

FLEDGING AGRICULTURALISTS? RETHINKING THE ADOPTION OF CULTIVATION BY THE BAKA HUNTER-GATHERERS

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ABSTRACT The Baka hunter-gatherers currently cultivate agricultural crops. However, they do not seem to esteem planned, continuous, year-round produce, to which the neighboring cultivators attach great importance. The Baka do not expect to always obtain foodstuff from their own fields. Rather, than interpret this resource usage as an immature stage before the adoption of full agriculture, the adoption of banana cultivation by the Baka can be recognized as a diversification of resource usage within the “semi-domestication” gradation. The author argues that “resource use” comprises of human-to-nature relationship and human-to-human relationship. What differentiates the resource use between the Baka and the cultivators is the human-to-human relationships that surround the resource, such as the right to use the resource, the labor input for the resource, the distribution and the consumption of the resource among the people. The author hypothesizes that the Baka community lacks a rigid logic linking labor input and ownership of its fruits. Conversely, when most Baka begin to feel that the causal relationship between labor and ownership is natural and reasonable, their community is recognized as being on the definitive step to becoming an agriculturalist community.

Key Words: Forest food resource; Semi-domestication; Diversification of resource use; Labor and ownership.

INTRODUCTION

The people known as the “Pygmy” hunter-gatherers are thought to have been using crops for some time. In the past, they often obtained crops from cultivators using forestry products as a means of exchange, but in recent years, they have also been cultivating crops themselves (Ichikawa, 1986; Terashima, 1986; Bahuchet, 1985; Kitanishi, 1995). The Baka Pygmies, or Baka hunter-gatherers, living in the southeastern part of Cameroon are no exception (Kitanishi, 2003; Yasuoka, 2006a; 2009a; Hattori, 2008). They have acquired cultivation techniques while helping neighboring cultivators in the cultivation of their shifting fields, and many now cultivate bananas and cassava themselves. Some of the Baka often stay in forest camps, but it is rare for their life in the forest to exceed half a year in any given year.

This kind of lifestyle that the Baka live today may not appear very different from that of the cultivators at first glance. Cultivators, Bantu-speaking in particular, living in the Congo Basin have been labeled “generalists of natural resource use” (Kakeya, 1998) or “multi-subsistence people” (Kimura, 1992) who also actively engage in fishing, hunting and gathering as well as cultivation. In

terms of the repertoire of subsistence activities and forest resources used, there is almost a complete overlap between the cultivators and the hunter-gatherers.

Nevertheless, the importance of crops produced by the Baka themselves in their diet seems to be much lower than that of the neighboring cultivators. Baka fields are too small to cover their staple diet year-round. They sometimes halt in the middle of working the fields and head off to the forest camp. And occasionally they are unable to eat the crops they themselves planted, because they stay in the forest camp during harvest time. The cultivation of crops has not reached a steady, core subsistence activity for the Baka⁽¹⁾.

I emphasize here that this attitude of the Baka towards agriculture is not an immature stage in the process of catching up with human history, i.e. the transition from a hunting-and-gathering life to an agricultural life. That mankind began farming was a watershed in our history. But, we should not place undue emphasis on the dichotomy between the hunter-gatherer mode of resource use depending on nature as-is, and the agriculturalist mode of resource use in which nature is modified to match human convenience. This would only obscure the importance of certain kinds of resources between wild and domesticated.

In this paper, I aim to renew our understanding of the life in the rainforest, in terms of the “semi-domestication” gradation between pure gathering and full cultivation, with an emphasis on the complexity of various subsistence activities practiced in Baka life. This attempt will help understand Baka crop cultivation, not as a midway state of transition from an old to new subsistence, but rather as resource use diversification within practices adopted in their life. This perspective will provide an alternative approach toward pondering the question: what could really make the hunter-gatherers choose a different mode of lifestyle, i.e. that of the agriculturalists?⁽²⁾

STUDY SITE AND PEOPLE

I studied the life of the Baka hunter-gatherers of Zoulabot Ancien village, Z village for convenience, located in the Boumba-Ngoko Department, East Region, Cameroon. The fieldwork on which this paper is based was conducted from 2001 to 2003, in 2005 and in 2008, for a total of 25 months. Some of the quantitative data on their livelihood I refer to in this paper were obtained from my previous works (Yasuoka, 2006a; 2006b; 2009a; 2009b; 2011).

Southeastern Cameroon is located on the northwest part of the Congo Basin, and has terrain of gently sloping hills at an altitude of 400 to 600 m, covered with tropical rainforest. The vegetation in the vicinity of Z village lies in the transitional zone from evergreen forest to semi-deciduous forest, and has a mixture of both elements (Letouzey, 1985; Yasuoka, 2009b). The average temperature throughout the year is around 25°C. Annual precipitation is around 1,500 mm. The period between December and February, during which precipitation is less than 100 mm, can be considered as the dry season, and the period when precipitation exceeds 100 mm between March and November, as the rainy season. However, precipitation levels and rainfall patterns vary from

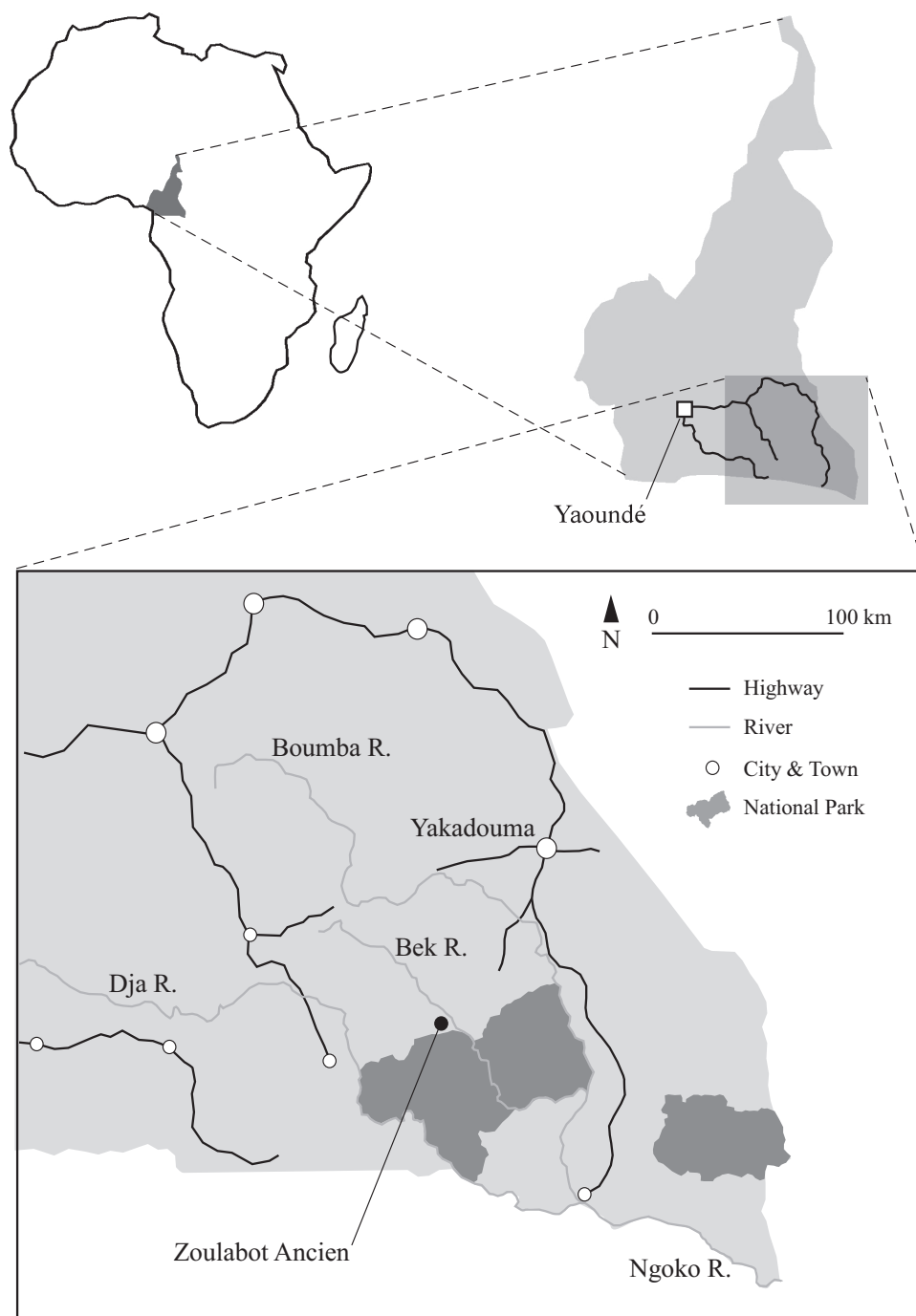


Fig. 1. Southeast Cameroon and the study site (Zoulabot Ancien).

year to year. From mid-June to mid-August, depending on the year, there can be less precipitation. Also, because cultivators carry out the task of clearing the fields during this period, it can be regarded as the minor dry season. During this period, starting with *Irvingia gabonensis* or *pekè* in the Baka language, a variety of wild fruits ripen. As such, the Baka often call the season *soko pekè* (the season of *I. gabonensis*). In this paper, the seasons are roughly divided into four: the dry season (from December to February), the minor rainy season (from March to mid-June), the *Irvingia* season (from mid-June to mid-August), and the major rainy season (from mid-August to November)⁽³⁾.

Today, most of the Baka groups live in semi-sedentary settlements along two unpaired highways, running from north to south that open a clearance around 150 km long in the forest area of southeastern Cameroon. Z village is located between the two highways, and is one of the least accessible places in this area (Fig. 1). The population of the village, as of 2003, consisted of about 140 Baka, as well as 11 Konabembe cultivators who practice shifting cultivation as their main subsistence activity. In a typical village in southeastern Cameroon, the populations of cultivators and Baka are roughly equal or cultivators are more numerous. However, due to the migration of Z village cultivators to areas with more accessible transport since the 1970s, Z village has currently taken on the appearance of a "Baka village." Because there is little relationship with the cultivators, the Baka in Z village carried out their subsistence activities self-sufficiently.

The Baka subsistence activities can roughly be understood based on where they are staying at a given time. There were about 30 households in Z village. I recorded daily, for 23 months from October 2001 until August 2003, the places of stay for each nuclear family, made up of a husband and wife and their unmarried children, that constitutes the Baka household unit (Yasuoka, 2006a). Looking at the total number of household-days during the study period, 49% were spent in the settlement and the farming camps, and 29% in the ordinary forest camp (Fig. 2). Therefore, it can be said that the Baka livelihood is centered around the settlement or the farming camp, and the ordinary forest camp. The large-scale, long-term forest life known as the *molongo* made up 7% of household days. Spread out over the year, this is a small value, but *molongo* has great significance in understanding Baka life. I will mention these three types of livelihood in the following sections, focusing on the acquisition of plants for food.

Besides these, there is the hunting expedition known as *maka*, in which only men participate. During the *maka* the women remained at the settlement or camps. From 2001 to 2003, because the prohibition on hunting was not so strict, the *maka* was carried out frequently at the request of outsiders carrying guns. In addition, the Baka often visit relatives and in-laws in other villages, and sometimes go to villages in areas near Yokadouma for wage labor in the cultivators' cacao fields or households. There were occasions when people were absent from the village for half a year or a number of years. Only short term visits of less than a month are noted in Fig. 2.

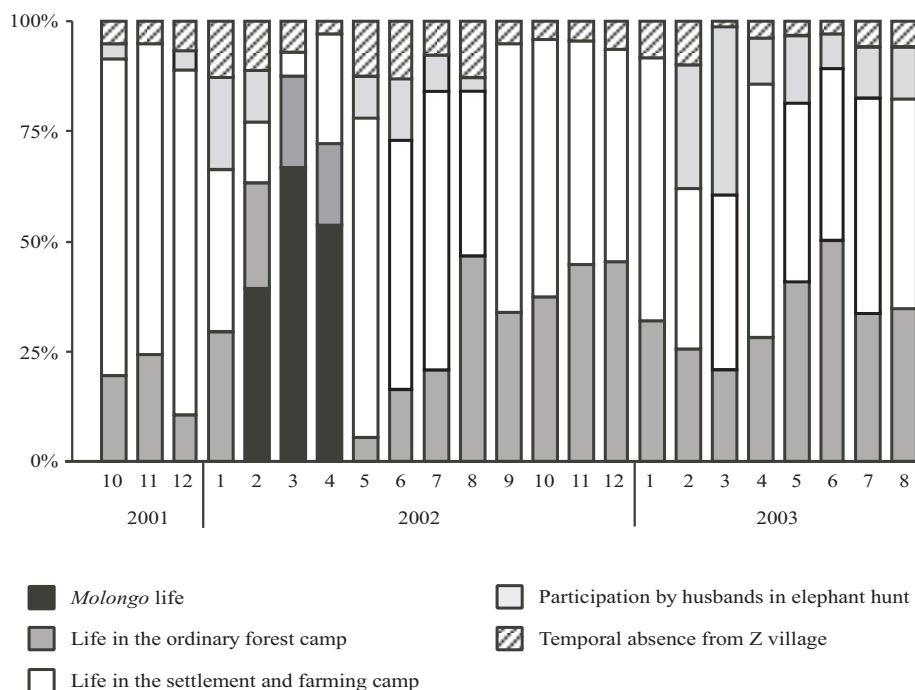


Fig. 2. Percentage of household-days spent by month in different modes of livelihood at (Oct. 2001–Aug. 2003), modified Yasuoka (2006a).

FOOD RESOURCE USAGE OF THE BAKA

I. Banana and Other Crops

The importance of agricultural crops in the subsistence has increased among the Baka of Z village through two opportunities. The first is that after settling down from the mid-20th century onwards, they acquired cultivation technology while assisting the cultivators. The second is that after the Konabembe cultivators migrated to Zoulabot Nouveau in the 1970s, the Baka themselves in Z village started cultivating crops in the abandoned fields and fallows.

In the settlement or the farming camps a few kilometers away from the settlement, most time is spent on agricultural work among subsistence activities. As far as the relation to subsistence activities, the difference between the two places is not large. In many cases, simple dome-shaped huts are made from the stems of shrubs and the leaves of *Marantaceae* plants (Fig. 3). If available, huts of raffia leaves are built. Some households build houses with mud walls at the camp, but do not have houses in the settlement.

In the fields, cooking bananas (plantain bananas) are mostly planted. Cassava is also companion-planted, but in Z village, its importance in the diet is low



Fig. 3. Scenery of the agricultural camp.

compared to banana. Adding to these, several households cultivate maize, peanuts, sweet potatoes and yautia (*Xanthosoma* spp.). But, planting these is small scale, and since the seeds and seed tubers are often eaten without setting aside enough for reproduction, it is not sustainable. No one grows cocoa, the commercial crop typical of this region.

The Baka seldom make processed foodstuffs. Both bananas and cassava that are harvested will be eaten, boiled in a pot on the day or the next day of harvest. In other words, only the amount to be cooked soon is harvested, because these crops do not keep more than some days without processing. The neighboring cultivators, on the other hand, crush the bananas in a mortar, and make dumplings to eat, and also make cassava powder and cassava spirit.

The process of banana cultivation of the Baka is not so different from the cultivators'. First, they cut down an opening in the forest, then wait for a suitable time and set fire to the clearing. Then they plant bananas, cassava, and maize if they have seeds. Around three months after planting, the maize can be harvested, followed by the cassava after six or eight months and the banana after around one and a half years. Though making the field itself requires physical effort, it is not a difficult task for the Baka⁽⁴⁾.

The problem is when and how large to make the fields. On the occasion that I visited Z village from January to March 2005, five farming camps existed within 3 to 5 km from the settlement, and the size of each camp was 3 to 8 households. I surveyed the eight households that were staying in one of the five

Table 1. The area (ha) and clearing period field belonging to eight households that made up a particular farming camp

Year	Season	Household							
		A	B	C	D	E	F	G	H
2002	Dry season						0.03		
	Minor rainy season							0.13	0.09
	<i>Irvingia</i> season								
	Major rainy season								
2003	Dry season	0.13							
	Minor rainy season	0.19		0.10		0.08			
	<i>Irvingia</i> season								
	Major rainy season		0.06				0.03		
2004	Dry season	0.09							
	Minor rainy season	0.05	0.10	0.08	0.10	0.06	0.07	0.15	0.09
	<i>Irvingia</i> season								
	Major rainy season					0.08	0.03	0.04	0.04
2005	Dry season	0.18	0.17	0.22		0.10	0.21	0.09	0.21

Survey interviews concerning the field measurements and clearing periods were conducted in January 2005. The cultivation in this farming camp was started by A in the 2004 dry season. The fields cleared in 2002 and 2003 are near to the settlement.

camps, as to the size and locations of their fields they cleared and harvested, and about the clearing period for each field (Table 1). From the results, the following three characteristics were identified in comparison with the Bangandou cultivators living also in southeastern Cameroon (Shikata, 2004).

Firstly, the area of one field is small. The average area of fields shown in Table 1 is 0.1 ha, and the size varies widely by year. Meanwhile, the Bangandou work on average 0.37 ha of fields twice a year, during the dry season and the *Irvingia* season, a total of 0.74 ha annually (Shikata, 2004).

Secondly, according to the cultivators' thinking, the Baka carry out clearing in the wrong season. The cultivators cut down the trees during the dry and *Irvingia* seasons, and burn the fields just before the rainy season starts. In contrast to this, among the 29 fields shown in Table 1, only ten fields (34%) were cleared during the dry or *Irvingia* seasons. The reason for this is that the Baka often stay at the forest camp during the dry and *Irvingia* seasons in order to gather wild yams and kernels of *Irvingia gabonensis* (*Irvingia* nuts).

Thirdly, the Baka have no agricultural sense of year-round harvesting, or, at least, it has not been achieved at all. Shikata (2004) pointed out that the

farming system of the Bangandou ensured a stable, year-round, and daily harvest of the banana, a crop difficult to store with a short window for harvesting⁽⁵⁾. In contrast, as can easily be predicted from the disparity in the areas of the clearings, there is great fluctuation in the amount of harvest in the Baka cultivation of banana. Actually, in Z village, because many households did not make fields from 2002 to 2003, the amount of harvest from 2004 to 2005 would appear to have been considerably smaller.

As a result, calorie supply for the Baka in the farming camp sometimes becomes less than that in the forest camp. The eight households of the farming camp were taking in 2,373 kcal upon converting the results to one adult per day (Table 1), and 2,361 kcal in the rainy season (Table 2). This is small compared to the 2,773 kcal calorie intake during the *molongo* life in the forest, which I describe later. In addition, even among the calorie supply at the farming camp, the relative importance of agricultural produce in the Baka diet is much smaller than that of the cultivators. Bananas makes up 47%, cassava and other agricultural crops make up just 5%, and the remainder is provided by oil palm⁽⁶⁾, wild yams, and other wild food. In the rainy season, bananas makes up 69% of the total. These estimates are for when they can easily harvest the agricultural crops. This means that if spread out over a longer time during the period of forest life, the relative importance of crops in the Baka diet becomes less. In contrast, cultivators who live in the Congo Basin obtain 80 to 90% of their caloric intake on agricultural crops (Miracle, 1967)⁽⁷⁾.

Even though produce from the fields is small and unstable, the Baka can obtain plentiful foodstuffs such as wild yams and *Irvingia* nuts in the forest camp. Therefore, there is no pressing need for the Baka to ensure year-round crop availability. The characteristic feature of agriculture in the Congo Basin can be generalized as non-intensiveness (Kakeya, 1998). Both the Baka's and the neighboring cultivators' banana cultivation exemplify this. However, compared to the cultivators, the non-intensiveness of the Baka banana cultivation stands out.

II. Honey and Perennial Yams

A Baka ordinary forest camp, typically made up of about one to five households, is often made at a distance of a one-day round trip from the settlement, usually 10 to 20 km away (Fig. 4)⁽⁸⁾. In Z village, there are several routes to the south of the settlement that enter the forest, with many trails branching off. A camp is made several tens of meters off the side of such trails, where it is easy to secure water. Although each Baka has certain preferences as to where they would establish a camp, there is no exclusive territory assigned to certain individuals or kinship groups. Once the location of camp has been decided, the women gather stems of small shrubs and build a dome-shaped frame, on which they then hang Marantaceae plants to thatch a roof. If raffia palm are found growing in abundance nearby, the men weave mats out of raffia palm leaves over several days for the roof and the walls, and build a more solid, squarish hut. Sometimes they make beds from the rachises of raffia palm.

As the forest products vary with the season, it is easier to grasp the overall

Table 2. Food composition, adult daily consumption^a (kcal/consumption-day) in camps and the settlement

Food	Farming camp		Molongo camp				Ordinary forest camp		Settlement			
	Dry season Feb. 2005	Dry season Feb. 2005	Nomadic period		Long-stay period		Irvingia season Aug. 2008	Irvingia season Jul. 2002	Rainy season Sep. 2002			
			Dry season Feb. 2005	Dry season Feb. 2005	Dry to early rainy season							
					Mar.–Apr. 2002	Mar. 2005						
Banana	1105	47%	46	3%			752	8%	393	13%	1629	69%
Other agricultural crops	110	5%	23	1%					25	1%	77	3%
Oil palm fruit	693	29%	1	0%					229	7%	141	6%
Palm wine	40	2%										
Annual yam	19	1%	345	19%	1493	62%	1678	61%	2	0%	1	0%
Perennial yam	207	9%	585	32%	79	3%	121	4%	45	1%	2	0%
Irvingia gabonensis									4612 ^b	52%	1785 ^b	58%
Baillonella toxisperma									3080 ^b	35%	402 ^b	13%
Other wild plants	46	2%	58	3%	30	1%	20	1%	0	0%	3	0%
Honey	13	1%	645	36%	183	8%	435	16%	67	1%		
Meat	40	2%	82	5%	604	25%	461	17%	308	3%	237 ^c	8%
Fish and shellfish	101	4%	16	1%	1	0%	57	2%				
Mushroom			0	0%	0	0%	0	0%			2	0%
Total	2373	100%	1801	100%	2390	100%	2773	100%	8866	100%	3079	100%
											2361	100%

^a For methods of conversion of food weight into calory, and of cululating adult consumptions, see Yasuoka (2006a, 2009a, 2011). The total of adult consumption-days for the farming camp was 314.5 (13 days, Jan. 29–Feb. 10, 2005), that of the nomadic period in 2005 was 866.5 (15 days, Feb. 24–Mar. 10, 2005), that of the long-stay period in 2002 was 3,325.0 (50 days, Mar. 5–Apr. 23, 2002), that of the long-stay period in 2005 was 1,247.5 (17 days, Mar. 15–A27, 2005), that of the ordinary forest camp was 119 (7 days, Aug. 22–28, 2008), and that of the settlement was 2393 (31 days, Jul. 1–31, 2002) and 371 (6 days, Sep. 15–20, 2002).

^b Large amounts of the oil extracted from *I. gabonensis* and *B. toxisperma* kernels were stored or sold. Thus, the Baka did not consume all the calories indicated on the table.

^c Data were collected during the bushmeat hunting boom provoked by the opening of a logging road (Yasuoka, 2006b). Consequently, large amounts of meat harvested in the settlement in 2002 were sold. The Baka bought cassava flour with the money that they gained from selling meat or *Irvingia* nuts.

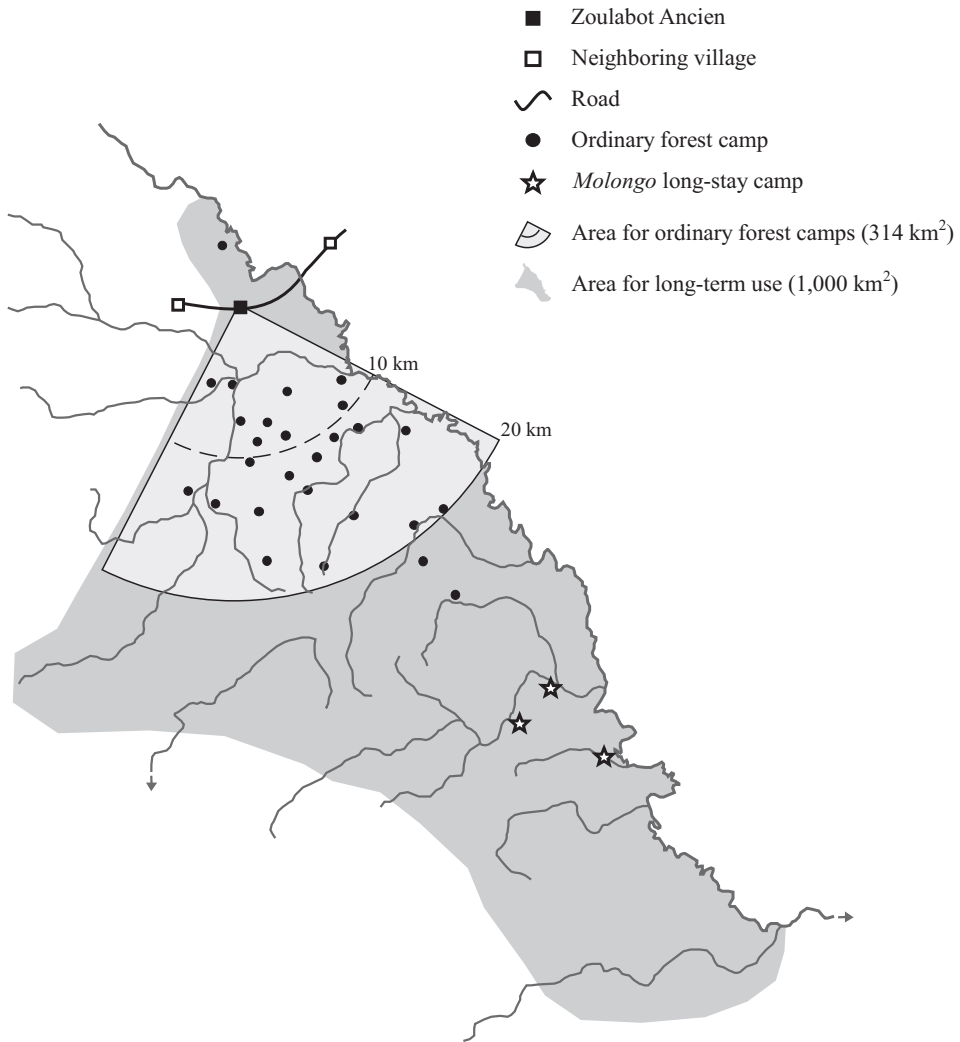


Fig. 4. Area for the ordinary forest camp and for long-term use by the Baka in Zoulabot Ancien. Modified from Yasuoka (2006b). Ordinary forest camps in this map were built during July 2002 to August 2003. One of long-stay camp of *molongo* was built in March 2002, two of that were built in March 2005.

picture concerning forest products by dividing the seasons into four, namely the minor rainy season, the *Irvingia* season, the major rainy season and the dry season.

In the minor rainy season from March to around mid-June, honey and the perennial wild yams (*Dioscorea mangelotiana* and *D. burkilliana*) constitute considerable parts of forest food resources for the Baka. Honey can be harvested throughout the year, but the yield increases from the beginning of the



Fig. 5. A man collecting honey from a stingless bees' beehive about 10 m off the ground.

rainy season when the nectar source plant species come into bloom. African honeybees and stingless bees (seven species were observed) make honey. The flavor is different between the two kinds of honey, but there is no large difference in the harvesting periods and yields. When the Baka walk through the forest, they always keep their senses attuned to signs of a honeycomb, such as the buzz of honey bees, the fallen honey bees on the ground, and a sight of the little entrance to a hive visible from the clearance between the trees. If they spend one day walking in the forest, it is usually possible to find at least one hive. Both men and women search for beehives, but it is a man's job to harvest the honey. If it is possible to climb a tree up to the hive, they do so and harvest honey (Fig. 5), if not, they may cut down the tree.

In the vicinity of Z village, numerous *Pentaclethra macrophylla* and *Irvingia gabonensis* grow as large sources of nectar, and honey can be harvested in abundance. Adding to these, according to the Baka, *Ceiba pentandra*, *Dichostemma glaucescens*, *Erythrophleum suaveolens*, *Pterocarpus soyauxii*, *Albizia adianthifolia* and *monjumbe* (unidentified vine), are also distributed around the settlement, and produce plenty of nectar, according to the Baka. Depending on the season, as much as 20 kg can be harvested from one hive. Sometimes they eat only honey for several days.

In the minor rainy season when harvesting other carbohydrate-based forest products becomes relatively difficult, perennial yams (particularly, *D. mangelotiana* and *D. burkilliana*) are an important foodstuff in the forest



Fig. 6. A woman gathering about 15 kg of *Dioscorea mangelotiana*.

camp. These yams are attached to a two-year or perennial stem, and as the tuber auxesis or attenuation seasonal cycle is weak, depending on the individual organism, the timing of the tuber's growth is different (Dounias, 2001; Yasuoka, 2009a). Because of this, it can be harvested year-round.

In addition, perennial yams can thrive under a dark, closed canopy, and they are relatively evenly distributed in the forest. So instead of having to go off to a specific area, the Baka explore the areas one by one. When the women walk through the forest, on occasion, they suddenly stop and pick up yam leaves that are dry and curled. The fact that the leaves and stems above ground are withered indicates that the tuber in the ground has stored enough starches. From among the surrounding bushes, they look for withered yam stems, follow the stems to their roots, and dig up the tubers. In most cases they weigh several kilograms. Sometimes, around 15 kg of *D. mangelotiana* tubers are harvested from one stump (Fig. 6).

It is rare for the Baka these days to stay in forest camps depending only on forest products in the minor rainy season, because available forest products are relatively limited. Therefore, they often made camps at a distance of a one-day round trip from the settlement to resort to the banana and cassava cultivated in the fields if necessary. However, from the end of February to the beginning of



Fig. 7. A family collecting *Irvingia gabonensis* while staying in a forest camp.

March, roughly the end of the dry season and the beginning of the minor rainy season, they actually become largely dependent on perennial yams and honey (Yasuoka, 2009a). This period in turn falls under the first half of the lifestyle called *molongo*. In this period, an adult would obtain 645 kcal from honey and 585 kcal from *D. manganotiana* and *D. burkilliana* each day. About 1,801 kcal was consumed on a daily basis (Table 2). With the honey eaten on the harvest spot taken into consideration, the supply of calories was not significantly less than that in the farming camp⁽⁹⁾.

III. Fruits and Seeds

A variety of fruits blossom in the *Irvingia* season from mid-June to August (Table 3). Among these, *I. gabonensis* and *Baillonella toxisperma* are particularly important. All the Baka know the location of *I. gabonensis* and *B. toxisperma*, and when the fruits ripen and fall, the women head off to gather them in the dim light at around six o'clock in the morning. If a tree is near to the camp, 20 to 30 kg of fruit is collected at a time and brought back to the camp, but usually, the kernels are extracted on the spot (Fig. 7). Baka enjoy chewing on the occasionally sweet pulp of the fruit while splitting the fruit and seed into two, using a machete, to extract the kernels. After a certain amount of the kernels are collected, they roast them over a strong flame, crush them in a mortar and squeeze out the oil content. The remaining solid portion is set

into a form such as a pot, cooled and stored. They shave off a little bit at a time and use as oily seasoning upon cooking until the dry season, or the next *Irvingia* season in some cases.

It is also possible to extract oil from the seeds of *B. toxisperma*. After extracted from the pulp, the seeds are dried out in the sun. Next, the shell of the seed is broken through and the endosperm is extracted. After roasting over a strong flame, it is crushed in a mortar, and the separated oil is squeezed out by hand. The remaining dreg is reheated and oil is squeezed out two more times. The remaining dreg contains toxic substances, and is not eaten. Meanwhile, the large and sweet pulp is a popular snack in the season.

These food resources have significant potential to support the Baka subsistence in the forest. According to estimates based on a survey of the harvest in the *Irvingia* season, *I. gabonensis* could supply nuts containing oil equivalent to 1,785 kcal per adult consumption per day in the settlement, and 4,612 kcal at the forest camp (Table 2). *B. toxisperma* could supply oil equivalent to 3,080 kcal at the forest camp⁽¹⁰⁾. But, the Baka do not consume all of these fruit products, but instead they store them for succeeding seasons or sell them to merchants.

It should be noted, however, the crop of *I. gabonensis* has a large interannual variation. In Z village, despite a good crop of *I. gabonensis* in 2001 and 2002, almost none was harvested in 2003. When I revisited in January 2005, I heard that there was a bumper crop in 2004. In 2003, when the harvest was poor in Z village, the women of Z village went out to gather the fruit in Ngato Ancien village, the neighboring village with a good harvest. Perhaps, if a larger area of several villages were considered, it may be possible to expect a reasonable harvest of *I. gabonensis* every year.

Another important foodstuff utilized during the forest stay is *Panda oleosa*. All the Baka memorize the location of the *P. oleosa* trees. On the way to the forest camp, they gather and eat *P. oleosa* when they rest. Fresh and rotten fruit and bare seeds are found scattered at the foot of the *P. oleosa* tree. Those bare seeds are crushed with machete or axes, and the extracted kernel is eaten raw, or sometimes roasted. The seasonality of the ripening of the fruit is weak, and the kernel kept in the seed can be eaten even after a fair amount of time. As such, it is a heavily-favored light snack. The kernels of *I. excelsa* and *I. robur*, which are congeneric with *I. gabonensis*, are also eaten roasted, not raw. In addition, the Baka consume insects found on particular species of trees. During the study period, Lepidoptera (butterflies and moths) and beetle larvae were gathered by the Baka from five species of trees (Table 3).

In the major rainy season from mid-August until November, no data on the Baka diet in the forest camps are available for the moment, but wild food sources derived from the forest will be the same as those during the minor rainy season, i.e. mainly honey and perennial yams. In addition, in a good year with a large crop, *I. gabonensis* fallen during the *Irvingia* season can still be harvested later. Also, the types of wild yams that can be harvested in large quantities in the dry season become available for harvesting.

Table 3. Produces of wild plants harvested by the Baka during the survey period ^a

Harvest season	Baka name	Latin name	Familiy	Major edible parts
Minor rainy season	mòngamba	<i>Dichostemma glaucescens</i>	Euphorbiaceae	Nectar
	pekè	<i>Irvingia gabonensis</i>	Irvingiaceae	Nectar
	góngu	<i>Antrocaryon klaineianum</i>	Anacardiaceae	Pulp
	ngóyo	<i>Trichoscypha oddonii</i>	Anacardiaceae	Pulp
	ngbé	<i>Anonidium mannii</i>	Annonaceae	Pulp
	kaso	<i>Tetracarpidium conophorum</i>	Euphorbiaceae	Kernel
	ngele	<i>Pterocarpus soyauxii</i>	Faboideae	Nectar
	ngimbà	<i>Afrostryax lepidophyllus</i>	Huaceae	Kernel
	pekè	<i>Irvingia gabonensis</i>	Irvingiaceae	Pulp, kernel, oil
	sòlìà	<i>Irvingia grandifolia</i>	Irvingiaceae	Kernel
	bòkòkò	<i>Klainedoxa gabonensis</i>	Irvingiaceae	Kernel
	bòyo	<i>Entandrophragma cylindricum</i>	Meliaceae	Lepidoptera larvae
	bàmbà / sáa	<i>Albizia adianthifolia</i>	Mimosoideae	Nectar
	ngàta	<i>Myrianthus arboreus</i>	Moraceae	Pulp
Major rainy season	mòse	<i>Sarcocephalus pobeguini</i>	Rubiaceae	Pulp
	tokombòli	<i>Chytranthus atrovioleaceus</i>	Sapindaceae	Kernel
	màdè	<i>Baillonella toxisperma</i>	Sapotaceae	Pulp, oil
	bámbu	<i>Chrysophyllum lacourtianum</i>	Sapotaceae	Pulp
	ligó	<i>Cola acuminata</i>	Sterculiaceae	Kernel
	njìyi	<i>Aframomum albioviolaceum</i>	Zingiberaceae	Pulp
	monjumbe	unidentified vine		Nectar
	mbalaka	<i>Pentaclethra macrophylla</i>	Mimosoideae	Nectar
	kúlò	<i>Ceiba pentandra</i>	Bombacaceae	Nectar
	mbàndà	<i>Erythrophleum suaveolens</i>	Caesalpinioideae	Nectar
	sapà	<i>Dioscorea praeensis</i>	Dioscoreaceae	Tuber
	²èsùmà	<i>Dioscorea semperflorens</i>	Dioscoreaceae	Tuber
	góbò	<i>Ricinodendron heudelotii</i>	Euphorbiaceae	Kernel
	payo	<i>Irvingia excelsa</i>	Irvingiaceae	Kernel
Dry season	kòmbèlè	<i>Irvingia robur</i>	Irvingiaceae	Kernel
	káàngà	<i>Entandrophragma candollei</i>	Meliaceae	Lepidoptera larvae
	gbàdò	<i>Triplochiton scleroxylon</i>	Sterculiaceae	Lepidoptera larvae
	kòkò	<i>Gnetum africanum</i>	Gnetaceae	Leaves
	ngbí	<i>Dioscoreophyllum volkensii</i>	Menispermaceae	Tuber, pulp
	kanà	<i>Panda oleosa</i>	Pandaceae	Kernel
	ba	<i>Dioscorea Mangelotiana</i>	Dioscoreaceae	Tuber
	kéke	<i>Dioscorea burkilliana</i>	Dioscoreaceae	Tuber
	kuku	<i>Dioscorea minutiflora</i>	Dioscoreaceae	Tuber
	balòkò	<i>Dioscorea smilacifolia</i>	Dioscoreaceae	Tuber
	njàkàkà	<i>Dioscorea</i> sp.	Dioscoreaceae	Tuber
	pèke	<i>Raphia</i> spp.	Arecaceae	Sap, beetle larvae
	mbilà	<i>Elaeis guineensis</i>	Arecaceae	Pulp, kernel, sap, beetle larvae

^a Aside from this list, there are tens of species of wild plants that the Baka use for food. See Hattori (2008).



Fig. 8. A woman harvesting about 15 kg of *Dioscorea semperflorens* at one of the gathering sites. Five or more women can gather the same volume of annual yams in the vicinity.

IV. Annual Yams

Molongo is a large scale forest life in which approximately 100 individuals, or 10 to 20 households, go out deep into a forest over 40 km from Z village (Yasuoka, 2006a; 2009a). *Molongo* can be divided into two major periods. In the first half, the Baka lead a nomadic lifestyle staying in one camp for several days or a week each. As mentioned above, during this period, honey and perennial wild yams such as *D. mangelotiana* and *D. burkilliana* are much consumed. After several weeks of life on the move, they finally arrive at a location around 40 km from the village (Fig.4). There the people stay for several weeks or a few months in a single camp. In this second half, the long-stay period of *molongo*, the Baka consume plenty of wild yams.

Depending on the annual yams, diet in the *molongo* life is ampler than that in the farming camp, at least from the point of view of calorie supply. During the long-stay period that occurred in 2005, there was a calorie intake of 2,773 kcal per adult-consumption per day, out of which 62% was provided by annual yams, 17% by bushmeat, and 16% by honey (Table 2). The Baka say they prefer wild yams to bananas. Furthermore, bushmeat and honey certainly make

their diet in the forest more desirable for the Baka.

During the *molongo*, the Baka eat much *D. praehensilis* and *D. semperflorens*, which renew stems every year (Fig. 8). As these renew stems in a one-year cycle (Dounias, 1993; 2001; Hamon et al., 1995; McKey et al., 1998; Yasuoka, 2009a), I refer to these types of wild yams as “annual yams.” Tubers of annual yams concurrently enlarge and shrink with changes in the seasons. When the rainy season begins, the annual yams grow their stems using the starch stored in the tuber. In the process, their leaves spread for photosynthesis. The starch created during photosynthesis is stored once more in the tuber. Then, when the dry season begins, the parts above the ground dry out. Therefore, from the end of rainy season up through the dry season, the annual yams can be harvested in large quantities. Conversely, harvesting is mostly not worthwhile during the rainy season,

The annual yams are concentrated in patches (Yasuoka, 2009a). This is another contrasting point between the annual yam and the perennial yam. If one goes to where annual yams grow during a given time, one can expect to harvest a reasonable amount. One woman may harvest as much as 30 kg of tubers in one day. This explains why the people of Z village travel far from the village in large group.

The annual yams usually grow under the gaps in the forest canopy (Yasuoka, 2009a). One may assume that the rainforest is characterized by thick vegetation of several canopy layers that obscure the sky and a dark forest floor with little underbrush. However, taking a walk through the forest, one notices the presence of numerous gaps created by tall trees that fell taking the surrounding trees down with them. Here, because the sun penetrates down close to the surface, the underbrush grows. The annual yams often are found in this kind of environment.

But, annual yams appear to have a weak dispersion capability compared to the typical pioneer plant, which vigorously grow under the canopy gaps (Yasuoka, 2009a). The seeds of pioneer plants are taken up by the wind and carried far away. As they grow quickly, they penetrate newly created gaps one after the other. The annual yams are distributed only in select areas of the gaps, even though gaps exist far and wide across the forest. Within a range of tens of kilometers heading from the village to the *molongo* long-stay area, there are few patches of annual yams. Therefore, the annual yam seems to be comparatively uncompetitive within the canopy gaps made under natural conditions.

Given this, how did the yams come to be greatly distributed in select areas visited during *molongo*? The annual yams gathered during *molongo* might be the result of those that were once planted by cultivators. In fact, in a map issued in 1910, the area of the current *molongo* camps is labeled with the name of an ethnic group alongside marks denoting the settlement (Yasuoka, 2009a). The ethnic-group name shows one of the Bantu-speaking cultivators, but not the Baka.

However, this possibility is small, because cultivators in these regions regard the wild yams to be barbaric food, and seldom eat them except when they feel hunger in forest camps (Oishi, 2010)⁽¹¹⁾. Still, even assuming that the yams were



Fig. 9. A woman taking a head of *Dioscorea praehensilis* tuber for transplanting in her field in the settlement.

not intentionally planted, the cultivators may have affected the distribution of the annual yams by clearing the forest and making fields. It is possible that the annual yams spread deep into the forest crossing through the large canopy gaps from fields and settlements made by humans.

In addition, there is the possibility that the Baka themselves have been involved in the spread of annual yams. After the Baka gather annual yams, they rebury the stump of the tuber with the stem attached, leaving a certain amount of tuber⁽¹²⁾. Through this act, they intentionally take care not to kill off the plant body so that they can gather in the same location again (Dounias, 2001). Additionally, I observed that, upon return from *molongo*, they brought back yam heads to the village and planted in a field (Fig. 9). Although it is not known since when the Baka started to carry out this kind of activity, the availability of the annual yam may have increased under such human influences.

Whichever is the case, the annual yam can be regarded as “ruderal plant,” which is easy to grow in an environment that has been artificially disrupted⁽¹³⁾. Although the annual yam has not been full-domesticated under the intentional control that accompanies the artificial accumulation of genetic mutation, its distribution has probably expanded under the indirect, loose involvement of human beings.

DIVERSIFICATION OF RESOURCE USE WITHIN THE GRADATION OF “SEMI-DOMESTICATION”

Based on the above observations on Baka food resource use, I attempt to argue that the adoption of banana cultivation among the Baka is a form of resource usage diversification within the gradation of “semi-domestication.” In some literature, “semi-domestication” is regarded as a stage in the historical process of the transition from gathering to cultivation. I attach importance to it as a contemporary form of resource usage varied between pure gathering and full cultivation, as Miyauchi (2009) noted. These varieties can be positioned on a multi-dimensional field of the gradation of “semi-domestication” with plural axes, such as the degree of spatial concentration of the resource, the seasonal fluctuation of the availability, the timing of required labor input, the certainty of the return, the involvement in reproducing the resource, and the unit of the resource in perception and management (Table 4).

Even in this view, the Baka use of honey and perennial yams is close to the general image of gathering. As shown in Table 4, honey and perennial yams are dispersed in the forest, and are gathered one by one whenever they are looked for. Although the amount of stored honey fluctuates seasonally, honey as well as perennial yams can be consumed throughout the year. Labor input is needed only just before eating, namely, exploring, climbing or cutting down trees with the beehive, or digging out the yams. But the return is uncertain. Sometimes nothing is available in the area, sometimes no honey is found in the beehive, and sometimes no edible part is on the tuber. For some involvement in the reproduction of resource, the Baka rebury the stump of the tuber of perennial yams on occasion.

The use of annual yams, as well as fruits of *I. gabonensis* and *B. toxisperma*, can be considered closer in the gradation to cultivation than honey and perennial yams. The annual yams are distributed about the forest in patch-like concentrations, and the seasonality of their availability is much higher. With knowledge as to the fruiting situation, it is possible to acquire a considerable harvest in the same locations again and again. As much as 30 kg of both these yams and fruits can be gathered a day, so it is tough to carry them to the camp. Annual yams are consumed soon after the labor input, whereas oil extract from the fruits are stored until several months later.

Intentional “semi-domestication” activities can be cited as a characteristic usage of annual yams in particular. When gathering annual yams, the Baka take care to ensure that the plant does not die, by reburying the head of the tuber in the soil (Dounias, 2001). Also, on occasion, the head of the tuber may be brought back to the settlement and transplanted. For *I. gabonensis* and *B. toxisperma*, similar kinds of intentional involvement in sustaining these resources are not apparent. However, a possibility exists that the Baka are indirectly contributing to scattering the seeds for these trees, for example, by unintentionally dropping the harvested fruits and seeds from their baskets.

The Baka use of banana can be considered much closer in the gradation to cultivation. Intensive labor input for clearing the forests is needed 1.5 to 2 years

Table 4. Characteristics of major food plant resources used by the Baka, compared with Bangandou banana cultivation

	Food resource	Distribution pattern	Seasonal fluctuation of availability	Timing of labor	Certainty of return	Involvement in reproduction	Unit of perception and management
Baka	Honey	Dispersed over the forest	Medium	Just before eating	Uncertain, depends on chance	None	A hive
	Perennial yam ^a	Dispersed over the forest	Low	Just before eating	Uncertain, depends on chance	Reburying a part of tuber on occasion	An individual
	Annual yam ^b	Patches in relatively limited areas	High	Just before eating	Certain, when available	Reburying & transplanting a part of tuber	A patch
	<i>I. gabonensis</i> fruit	Patches in forest	High	A few months before eating	Certain, when available	Possibly dispersing seeds	A tree
Bangandou cultivator ^c	Banana	Concentrated around the settlement	Low, if well managed	1.5–2 years in advance of eating	Certain, when available	Making habitat, transplanting suckers	The field as a whole, with not too much care for the individual plant
	Banana	Concentrated around the settlement	Low	1.5–2 years in advance of eating	Certain, year-round	Making habitat, transplanting suckers	Each individual plant

^a The perennial yams are mostly *Dioscorea mangelotiana* and *D. burkilliana*.^b The annual yams are *D. praehensilis* and *D. semperflorens*.^c Characteristics of the Bangandou was obtained from Shikata (2004).

before the first harvest. But, we should note the difference between banana cultivation by the Baka and the cultivators'. When compared to the banana cultivation practices of the neighboring cultivators, there are many aspects of the Baka practice that appear to be incomplete. When the cultivators plant bananas, they adjust the number of plants by calculating backwards from the time of harvest, in order to achieve continuous daily harvest throughout the year. As a result, one woman handles several thousand individual bananas (Shikata, 2004). On the contrary, the Baka do not seem to be concerned with continuous year-round harvests at all. It is not necessary for them to put continuous effort into managing the fields to keep year-round harvests, because they can go to the forest when bananas are little available. In light of this point, a banana field is not so functionally different from the annual yam and *I. gabonensis* gathering patches for the Baka. At least, I cannot find a definitive discontinuity between the Baka's banana cultivation and other resource uses⁽¹⁴⁾.

Life today for the Baka in Z village is a mixture of three major modes of life: a life in the settlement or farming camp centered on cultivation of banana, a life in the ordinary forest camp centered on gathering honey, perennial yams, and wild fruits, occasionally bananas from the fields, and a *molongo* life centered on the use of annual yams. It should be noted that the settlement life and the *molongo* life do not have a seasonal, complementary relationship, but rather, they exist side-by-side as options in the same season. The season suitable for clearing the fields is the dry season, which is also the season for harvesting the annual yam. The same can be said for the settlement life and the ordinary forest camp life. The Baka choose between staying around the settlement or in the forest camp, depending on factors such as the conditions of the produce in the fields and the forest, social relationships with other peoples, business with traders, or mere whim.

One may jump to the conclusion that this kind of mixture of hunting-and-gathering and cultivation is just a fledgling agricultural life. Such an idea prejudices that: (1) the subsistence practices respectively involved with the gathering of wild foodstuffs and cultivation of crops are based on completely different forms of human-to-nature relationships, and (2) intermediate practices between the two will eventually converge into cultivation. However, what I have shown above seems to deny these prejudices. Baka banana cultivation can be regarded as a diversification of resource use within practices adopted in their life. Their resource use as a whole does not seem to be changing dynamically, but rather is in equilibrium.

The present state can be stable. Lacking the methodical cultivation of the cultivators does not necessarily mean that the Baka state of resource use is at a midway in transition toward eventual full cultivation. Even if it changes, the direction of change in the Baka resource usage cannot be decided a priori. The usage of a certain resource can move toward pure gathering within the gradation of "semi-domestication," for example, due to an introduction of useful plants from the outside (Matsui, 1989). I stress again that just because the Baka added the cultivation of banana to their subsistence repertoire, it cannot be concluded that they will soon make the transition to becoming agriculturalists.

TO BECOME AGRICULTURALISTS

In adopting the above perspective, a new question has to be asked: what is necessary, in addition to domesticating plants, in the transition to becoming agriculturalists? As I pointed out at the beginning of the paper, the repertoires of subsistence activities of the Baka and the cultivators largely overlap. Then, what difference is there between them?

First of all, it should be noted that there are two dimensions to resource use: one is the human-to-nature relationship, another is the human-to-human relationship. The biological nature of a particular food resource cannot solely determine whether the usage of that food resource falls under full cultivation or pure gathering. Even human-to-nature relationships, some of which are shown in Table 4, cannot determine this. To attempt answering the above question, I focus on the human-to-human relationships that surround the resource, such as the legitimating the resource use, the organizing labor to acquiring the resource, and the distribution of the resource.

In previous research, Ichikawa (1982) pointed out that an economic division of labor relationship with neighboring cultivators is the reason for agriculture not taking root among Pygmy hunter-gatherers until recent years. The Pygmies provide bushmeat, honey and labor. The cultivators provide crops, alcohol, and iron tools. Also, Kitanishi (2003) considered the Baka social norms of food sharing and tolerance of theft of crops, along with the instruction, or coercion, of the government, to be the possible major reasons why banana cultivation became widespread among them. When only one person begins farming, the value that could be obtained by an individual inputting labor would be extremely small due to sharing and stealing. But, would all the Baka uniformly begin to cultivate crops under coercion by the government? Both these arguments focus on the human-to-human relationship, and indicate important factors toward understanding the reasons why the Pygmies remained hunter-gatherers until recent years.

However, in my opinion, these arguments seem to put too much significance on the adoption of cultivation among the Pygmies as a radical shift in their subsistence. Banana cultivation, in fact, requires intensive labor input in advance, and one may think this point substantially distinguishes banana cultivation from the use of forest products⁽¹⁵⁾. But, it is not obvious whether the Baka themselves also consider this difference important. Rather, in the practical life of the Baka, that difference does not seem to have a significant meaning. I think this is the very point that differentiates Baka banana cultivation from that of the agriculturalists. Phrased differently, attaching significance to the labor input that precedes the harvest is essential to being an agriculturalist community. The probability of this idea shall be demonstrated fully elsewhere. Instead, I will describe here some anecdotes for basing future research.

In February 2005, I surveyed the fields of the Baka in Z village. In a certain field cleared about three years before, I asked the man who did the work about the harvest. He said that he had not harvested this field. It turns out that the produce had been eaten while he stayed at the forest camp. When pans or

machetes go missing, with a look of disgust, the Baka often assign blame to cultivators or merchants. So, I asked him if the produce had been eaten by the cultivators, he responded, "No, the Baka!" At that moment, his behavior suggested a kind of anger, and he seemed not to know where to direct it.

Also, when a certain Baka woman seemed to have harvested some bananas, I asked her the location of the field she had harvested. The woman pointed vaguely, and said that it was from fields in that area. But I knew that her fields were not in that direction, I continued asking whose fields she had harvested from. She flashed an embarrassed smile and became so tongue-tied that she found it difficult to answer. Afterwards, when I tried asking her when she was alone, it turned out that the bananas were from her brother's field. She had taken them from a field managed by her brother's wife.

As the two examples suggest, it is not rare to "gather" from somebody else's field among the Baka. I often heard of instances of bananas being eaten by other people while the owners were staying at the forest camp. I myself have accompanied Baka when they "gathered" bananas. However, this does not mean a consensus exists that it is acceptable to "gather" from someone else's field. As suggested by the second anecdote, even when the field belongs to a brother, having taken produce from another's field is not the kind of behavior that can be declared with one's head held high. What is important here is that no conventional rule or logic exists for the purpose of condemning those acts. The "gathering" carries some sort of negative implications, but the ethical imperative that distinguishes "theft" from "gathering" is not clear, leaving the Baka unable to condemn the people that "gather" produce from fields not their own. If a Baka saw someone in the act of "gathering" in his field, perhaps, he would not know what kind of attitude to take towards the "gatherer."

In regard to this point, the agriculturalists seem to be clear. The constituent members of the agriculturalist community accord a causal relationship between labor input and ownership of the crops⁽¹⁶⁾. An agriculturalist is often pressed to give away the produce in reciprocation, in cases of mutual labor exchange or wage labor. Even in these cases, labor is organized on the principle that one's labor should ensure the possession of its fruits. Therefore, when one's produce is taken away from the field, anger is expressed in public at the theft, and the perpetrators will be fined.

On the contrary, among the Baka, an individual's labor input is not directly linked to the ownership of the crop. Consider the case of gathering honey. Among them, the "owner" of the gathered honey is the person who discovered the hive. In order to harvest the honey, it is necessary to climb or cut down the tree. In either case, the "owner," more likely than not, leaves the labor to the others. In February 2003, when I was present at such a gathering effort, a middle-aged man discovered a beehive. Unfortunately, the hive was in a spot that could not be climbed, so two young men cut down the tree. The tree was toppled in about two hours, after which the honey was extracted. Finally at the time to eat, the men who cut the tree down joined in the ring of "recipients" to take part in eating the honey, together with the approximately ten people who were with them (Fig. 10).



Fig. 10. Sharing of honey. Two bare men cut the tree down with two hours of labor, but they receive the fruits of their labor from the “owner.”

Where was the compensation for the two hours of hard labor? One possible way of interpreting this case is that by rotating the harvesting labor, roughly everybody will have put in hard labor in the long run. However, I focus on the point that the discoverer, i.e. the “owner,” deliberately avoided doing any labor himself, and that the two men gained nothing more special than the others. Through this attitude, the Baka create a situation in which the “ownership” is not at all linked to the labor input.

Concerning the process of food sharing of the Aka hunter-gatherers who live in the Republic of Congo, Kitanishi (2001) analyzed a wealth of examples and indicated that the “owner” of foodstuffs in the Aka community is not granted the right to freely deal with the foodstuffs, but is expected to act in the capacity of ensuring distribution. In the case of food obtained by hunting or gathering, someone is always given “ownership” based on defined rules. The foodstuffs, through multiple distributions, flow among the people staying in the camp. Then, in the event of such a distribution, the range of choices accorded to the “owner” is narrow. The point is that the foodstuffs are shared among the people present at the camp, and in order to do this, the “owner” is a person “responsible for distribution,” ensuring that the process goes smoothly.

The concept of the “owner” is seen in the same way among the Baka. In

the honey case mentioned above, the “owner” distributed the honey to everyone there. The question of who did the labor does not matter. Everyone present knows who actually did the labor, and of course who discovered the hive. But, for the Baka, knowing that is not equivalent to acknowledging privileged ownership by the persons who conducted the labor⁽¹⁷⁾.

Of course, the honey and the banana are different from each other. In banana cultivation, labor input will bring its results with a high degree of certainty. Whether they acknowledge it or not, the Baka perceive the fact that banana grows in all probability after intensive labor inputs in a field. Banana cultivation thus has the potential to make the Baka recognize the causal relationship between labor input and ownership of its results. Actually, on an individual basis, there are Baka who are dissatisfied with the loose causal relationship between labor and ownership. In Z village, a certain man received ritual medicine from a cultivator he was acquainted with to defend against “theft,” and placed it in his own fields.

This kind of behavior is, however, regarded as Bantu-like behavior, and is the target of scorn among the Baka. Contrary to his attitude, the majority of the Baka avoid being regarded as if they have the intention of exclusive possession of the produce. They certainly recognize that labor brings fruits. So, the “owner” of the above case of honey deliberately avoided being eager to put in his labor, in order to deny the link between labor input and “ownership” of its fruits. In other words, the link between the labor and its fruits is perceived, but the causal relationship between the labor and the “ownership” of its fruits is not acknowledged⁽¹⁸⁾.

The point is, when someone insists on the ownership of the produces of his labor, this behavior is not regarded as normal or favorable in the Baka community. Conversely, when most Baka begin to feel that the causal relationship between labor input and ownership of its fruits is reasonable and legitimate, the community may be recognized as being on the definitive step to becoming an agriculturalist community⁽¹⁹⁾.

CONCLUSION

The Baka hunter-gatherers, today, cultivate agricultural crops, as well as gather wild plants. One might interpret today's Baka resource usage as being at an immature stage leading to fully becoming agriculturalists. However I doubt this interpretation. Rather, the adoption of banana cultivation by the Baka can be recognized as a diversification of resource usage within the gradation of “semi-domestication.” The Baka do not seem to have the agricultural sense of planned, continuous, year-round produce, to which the cultivators attach importance. For the Baka, their own fields are not necessarily places that they can expect to always obtain foodstuff from. These facts have encouraged me to suppose that the Baka consider agricultural fields to be little different to wild food gathering patches.

I hypothesize that when most Baka begin to acknowledge the causal

relationship between labor input and ownership of its fruits, the community can be recognized as being on the definitive step to an agriculturalist community. However, this change is not inevitable. In the tropical rainforest where the vegetation is very vigorous, both human-to-nature and human-to-human relationships concerning resource use, even in the case for the major food resources, seem to be able to remain at a looser state that can be termed “semi-domestication⁽²⁰⁾.” The Baka in Z village still live outside the scope of the agriculturalists, using various “semi-domesticated” resources as they deem fit at the time. Regardless of efforts they put into making their fields, they interrupt their work in the field and move to forest camps with great ease. In their livelihood, banana cultivation has simply been assimilated as a part of their subsistence practices adopted as they continue to be “hunter-gatherers,” or “semi-domesticators,” who lack a rigid logic linking labor input and ownership, or at least this relationship is little legitimate. While a day may come when the Baka will be full agriculturalists, any transition will be a longer way off than anybody can estimate.

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NOTES

- (1) Depending on the region, some Baka, as do the “cultivators,” make distilled liquor (Kagari Shikata, private correspondence) and even grow cocoa (Kitanishi, 2003). Even though these people remain a minority, they deserve to be noticed when we try to understand the full scope of Baka subsistence and its change under influence from the outer world, such as the state and market. In this paper, my focus is more on the core nature of the difference between the Baka subsistence and that of cultivators.
- (2) In this paper, I distinguish “agriculturalist” from “cultivator.” The latter refers to a real, observable people who can be labeled “generalists” or “multi-subsistence people,” whereas the former refers to an ideal, abstract representation of people of which lifestyle is constructed totally based on agriculture. Consequently, a given cultivator group is not always an ideal agriculturalist community.
- (3) The Baka do not particularly distinguish between the major rainy season and the minor rainy season, but the difference between them can be noted by the large increase in the flow of rivers in the major rainy season, due to the cumulative rainfall.
- (4) Married Baka men in Z village work as a service to their wives’ parents, but they do not hire other Baka for agricultural work, nor organize mutual labor exchange. In other areas, hiring other Baka men for agricultural work and mutual labor exchange has been observed, although not often (Kitanishi, 2006).
- (5) Once the banana ripen and considered ready for harvest, the Bangandou harvest them

- within one to two weeks (Shikata, 2004).
- (6) Oil palms were probably introduced by the neighboring cultivators and still grow around the settlement.
 - (7) According to Hanawa (1996), among the Bantu-speaking cultivators in eastern Congo, a large part of the calorie intake for a certain number of people is from palm wine.
 - (8) The main purpose of this kind of camp is often snare hunting, however the Baka also engage in bail out fishing in small rivers in the dry season, and collect forest products such as *Irvingia* nuts in the *Irvingia* season. Here I focus on the use of vegetative foodstuff. For snare hunting, see Yasuoka (2006b).
 - (9) The honey yield is large in the rainy season when the majority of nectar source flowers blossom and bear fruit. Seasonality is weak for perennial yams, although they may produce a greater yield in the dry season.
 - (10) According to my preliminary estimation, 20 kg of *I. gabonensis* fruits yield 1 kg of kernels, with 5,360 kcal (6,700 kcal/kg $\times$ 0.8 [edible ratio]), and 10 kg of *B. toxisperma* seeds yield 1.5 kg of oil with 13,500 kcal (9,000 kcal/kg).
 - (11) I heard during the fieldwork that three Konabembe cultivators in a certain village in this region died due to eating poisonous species of *Dioscorea*. This accident implies that Bantu-speaking cultivators are not always familiar with wild yams.
 - (12) Dounias (2001) pointed out the existence of ownership and inheritance of individual yams, the existence of penalties for stealing, and function of tubers as a bride wealth. He used the term, "para-cultivation," for these practices. The reason he used this term rather than "proto-cultivation" is that since the Baka do not transplant the yam to the fields and keep it in the original environment, these methods employed by the Baka will not evolve into agricultural practices.
 - (13) Currently, there are not many clustered areas of annual yams around Z village. This may be due to the fact that the settlement is becoming increasingly cluttered with its population increasing. Should the number of annual yams begin to increase near the settlement, they would immediately succumb to excessive pressure from gathering and become depleted. Rather, areas dozens of kilometers away from the settlement may be suitable for the Baka annual yam use.
 - (14) In the African rainforest, cassava is a typical crop along with bananas. Because cassava can be "stored" for a long time left in the soil and not harvested (Sato, 1984), it is not necessary to manage the harvest period for each individual piece as with the banana. However, among the Baka, cassava is not cultivated as much as bananas. Why the Baka do not use cassava, which does not require precise cultivation management, as their main crop is an interesting question.
 - (15) This kind of time lag between labor and benefit is not only found in agriculture. J. Woodburn classified the hunter-gatherer societies using the concepts of immediate return and delayed return systems. There exists time lag between labor and benefits for hunter-gatherer societies with the latter system (Woodburn, 1982).
 - (16) Actually, the division of roles within the family does exist, where the husband clears the forest and the wife plants, manages and harvests the crops, but this deviates from the paper.
 - (17) As this shows, the Baka acknowledge an "owner" of the resource. For example, the Baka occasionally stand a twig of *Entandrophragma angolense* (*kaki* in Baka, homophone with "flash of lightning") on the reburied tuber of the annual yam. They say that when someone else attempts to harvest it, lightning will strike her or him. In this case "ownership" is actually linked to the person who first dug the tuber and reburied it. But, it should be noted that this link concerns not the labor input, but the fact that she/he found it.

- (18) Tanno (2004) described an interesting anecdote that indicates different attitudes towards the “labor” between the Aka hunter-gatherers and their neighboring Bantu people in northern Congo. The Aka often take crops from neighboring Bantu people’s fields. The Bantu accuse the Aka of theft. However, the Aka never consent to the Bantu’s logic of accusation, although the Aka show signs of apologies for the act. One day, an Aka grumbled at Tanno about the logic of the Bantu. He insisted that he had merely harvested the field where he had worked for the Bantu. He knows, of course, the Bantu never consent to this logic. The Bantu will say that he has already paid for the labor, and therefore the act of the Aka is nothing but a theft.
- In this case, I interpret, both of them acknowledge that the Aka worked in the field, but the concept of “labor” (or “work”) is different between them. The Bantu thinks the “labor” of the Aka can be offset by paying or giving some commodities, whereas the Aka do not think so. The Aka take crops from the fields where they worked, not because of a shortage of payment, but because of the fact they worked there. This anecdote clearly shows that the Aka do not think the “labor” can be completely compensated with payment, whereas the Bantu think it is possible.
- (19) Conversely, once more, when some plant resource becomes fully domesticated under the intentional control for the artificial accumulation of genetic mutations, we might suppose that the human-to-human relationship in the community had changed in advance.
- (20) This paper focuses on “semi-domestication” by the Baka, but it should be noted that “semi-domestication” by the cultivators can also be widely seen (Hanawa, 2002; Komatsu, 2011).

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