<i>Pisum sativum</i>	<i>ntongwe</i>
Pigeon pea	<i>Cajanus cajan</i>	<i>luponso</i>
< Cucurbits >		
Pumpkin	<i>Cucurbita</i> sp.	<i>cipushi</i>
Edible gourd	<i>Lagenaria</i> sp.	<i>mungu</i>
Cucumber	<i>Cucumis sativus</i>	<i>cibimbi</i>
Small cucumber	<i>Cucumis</i> sp.	<i>amankolobwe</i>
< Vegetables >		
Okra	<i>Hibiscus esculenta</i>	<i>cilunguntanda</i>
Not identified	?	<i>lubanga</i>
Chinese cabbage	?	<i>leepu</i>
Tomato	<i>Lycopersicum esculenta</i>	<i>tomate</i>

those from other periods are derived from interviews.

1. Cutting Trees (*kutema*)

In April, when the rain abates, a man goes to the land chosen in advance for the *citemene*. He takes off his footwear and climbs up a tree, supports himself with one hand, and using an ax with the other hand lops off all the branches of the tree (Fig.6). When the tree is too big to climb, he places a log against the tree and climb up it. Sometimes he makes and uses a simple ladder by notching a log. Small trees are felled at the height between the waist and the breast. In their language, cutting trees is called *kutema*. The name of *citemene* originated from this word. Tree with thorns such as *Mupapi* (*Securidaca longepedunculata*) and *Mulebe* (*Lannea discolor*), juicy trees such as *Nakabumbu* (*Ximenia americana*), or those which have already shed their leaves are left as they are.

An estimation of the work input required for *kutema* is an important subject and should be studied in the future research. This time, partly because of the short research period, there were only a few opportunities for direct observation. The data given is the time for lopping off the branches which we could record (Table 4). *Kutema* work depends on many elements such as the skill of the worker, kind of tree, D. B. H. , height of the tree, shape of

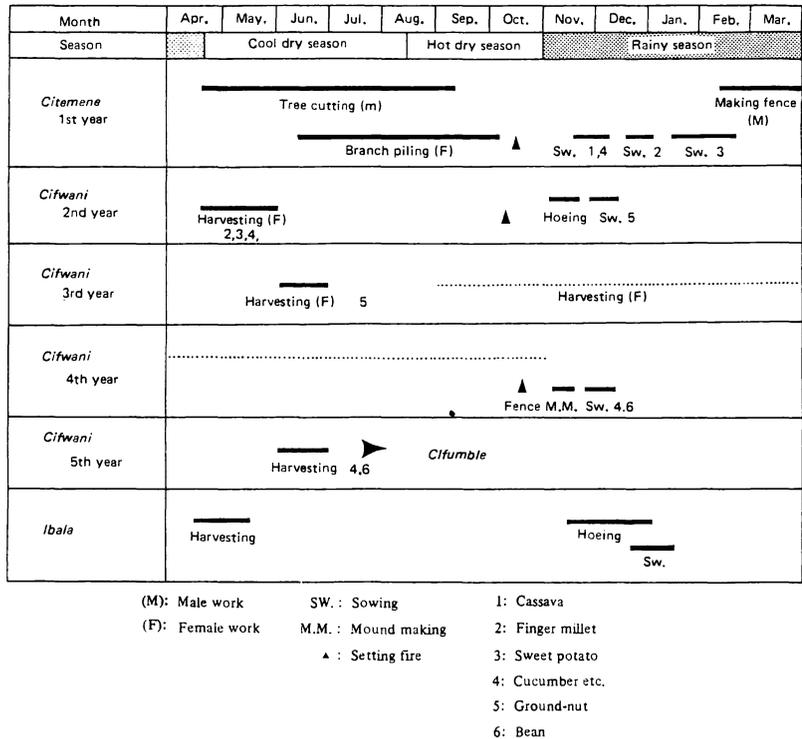


Fig. 5. Agricultural calendar.

the branches, and sharpness of the ax. However, if the tree is less than 30cm in D. B. H., the work should be completed in less than 10 minutes. When the diameter of the branch was about 8cm, it was observed that several strikes by the ax could lop off the branch easily.

After the branches are cut, he comes down from the tree and trim them into moderate size and place the branches with the cut ends facing the center of the *citemene*. This procedure called *kusankula* enables the women to carry the branches more easily. The cut branches are left for two or three weeks to dry, though the following task should be started before the leaves are completely dry and begin to fall. The lopping continues until late September.

2. Piling the Branches (*kuanse fibula*)

The dried branches are carried to the center of the clearing by women and piled up. The women put a cloth on their heads and load the branches on top, balancing them by adjusting the front and rear length. A woman carries 20-30kg of branches at one time and bring them to the center (Fig. 7). Then the branches are piled up evenly about 1m high to make a circular or oval stack with the stems of branches facing the center (Fig. 8). This process is called *kuanse fibula*. Finally, small branches are piled up along the outer edge of the stock, where cucumbers and gourds will be planted.

An estimation of the women's work-input in piling the branches is another important subject for future research. It is highly probable that the work would be a significant factor by which the acreage of the *citemene* is limited.



Fig. 6. Lopping off the branches on the top of the tree.

Table 4. Time for lopping off the branches.

Case No.	Date	Tree species	D.B.H.	Tree height	Work time
1	Sep. 10	<i>Anisophyllea boehmii</i>	26.5 ^{cm}	5.0 ^m	7'24
2	Sep. 10	<i>Brachystegia utilis</i>	23.5	7.4	6'10
3	Sep. 15	<i>Anisophyllea boehmii</i>	24.4	6.7	3'43
4	Sep. 17	<i>Julbernardia paniculata</i>	22.2	5.2	3'34
5	Sep. 17	<i>Brachystegia utilis</i>	21.0	7.0	2'43
6	Sep. 17	<i>Brachystegia utilis</i>	25.6	9.2	7'29

Generally, a married couple as a unit takes charge of the work of lopping and piling the branches. Sometimes they prepare local beer brewed from finger millet and ask villagers for joint work, or even employ workers for cash.

3. Firing the Gardens (*kuoce fibula*)

When the rainy season draws near, people set fire to the *citemene*. It used to be a special task for the chief to decide the date of firing (Richards, 1939), but today, each couple undertake it on their own initiative.

People set fire to bundles of dried grass, and walk around the *citemene* with the burning bundle of grass in their hands, and start fires in several places on the *citemene*. Immediately,



Fig. 7. Woman carries branches.



Fig. 8. Piling branches.

the fire flames up, and then dies down in about 20 minutes. After being convinced that the fire has spread well, the couple returns home. Thus, the *citemene* becomes a swidden field covered with a thick layer of ash. This field is called *bukula*. Sometimes the fire continues as long as a week. Ideally, the branches should be completely burnt up without interruption by rain.

4. Planting and Sowing

Planting starts when the land absorbs enough rain water. Cucumbers and gourds are sown on the edge of the *bukula*, and cassava is planted in the middle of the *bukula*. To plant cassava, they dig a scoop of earth with a hoe, place 2 cut stems of cassava about 10cm long in the holes, and then put soil over them. Usually planting is women's task done with the help of men. Also, tomatoes and other vegetables are planted in the *bukula*.

The sowing of finger millet starts during the Christmas season. At this time, the villagers work together by making a round of their *bukula* one by one. They divide a *bukula* into strips by drawing lines with a stick. A skillful person cast the seeds within each strip so that the seeds are spread evenly. Other people follow this person with hoes in their hands to put soil over the seeds.

In January, they make ridges called *mpomboloke* around the *bukula* and plant sweet potato, maize, and sorghum.

5. Fencing the Garden (*kupindilo lubao*)

The last laborious task in the series of work relate to the *citemene* is the construction of a fence to keep away wild animals, such as bush pigs (*kapoli*) and Grim's duikers (*mpombo*). People start constructing the fences in February, when the planting is over. Men gather logs for stout poles and sink them into the ground. Women gather horizontal logs to be placed between the stout poles. A rough gate called *cipata* is set in a part of the fence (Fig. 8 and Fig. 9).

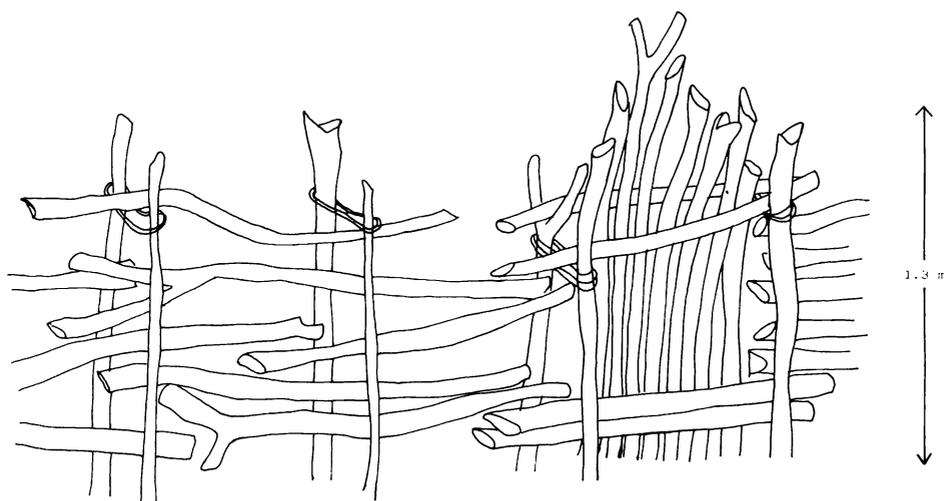


Fig. 8. Sketch of the fence and gate.



Fig. 9. Fence with a gate around the *citemene*.

6. Harvesting

First of all, cucumbers and gourds begin to ripe in the middle of March. The finger millet is harvested during April and May by women who cut off the millet heads with knives. The harvested millet is dried in the sun, and then is stored in a simple granary (*mukuta*) made of wood and grass, or in a granary with mud-walls and a thatched roof (*butala*). When women start harvesting the finger millet, men start lopping branches (*kutema*) to make new *citemene*.

7. *Cifwani*

The swidden fields where finger millet has already been harvested are called *cifwani*, and other crops are planted there according to a sequence.

In the second year, after the remainder of the stalks of finger millet are burnt, and as soon as the rainy season starts, ground nuts are planted. In the third year, after the ground nuts are harvested, cassava is dug up when needed and served for meals. In the fourth year, the fences around the swidden fields are burnt down, and pumpkins and cucumbers are planted there. Also, they make mounds in the field and plant beans. In the fifth year, after the harvest of the beans, the field is abandoned. This abandoned field is called *cifumbule* and will lie fallow for more than 15 years.

8. Temporary Hut (*mitanda*)

When it becomes difficult to find a suitable place for the *citemene*, people seek new sites in areas away from the village, where they make temporary huts called *mitanda*. They move to these huts from May to October to make the *citemene*. For example, in Mulenga-Kapri, five households built *mitanda* in a place 6km away from the village in 1983 to clear the land for *citemene*.

On Sundays, they often make a day trip to the village to attend Masses in the church⁶⁾. Before the rainy season starts, people finish making the *citemene* and come back to their home village. In the planting season, they go to their *mitanda* everyday to advance the

work. After the harvest, frequent trips are necessary to bring the harvested crops to the village. Because of these conditions, the *mitanda* should be within 6km distance, that is, a walking distance of one and half hour from the village.

9. Mound Cultivation (*ibala*)

Besides the *citemene* which we have just looked at, people cultivate gardens called *ibala* around the village. As for Mulenga-Kapri, there are *ibalas* at a deserted village (*cibolya*) across the road. Traditionally, they till secondary grassland around the village, or land where all the trees are cleared. Then they make long mounds (*mooluwa*) or round mounds (*mputa*), and plant maize, sweet potatoes, cassava, beans, and other crops. They call such mound cultivation "*kulima panshi*", which means "to cultivate the ground". Those who believe that, "for the Bemba, cultivation means *citemene*" talk about "*kulima panshi*" implying that the work is tiring and they are disinclined to do it.

Recently, with the wide use of chemical fertilizers and insecticides, the number of permanent field has increased. Although people in Mulenga-Kapri are interested in cultivation using these chemicals, they actually continue the traditional mound cultivation on a small scale because the chemicals are expensive and difficult to get. At Aluni village, 16km west of Mulenga-Kapri, they have cultivated cash crops, such as maize, by using chemicals.

SOME ECOLOGICAL FEATURES OF CITEMENE CULTIVATION

In the following section some ecological characteristics of *citemene* cultivation will be examined primarily by using quantitative data.

1. Tree Composition of Woodland Around the *Citemene*

What differences could be observed in the tree composition of the woodland between the *mitanda* and the village area? Here, the distribution of the height and D. B. H. of the trees will be examined as an index. The data for the Forest Reserve are presented again as a control (Fig. 10 and Fig. 11). The village area has the greatest number of trees and the Forest Reserve the least with the *mitanda* area occupying the middle position. This fact is especially obvious in the distribution of D. B. H. The figure indicates that not only the number of trees itself, but also the number of trees with branches at breast height increase in the same order as mentioned above.

In the Forest Reserve, trees between 1m and 15m in height are distributed almost evenly. Trees of about 4m form a peak in the *mitanda* area whereas in the village area the peak is about 3m. As for the D. B. H., trees less than 10cm in diameter increase remarkably in the *mitanda* and village area. Especially, trees less than 5cm in diameter show a striking increase in the village area.

Since the Forest Reserve can be regarded as a representative of the climax phase of the miombo woodland in the region, it is clear that in both the *mitanda* and village areas people make the *citemene* before the woodland reaches the climax, and that the land was cleared at an earlier stage of succession in the village area than in the *mitanda* area.

2. *Citemene* Field and Tree Cutting Area

One of the characteristics of *citemene* cultivation is that the tree branches are cut and gathered from an area which is larger than the swidden field itself. Table 5 indicates the relation between the acreage⁷⁾ of the fields and of the cutting areas concerning the *citemene*

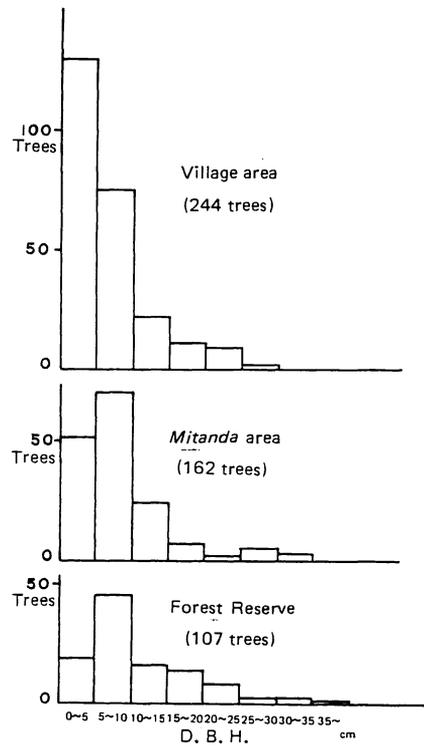


Fig. 10. Distribution of D.B.H. in the woodland near the *citemene*.

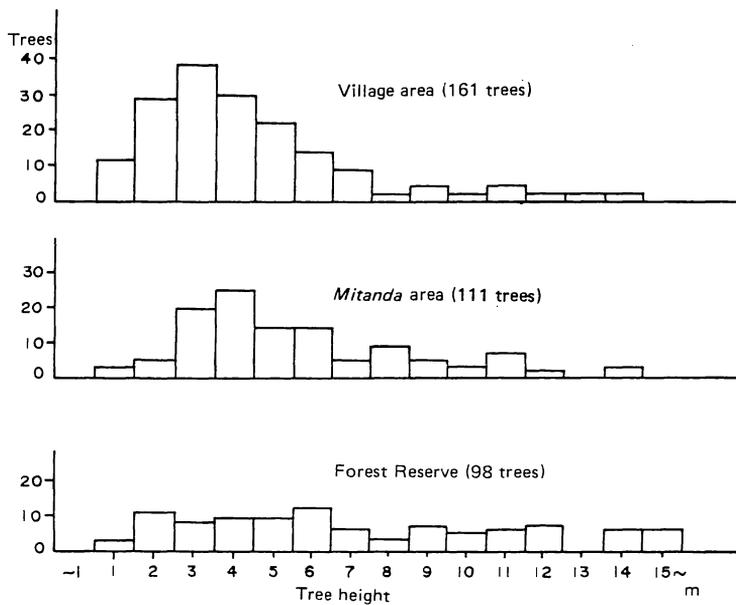


Fig. 11. Distribution of the tree height in the woodland near the *citemene*.

Table 5. Acreage of *citemene* field and tree-cutting area in 1983.

Household No.	<i>Citemene</i> field	Tree-cutting area	Ratio
1	34 ^a	192 ^a	5.6
2	34	?	?
3	23	126	5.5
4	29	184	6.3
5 (M)	44	306	7.0
6 (M)	63	386	6.1
7	—	—	—
8 (M)	54	434	8.0
9 (M)	72	486	6.8
10	—	—	—
11 (M)	56	351	6.3
12	28	197	7.0
Mean except 2, 7 and 10	45	296	6.6

(M): at *mitanda*

cleared by the people in Mulenga-Kapri in 1983.

The acreage of the *citemene* field varies from 23a to 72a, and the average per household is 45a. In the village area, it is the range of from 23a to 34a, and in the *mitanda* area from 44a to 72a. Generally speaking, villagers cultivate larger *citemene* in the *mitanda* area.

The acreage of the tree cutting area is 5.5 to 8.0 times larger than that of the *citemene* field, and the average ration is 6.6 times. In the village area, the ratio ranges between 5.5 and 7.0 times, and, in the *mitanda*, it is between 6.1 to 8.0 times. Not much difference is observed, but the ratio in the village area tends to be lower.

Judging from the data, the main factor for choosing to make *citemene* in the *mitanda* is a preference for making larger *citemene* in the broad woodland.

3. Lopped Trees by *kutema*

Another characteristic of *citemene* cultivation is the lopping of branches by climbing up the trees. What kind of trees and how many trees will be lopped by *kutema*?

Fig. 12 shows the distribution of tree heights of the 1983 *citemene* clearing around the village. In the figure, trees with a height greater than 2m can be considered as lopped ones by *kutema*. The number of such trees amounted to 18 in 1,000m². That is, one or two trees per 100m² are being lopped.

Fig. 13 shows the D. B. H. distribution of trees with a height of more than two meters in the same *citemene*. This data is not based on the quadrat method, but is based on each measurement of 50 trees which are standing within a patch of the clearing. The part with oblique lines in the figure indicates the number of trees which were not cut, such as thorn trees, juicy trees, or those which had shed their leaves at the time of *kutema*. From the figure, it can be observed that those trees with a D. B. H. of more than 15cm, especially trees from 15 to 20 cm are lopped by *kutema*, and that those trees with a D. B. H. of less than 15cm were felled.

Of course, the way of doing *kutema* is not constant, since it depend on the tree

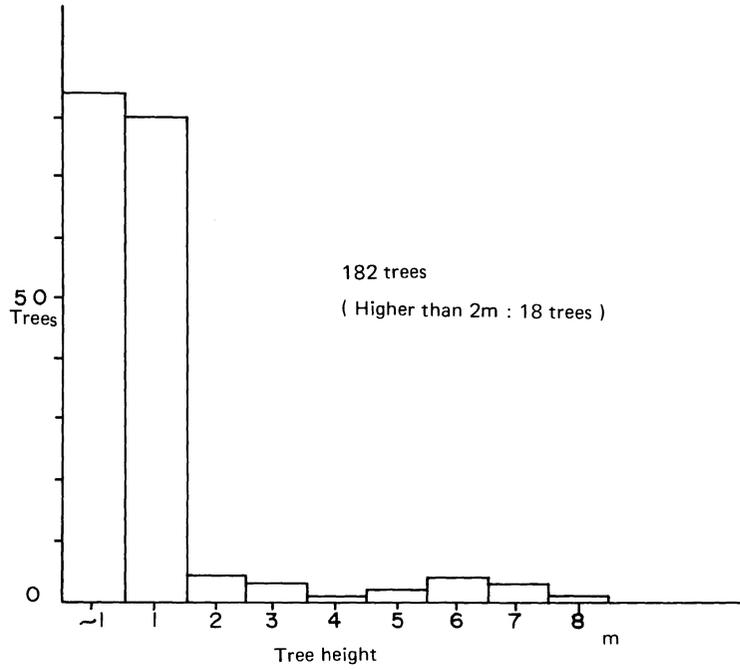


Fig. 12. Distribution of tree height of the 1983 *citimene* clearing.

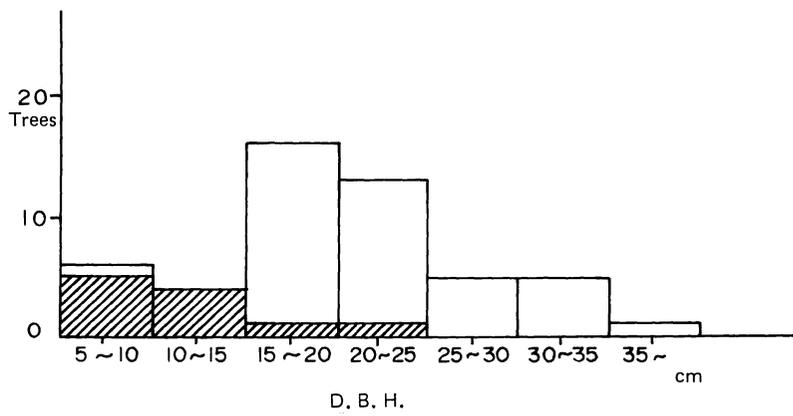


Fig. 13. D.B.H. of lopped trees by *kutema*.

composition and the character of the worker, but this example may be thought of as a typical case of *kutema* in Mulenga-Kapri.

CITEMENE CULTIVATION AS SUBSISTENCE STRATEGY

Harvests from the *citemene* and the *ibala* are an essential source of daily food for the villagers, though sometimes they sell groundnuts to get cash. Their standard daily diet consists of *ubwali*, the staple food made of millet or cassava, and a side dish. From the viewpoint of food ecology, it is also important to consider such problems in the quality, the quantity, and the way of obtaining the materials necessary for side-dishes. However, in this paper, only three problems will be examined: the choice of *citemene* location, the relation between household size and the *citemene* acreage, and the social strategy concerning local beer production and consumption.

1. Choice of *Citemene* Location

Fig. 14 shows the location of *citemene* over three year period and *ibala* cultivated in 1982 in Mulenga-Kapri.

Land within about 2km of the village as far as the Kanuwanpungu River was chosen for *citemene* in 1981. In 1982, the *citemene* fields were made as far as 4km from the village, and in 1983 the land used extended as far as the *mitanda*, the area across the Chilimabwe River which is 6km from the village.

Three households (Nos. 1, 3, and 12) have cultivated all the *citemene* within 2km of the village during this three year period. They are the elders of the village, including the ex-*Mwinemushi* and present *Mwinemushi*. Those who cultivated the *citemene* in *mitanda* in 1983 are the younger members of the village. Two widows' household (Nos. 2, and 4) are intermediate cases.

As for the distance from the village, it is assumed that the choice of the *citemene* location is socially controlled according to the age and household composition.

2. *Citemene* Acreage and Household Size

If the value system of the Bemba is taken into consideration, it would not be too much to say that the staple food is *ubwali* made of *amale* (finger millet) for them. People have a strong attachment to *amale*, and praise its taste and the fact that it is filling. If possible, they would willingly eat *ubwali* made of *amale* all year round, but the *amale* in the granary become low by the end of October. Villagers say "from April to October, we eat *ubwali* made of *amale*," and "then we use *amale* only for *ubwaluwa* (traditional beer) from November to March". That is, for about half a year, they eat *ubwali* made of *amale*, and for the rest of the year they eat *ubwali* made of *kalundwe* (cassava) as the staple food. Both of *amale* and *kalundwe* are mainly produced from the *citemene*.

Table 6 shows the *citemene* acreage and household size (shown as 'man-value'). 'Man-value' was set according to Richards and Widdowson's standard (1973; p. 177), "1.0 to each male of 14 years and over; 0.7 to each child between 6 and 14 years of age; and 0.4 to each infant (except for breast-fed infant)". In this table, there are four families with empty spaces for *citemene* field. The husband of No. 6, who is under bride-service in the village, helped No. 5 to cultivate their *citemene* in 1981, and did not make his own *citemene*. No. 7 married a man from another tribe, but since the husband left the village, her household is under the same condition as a widow's household, and is completely depend on her mother's household, No. 5. No. 10 divorced her husband in 1983 and returned to

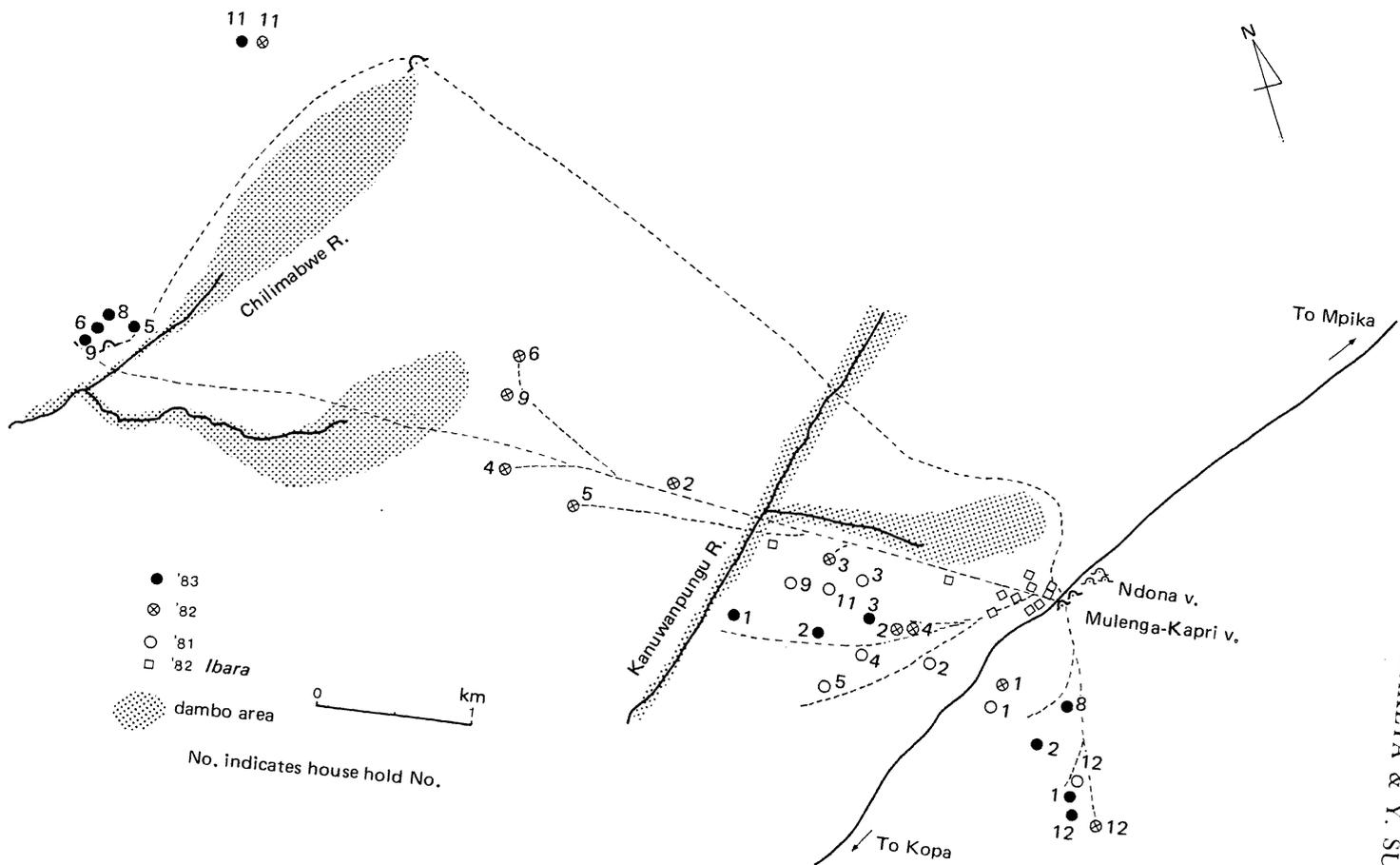


Fig. 14. Location of the citemene.

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Table 6. Acreage of the *citemene* field and household size.

Household No.	'82 C.F.	'81 C.F.	Total ⁽¹⁾	Man-value ⁽²⁾	$\frac{(1)}{(2)}$	'82 ibala	'83 C.F.	
1	36 ^a	36 ^a	72 ^a	4	18	24 ^a	34 ^a	
2	42	36	78	3.6	22	13	34	
3	34	30	64	3.2	20	45	23	
4	35	30	65	2.2	30	11	29	
5	27	65	92	1.8	} 8.5	} 19	30	44
6	70	—	70	3.3				
7	—	—	—	3.4				
8	—	—	—	1.8	—	—	54	
9	38	35	73	4.0	} 6.0	} 12	46	72
10	—	—	—	2.0				
11	76	52	128	1.8	71	14	56	
12	20	32	52	3.3	16	—	28	
Total	378	316	694	34.4	20	182	437	
Total except No. 8 & No. 11	302	264	566	30.8	18	168	327	

C.F.: *citemene* field

the village. No. 5-No. 6-No. 7 and No. 9-No. 10 could be handled respectively as units as far as the food source is concerned. No. 8 is a married couple who moved into the village in 1983.

In 1983 when the research was carried out, villagers depended mainly on the products of 1981's and 1982's *citemene*. On the average, an adult possesses 20a of *citemene* over a two year period. If the fact that No. 8 was absent from the village in 1981 and 1982, and No. 11 is, as explained later, now under his bride-service to his wife's family in a neighbouring village is taken into account, the average, excluding these two families, is 18a. From these figures it can be assumed that 9-10a of *citemene* per adult must be cultivated every year to maintain the standard of living in the village.

As compared with the average figure, No. 11 shows an extraordinary high amount of land and No. 9 and No. 12 are below the average. No. 11 is a recently married young couple, and the husband is the youngest among the married men in the village. However, this high figure resulted mainly from the fact that he is now in bride-service to his wife's family in the neighbouring village. This household practices virilocal residence. Fig. 10 which denotes *citemene* location shows that only No. 11 made *citemene* in places apart from other members of the village in 1982 and 1983. The places are actually the *mitanda* of the people of his wife's village. If the acreage of the *citemene* in the case of No. 5 is also taken into account, it can be argued that the system of bride-service still plays an important role in *citemene* cultivation.

Both No. 9 and No. 12 are households whose husband have more than one wife. As was stated above, these wives live in different villages in Bemba society, and the circumstances that the husband has to make *citemene* for each family are reflected in the figures. Moreover, No. 9's daughter (No. 10) has divorced and came back to the village recently.

It is obvious that, though labour input and output should be studied in detail, the

citemene cultivation is based on household labour. Also, it is obvious that the composition of the labour force is one of the significant factors for determining the acreage of the *citemene*. From these points of view, the study of subsistence strategy in a widow's household would be important. There are three widow households (Nos. 2, 4, and 5) which cultivated the *citemene*. Among the three, No. 5 has a single grown-up son who does *kuteme* work sufficiently. In the case of the other two households, they either ask for help from their father or brothers, or ask other villagers for joint work with an offer of *amale* beer. Or, they employ workers to do *kuteme* with cash obtained by selling *amale* beer, or with cash sent from siblings and sons who work in town. In any case, it should be stressed that the widow's livelihood is supported by the strong bonds of the siblings and family members.

Table 6 also indicates the acreage of the *ibala* in 1982 and the *citemene* in 1983. By examining the acreage of the *citemene* over a three year period, two types of strategy are observed: those who cultivate about the same acreage of *citemene* every year, such as No. 1, and those whose cultivated acreage varies greatly each year, as shown in the case of No. 9 in 1983. Including a consideration of the variation in *ibala* acreage, it can be concluded that the people formulate a basic strategy to adjust the acreage of the *citemene* and *ibala* over the course of several years to keep their subsistence level according to the characteristics of their household composition and social conditions.

3. Social Strategy for Beer-making

Another reason for the Bemba's strong attachment to *amale* is *ubwaluwa*, a traditional beer brewed from *amale*. *Ubwaluwa* is essential at traditional rituals, such as girl's initiation (*cisungu*), the marriage (*bwinga*), and inheritance (*bupyani*), and at special occasions such as Christmas and the New Year. Also, it is indispensable when they ask others for joint work for cutting trees or piling branches. Drinking beer serves as recreation, especially on weekends. Also, brewing beer is a good source of cash for women, especially for widows.

Brewing *ubwaluwa* is a women's task and involves complicated procedures which take about 10 days to two weeks. There are two kinds of *ubwaluwa*: *katata* and *cipumu*. Both of them go through nearly the same process, but are made up differently in the final stage.

Katata looks like thick beer and is sold for cash. Sometimes people gather at a brewing place and treat each other to a drink, though usually only close relatives and friends get together to drink privately purchased *katata*.

Cipumu is undiluted thick brown sludge and is put in a container such as a gourd or pot. Then boiling water is added, and it is drunk through a hollow reed or a narrow iron pipe. Communal drinking is essential to enjoy *cipumu*, and those people who produced the *ubwaluwa* have to serve it for free. Usually, the villagers gather in a open rest hut called *nsaka*, sit around the container of *cipumu*, and drink one after the other. The party provides an occasion for people to communicate and exchange information, and sometimes they sing and dance to drums.

a. Frequency and Quantity of *Ubwaluwa* Production

Table 7 shows the frequency of *ubwaluwa* production for each month from September 1 to December 17 when we stayed in the village. Looking at each month, the *ubwaluwa* is brewed more frequently in October and November. These months are a resting period when the work on the *citemene* has settled down. Those who live in *mitanda* came back and the village becomes very lively.

Each household brewed *ubwaluwa* from one to five times with an average of 2.4 times during the three and half months. The amount of *amale* used for *ubwaluwa* production is 12 to 22kg, and the average is 19.4kg. It was revealed by observations that 13.5% of the total weight of *amale* was discarded in processing it into flour to make *ubwali*. *Amale* for meal

Table 7. Frequency of *ubwaluwa* production from September 1 to December 17, 1983.

Household No.	Month				Total
	Sep.	Oct.	Nov.	Dec.	
1	1	1	0	0	2
2	0	2	2	1	5
3	1	0	0	0	1
4	1	1	1	0	3
5	0	1	1	0	2
6	0	1	1	0	2
9	0	1	1	0	2
Total	3	7	6	1	17

furnishes 366 Cal of food energy per 100g (F. A. O. , 1968). Consequently, the amount of *amale* used for a *ubwaluwa* contains about 65,000 Cal. On the assumption that the energy intake for an adult is 2,000 Cal per day (estimating higher by reference to Richards and Widdowson, 1937), the amount of energy in this *ubwaluwa* is equivalent to the food necessary to feed 33 persons for a day. Based of the average figure 2.9 of the 'man-value' per household indicated in table 6, the amount of *amale* is equivalent to that necessary to feed a household for 11 days.

As stated before, although people prefer the *ubwali* of *amale*, the storage of *amale* becomes low at the end of October. However, it should be taken into account that the quantity of *amale* consumed to brew the *ubwaluwa* in these three and half months is nearly equivalent to the meal for one month.

If these facts are considered from the view of subsistence strategy, three important problems can be pointed out.

- 1) *Amale* is something which has high social value beyond subsistence.
- 2) Drinking beer could have a close relationship with the problem of hunger season between January and March which was discussed by Richards (1939).
- 3) These facts indicate the importances of cassava as a subsidiary staple food, whose harvest is stable and period of consumption can be adjusted.

b. Earning Money and Communal Drinking

Brewing *ubwaluwa* is an important way to earn cash, that is, the making and selling of *katata*. However, among the 17 cases observed, there was no example in which only *katata* was made, though there were 2 cases in which they made only *cipumu* for rituals. This means that they have to make *cipumu* even when they make *katata* to get cash.

Table 8 shows the distribution of the common material (called *mimena*) used in making *cipumu* and *katata* for the five cases in which the amount of *ubwaluwa* could be measured. Usually, more than half of the *mimena* was used for *cipumu*, and 37% was used even in the minimal case.

Villagers explain the reason for making *cipumu* whenever they make *katata* as follows: "In any case, it is very bad to make only *katata*, because it means you do not share it with others (*kutana*).” This means there is a strong social restriction to make *ubwaluwa* just for cash, and that is why the production of *cipumu* for communal drinking always accompanies to the production of *katata*.

The communal drinking provides all villagers with amusement and opportunities to communicate and exchange information. Moreover, it is an occasion to ascertain or

Table 8. Amount of *mimena* used in making *cipumu* and *katata*.

	<i>Cipumu</i>		<i>Katata</i>		Total Kg
	Kg	%	Kg	%	
Case 1	5.8	51.3	5.5	48.7	11.3
Case 2	4.9	53.3	4.3	46.7	9.2
Case 3	6.0	66.7	3.0	33.3	9.0
Case 4	3.6	46.2	4.2	53.8	7.8
Case 5	2.5	37.3	4.2	62.3	6.7
Mean	4.6	52.3	4.2	47.7	8.8

reinforce the solidarity of the village society.

SUMMARY AND CONCLUSION

Many outstanding studies, such as the representative works by Richards (1939), Trapnell (1943), and Allan (1965), have been done on the *citemene* system of the Bemba. On the bases of these works, this paper attempted to analyze the socio-ecological characteristics of the *citemene* system using first-hand data gathered by participating in the life of a modern Bemba village as much as possible.

Villagers in Mulenga-Kapri cultivated *citemene* around the village and in the *mitanda*. They climb up one or two trees of more than 15cm in D. B. H. in every 100m² to lop off the branches, or they cut down the trees less than 15cm in D. B. H. , pile up the branches in the center, and set them on fire to make *bukula*. The acreage of the cutting area required is 6.6 times greater than that of the *bukula*.

While the aged of the village make the *citemene* near the village, the younger villagers seek larger land for *citemene*, and move to the *mitanda* to make larger *citemene* in distant areas as far as 6km from the village. As Richards suggested (1939; P, 299), the temporary move to the *mitanda* has an important socio-ecological function to regulate social relationships among villagers, though it was not analyzed in this paper.

Compared to the mature woodland represented by the Forest Reserve, the *citemene* is made in woodland areas of earlier succession, especially in the village area. This involves some problems which must be considered concerning the reduction of the fallow period resulting from population pressure and deforestation. Also, there are some interesting points in relation to Boserup's theory (Boserup, 1965) which discussed the transition to intensive agriculture.

In the *citemene* in the area, the main crops are finger millet and cassava. The *citemene* system bears a strong connection with the production of finger millet, but the importance of cassava also should be emphasized. Compared with the area and time (1930s) of the detailed study by Richards (1939), the modern *citemene* cultivation around Mulenga-Kapri is distinctive in the fact that it involves cassava cultivation as an indispensable component. Because of the advantages of high productivity per unit area and the long-term availability, cassava has guaranteed the stability and continuance of the *citemene* system of the area.

People depend on finger millet for half a year, and on cassava for the rest of the year, both of which are produced mainly from the *citemene*. Every year, 9-10a of the *citemene* per adult is cultivated, but the acreage of the *citemene* field varies for each household. Each

household based on a subsistence strategy adjusts the acreage of the *citemene* and *ibala* over the course of several years according to the characteristics of its composition and social conditions. Traditions such as bride-service and polygamy have a strong influence on the acreage of the *citemene*.

Another base for subsistence life is *ibala* cultivation. Although *ibala* was not mentioned in detail in this paper, and is left as a subject for the future, it is very important especially in considering the future of the Bemba agriculture since the *ibala* has begun to change drastically in accordance with the demand for modernizing agriculture.

The highly prized staple food is finger millet, and it is a material used in the manufacture of *ubwaluwa*, the favorite drink of the villagers. The amount of finger millet consumed in one brewing of *ubwaluwa* is equivalent to the amount of food needed to feed 33 persons. *Ubwaluwa* is also an important source of cash for women, and it provides the opportunity for communal drinking. They brew *katata* for selling, and *cipumu* for communal drinking, and there is a strong social restriction that *katata* must be brewed with *cipumu*. “*Kutana*” (“not to share”) with others is strictly controlled socially. The basic principle of sharing underlies Bemba village life. *Cipumu* is indispensable in the main rituals, or in asking for joint work to cut trees and pile branches as well as in communal drinking, which support the communal life in the village. In short, *cipumu* symbolizes the continuance of traditional Bemba culture.

As stated above, people show a strong attachment to finger millet. This attachment is profoundly related to their physiology, and it helps to preserve the *citemene* system and support the continuance of traditional Bemba society at the village level.

The *citemene* system based on the subsistence strategy described above is a highly adaptive cultivation system under the conditions of vast woodland, low population density, and subsistence agriculture. It has a very unique cultivation method in accordance with the characteristics of the woodland, which is different from the slash-and-burn horticulture in the woodland of other countries, for example, in western Tanzania (Kakeya, 1976). It can be said, though further quantitative study is required, that *kutema*, in which they cut only the branches without cutting down the trees, is a method which accelerates the renewal of the woodland. Also, *kuanse fibula*, the gathering of branches taken from a wide cutting area, can be regarded as a method which is suitable for a woodland where the density of trees and the fertility is rather low.

However, the *citemene* system is now being forced to change drastically as agriculture methods are modernized and an attempt is made to preserve the forest. We would like to further investigate the actual conditions and the problems caused by the change in future research of the “Woodland Project”.

The results of such research would enable comparison with the outstanding ethnography of the 1930s written by Richards (1939), and provide us with clues to investigate the problem of “change” in more detail.

NOTES

- 1) Bemba society was organized into a great kingdom reigned over by a paramount king before the coming of colonial rule. For our research it is important to understand socio-ecological bases which were in effect at that time and to make clear their influence on modern Bemba life. This paper, however, focuses exclusively on the socio-ecological bases of the actual everyday life in a small village.
- 2) Bemba words will be written in italics, and all of them will be given in singular form except for the conventional use of plural forms. Usually Bemba words take the preprefix vowel of their prefix

such as *icitemene*, but in this paper these preprefixes will be omitted and words will be written as they are in dictionaries like *citemene*.

- 3) All the vegetation analyses presented in this paper were conducted by setting 10 quadrats of 10m square except for one special case.
- 4) We measured the D. B. H. of trees with a diameter tape.
- 5) We measured tree height with a dendrometer.
- 6) Almost all of the villagers are pious Christians.
- 7) We made a survey of acreage using a transit-compass.

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