

Information

Banana Farming, Cultivars, Uses, and Marketing of Nkore in Southwestern Uganda

Yasuaki SATO^{1,*}, Kaori KOMATSU², Koichi KITANISHI³,
Kagari SHIKATA-YASUOKA⁴, and Shingo ODANI⁵

¹ Faculty of Design Technology, Osaka Sangyo University, 3-1-1, Nakagaito, Daito 574-8530, Japan

² Faculty of Humanities, Hokkai-Gakuen University, 1-40-4, Asahimachi, Toyohira, Sapporo 062-8605, Japan

³ Faculty of Global and Science Studies, Yamaguchi University, 1677-1, Yoshida, Yamaguchi 753-8541, Japan

⁴ The Center for African Area Studies, Kyoto University, 46 Yoshida-Shimoadachi, Sakyo, Kyoto 606-8501, Japan

⁵ Faculty of Letters, Chiba University, 1-33, Yayoi, Inage, Chiba 263-8522, Japan

Key words: East African highland bananas, Farming system, Dietary habitat, Commercialization

Introduction

Small scale banana cultivation for self-consumption and domestic market use yields almost half of banana production of the world (Arias *et al.*, 2003). These bananas are more frequently cooked as staple food and snack, and used for brewing than eaten in the raw form. Each banana farming area has developed a unique set of cultivars¹⁾, cropping systems, and uses of bananas.

Humid zones in the southern part of Uganda²⁾, as well as Rwanda and western part of Tanzania, are famous areas for farming unique banana cultivar subgroup called ‘the East African highland bananas’ (AAA-EA). As a conventional cropping system, it has extremely high productivity and supports local people in areas with one of the highest population density in Africa. However, in Uganda with population migration, land shortage, and pest and disease prevalence, areas that produced and supplied bananas to urban areas have drastically changed in the last half century.

This paper reports the current situation of banana-based livelihood system of Nkore, formerly agro-pastoralists in Southwestern Uganda, presently the main banana producing area in Uganda. We describe their farming system, cultivars, uses, and distribution of bananas.

Banana Farming in Uganda

Bananas have some genome groups by combination

of their ancestral wild bananas, *Musa acuminata* (AA) and *Musa balbisiana* (BB). There are genome groups such as AA, AB, AAA, AAB, ABB and AAAA in the world. In Africa, De Langhe *et al.* (1994) classified three banana farming areas mainly based on the genome groups and these geographical distribution. Uganda is included in ‘the East African highland AAA’ area in the highlands (900-2,000m elevation) of Uganda, Rwanda, Burundi, eastern part of the Democratic Republic of Congo, north-western part of Tanzania, and western part of Kenya. It is named after characteristic cultivars with AAA genome group (AAA-EA) which represents 78% of bananas cultivated in these areas according to the estimation (Karamura *et al.*, 2012). This area is also the secondary centers of the diversity of banana cultivars, with Uganda being the core. They have two principal uses: steamed and mashed bananas (staple food), and beverage (beer). In the area, intensive farming of bananas near home-steads supplies staple food and cash income for the local people, as the area has one of the highest population densities in Africa (Karamura *et al.*, 2012).

In Uganda, banana trading had begun by 1870s (Kingdom era), and expanded rapidly between the 1940s and 1950s without control by colonial government. From the late 1970s, most farmers in southern Uganda resorted to growing and marketing bananas, sweet potatoes, cassava, and maize instead of coffee and cotton whose exports collapsed. Banana trade has evolved and developed after the liberalization of the Ugandan economy in 1993 (Dezi Sebu Ngambeki, *personal communication*).

Banana producing areas kept changing. Central Uganda (most population is Ganda people), which was the main production area in the early 1960s, has lost traction since the 1970s because of decrease in labor

Communicated by N. Kurauchi

Received Dec. 21, 2017

Accepted Apr. 9, 2018

* Corresponding author

sato@est.osaka-sandai.ac.jp

force, increased incidence of pests and diseases, and soil degradation. On the other hand, banana production in Southwestern Uganda rapidly increased. Population growth in Kampala encouraged banana production and shipment in southwestern Uganda (Gold *et al.*, 1999; Gold *et al.*, 2002; Yoshida, 2008).

The national average yield of bananas in Uganda is estimated to around 12 t/ha., and the yields in various areas have large differences between production systems. At subsistence level, it is estimated 5 to 17 tons per ha (Kalyebara *et al.*, 2007). The study area seems in the relatively high productivity system.

Study Area and Methods

Methods

A field research was conducted at Kagyevo village, Kebisoni Sub-County, Rukungiri District in August 2016 (Fig. 1). An additional research was conducted there in February 2018.

We observed land use in the study area, including banana gardens. Quadrat sampling was conducted in a farmer's garden to assess the arrangement of crops and cultivars of bananas. We interviewed farmers about banana cultivars and other crops, farming system practices, and cooking and utilization of bananas for other purposes in the village. We also enquired of farmers about historical background of the village and their farming practices. Observations and interviews were examined at banana markets near the village, too.

Present Situation of the Study Area

The Kebisoni Sub-County, belonging to Rukungiri

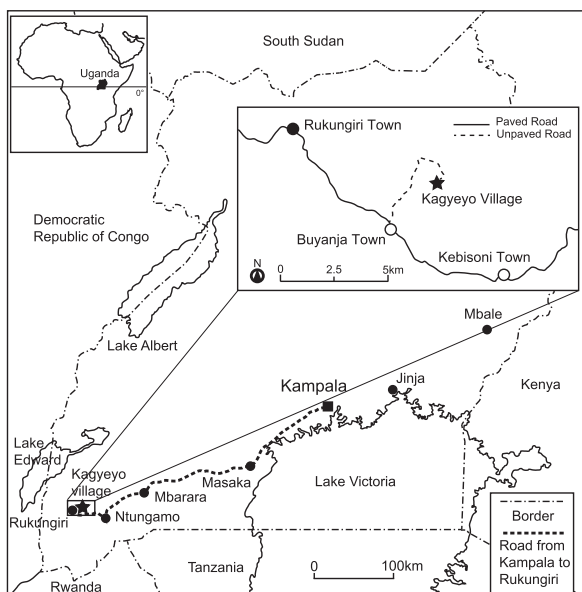


Fig. 1. Research area.

District is 79.2 km² in area with a population of 27,600, which has a very high population density of 348.5 persons/km². Annual population growth rate of Rukungiri District is 1.5 %. The average household size is 4.9 in Rukungiri District (Rukungiri District, 2014). Kagyevo village is located approximately 6 km southeast from Rukungiri town, the district headquarter. The village consisted of 94 households at the research period.

Topography of the Rukungiri District is characterized by undulating hills, with steep slopes and V-shaped valleys. The mean annual rainfall ranges between 700-1,200 mm. The daily average temperatures of the district range between 15-20 °C (Rukungiri District, 2014).

Ethnic groups in Rukungiri District include Banyankore (referred as Nkore in this paper), Bahororo, Bakiga, Banyarwanda, Baganda (referred as Ganda in this paper), etc. Languages mainly used in the district are Runyankore and Rukiga, both belong to Bantu language (Rukungiri District, 2014). Nkore consists of two groups: Bairu farmers who are the majority, and Bahima pastoralists who are the minority. Bahimas hold the governing class in the Ankole Kingdom established in the 15th century (Nzira *et al.*, 2011). Farming of cooking bananas was minor and bananas were mainly for making beverages in the 19th century. Banana production for cooking increased gradually from about 1910, and they eventually replaced finger millet as the center of their diet with bananas (Langlands, 1966). In the western periphery of Nkore area, including our research site, it is believed that the officer of Ganda introduced bananas for cooking and beverage for the first time around 1912. In the 1940s, production of cooking banana in Nkore area was rapidly expanded (Langlands, 1966), and the area around the research site was one of the largest banana producing places in mid-century (McMaster, 1962).

At present, bananas have considerable importance in the farming in Nkore area. Banana gardens occupy approximately 40% of the acreage of cultivated areas in the Kebisoni Sub-County. Finger millet, the former main crop, has only 18% of that of bananas (Rukungiri District, 2014).

Farming System and Banana Cultivation

Livelihoods in Kagyevo village consists of farming, especially bananas; poultry and livestock, including breeding of cattle, goats, sheep, and fowl; and silviculture of eucalyptus and pines on a small scale. The main crops for staple food are cooking bananas, root crops such as sweet potatoes, cassavas, Irish potatoes, and cocoyams (*Xanthosoma* sp.), and grains such as finger

millet, sorghum, and maize. Kidney beans, peas, cowpeas, groundnuts, and vegetables are also grown. Coffee (Arabica and Robusta) is a major cash crop.

Farmers categorize their land as plains (*ahatereni*³⁾), valleys (*oruhanga*), and hills (*akatembo*) (Fig. 2). A part of the valleys include swamps (*ekyfunzo*). Houses, banana gardens (*orutokye*), and coffee gardens (*ishamba ryo muani*) are located in the plains, whereas finger millets and sorghums fields (*omosiri*⁴⁾) are part of the valleys. Crops other than bananas are grown at the plains and valleys. In addition, hills are used for pastures (*erisizo*) during rainy seasons or for growing eucalyptus trees (a woodlot or a plantation is called *ishamba ekyibira*). Valleys are also used as pastures during dry seasons.

Although the pastures had been previously common property, they were privatized after 1960. Only a small number of households owned large pastures in 2016, and the farms owned by most of households gradually became smaller. Land shortage caused by population growth was a serious issue. Most people did not have access to woodlots and pastures.

This area has the first dry season from the end of January to March, called *akanda*, the first rainy season from March to mid-May called *katumba*, the second dry season from the end of May to mid-August called *ekyanda*, and the second rainy season from mid-August to November called *eitumba*. Farmers regard early *eitumba* rainy season as an important period for agricultural operations, especially for seeding.

Typical banana gardens are managed for several decades or more, and inherited by the heirs. However, when a yield reduction occurs, either due to degradation of soil fertility, pests or diseases, farmers plow the other parts of their fields or reclaim new lands. Farmers use cow dung for compost, in addition to sheep and goat dung. They sprinkle dried cow dung during the dry season in the banana gardens, but farmers without cattle use ash and food waste. The household of our infor-

mants put cow dung in a bag in the small pond near their house, dissolved it in the water, and spread this water on their garden. Occasionally they sold this water in the village. The household of our informants attempted to dig trenches in their banana garden and put cow dung to improve soil fertility and productivity, as imitating the efforts of farmers in the suburb of Kampala.

As necessary, they plough new banana gardens during a dry season. After that, women start to plant banana suckers at the beginning of the rainy season. Although cattle were used for ploughing in the 1960s, currently they use only hoes. They dig up whole suckers reaching 1-2 m height, cut the leaves off, except for cigar leaves (rolled young leaves), and plant them. At the early stages of banana growth, or if soil fertility is poor (five years after planting bananas), they intercrop beans as well as perennial crops such as cocoyams and coffee trees in the banana gardens. Occasionally they plant cassava as a protective hedge to prevent cattle from entering the farms. They weed twice during a rainy season. At the stage that bunches become large, farmers use a pole supporting banana plants, which is called *echiga*. Most cultivars can be harvested for approximately one year from planting. After harvest, plants are cut and leaves are left in the fields. Although bananas are harvested throughout the year, the yield decreases from September to December. Then it increases in February and is maintained until September. The reasons for seasonal fluctuation can be attributed to less frequent flowering from July to October, and to frequent falling caused by unfavorable windy conditions.

Farmers indicated the pests and diseases of bananas and coffee, land shortage caused by population growth, shortage of wood for firewood and charcoal as their key problems. A severe disease of bananas at Kagyeyo village might be caused by banana bacterial wilt, which had been noticed mostly after 2000 and is spreading all over Uganda. They applied traditional control measures to the banana diseases, which had been used against tree diseases. Some farmers applied ash on the cross section of pseudostem after harvest. Regarding to coffee, pests and diseases have prevailed since 2012, and many coffee trees have withered. We found only a small number of coffee trees in the research area.

The banana garden owned by our informant had an area of about 0.8 ha, which was larger than the average garden in the village. He explained that his household harvested 10 bunches of bananas in a week on average, 500 bunches in a year, of which 400 for self-consumption, and 100 for sale. We mapped two quadrats (10 m × 25 m)

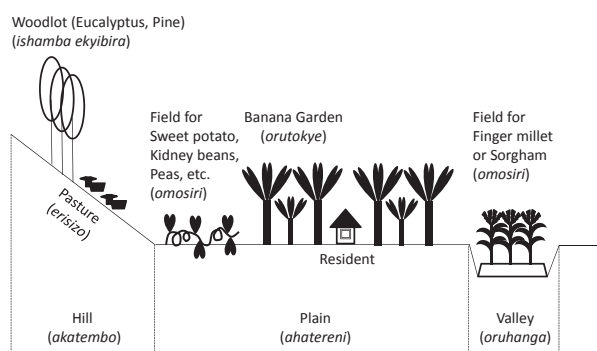


Fig. 2. Land use pattern in the research village.

in his garden: plot 1 (the central part of the garden) and plot 2 (marginal part of the garden). There were a few reasons why we chose these two parts of the garden. Farmers told that they planted the AAA-EA cooking bananas (*enyamwonyo*) in the central part of their gardens where soil was very fertile, and that bananas harvested from the margins of the gardens are used for beverage purposes. In addition, when we glanced over his garden, we found apparent difference in crops and planting density between the two parts. We recorded crops, cultivars

of bananas and their suckers, and trees in the quadrats (Fig. 3, Table 1). The quadrats were mapped in his garden that had been cultivated since the generation of current owner's father, which would had been reclaimed in the early 1930s. Nine banana cultivars were observed in two plots: 5 cultivars for cooking, 2 cultivars for eating raw and beverage, and another 2 cultivars for beverage. Difference in cultivars and density of banana plants between two plots was evident, and was consistent with the farmers' responses. All five cultivars observed in the

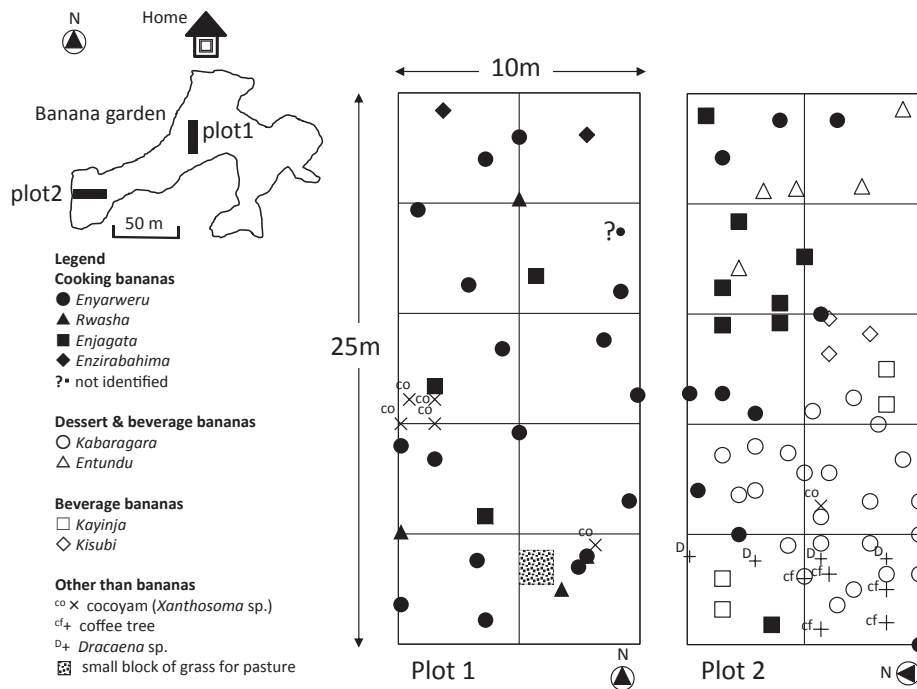


Fig. 3. Distribution of banana cultivars, crops and trees in the central part (plot 1) and the margin part (plot2) of a banana garden.

Table 1. Number of banana mats, bunches, and parent plants and suckers in the central part (plot 1) and the margin part (plot2) of a banana garden (10×25 m²).

plot	Banana cultivar	Uses	Number of mats	Number of bunches	Number of parent plants and suckers
1	<i>enyarweru</i>	cooking	17	6	81
	<i>rwasha</i>	cooking	4	1	19
	<i>enjagata</i>	cooking	3	3	20
	<i>enzirabahima</i>	cooking	2	1	12
	Not identified	cooking	1	0	1
	Total			27	11
2	<i>enyarweru</i>	cooking	10	1	21
	<i>enjagata</i>	cooking	8	2	21
	<i>kabaragara</i>	dessert, beverage	23	4	69
	<i>entundu</i>	dessert, beverage	5	2	25
	<i>kayinja</i>	beverage	4	1	19
	<i>kisubi</i>	beverage	3	0	11
	Total			53	10

central part (plot 1) were for cooking, whereas among six cultivars observed in the marginal part (plot 2), 2 cultivars were for cooking, 2 for eating raw and beverage, and 2 for beverage. A large difference in planting density of bananas was observed: 27 plants for plot 1 and 53 plants for plot 2 in the area of 250 m², respectively.

The informants explained that the low plant density in the central part of their garden was caused by frequent management of suckers, whereas minimal management of suckers in the marginal part led to high density of banana plants, and the new suckers were left to grow and mature. The cultivars for eating raw and beverage planted in the marginal part of their garden were *kabaragara*, *kayinja*, and *kisubi*, which produced many suckers. We observed eleven bunches among 27 plants in plot 1, and ten bunches among 53 plants in plot 2. It also indicated better management in the central part of a banana garden than in the marginal part.

Cultivars

In the study area, the cultivars of AAA-EA group are divided into two categories: one is bananas used as

a staple starchy food called *enyamwonyo*, and the other is for beverage purposes, called *embire*. In addition to them, there are other bananas that can be used for beverage, dessert bananas (*ebyeminekye* or *ebyeinekye*), and plantain⁵⁾ (*gonja*). Their classification of bananas according to their uses is same as the way commonly observed throughout East Africa (Mgenzi *et al.*, 2012).

Our informants recalled their 22 banana cultivars at the interview. We also recorded other four cultivars at the banana markets in the village neighborhood areas. Table 2 shows the cultivar names, observed locations, scientific genome groups and classifications, frequencies in the area, and uses. These cultivars are also locally classified into several groups.

Of the 22 cultivars, 14 were classified into *enyamwonyo* or *embire* (AAA-EA). Six cultivars among 7 cultivars whose frequencies were ‘very common’ were also in AAA-EA. Nine cultivars among the 14 AAA-EA cultivars were for cooking, and 5 cultivars were for beverage. Four cultivars among the 7 cultivars whose frequencies were ‘very common’ were for cooking and 3 were for beverage.

Table 2. Banana cultivars observed in the research.

Cultivar name	Location	Genome group and classification	Freq.**	Use***	Local classification
<i>enjagata</i>	Kagyeyo	AAA-EA	1	A	
<i>enyarweru</i>	Kagyeyo	AAA-EA	1	A	
<i>rwasha</i>	Kagyeyo	AAA-EA	1	A	
<i>enyabutende</i>	Kagyeyo	AAA-EA	1	A	
<i>enzirabahima</i>	Kagyeyo	AAA-EA	2	A	
<i>mbwazirume</i>	Kagyeyo	AAA-EA	2	A	
<i>kyetengwa</i>	Kagyeyo	AAA-EA	3	A	<i>enyamwonyo</i>
<i>kafuzzi</i>	Kagyeyo	AAA-EA	3	A	(AAA-EA, Cooking)
<i>enzirabushera</i>	Kagyeyo	AAA-EA	3	A	
<i>musakala</i>	Kebisoni*	AAA-EA	?	A	
<i>kibuzi</i>	Kebisoni*	AAA-EA	?	A	
<i>mzuba</i>	Kebisoni*	AAA-EA	?	A	
<i>entobe</i>	Kebisoni*	AAA-EA	?	A	
<i>entundu</i>	Kagyeyo	AAA-EA	1	C, D	
<i>ensika</i>	Kagyeyo	AAA-EA	1	D	
<i>enyarukira</i>	Kagyeyo	AAA-EA	2	D	<i>embire</i>
<i>enshenyure</i>	Kagyeyo	AAA-EA	3	D	(AAA-EA, Beverage)
<i>engombanyi</i>	Kagyeyo	AAA-EA	3	D	
<i>kabaragara</i>	Kagyeyo	AAB	1	B, C, D	
<i>kayinja</i>	Kagyeyo	ABB	2	D	
<i>kisubi</i>	Kagyeyo	AB	2	D	
<i>dipuli</i>	Kagyeyo	?	3	D	No general name in Nkore (Beverage except for AAA-EA)****
<i>bogoya</i>	Kagyeyo	AAA	2	C	<i>ebyeminekye</i> or <i>ebyeinekye</i>
<i>kawanda</i>	Kagyeyo	Hybrid	3	C	(Dessert banana)
<i>gonja</i>	Kagyeyo	AAB (Plantain)	3	B	
<i>kyinywa kyimwe</i>	Kagyeyo	AAB (Plantain)	4	B	<i>gonja</i> (Plantain)

* These bananas were observed at banana market in Kebisoni.

** Frequency of banana, 1: very common, 2: common, 3: rare, 4: very rare.

*** Use of bananas, A: cooking (boiled and steamed mashed banana), B: snack, C: dessert, D: beverage.

**** Although *kabaragara* is classified into ‘beverage except for AAA-EA’ in this table, it also belongs to *ebyeminekye* because it is used as dessert banana.

The dominant cultivar *enyarweru* has large fingers and a compact bunch, which is suitable for sale and transportation. Fruits of the second most popular cultivar *enjagata* are regarded as being the most delicious. They are also softer than those of *enyarweru*, so farmers can cook them faster. However, their fingers are not suitable for transportation because they are scattered and damaged easily.

The most popular cultivar other than AAA-EA was *kabaragara*. *Kabaragara* is a famous cultivar in Uganda as *sukali ndizi*. It has multiple uses, such as dessert, beverage, and material of a pancake dish named *kabaragara*. *Bogoya*, the popular trade name of which is Gros Michel, has large fingers and use for dessert. *Kawanda* is a kind of FHIA which are hybrid and tetraploid bananas. The name of *kawanda* is derived from the place name of a research institute of NARO (National Agricultural Research Organization). Although it has a large bunch, they say it does not taste good. It was not popular with farmers. For plantain, the number of cultivars grown and frequency was very low in the village. According to Talengera *et al.* (2012), plantains account for only 2% among all the banana gardens in Uganda because of agricultural and cultural factors. Plantains are very susceptible to weevils and have a low leaf production rate, and a poor root system, but grows tall. They are associated with a bad omen in some parts of Uganda.

People shared knowledge of the stories how *kabaragara*, *kayinja* and *rwasha* were introduced to the village. *Kabaragara* was introduced from Ganda area 30 years ago, and *kayinja* was introduced 60 years ago. Gold *et al.* (2002) indicated that cultivars of various genome groups other than plantains and the AAA-EA were comparatively recent introductions to Uganda. Various colonial workers and religious missionaries contributed to those introductions, which were made at Entebbe botanical gardens in Uganda from 1904-1931. These cultivars arrived at the research area in decades after their introduction to Uganda. Time of introduction of the most AAA-EA to this village was unknown except for *rwasha*, whose frequency was very common, and it was introduced to the village only 10 years ago. This shows the long history of the connection between people and the AAA-EA.

People knew the etymologies of the three cultivars. *Kabaragara* refers to the name of a place where Ethiopians live together in Kampala. They make banana snacks named *kabaragara* from the fruit of this cultivar known as *kabaragara*. For *enzirabahima*, Bahima refers to the pastoralist group of Nkore. *Zira* means 'dislike' and *en* is

a prefix. These fruits dry quickly to taste bad after being cooked. Bairu groups think that Bahima are lazy people, and therefore, they cannot eat these cooked fruits. The story behind this etymology may indicate contempt for Bahima by Bairu.

We did not find the etymology of other bananas related to the history of Nkore and rituals in the village. On the other hand, such etymologies were found in the Ganda village (Sato, 2011). The classification of cultivars into male and female, and cultural meaning to specific cultivars were found in a Ganda village.

Dietary Habits and Banana Uses

The formal meal in the village consisted of starchy staple foods and side sauce dishes. People preferred a meal with a variety of starchy foods such as cooking bananas, sweet cassava, sweet potatoes, Irish potatoes, and pumpkins. Side dishes included boiled beans, chicken, beef, and vegetables. Our informant explained that banana accounted for 70% of their staple food, sweet potatoes did for 25%, and others (rice, pumpkin, finger millet, cocoyam) did for 5%, and that the proportions of other households in the village were similar to them. He also told that the primary source of protein is more than 10 kinds of beans.

Omubumba, steamed and mashed bananas were the most popular cooked banana recipes. Although *omubumba* is similar to *omuwumbo* in Ganda, its cooking in Nkore is simpler and easier than that of Ganda. Daily *omubumba* is cooked as follows: Fingers of cooking bananas (*enyamwonyo*) are pared, and placed in a pot. The pot is covered with 4 or 5 pieces of banana leaves by folding in half and placed on the side of the pot. Occasionally, pared Irish potatoes, sweet potatoes, and cassavas are placed on the leaves. Water is added to the pot to about the half-height of bananas (approximately 10 cm), boiled for about an hour in low or moderate heat. As the water dries from the pot, hot steamed bananas are wrapped with banana leaves in the pot, and mashed with a spatula.

For local ceremony, a large amount of *omubumba* was prepared in a big pot. Along with half-split petioles and banana leaves in the bottom of the pot, they place the pared bananas and cover the pot with approximately 100 banana leaves, because they use covered leaves as dishes. They boil it for several hours (approximately 8 hours based on our observation), then mash them with a large spatula. They retain the warm temperature with low heat until just before eating.

A mixed dish of boiled bananas and beans, which

was called *katogo*, was the second most frequently recipe using cooking bananas. Beans are boiled, then banana fruits are pared and cut in half lengthwise, placed in a pot filled with beans, water, purified salt, and rock salt. This mixture is boiled until water evaporates.

The most preferred cultivar for *omubumba* was *enjagata*, because it was the tastiest, and the softest, and could be cooked fast. Although the AAA-EA cooking bananas (*enyamwonyo*) are suitable for *omubumba*, during times of shortage, other types, including plantains (*gonja*), bananas for beverage (mostly *embire*), and dessert banana (*ebyeminekye*) may also be used.

Plantains were occasionally offered as a snack. They used ripe plantain or those just prior to ripening. They cut both ends of fruits and boil them with banana skin (the food name is *empogora*), or roast peeled plantains. Fried pancake called *kabaragara* is made from fruits of *kabaragara*.

Three kinds of alcoholic beverages were brewed in the village: banana beer, sorghum beer, and finger millet beer. Banana beer was commonly consumed, whereas sorghum beer and finger millet beer were offered during special occasions such as at ceremonies.

Banana beer is made from fruits of cultivars with high moisture content and stickiness. It is possible to make banana beer of fruits either from one cultivar or from a mix of several cultivars. Banana beer is prepared as follows. The banana fruits are buried in a pit, and on the third night they heat the hole, which is connected to the bababa pit, so the buried bananas can ripen better. On the fifth day, they take out the softened fruits, and peel, tread, and place them in a canoe-shaped container. After that, they add leaves of grass, and unmarried men tread them barefooted. When fruits are crushed sufficiently, they add water in the container, and squeeze fruits and grass, and collect the juice in a vessel. To this, they also add roasted and grounded sorghum (2 kg of sorghum for 20 kg of banana juice), and let the juice ferment for a day.

We had a chance to observe a local wedding party. Neighbors offered a bunch of *bogoya*, a large dessert banana to the marriage ceremony. They carried fruits wrapped with banana leaves on the head so that people could identify the families that offered *bogoya*. In the ceremony, relatives of the couple exchanged symbolic gifts. Mother of the groom gave the bride a basket of *kalo* (porridge of finger millet), and brothers and sisters of the bride offered relatives of the groom several baskets hanging from a rod. The contents of these baskets were *kalo*, milk, banana beer, finger millet beer, and

sauce made of ghee (*eshabwe*). The wedding cake was placed in a basket with a shape similar to that of *kalo* basket. *Omubumba*, *kalo* and *eshabwe* were required for the meal at the wedding.

The non-fruit parts of bananas were used for live-stock feed. Goats and sheep eat the banana skins and the cattle eat chopped pseudostems.

Banana leaves were indispensable to boil and steam *omubumba* and *rwombo*, a steamed dish wrapped with banana leaves. When they brew bananas, sorghum, and finger millet beer, banana leaves were used for covering. For raising bees, the lid of wooden beekeeping box was made of cleaved banana pseudostem by sticking it on the box using cow dung.

Distribution and Marketing of Bananas

We found two distribution channels of bananas: local distribution and distribution to the city Kampala. Bananas sold at Kebisoni banana market were generally distributed locally, whereas Buyanja banana market served as a collection point for transporting bananas to Kampala (Fig. 1).

For local distribution, farmers sold bananas to bicycle traders, and they brought them to Kebisoni market. Traders attached four to eight banana bunches to their bicycles. Motorcycles were occasionally used. Kebisoni banana market had a building with a galvanized iron roof without wall. Bunches of bananas were arranged on the floor. The unit of sale was a bunch. We observed 20 or more bunches, most of which were the AAA-EA cooking bananas. Only one bunch of *kabaragara* was noticed. Bananas for beverages were not traded. At the market, both consumers and retailers purchased bananas, and occasionally transporters to Kampala bought them when they could not obtain enough bananas from other markets or collection points. Farmers around Kebisoni and southwestward area from Kebisoni supplied bananas for Kebisoni market.

For distribution to Kampala, Buyanja banana market was one of the centers around research area. Buyanja banana market should be regarded as a collection point (Yoshida, 2008) or collection/loading center (Dezi Sebuo Ngambeki, *personal communication*), rather than 'market'. Bicycle traders brought the majority of bananas. Motorcycle traders and farm owners keeping their own pickup trucks occasionally brought others. While most of the bananas were the AAA-EA cooking cultivars, *bogoya* and *kabaragara* were also found at the market. Bananas for beverage were not traded. Bunches of *bogoya* and *kabaragara* were covered with leaf sheaths

from pseudostem of bananas to prevent damage. There was a warehouse at Buyanja banana market for storage of bunches of the AAA-EA, *bogoya*, and *kabaragara*. In the open space in front of the warehouse, market workers divided bunches into fingers, and packed them in large sacks. A sack contained fingers of ten bunches. Only the AAA-EA were packed in this way.

Transporters from Kampala came to buy bananas with trucks. The packed banana fingers were placed at the bottom of the truck bed. Bunches of *bogoya* and *kabaragara* were protected with leaf sheaths from pseudostem of bananas, and were placed above.

The amount of traded bananas at Buyanja banana market was quite larger than that at Kebisoni banana market. As Yoshida (2008) indicated, most of the distributed bananas were transported to Kampala, whereas only a small part were locally distributed.

The farm gate price of a standard size (24.5 kg) bunch of the AAA-EA for cooking at Kagyeyo village was 6,000-7,000 shillings⁶⁾ in August. Farmers noted that the price varied due to seasons and it rose to 15,000 shillings in December. The selling price in Kebisoni market in August 2016 was almost 10,000 shillings and almost 25,000 shillings in a Kampala market.

The prices of the AAA-EA cooking bananas did not depend on the cultivars, but only the apparent sizes. However farmers evaluated the cultivars with soft texture after cooking as better, traders did not consider it. As a results, such a difference did not influence the prices.

According to our informant, 50% of his household income by selling agricultural products was from bananas, most of which were AAA-EA, 30 % was from coffee, 10% was from milk, and 10% was from other things such as beans, sorghum, sweet potatoes, honey, and *Eucalyptus* trees. They sold about 100 bunches in a year, equivalent to roughly 1 million shillings. Bananas and coffee were also the major income sources at other households, but other kinds of income sources were different between households, he said.

The farm gate price of a bunch of *kabaragara* (5.1 kg) was 3,000 shillings, and that of *bogoya* (30 kg with leaf sheaths cover) was 10,000 shillings.

Conclusion

Early history of banana farming in Uganda advanced mainly in Ganda area, Central Uganda. Banana farming in Nkore area expanded in the first half of the 20th century, replacing finger millet as the main crop for staple food. Nkore people developed agro-pastoralism

unlike Ganda people who lacked cattle breeding and sophisticated cultural dependence on bananas (Sato, 2011).

According to previous studies, Nkore area has become the main banana production area in Uganda and bananas has become as much a main commercial crop as a staple food since the 1970s. This paper also shows that banana, especially AAA-EA was the most important crop for self-consumption and commercial purpose in 2016. Cattle breeding is an important difference in farming system between Nkore and Ganda. Nkore farmers who owned cattle used cow dung for compost. However, decrease of cattle is a serious problem in the study area. Farmers without cattle could use only ash and food waste for compost. Farmers were surrounded by other problems such as land shortage, reduction in yield of bananas and coffee by insects and diseases. Haya people, who live in northwestern Tanzania, whose language belongs to the same group as that of Nkore, developed agro-pastoralism similar to that of Nkore. They are also confronted with similar problems such as land shortage and reduction of cattle (Maruo, 2002).

We found the difference in crops and cultivars in the garden. Farmers planted AAA-EA cooking bananas in the central part of the garden, where the soil was fertile and careful management was carried out, whereas many bananas for beverage were observed at the marginal part. This shows the importance of AAA-EA cooking bananas for them. Such division of the gardens is also reported in Ganda (Sato 2011).

Comparing the result of Gold *et al.* 2002, which studied banana cultivars throughout Ugandan banana cultivating area in 1993-1994, the diversity of cultivars and composition of cultivars in the study area were almost similar to those of the previous study on Nkore area and Ganda area, despite the progress of commercialization of bananas.

The shorter history of banana farming in Nkore than that in Ganda may reflects the difference in their dietary habit and banana uses. Banana cooking in Nkore is simpler than that in Ganda. While many ritual uses of bananas were reported in Ganda (Sato, 2011), we found only small numbers of them in the study area. Etymologies in Nkore were also simpler than those in Ganda. Discrepancy between development of practical value of bananas (staple food and cash crop) and symbolic value is an interesting issue in our research.

Our further subjects are illustrating the impact of rapid commercialization of staple food on their subsistence and food habit of Nkore, and clarifying

Nkore farmers' strategies against land shortage, insects and diseases of bananas. More detailed comparison of banana-based livelihood systems between banana specialists such as Ganda and agro-pastoralists such as Nkore in the AAA-EA area should be made.

Acknowledgements

This work was supported by JSPS KAKENHI Grant numbers JP15H03134 (to S. Odani, K. Komatsu, K. Kitanishi) and JP24710298 (to Y. Sato), Focused Researches of Osaka Sangyo University, Japan (to Y. Sato), Grant-in-Aid for JSPS Research Fellow (to K. Shikata-Yasuoka). We appreciate the useful information given by Dr. D. S. Ngambeki. We are grateful to Professor J. R. S. Tabuti of Makerere University, Uganda, Ms. D. Ashaba, and Mr. A. Kamwaka and his family, as well as residents of Kagyeyo village.

Footnotes

- 1) We use the term 'cultivar' not as an agronomic classification with stable heredity but as a local and indigenous classification unit.
- 2) Southern part of Uganda includes Central, Western, and Southwestern Uganda.
- 3) Vernacular words are shown in italic letters in this paper.
- 4) *Omosiri* is a common word for 'field,' and used as *omosiri gwa* 'crop name': e. g. *omosiri gwa ebihimba* (beans) and *omosiri gwa mhogo* (cassavas).
- 5) Plantain indicates two meanings: a general term for cooking bananas and a specific subgroup of AAB genome group as a technical term. In this paper, it means the latter.
- 6) Shilling is a unit of currency in Uganda. One US dollar was exchanged into 3,200-3,350 shillings in August 2016.

References

- Arias, P., C. Dankers, P. Liu, and P. Pilkauskas 2003. The World Banana Economy: 1995-2002 (FAO Commodity Studies 1). [Online] <http://www.fao.org/docrep/007/y5102e/y5102e00.htm> (browsed on March 31, 2018)
- De Langhe, E., R. Swennen, and D. Vuylsteke 1994. Plantain in the early Bantu world. *Azania* 29-30: 147-160.
- Gold, C. S., E. B. Karamura, A. Kiggundu, F. Bagamba, and A. M. K. Abera 1999. Geographic shifts in the highland cooking banana (*Musa* spp., group AAA-EA) production in Uganda. *Int. J. Sust. Dev. World* 6: 45-59.
- Gold, C. S., A. Kiggundu, A. M. K. Abera, and D. Karamura 2002. Diversity, distribution and farmer preference of *Musa* cultivars in Uganda. *Exp. Agr.* 38: 39-50.
- Kalyebara, R., S. Wood, and P. N. Abodi 2007. Assessing the potential impact of selected technologies on the banana industry in Uganda. In: *An Economic Assessment of Banana Genetic Improvement and Innovation in the Lake Victoria Region of Uganda and Tanzania*. (Smale, M. and W. K. Tushemereirwe eds.) Research reports 155, International Food Policy Research Institute (IFPRI) (Washington D. C.) pp.141-153.
- Karamura, D., E. Karamura, A. Nsabimana, F. Ngezahayo, S.-C. Bigirimana, B. Mgenzi, S. Mkulila, T. Munyuli, M. Musakamba, and S. Tendo 2012. In: *The current classification and naming of the East African highland bananas (Musa AAA) based on morphological characteristics. Banana Cultivar Names, Synonyms and Their Usage in Eastern Africa*. (Karamura, D. A., E. Karamura, and W. Tinzaara eds.) Bioversity International (Kampala) pp.6-23.
- Langlands, B. W. 1966. The banana in Uganda-1860-1920. *Uganda Journal* 30 (1): pp.39-62.
- Maruo, S. 2002. People living with bananas in the village of Haya, northwestern Tanzania. In: *The World of African Farmers: Its Indigenousness and Change*. (Kakeya, M. ed.) Kyoto University Press, Kyoto, pp.51-90 (in Japanese).
- McMaster, D. N. 1962. A Subsistence Crop Geography of Uganda. Geographical Publications Limited (Bude) pp.1-111.
- Mgenzi, B., S. Mkulila, and D. Karamura 2012. The usage of banana names in East Africa, with reference to Lujugira-Mutika subgroup (*Musa* AAA). In: *Banana Cultivar Names, Synonyms and Their Usage in Eastern Africa*. (Karamura, D. A., E. Karamura, and W. Tinzaara eds.) Bioversity International (Kampala) pp.1-5.
- Nzira, R., Mbagwa-Niwampa, and D. Mukholi 2011. Peoples and Cultures of Uganda, Fourth Edition. Fountain Publishers (Kampala) pp.1-211.
- Rukungiri District 2014. Higher Local Government Statistical Abstract. Rukungiri District (Rukungiri) pp.1-52.
- Sato, Y. 2011. Life-world of Banana Cultivators in Uganda: An Ethnoscience Approach. *Shokado* (Kyoto) pp.1-148. (in Japanese with English summary)
- Talengera D., D. Karamura, and M. Pillay 2012. Plantains (*Musa* AAB) in East Africa. In: *Banana Cultivar Names, Synonyms and Their Usage in Eastern Africa*. (Karamura, D. A., E. Karamura, and W. Tinzaara eds.) Bioversity International (Kampala) pp.41-48.
- Yoshida, M. 2008. Food Supply for Growing Cities in Developing Countries: A Study in the Marketing of Staple Food Crops in Uganda. Makerere University Printery (Kampala) pp.1-124.