

ISSN 0917-0847  
Rikkyo University  
Centre for Asian Area Studies  
Occasional Papers No.13

# **Anthropological Studies of Sago Palm in Papua New Guinea**

**Yukio TOYODA**

**Centre for Asian Area Studies  
Rikkyo University  
Tokyo  
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Published by

**RU-Centre for Asian Area Studies**

3-34-1 Nishi-ikebukuro, Toshima-ku, Tokyo 171-8501, Japan

Tel. +81-3-3985-2581 Fax. +81-3-3985-0279

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First Published February 2008

Printed by IROHASHA Co., Ltd, Tokyo.

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## Preface

Sago Palms (*Metroxylon Sagu* Rottb.) grow naturally or under semi-cultivated conditions in lowland in Southeast Asia and South Pacific. These plants are utilized as staple food in some parts of Indonesia and Papua New Guinea, and in some other areas in the Philippines and the South Pacific, they are used as building materials for traditional houses.

Sago is used in lowland of Papua New Guinea as staple food, and also building materials for thatching. The author has been conducting anthropological research for some 20 years, and this volume collects three papers ever written on sago and agriculture in Papua New Guinea.

The first paper was presented at International Sago Symposium held at Tsukuba in 2001 as a keynote speech. It explains socio-cultural aspects of sago palm and reviews sago studies conducted in social science and humanities, such as anthropology and sociology. It first appeared in *New Frontiers of Sago Palm Studies*, edited by Kainuma et al.

Next paper was originally published in *Sago Palm*, a Journal of Japanese Society of Sago Studies. This paper describes how sago is utilized as a staple food in Sowom village in East Sepik Province, Papua New Guinea, and shows that sago is related to various aspects of their life.

The last paper deals with the problem why the Kwanga people, those who are doing shifting cultivation in Papua New Guinea, grow many species in a single plot of the garden at the same time. It was originally read at Eighth International Sago Symposium 2006, held at Jayapura, Indonesia, and it was published originally as 'Multicropping in Sago (*Metroxylon Sagu* Rottb.) Growing Areas of Papua New Guinea' in Karafir, Y. P., F. S. Jong and V. E. Fere (eds.) *Sago Palm Development and Utilization: Proceedings of the Eighth International Sago Symposium*, Universitas Negeri Papua.

I hope that this small volume would be useful for many sago researchers in various fields, not only in anthropology and sociology, but also in some fields in natural science.

February 2008

Yukio Toyoda



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# **Socio-economic and Anthropological Studies in Sago Growing Areas\***

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**Abstract:** This paper is a review of socio-economic and anthropological studies that have been conducted in the sago growing areas. Selected topics are as follows: 1) The Concept of Vegeculture, 2) Multi-species Growing, 3) Accumulation of Wealth, 4) Social Roles of Crops, 5) Personification of Crops, 6) Myth Explaining the Origin of Crops.

## **1. Introduction**

The area in which sago palm is cultivated covers numerous islands and continental regions in Southeast Asia, south Asia, and Melanesia of Oceania. This paper reviews socio-economic and anthropological studies that have been conducted in these areas. The number of those who have conducted research in this area is enormous. Space does not allow me to discuss all of them, and it is beyond my ability to cover whole studies. I will mention, therefore, only those that are related to agriculture, including extracting sago starch, and the contribution these studies have made. My main concern is the attitude of people toward agriculture: how people's lives are related to their crops, and what they think about these crops.

## **2. The concept of Vegeculture**

Let's first consider the concept of 'vegeculture,' or vegetative planting culture. This concept has been used to describe the method of agriculture in the sago growing areas. The concept was proposed by Karl Sauer (1952) and other scholars, and has been developed by a Japanese botanist, Sasuke Nakao. Nakao's theory is not widely known, since he has not published many papers in English, but his theory deserves our close attention on several points. First, it is very synthetic in that it

covers the entire area of the Old World. Secondly, it is well supported in that it is based on his firsthand information collected in his own fieldwork in Asia and the Pacific regions.

Nakao suggested that vegeculture is a basic category of farming culture in human world history. He described vegecultural systems in detail and then integrated this system into a global view of farming around the world. He has classified agricultural systems in the Old World into three types (1966):

- 1) Mediterranean farming culture, which originated in the Fertile Crescent. The main crops here are winter growing cereals such as barley and wheat.
- 2) Savannah farming culture, which originated in semi-arid regions of Africa and India. The main crops here are summer-growing cereals such as Panicum, Setaria, Sorghum (the three main millets), and Oryza (Asian rice).
- 3) Vegeculture, which originated in the wet tropical forest zones of Southeast Asia, and is based on vegetatively propagated crops such as bananas, taros, yams, and sugarcane. These crops are propagated by natural vegetative propagules, shoot splitting, root cuttings, and branch or stem cuttings.

This concept, vegeculture, is contrasted with seed-planting culture which grows cereal grains, such as wheat, maize, and rice. In the system of vegeculture, Nakao mentioned three groups of crops as major vegecultural components, which are bananas, yams, and aroids. Later, he added sugarcane (*Saccharum spp.*) to the system of vegeculture, since it was found that sugarcane had been domesticated in New Guinea over a long period of time. He also gave attention to sago (*Metroxylon sagu*) and breadfruit (*Artocarpus sp.*) as vegecultural components.

According to Nakao's view, the term vegeculture refers not only to the agronomic techniques used for production, but to the steps of cultivating, processing, and using the plants concerned, as well. With this broad view of vegeculture, he has made comparisons with the two other major categories of farming culture: Mediterranean farming culture, and savannah farming culture. Nakao has shown several major cul-

tural traits and trends associated with vegeculture:

- 1) Non-seed propagation. All the crops of vegeculture are propagated by vegetative means, by cuttings, and other methods. It is believed that these propagation methods had been used by humans much earlier than seed propagation methods.
- 2) High-polyploid cultivars are common in the main crop groups.
- 3) No pulses or oil crops. Although there are many wild pulse species in the areas where vegeculture is practiced, they are not used and have not been domesticated. Hunting and fishing are therefore critical for balance in the human diet.
- 4) The digging stick is the only tool developed for use in vegeculture. People use it for different purposes, such as digging holes, harvesting yams, clearing and preparing land, and so on. Metal tools have not been developed.

Based on these traits, Nakao has suggested a hypothesis for the development of vegeculture. He suggested three developmental stages of vegeculture:

- 1) collection of wild fruit, roots, and tubers
- 2) domestication of the major crops, and assembling the full complement of the four major crop groups to form the vegecultural complex
- 3) establishment of shifting cultivation and irrigation systems for taros

The manner of food processing has also changed. In the first stage, people cooked bananas and root crops on hot stones in earth ovens, which is still observed in the Pacific area. In the case of poisonous root crops, people mashed the raw starchy material, and then leached it in water. This was also found to be effective for purifying and collecting the starch. From these methods, according to Nakao, people have developed the techniques now used to extract sago starch.

Vegeculture is believed to have originated in Southern China, or somewhere in the tropical forests of Southeast Asia. Three main directions of dispersal from Southeast Asia were suggested.

- 1) eastwards to Oceania
- 2) westwards to East Africa and Madagascar

3) northwards to the warm-temperate, evergreen forest zone of Eastern Asia.

The areas where people grow sago basically belong to vegeculture areas, and have some common features when we look at the social aspects of agriculture. I will mention some common characteristics, mostly based on the anthropological research conducted so far. My discussion is based mostly on data from Melanesia, where I have conducted research, but I believe that most of the characteristics I present here would apply to the other sago growing areas.

### **3. Multi-species growing**

Vegeculture uses many species, while seed-crop agriculture grows very few species. When we see gardens in sago growing areas, most of which have been created by the slash and burn method, we see many species grown in a single plot at the same time. For example, in gardens in Papua New Guinea, people grow yams, taros, bananas, cassava, sugarcane, corn, and so on in the same garden plot. Even when we look at one species of yam (either *Dioscorea esculenta* or *Dioscorea alata*), the people distinguish many types, and they give different local names to each variety. Table 1 shows how many varieties of yams, taros, bananas and sago are grown in a village of Papua New Guinea. Besides the crops in this list, corn and green vegetables are also grown as subsidiary crops.

Table 1 indicates that the people classify thirty-nine varieties of *Dioscorea alata*, and thirty-eight in *Dioscorea esculenta*. This is not an especially rare case, rather it is quite common in this area. These crops are divided according to their forms, colors, tastes, and agronomic features, such as the way of swelling, and so on. These distinctions vary from place to place, and the local names differ according to their language group. Most varieties are divided into male and female, which I will explain later.

People in these areas prefer to have many crop varieties, and tend to try as many new crops as possible. They have several ways of acquiring new crop varieties

**Table 1.** Varieties of crops in Wanjeaka village of Sandaun Province, PNG

Crops	No. of varieties	Male	Female
Yam ( <i>D. alata</i> )	39	19	20
Yam ( <i>D. esculenta</i> )	38	16	22
Taro	26	26	0
Banana	65	31	34
Sago	9	5	4

for themselves. For example, when they go to a new place and find new crops, they obtain them by exchange, and/or by purchase. Often, when a girl marries into a new place, she brings some crops with her and tries to grow them there. By these methods, people collect many varieties. When they find new ones that are worth growing in some respects, they keep growing them, and add them to their own varieties. In this way, the number of varieties is increased.

Why these people try to keep many varieties is not an easy question to answer. We tend to think that growing many varieties could minimize the risk of losing the crops to plague. We could lower the risk by keeping many varieties in the hope that we could keep some varieties even if others are damaged. However, the people usually emphasize that they keep so many varieties because they want different tastes. Eating only a few varieties of food crops makes their meals monotonous and dull, they say, but they can enjoy different tastes if they have many varieties in their gardens. It is difficult to state a specific reason for the keeping of many varieties, but it could be possible that they have observed the habit of keeping many varieties through their experience, but that they have lost their reasons for doing so. It is possible that they keep many varieties in order to lower the risk of losing their crops to plague, although they do not mention this reason clearly. Although vegetable culture is less productive than growing seed-crops, such as wheat, maize, and rice, it is more stable than seed-crops. This could be related to the fact that a wide variety of species are cultivated in the system of vegetable culture.

#### **4. Accumulation of wealth**

Accumulation of wealth has not occurred very much in these areas. Since it was hard to keep root crops for a long time, people could not store these crops as their wealth, while seeds, on the other hand, such as rice and wheat, are easily stored and can be accumulated as wealth. The technique of storage in vegeculture areas has not developed much. This could be a major reason, together with the lack of transportation techniques, why the people in these areas have not accumulated wealth. This lack of wealth may in turn explain why large political organization has not developed in the vegeculture areas (Sahlins 1963).

In some parts of Oceania, such as Polynesia and Micronesia, most societies have developed chieftainship, or chiefdom, and some societies even have developed kingdoms, such as Tonga, Tahiti, and Hawaii. Tonga still has maintained its kingdom, although the kingdoms of Hawaii and Tahiti have actually disappeared after contact with European countries. These are the areas where large political organization has developed.

In regards to the scale of population, these political organizations are much smaller than the ones in other areas, such as in Southeast Asia. The population of the chiefdoms and kingdoms in Oceania are at most hundreds of thousands, and usually tens of thousands. When we compare them with the kingdoms of Southeast Asia, they are much smaller in population. It is still reasonable, therefore, to say that large political organization has not developed in the vegeculture areas.

This may help to explain why food exchange has developed in the vegeculture areas. Since the crops in vegeculture are not stored for a long time, they are usually consumed on the spot. Therefore, the people harvest only as much as they need, and do not have surplus crops. When the quantity is too much to be consumed for the growers themselves, it will be shared and exchanged. Especially in the Pacific areas, exchanging food is very common, and in some areas it has developed into rituals,

such as the yam festivals in the Sepik area and the Trobriand Islands, Papua New Guinea.

## **5. Social roles of crops**

Crops play many social roles in these areas. They are not only considered to be food, they also play important roles in social life. For example, crops are quite often considered to be 'gifts' in rituals. The crops which are supposed to be exchanged, are limited to certain species, and cannot be replaced by others. The species which are exchanged show a diversity depending on the area, but yams are quite common and taros, bananas, and sago are sometimes exchanged.

In Melanesia, people often give special meanings to yams. Yams are considered not only as 'food', but also as 'gifts' in rituals. They are often treated as special crops and many rituals are performed in relation to yams. In the case of the yam festival in Papua New Guinea, after villagers harvest yams, they put the yams in the open space of the village to display them to neighboring villagers. They exchange these yams with the people in the other villages. They give their own yams to the others, and the yams are eaten only by the other villagers. That is, those who have grown yams are not allowed to eat their own.

This is clearly expressed in an Arapesh aphorism, which was introduced by an American anthropologist, Margaret Mead (1938). The Arapesh, living in the Sepik area, Papua New Guinea, grow yams as their main food. They have an old saying about yams and pigs.

Arapesh aphorism

Your own mother,

Your own sister,

Your own pigs,

Your own yams which you have piled up,

You may not eat.  
Other people's mother,  
Other people's sister,  
Other people's pigs,  
Other people's yams which they have piled up,  
You may eat.

In this aphorism, the phrase 'may not' is used to mean prohibition. When the Arapesh harvest yams, they pile them up and display them for their neighbors, then give them to these neighbors. To pile up is the expression used to describe the manner in which yams are displayed. The Arapesh do not eat their own yams - or rather, they are not allowed to eat their own yams. Those who grow yams do not eat their own, but they eat the yams of their neighbors when their neighbors harvest their yams. Therefore, the aphorism tells the people that yams must be exchanged.

Similarly, you are not allowed to eat your own pigs. Pigs are to be given to others as a 'gift'. When you have to pay a bride price, or when you have to compensate for the damages caused by troubles between communities, such as fighting, or someone's crimes, special gifts are used for compensation, and they are usually pigs and crops, such as yams (Rubel & Rosman 1978).

In the aphorism, to eat someone means to have sexual relations with him/her. This metaphor is quite common throughout the world. The aphorism says, therefore, that you are allowed to have sexual relations with the other people's sisters and mothers, or that you are allowed to marry someone other than your own relatives, but you are not allowed to marry, or have sexual relations with, your own sisters and mother.

In this aphorism, two rules are described in the similar expression. One is that you are not allowed to eat your own yams and pigs; you have to exchange them. The other is that you must not have sexual relationships with your relatives or family members, which would be the taboo of incest.



This aphorism has been quoted by a structural anthropologist, Levi-Strauss, and has become quite popular in that it explains the taboo of incest and the rules of marriage at the same time. According to Levi-Strauss, to make incest taboo, which is a universal phenomenon in human societies, means that you must marry someone other than your own relatives, or outside your own kin group.

In this way, marriage is explained by Levi-Strauss as ‘the exchange of women.’ In the same way as yams and pigs must be exchanged, women must be exchanged to maintain the system of marriage. By creating the taboo of incest, he argues, human beings began to marry someone outside their families, and then, they could establish a relationship with other groups. Levi-Strauss insists that this is the essence of marriage, and that it is clearly expressed in the Arapesh aphorism (1967).

Besides yams, some species of taros and bananas are also used as gifts. In the Sepik area of Papua New Guinea, sago used to be treated as gifts, and people were not allowed to eat their own sago (Toyoda 1995). This rule, however, is not practiced by these people any more.

## **6. Personification of crops**

Crops in these areas are often personified. They are treated as if they are living human beings. This is shown in many instances. A typical case is yams. In the case of the Sepik area, Papua New Guinea, men growing yams often use the expression ‘my child’ to refer to yams (Kaberry 1941, Tuzin 1972). In the same area, when people plant yams, they plant them with their other crops, in the same garden, saying that the yams will not feel lonely this way. People often plant *D. esculenta*, *D. alata*, and taros together, saying that *D. esculenta* and *D. alata* are a married couple, and that the taros are their children. People believe that yams feel happy when they are together with their family, and that they grow well when they are happy. Another example is that it is believed that crops will feel happy when some flowers are planted in the same plot, and that they will then grow well. There are examples from Papua

New Guinea of people who decorate yams as if they are human, and display them in the center of their village when they harvest them.

Another example of personification of crops in some areas of Papua New Guinea is giving gender to crops. Each species of crops is categorized as male or female. The distinction is not related with biological sex, and it varies from place to place. Therefore, the term 'gender' would be appropriate, rather than sex. Generally, yams are considered to be male, and taros, female. Quite often, certain species of yams, usually long and straight ones, are considered to be male, and shorter yams are considered to be female. The association of maleness and being long and straight seems to have its basis in penis imagery. Taros are usually categorized as female, and bananas and sago are divided into male and female (See Table 1).

This association of crops with gender is reflected in the manner in which crops are grown. People's sexual behavior is thought to be closely related to the growing of crops. Yams are usually categorized as male, and are planted in a special area. Women are kept away from this garden, since they are considered to be 'polluted'. If women go into the garden, people believe that the crops will be spoiled.

The technique of growing valuable crops is related to men's social status. Festivals and rituals are good occasions for showing and/or raising one's social status. In the case of yam festivals, people try to grow big, long yams and try to show their excellence in agricultural technique by displaying them (Tuzin 1978). Having good technique in growing special crops is a way of gaining social prestige, and improving social status. When crops do not grow very well, people often blame the growers by saying that 'those who cannot grow crops very well must have been playing with women, and do not know how to grow yams very well'.

## **7. Myths explaining the origin of crops**

Among the people cultivating root crops, we find similar myths that explain the origin of growing crops, especially root crops. The most typical one is the

Hainuwele myth, which has been introduced by Ad Jensen, a German ethnologist. This myth is found among the Wemale in Ceram Island, Morucca, and it is well known as a story explaining the origin of growing root crops. The story is as follows:

In ancient times, a girl was born from a coconut bud, and was named Hainuwele, which means coconut bud. She grew rapidly, and became ready for marriage in three days. In the Maro festival, which was supposed to last nine days, she gave many things to the people there. The first night, she gave betel nuts and pepper leaves to those who joined the festival. From the second night on, she gave various valuables successively to the people: pieces of coral, pieces of chinaware, bush knives, pieces of copperware, earrings of gold, and gongs. On the ninth night, the people became afraid of her, and decided to kill her. They dug a big hole, pushed her into it, and killed her. When the father of Hainuwele knew this, he took nine petioles of coconut tree, and dug them into the ground to find her body. He pulled out eight petioles in vain, but when he pulled out the ninth, he found the hair and blood of Hainuwele with it. He dug out her body, cut it into pieces, and buried them in the open spaces of the village. From each piece of her body, many crops came out. These crops were new to the people, and the people began to grow and eat them (Jensen 1966).

We find quite a large number of myths and folklore similar to this story. The stories begin by killing someone, usually a girl. The body of the dead girl was then cut into pieces, and these were buried in the ground. Later, from each piece of the body, crops began to grow, and the people found that they were edible, and they began to grow them for themselves. These stories explain the origin of crops, especially root crops.

Similar myths are found in Southeast Asia, Melanesia, Polynesia and even

North and South America. Jensen called this pattern of myths Hainuwele type, and argued that it is strong evidence that the people having this type of myth used to practice vegeticulture. Jensen himself did not use the term 'vegeticulture', and used the term 'Altpflanzer', which means 'old planters'. Even those who practice seed-planting agriculture now have this type of myth, such as the people in Southeast Asia, including Japan. This kind of myth tells us, Jensen argued, that these cultures used to practice vegeticulture before they began seed-planting agriculture.

For example, *Kojiki*, which is a collection of Japanese myths, has a similar story. A goddess named *Ohgetsu-hime* was killed by a young god, *Susano*, and from her body, many crops appeared. The people of Japan have grown rice for thousands of years, and no longer have a vegeticulture system. Jensen argued that this kind of myth tells us that they used to practice vegeticulture before they began growing rice. Although there is still some debate as to whether these similar myths have originated from a common myth, those who have similar myths and folklore could have some cultural characteristics in common. The distribution of these myths shows that these areas have some features in common in their cultural background, even though they have different agricultural systems now.

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\* This paper first appeared in Kainuma, et al. (eds.) *New Frontiers of Sago Palm Studies*. Universal Academy Press, pp.15-23, December 2002, titled 'Socio-economic and Anthropological Studies in Sago Growing Areas'.

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## Sago as Food in the Sepik Area, Papua New Guinea\*

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**Abstract:** Sago from *Metroxylon sagu* Rottb. is a staple and important supplementary food in lowland areas of Papua New Guinea, such as the Sepik River basin on the northern coast and the Fly River delta on the south. The sago palm plays important roles in many aspects of social life, such as for house construction material and starch in gift rituals. This paper describes how sago is utilized as a staple food in Sowom village in East Sepik Province, Papua New Guinea, and shows that sago is related to various aspects of their life. The authors visited the village in 1993, 1995, 1999, 2001 and, 2004, and one of the authors stayed in the village for 6 months in 1999. During these visits, research was conducted through participant observation and intensive interviews in Sowom village to investigate the utilization patterns of sago for food. Research focused on folk classification of sago, starch extraction, cooking methods, dietary habits, storage techniques and so on. The research findings are as follows. 1) Sago is classified into 7 different types, including the division of those with and without spines. 2) The processes of extracting starch are allocated by gender as a rule. Usually, the processes from selecting the palm to crushing the pith are conducted by men; the succeeding processes are done by women. 3) Sago is eaten almost daily, mostly in the form of sago jelly, and it is regarded by the local people as their main food. 4) Cooking sago jelly is done only by women. 5) Sago starch can be stored for several months if stored properly. 6) Sago plays important roles in various aspects of Sowom's social life, such as being a part of the bride price, the symbol of typical food.

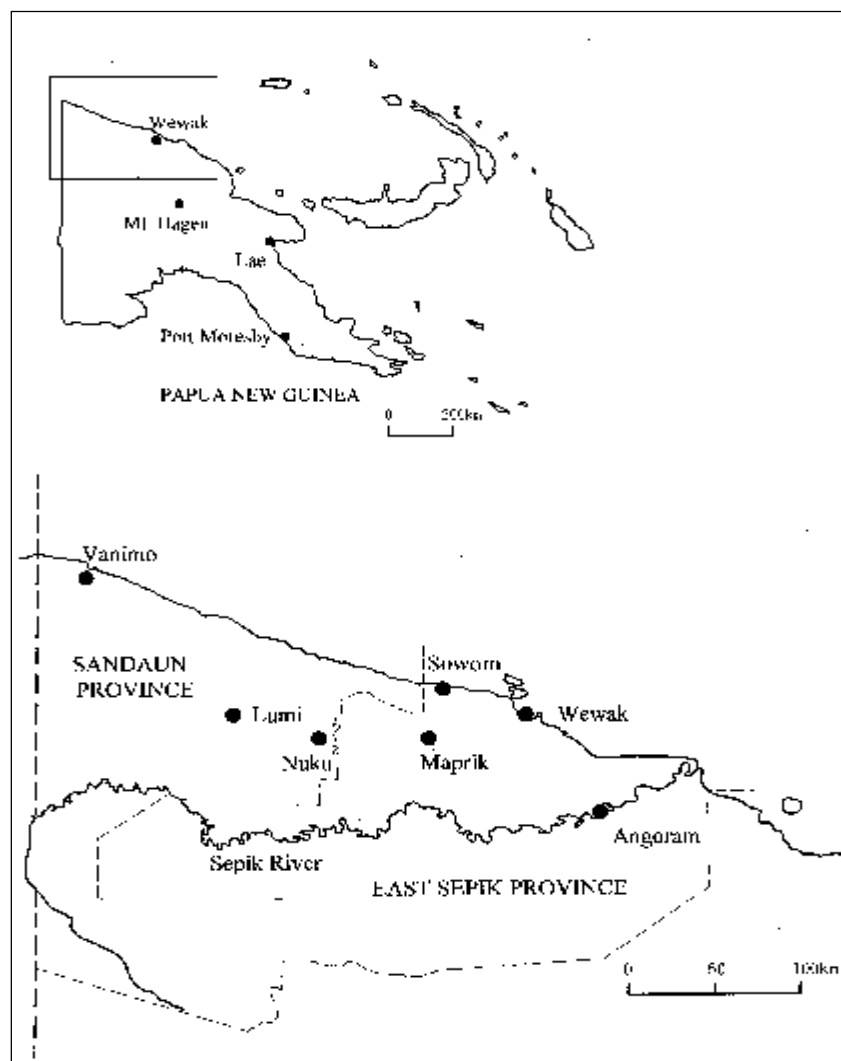
**Key words:** dietary habit, gender, *Metroxylon sagu* Rottb., Papua New Guinea, Sepik area

### 1. Study Site

The study site is Sowom<sup>1)</sup> village in East Sepik Province, Papua New Guinea, which is located at approximately at 3° 22' south latitude and 143° 07' east longi-

tude (Figure 1). The village is located on the coast, 60 km west of Wewak, the capital of the Province. The average temperature of Wewak is 27°C, and the annual rainfall in Sowom averages 2,200 mm (McAlpine et al. 1983).

A Sowom village is inhabited by Arapesh language speakers, who have lived in the village for many generations, and those who migrated to the village from Sandaun Province and the Highlands area. The village consists of 8 hamlets (Table 1). Ples is the largest hamlet, and is considered to be the oldest site of the village. Ples means ‘village’ in Tok Pisin (Melanesian Pidgin), which is the lingua franca in this area; the



**Figure 1.** Map of Sowom village, Papua New Guinea

**Table 1.** Hamlets in Sowom village

Name of hamlets	No. of households	Location
Ples	43	coast
Asoro	3	level ground
Boishul	8	level ground
Kaorum	6	level ground
Kundium	2	level ground
Ex-service	0	hilly ground
Arohimi	20 *	hilly ground
Umamum	30 *	hilly ground

\*Villagers' estimates.

fact that it means 'village' indicates that Ples is considered to be the main component of Sowom. Some people moved out from Ples and built new settlements in the late 1990s; these new hamlets are Kaomun and Kundium. People moved to these sites for easier access to fresh water and to their garden plots. Some people in Kaomun and Kundium maintain close contact with Ples, and have a house in Ples in addition to their main houses in their own hamlet. The other hamlets, such as Asoro, Buishul, Arohimi, and Umamum, were formed by migrants to Sowom from other areas. For example, Asoro was formed by individuals from Mt. Hagen (Western Highlands Province), and Buishul by people from Sandaun Province. Arohimi was established by those who formerly used to live in inland areas, and some of them built a new village, Umamuma. A plot of land was purchased by the government and a house has been built at a location for the police to do occasional patrol. It is called Ex-service, and nobody lives there permanently. Research for this article was conducted mainly in Ples and Kaomun, which are considered to be inhabited mostly by those who originally founded Sowom.

Those who originated from Sowom speak the Mountain Arapesh language, which belongs to Arapesh Family of Kombio Stock, Torricelli Phylum, non-Austronesian languages. The number of the speakers of Mountain Arapesh is around 13,000 (Wurm 1982), including some 50 other villages such as But, Dagua and Kairiru



(Laycock, 1973: 14).

The main source of food in Sowom is starch extracted from the sago palm. In addition to producing sago starch, villagers grow vegetables in gardens. The main crops are sweet potato (*Ipomoea batatas*), taro (*Colocasia esculenta*), yam (*Dioscorea spp.*), cassava (*Manihot esculentus*), banana (*Musa spp.*), pitpit (*Saccharum edule*), pawpaw (*Carica papaya*), sugarcane (*Saccharum officinarum*), maize (*Zea mays*), cucumber (*Cucumis sativus*), and pumpkin (*Cucurbita pepo*), and so on. Since the village is located on the coast, the villagers also catch fish for their meals.

## **2. Research Method**

Research was conducted mainly from 1999 to 2004. One of the authors, Todo, stayed in the village for 6 months from May to October in 1999, and lived with a family in Sowom. Toyoda and Toyohara visited the village in 1993, 1995, 1999, 2001, and 2004 spending a total of about 8 weeks in the village. While staying in the village, observations, measurements, interviews and questionnaires were conducted, using Tok Pisin.

The vernacular language is seldom spoken among the younger people, and they are unfamiliar with the vernacular classification of plants and plant parts. The interviews and questionnaires were, therefore, mostly conducted with elderly people in the village.

## **3. Results and Discussion**

### **(1) Taxonomy of the sago palm in Sowom**

In general, the sago palm can be classified popularly into 2 types; those that have spines, and those without spines. The Sowom classify the sago palm into 7 types (Table 2). Sago is generally called *saksak* in Tok Pisin, and it is called *lohu* in their vernacular language. The spiny type is classified into 2 types, and spineless into 5. These types are distinguished on the basis of height, trunk thickness, petiole color,

pith characteristics (wet or dry) and so on.

Some people state that the quantity produced and taste of the starch varies according to the type of sago palm. For example, it is said that sago from palms with spines is better tasting than from palms without spines. But most people do not find any difference between the two types. This is related to linguistic situation that most of them speak Tok Pisin and they do not know their vernacular language very well.

**Table 2.** Kinds of Sago Palm in Sowom

	Local name	Meanings in vernacular language
sago with spines	<i>shing (shingas)*</i>	sago with spines
	<i>marum (marupos)</i>	growing high and large
sago without spines	<i>manyenik (masusiu)</i>	trunk is white, pith contains much water
	<i>alkatowin (alkatois)</i>	trunk is tall, pith contains little water
	<i>alios (aliopos)</i>	
	<i>urubon (urubob)</i>	trunk is hard
	<i>murap (muras)</i>	pith is hard

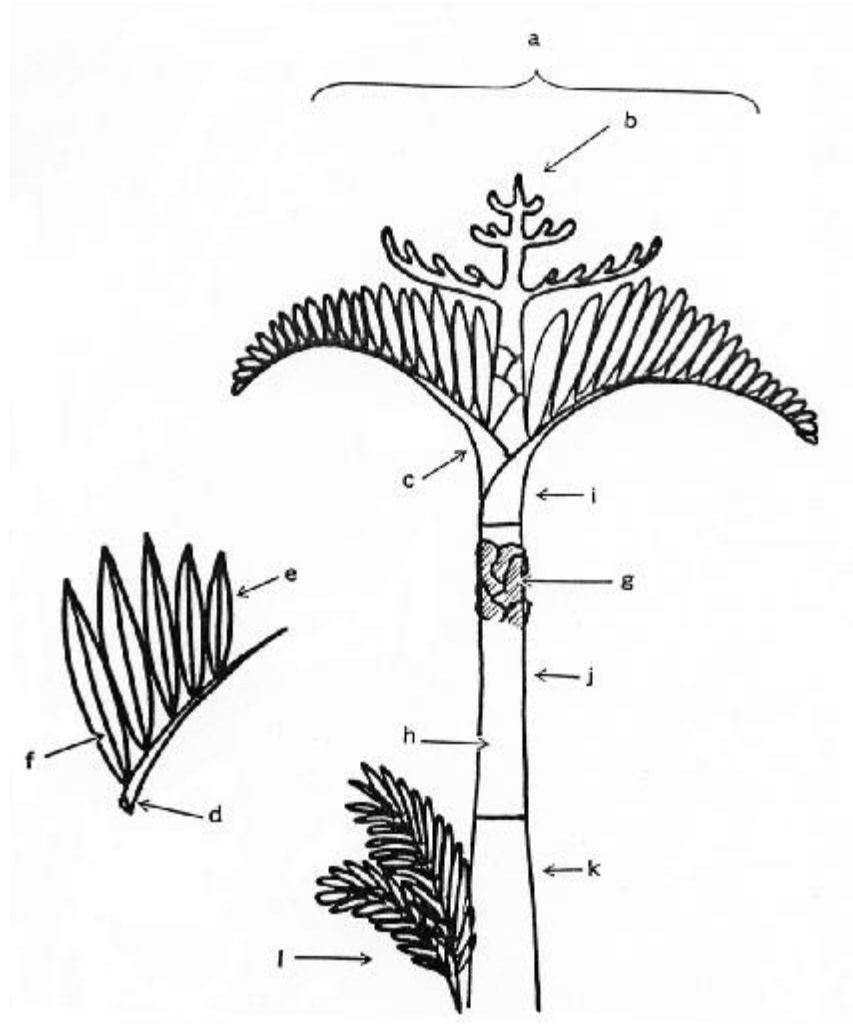
\*Names in parenthesis indicate plural forms.

## (2) Sago palm parts in Sowom

Each part of the sago palm has a vernacular name (Figure 2). This is partly because almost all parts of the palm are utilized in daily life. The leaves are used for thatching, petioles for making walls, and thin ones as fishing rods. Petioles also are often used to make various kinds of containers, such as storage baskets for sago starch.

Most young people do not know these traditional names for the kinds and parts of sago palm in their vernacular language, since they are losing their vernacular language, as Tok Pisin is becoming more popular as their common language. Also, young people are unfamiliar with the kinds and parts of sago palm because they do not do agricultural work as frequently as before, since they leave the village to attend

school when they are young or are often stay away from the village and have little opportunity to work in village food production.



a. <i>lohu</i>	sago as a whole	b. <i>beinap</i>	treetop
c. <i>barg(bags)*</i>	petiole	d. <i>nudun</i>	rachis
e. <i>surugites</i>	leaflet	f. <i>porpotok</i>	midrib of leaflet**
g. <i>mous</i>	remainders of petioles	h. <i>aingul</i>	cortex
i. <i>beinap</i>	upper part of trunk	j. <i>ndarut</i>	middle part of trunk
k. <i>baug</i>	lower part of trunk	l. <i>angu(angophos)*</i>	suckers

\*Names in parenthesis indicate plural form.

\*\*The central vein of a leaflet.

**Figure 2.** Vernacular terms for sago parts in Sowom

### **(3) Land tenure and sago use**

Sowom village is surrounded by swamp, and numerous sago palms are easily found within a 10 minutes' walk from the village. In these swampy areas, sago grows wild, but the people also cultivate some sago palms by transplanting suckers. They also try to take manage sago-growing areas by cutting back treetops and weeds. But in most cases, they do not look after the palms after they are transplanted. The palms that they utilize for extracting starch are mostly wild ones.

The people claim ownership of each palm that grows on their land and maintain them for their descendants by assuring they grow well. The land is often not owned individually but communally among relatives, and as a result, the palms are also claimed by relatives, usually by several adult males. The land is usually claimed only by men, but when a husband dies, a part of the land is transferred to the widow. Even in the case when the children are adults, the widow can claim ownership of a part of the land.

When sago starch is extracted, villagers mostly exploit their own sago palms, or those of their relatives. If a palm is owned communally, permission must be obtained from the relatives before it can be exploited. If they cannot find mature palms on their own land, or if the palms are located too far away, they may ask unrelated people for suitable palms. This kind of request is usually granted, since reciprocity is expected in their daily lives.

The extraction process is usually done by household, not by a nuclear family but by an extended family. When starch is extracted by a couple, men usually crush the pith and women leach the starch. When someone joins in the work, he/she can claim a portion of the starch even if the palm does not belong to him/her, if he/she is one of the relatives of the owner.

### **(4) Sago Starch extraction processes**

In Sowom, sago is extracted mostly for subsistence, and the techniques and implements used to extract the starch sago are similar to those reported in general for the tropics (Ruddle et al. 1978: 11-24, Flach 1997: 28-30).

### **1) Finding a suitable palm**

When the people in Sowom plan to extract sago starch, they first try to find a suitable palm just before flowering, since they know that the palm will die soon thereafter. They sometimes cut into the trunk to check if it has sufficient starch. Because starch extraction needs large quantities of water, it is necessary for a water source to be located near the palm. If the palm is far from a water source, people sometimes dig a hole of about 3 to 5 meters deep, and about 3 to 4 meters in diameter, to capture and store rainwater. But when they use this small pool method, the amount of water is quite often insufficient for extracting starch, and therefore a river or stream location is preferred.

### **2) Clearing the tree base and trunk**

After choosing a palm, the weeds on the ground surrounding the palm are cut and cleared by using bush knives. Epiphytes and weeds on the trunk are also cleared. An area large enough for the succeeding processes must be created by clearing the undergrowth surrounding the palm, including space in the direction of the trunk felling.

### **3) Felling the tree**

First, the base of the trunk is cut away with bush knives on the side of the felling direction to make it easier to cut down the trunk with an axe. In the felling process, deep cuts are made into half of the trunk from one side, and then cut from the opposite side. The trunk will fall in the direction down of the side of the first cutting. Since the sago trunk is soft as compared with the other palms, it is rather easy to fell the tree; the work takes 10 to 15 minutes.

### **4) Crushing the pith**

After felling a tree, the cortex of a section of trunk appropriate for a day's

crushing is stripped away. Crushing is done using a special stand for extraction. When one stand is used for crushing, around 2 meters of skin of the trunk are peeled away. Crushing is usually done with a sago chopper having an iron tip. The Arapesh vernacular name for the chopper is *gun* (Figure 3). The color of the pith is first pinkish white, becoming light brown as time passes. The people attempt to crush the pith into small pieces, saying that the amount of the starch produced in the subsequent process depends on the smallness of the pith. Crushed pith is called *abek* in the vernacular language and pith not sufficiently crushed is referred to as *bawas*. The fact that poorly crushed pith is referred to differently indicates that the people recognize the importance of crushing the pith into small pieces.



**Figure 3.** Sago chopper (*gun*)

##### **5) Carrying pith to the extraction stand**

The extraction stand is set up where ample water is accessible (Figure 4). Crushed pith is carried to the extraction stand, which is set up in advance. The people formerly used coconut coir fiber as a sieve, but nowadays they use rice bags of woven plastic for the filtering (Figure 5).



**Figure 4.** Stand for sago extraction



**Figure 5.** Extraction sheet made of plastic sheet for rice bag

#### **6) Leaching sago pith**

This process involves taking a lump of crushed pith and placing it on the filter, saturating it with water, and then kneading it. The water with sago starch in suspension, passes through the filter, and is collected in a vessel made of palm peti-

oles. This process is repeated 5 to 7 times, until the liquid that passes through the filter becomes transparent. Then, the next lump of pith is placed on the filter.

### **7) Taking out starch**

The water with starch is stored in vessel, and the starch is collected by sedimentation. The starch gradually settles to the bottom after the water is left for 15 to 20 minutes. When the water becomes transparent, the water over the starch is poured off, and starch is left. The color of the liquid is usually light red, and the color of the starch is pinkish white when the water is transparent. The color of the starch depends on the condition of the water they used for extraction. The water is taken from rivers or small ponds. When the water is cloudy, the starch and the liquid becomes light brown.

### **8) Carrying starch to their home**

The starch is usually put in a rice bag, and is carried to the family home. This is mostly done by women.

### **9) Storage**

The starch is put into a basket made of petioles and leaves of sago palms and stored in a wet condition (Figure 6). A little water is regularly added to the starch, once or twice a week, to keep it moist. It is said to be possible to preserve sago without spoiling for 5 to 6 months, if kept well.

## **(5) Division of labor by gender**

The process of extracting sago starch is mostly done by a couple, a man and a woman. It is often reported in the literature that the process of sago extraction is allocated by gender. Usually the earlier part of the process is carried out by men, and the latter by women (Tuzin 1976: 16-17, Bateson, 1958: 36-37), although the Abelam women do both (Kaberry, 1940/41, 347). In the case of Sowom, the processes from selecting the palm to crushing the pith are conducted by men, and the following processes from leaching pith to storage are done by women. Therefore, when they ex-





**Figure 6.** Storage instrument for sago starch

tract sago starch, men leave home earlier than women, usually 7 to 9 a.m. without taking breakfast, and begin crushing pith without a woman's help. Women, after preparing breakfast for men, leave home later with their husband's breakfast, and then carry out the process of leaching pith. After men finish crushing the pith, they return alone to their village without waiting for their partners.

It is said that the division of labor by gender used to be strictly observed by the people. But nowadays, among the younger couples, men sometimes help women with their work. For example, men sometimes help women to carry sago starch back home. However, they try not to do that in the presence of others. Even if men carry sago starch for women, they will stop carrying just before they arrive at the village, and hand it to women lest others see them. Also in the case of leaching pith, men sometimes help women when they are alone, but men never do that if someone else is present. This is probably because there is strong tradition of male dominance in

Sowom village, as in other areas in Papua New Guinea. It is believed that men are superior to women and that the division of labor by gender should be strictly observed and men should not do women's work.

The idea of men's superiority to women is also seen in the process of the work of extraction of sago starch. This depends on the men's mood. Since the work of sago leaching has to be done after the work of crushing pith, women cannot get sago starch if men do not crush the pith. When the man is not in the mood to work, the work will not be done. If a woman is asked when they will next leach sago, she usually answers 'it depends on him'.

#### **(6) Working period**

The extraction work is done from morning to evening. Since it is not possible to work after the sunset, and the starch might be spoiled if the work is stopped halfway and the starch is left on the spot, the work has to be finished before dark. As a consequence, the work is begun in the early morning.

The average length of trunk for extracting starch is around 10 meters. Since a log portion for each day's crushing is around 2 meters long, it is supposed to take about 5 days to finish the work of 1 trunk of sago palm. But that does not mean that the work of extracting sago starch is done over 5 consecutive days. Since extracting starch is hard work, they often take a rest. Work is also stopped when there is heavy rain. The water becomes muddy during heavy rain, and they cannot get clean water for leaching sago.

As in the other parts of Papua New Guinea, most people in Sowom are Christians, and therefore, they do not work on Sundays. In addition to that, Mondays are considered to be the days for communal work in Sowom, and they clean school facilities and roads, tombs, and help in large scale work, such as bringing down logs for new houses, and so on. Furthermore, they are often asked to help others in their work, for example in harvesting cash crops such as cacao, coconuts and so on.

As a consequence of these, it usually takes around 2 weeks to finish the work of extracting sago starch from 1 trunk. They do this work once every 2 to 3 months. For their family subsistence use, harvesting sago every 2 to 3 months gives more than they need, but because of sago used for rituals and funerals, they need to harvest that frequently. When they have rituals and/or funerals, they invite people from outside the village. A large quantity of sago is consumed in a short period. If the sago is consumed only by family members, they do not need to work as frequently.

### **(7) Secondary food products**

Besides sago starch, the people in Sowom gather sago grubs and mushrooms as by-products of sago harvesting.

#### **1) Sago grub**

Sago beetles (*Rhynchophorus ferrugineus*) and their grubs are collected for food from the pith of sago palm. Beetles and grubs are eaten, but people prefer grubs to beetles as a food (Figure 7). When they eat the beetles, the heads, legs and wings are removed, and only the abdomens are eaten. Grubs and beetles are roasted or fried. Since sago starch consists of mostly carbohydrate and water, sago grubs are considered to be useful source of protein.



**Figure 7.** Sago grubs

Sago beetles appear in stumps of sago after the starch extraction, but people try to collect them by felling useless palms, which are considered to have little starch or little hope to grow well. Or even after beginning to extract sago starch, they stop extracting and leave the trunk lying deliberately, when they discover it is not a good source of starch. It is said that they cannot get much starch if the trunk contains too much 'water'. When the pith becomes dry, sago grubs do not flourish, and people put sago leaves on the trunk so that the sunlight does not reach the trunk. People check the trunk regularly lest the grubs mature and fly away.

## 2) Mushroom

A type of mushroom (*Volvariella volvaceae*) grows on the pith discarded after the extraction work. Some of them become more than 10 cm tall (Figure 8). Nevertheless, the people do not try to harvest the mushroom deliberately, probably because they do not care for their taste. Each sago trunk left for growing sago grubs is claimed individually and it is prohibited to take sago grubs from someone else's trunk. But as for mushrooms, they can be harvested freely by anyone who finds them. This is partly because it is hard to predict where and when they will grow and be ready to eat, and partly because the people do not like the taste very much.



**Figure 8.** Mushroom grown on sago palm

## **(8) Cooking Method of Sago**

It is reported that traditionally there are three main ways of cooking sago. They are sago jelly, fried sago cakes and baked sago in bamboo sections (May 1984:54). In the case of Sowom, there are four major ways to cook sago: sago jelly, fried sago, sago soup and steamed sago.

### **1) Sago jelly**

In Sowom, sago jelly is the primary method of cooking sago, and it is called *kwine* in their vernacular language. First, the sago flour is taken from the storage vessel, and is put in a large pot or pan. Then, hot water is added to the flour. They say that if the water is too hot at this time, starch coagulates rapidly, and not equally. When the starch finally dissolves, impurities and fibers are removed with a sieve made of coconut fiber. Then, boiling water is added to the starch in one stroke. The added amount of boiling water determines the state of sago jelly produced. If the quantity of water is too small, the jelly becomes hard, whereas the jelly stays soft, if the water amount is just right.

The jelly is taken from the pot using two sticks. By using these sticks, the people make dumplings, which are 6 to 7 cm in diameter. The dumplings are served on the leaves of *Heliconia spp.* Usually 5 to 7 pieces of dumplings are served for an adult (Figure 9). This method of cooking is quite common in the lowland of Papua New Guinea, but the size of the dumplings differs from place to place. In the case of Sandaun Province, the diameter is 3 to 4 cm, and they serve a larger number of dumplings, usually around 10 pieces for a portion.

The color of the jelly varies from pinkish white to brown. The color depends on the water used in leaching.

### **2) Fried sago**

The second way of cooking sago is by frying. After drying sago starch, it is fried in a pan. The sago starch kept in storage vessel is wet, and is difficult to fry. Therefore, a certain amount of sago is taken out of storage, and is dried for several



**Figure 9.** Sago Jelly

days before cooking.

It is believed that this cooking method is fairly new, since not every household has a frying pan for the cooking. It is believed that this method originated in Sandaun Province. It is said that a woman who married into Sowom from Aitape in Sandaun Province introduced this cooking technique. Most of the households in Aitape are said to have a special frying pan for this cooking.

While sago jelly is a staple diet, fried sago is considered to be a kind of snack. Even when they stave their hunger by eating fried sago, they usually eat sago jelly after that, saying that sago jelly is a ‘true’ meal for them and that fried sago is not.

### **3) Sago soup**

Another way of cooking sago is making soup from sago together with bananas and coconut milk. The vernacular term for this cooking method is *bouisii*. Bananas must be fully ripe, and this soup is considered to be a sort of sweet because of sugar in the bananas and coconuts. It is said that this soup is good for health when it is rainy and cool, because it makes the body hot. Sometimes the leaves of *tulip* (*Gnetum gnemon*) are used instead of bananas, and in that case, it is said that the taste is bitter rather than sweet.

#### **4) Steamed sago**

*Erbergu* is a method of steaming sago together with bananas and coconut milk. Sago, bananas and coconut milk are wrapped up with leaves of *Heliconia spp.*, and steamed on a charcoal fire or under hot stones for one or two hours. The Sowom people prefer these two cooking methods, sago soup and steamed sago, saying that they love its tastes and stickiness.

#### **(9) Side dishes**

Sago jelly is usually eaten with some side dishes. These are mostly greens, vegetables, and fish. The side dishes are often boiled with coconut milk, made from copra. Since Sowom village is located on the coast, coconuts are easily obtained and this is the most popular side dish with sago jelly. Sometimes coconut water is used instead of coconut milk, but they consider it to be an emergency measure and do not enjoy eating it. Even fried sago is not considered to be the main food. Peoples say 'we do not feel full if we do not eat sago jelly'.

#### **(10) Sago as food in Sowom**

In order to investigate the status of sago as food, dietary habits were investigated among 21 households from 21 September to 21 October, 1999 by administering a questionnaire, and conducting interviews. The valid data amounted to 283 household-days.

Sowom people tend to eat any time they have food, especially during the daytime. It is difficult, therefore, to determine the frequency of their meals. In this research, only those meals cooked and eaten at home were counted. Quite often, they are given food when they visit others, and the frequency of meals would be actually higher than that shown in Table 3. Breakfast was counted when eaten before going out to work, and supper after coming home. Lunch was counted when they ate during their work, and during the daytime when they did not go out because of heavy rain.

**Table 3.** Kinds of food consumed in each meal in Sowom\*

	Breakfast	Lunch	Supper	Total
No. of valid data	283	215	279	777
sago	183	73	236	492
bananas	110	106	48	264
root crops**	46	38	22	106
rice***	58	39	48	145

\*Multiple responses.

\*\*Root crops include taro, sweet potato, yam and cassava.

\*\*\*Rice is imported from Australia and sold at shops.

Among a total number of 777 meals, sago was eaten 492 times (63.3%). It is the most frequently consumed food as compared with the other kinds of food. Sago is mostly eaten as a breakfast meal (64.7%) and as supper (84.6%). This is related to the fact that breakfast and supper are usually prepared by women, whereas lunch is sometimes cooked by men and children. Since sago is always prepared by women, when men or children feel hungry during the daytime, they cook something other than sago, such as bananas, yams or taros. Another factor related to sago being eaten almost always at supper is that they frequently have no side dish for sago jelly in the morning, even if they want to. It is the custom to prepare a side dish for sago jelly during the daytime by collecting green vegetables and/or catching fish, and consequently they have enough of a side dish for cooking sago jelly at supper.

Sago is eaten nearly two-thirds of the major meals, but its role as a staple food becomes much clearer when the frequency is measured on a daily basis. It is consumed almost every day, with the frequency of 97.2% (Table 4).

Although the methods of cooking sago vary, not all of them are as commonly practiced. Among the four cooking techniques, sago jelly is by far the most common (Table 5).

Research on the cooking practices was conducted from May to December;



and during this period, the dry season, no seasonal changes were observed. There are no data available to ascertain whether there is any change of cooking practices between the rainy and dry seasons.

**Table 4.** Frequencies of food kinds consumed in Sowom\*  
(daily basis)

	No. of days	per cent
No. of valid data	283	
sago	275	97.2%
bananas	191	67.5%
root crops**	84	29.7%
rice***	119	42.0%

\*Multiple responses.

\*\*Root crops include taro, sweet potato, yam and cassava.

\*\*\*Rice is imported from Australia and sold at shops.

**Table 5.** Frequencies of each cooking method of sago in Sowom

Cooking method	No. of frequencies*	
sago jelly	481	96.2%
fried sago	7	1.4%
sago soup ( <i>bouisii</i> )	8	1.6%
steamed sago ( <i>erbergu</i> )	4	0.8%
total	500	

\*The figures come from the numbers of Table 3. Total number is more than 492 of Table 3, since multiple kinds of sago are sometimes served once.

### (11) Cooking and gender

In Sowom, cooking is usually done by women. From infancy, girls tend to stay with older women in the family, usually their mother. They try to help elders in washing dishes, carrying water, collecting greens and cooking. By imitating their

elders, they learn these tasks. But cooking sago jelly is considered to be difficult to learn, and it is believed that it would be a waste of sago if they let girls cook sago and they fail. The older women, therefore, teach young girls repeatedly how to cook sago jelly, beginning when the girls are around 10 years old. When the girls are around 15 years old, they learn how to cook sago jelly properly, and they also learn the other kinds of jobs women perform. Being able to cook sago jelly properly is considered to be the symbol of becoming an adult woman for Sowom girls.

### **(12) Sago and social life**

In most areas of Papua New Guinea, the relatives of a prospective husband give property and valuables to the bride's relatives as a bride price. The components of the bride price vary from place to place, but usually money and pigs are paid. In and around Sowom, sago starch is paid as a bride price along with money and pigs. It is inferred that sago starch is considered to be emblematic of a meal, from the fact that it is given as part of the bride price.

Sago jelly is served on the occasion of weddings as a welcome to guests. In the case of funeral, each household prepares sago jelly and hosts the people coming from the other villages. If the deceased is young, it is expected that close relatives stay with in the family of the deceased for a certain period, usually 3 weeks. When the mourning period is over, the family of the deceased holds a party to express their thanks to the relatives and hosts them with a large quantity of sago jelly, equal to the amount from one palm.

The people in Sowom have a tradition of not eating sago jelly when a close relative dies. Usually, when a husband loses his wife, or a father loses his daughter, he stops eating what he likes best to show his grief. In the case of Sowom, sago jelly is a typical food and they usually choose sago as a sign of mourning. The duration of ceasing to eat sago jelly is up to the individual person, and it often continues for one year, and sometimes forever.

### **(13) Conclusion**

Through a series of this field research, the findings of the research were as follows;

1. Sago is classified in Sowom into 7 types, including the division of those with and without spines.
2. The processes of extracting starch are allocated by gender as a rule. In Sowom, the processes from the choosing the palm to crushing the pith are carried out by men, and the succeeding processes from leaching pith to storage are done by women.
3. Sago is eaten almost every day in the form of sago jelly, and sago jelly is considered to be a staple food in Sowom.
4. Cooking sago jelly is done only by women.
5. Sago starch can be stored for several months, if kept properly.
6. Sago plays important roles in various aspects of Sowom's social life, such as a part of bride price and as a symbol of typical food.

### **Note**

- 1) Sowom has been often described as Sowam in maps and reports, but the people in the village prefer the name of Sowom. In this paper, therefore, Sowom is used instead of Sowam.

### **Acknowledgement**

A series of research on which this paper is based was financed by the following funds and organizations; Tokyo University of Agriculture, Grant-in-Aid for Scientific Research of Japan Society for the Promotion of Science (14401016, 16401032), Sago Palm Special Fund from Japanese Society for Tropical Agriculture (1993), Grant-in-Aid for Tropical Bio-Resources Research from the Japan Society for the Promotion of Science (2000), and Nagato Fund for Sago Studies (2004). We would like to express our gratitude to them. We specially thank Dennis V. Johnson for his thoughtful comments on an earlier draft, and Hiroshi Ehara and Yusuke Goto for their advice on our paper. We are also indebted to Mr. Kawabata, who has kindly helped with our

research in the Sepik area, Papua New Guinea. We wish to extend our thanks to the villagers of Sowom, who warmly accepted us during our stay. The successful completion of our research is largely due to their kind assistance.

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\* This paper first appeared in *SAGO PALM*. Vol.12(2), pp.1-11, July 2005, titled 'Sago as Food in the Sepik Area, Papua New Guinea' (co-authored with Rieko Todo, Hidekazu Toyohara).

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## Multicropping in the Sepik Area of Papua New Guinea\*

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**Abstract:** In the Sepik area of Papua New Guinea, gardens are created using shifting cultivation. One sees there many crop species grown in a single plot at the same time. Even when only one botanical species is found in a garden, the people distinguish many types, and give different local names to each folk variety. Research has been conducted among the Kwanga people in the Nuku area of Sandaun Province, Papua New Guinea, in order to investigate the circumstances of multicropping, and the logic of why they grow many varieties at the same time in their gardens.

The Kwanga people of Papua New Guinea cultivate 77 varieties of yam (*Dioscorea alata* and *D. esculenta*), 24 of taro, 65 of banana, and 9 of sago palm. These crops are differentiated according to their form, color, flavor and agronomic features.

Why the Kwanga grow so many crop varieties is not easy to understand. One might expect that growing many varieties could mitigate the risk of specific crop loss to pests or diseases. One can reduce risk by keeping many varieties in the hope that some varieties will thrive and produce even if others fail. However, the local people do not agree with this logic. They usually emphasize that they cultivate numerous varieties because they want different flavors. Eating only a few varieties of food crops makes their diet monotonous and dull, they say, but they can enjoy different flavors if they have many varieties in their gardens. Although we see ecological and agronomical rationality in indigenous people's behaviors, the people do not recognize this rationality and they have their own rationality.

It is postulated that there are two ways of understanding their logic. One is that the local people's rationality is similar to ours, but for some reasons they do not recognize its meaning now. The other is that their rationality is different from ours, and they do not reason with our ecological and agronomical perspective. They grow many kinds of crops based on other logic, such as enjoying different flavors.

**Key words:** folk taxonomy, Kwanga, multicropping, Papua New Guinea, Sepik area

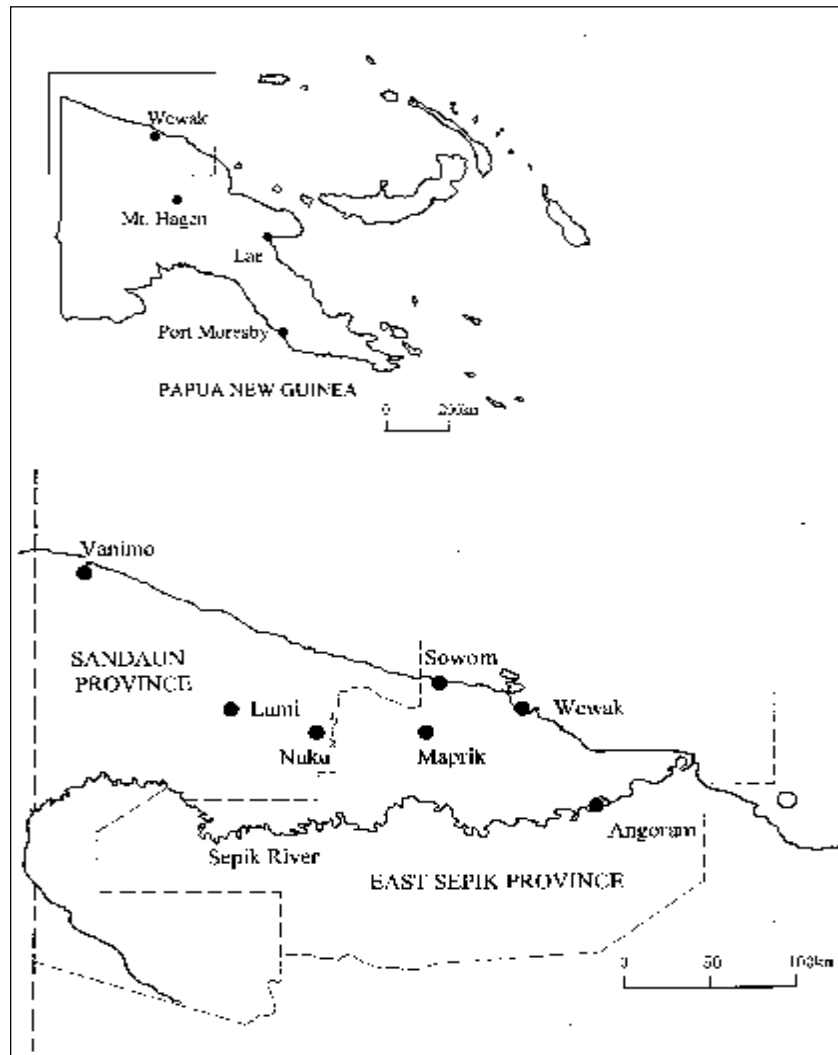
## **1. Introduction**

In the Sepik Area, many crops are grown in addition to sago palm, and they are mostly nonseed-crops, such as yam, taro and banana. In the case of seed-crop agriculture, it is typical that a single crop is grown over a wide area, but the people in the Sepik Area cultivate a large variety of food crops in a single plot at the same time. Even in the case where they only have a few botanical species, they distinguish numerous varieties among these species. Arapesh people in the Sepik area classify yams into dozens of varieties (Tuzin 1978). The Iwam people of the upper Sepik River also classify taros and bananas into a number of varieties (Yoshida 1985). These phenomena are observed in other areas where vegetative propagation is common<sup>1</sup>. For example, the Hanunoo people in the Philippines cultivate 77 kinds of crops by the slash-and-burn technique (Conklin 1962). In northwestern Thailand, the Lua people cultivate 84 varieties of crops (Kunstadter 1978). The way in which these local groups distinguish varieties is different from a scientific classification, and is based on indigenous criteria.

It has been argued that multicropping<sup>2</sup> has ecological and agronomical rationality (Hong 1987), and the types of these classifications have been reported (Conklin 1962, Kunstadter 1978). But what has not been discussed is how the people recognize the rationality of multicropping (Yoshida 1985). This paper describes how the Kwanga of Wanjeaka hamlet, Sepik Area in Papua New Guinea, distinguish varieties of crops, such as yam, taro, bananas and sago, and describes the classification criteria they use. The significance of growing many crops at the same time will also be discussed.

## **2. Research area and methods**

The research area is Wanjeaka hamlet, Seim area, Sandaun Province, Papua New Guinea. The province has a population of around 140,000, and covers an area of 36,000 km<sup>2</sup>. The Seim area had 4,320 inhabitants in 1990 (National Statistical



**Figure 1.** The Sepik Area, Papua New Guinea

Office 1993). The Seim area is located at the base of Torricelli mountains, and has an annual rainfall of approximately 2,000 mm. According to the natural vegetation, it is classified as lowland alluvial plains and fans (Paijmans 1976). The villages in this area are scattered in small settlements, and Wanjeaka is one of them. The inhabitants of Wanjeaka speak the Kwanga language, which has 13,000 speakers totally. Kwanga belongs to the Sepik-Ramu phylum, Sepik sub-phylum, Middle Sepik stock and Nukuma family. Other villages of Kwanga speakers include Apangai, Bongos, Tau and so on (Laycock & Z'graagen 1975, Wurm 1982).

Field research was conducted mainly from 1991 to 2001. The author visited the village in 1991, 1992, 1993, 1994, 1999, 2001, and spent a total of 8 weeks there. While staying in the village, observations, measurements, interviews and questionnaires were conducted, using Tok Pisin (Pidgin). The Kwanga language is seldom spoken among the younger people, and they are unfamiliar with the indigenous knowledge of crops. Interviews and questionnaires were, therefore, mostly conducted with elderly people in the village.

### **3. Kwanga shifting cultivation**

Most crops in Kwanga area are grown under shifting cultivation. The land is cleared first by cutting large trees, and then left for a week in order to let the felled trees dry out. After burning the trees and other cut vegetation, the land is left for another week, and then the people begin to plant crops. The crops are yams (*Dioscorea spp.*), taro (*Colocasia esculenta*), bananas (*Musa spp.*), maize (*Zea mays*), pawpaw (*Carica papaya*), sugarcane (*Saccharum officinarum*), tobacco (*Nicotiana tabacum*) and so on. The yams are the main food; extracting starch from sago is conducted supplementarily.

The timing of clearing land is governed by the color change of certain types of leaves, and this change indicates that the rainy season will begin shortly. When the crops are harvested, another plot of land is begun to be cleared for the following season's garden. It is usually adjacent to the present one, since it is easier to carry young crops the short distance to a new garden. The gardens are rotated on a 15-20 year cycle.

Where in a field specific crops are planted varies with the crop. Yams are planted on slopes, so that they can be easily dug out. Bananas are planted at the base of other tree crops, or along the garden edges. Sugarcane is also planted at the base of other tree crops. The sequence of planting is also fixed. Taros come first, followed by yams and bananas. When the taro and yam are young and not yet ready to harvest



and eat, the people obtain starch from the sago palm trunks.

#### 4. Folk Classification of Crops by the Kwanga

Food crops grown in the gardens are classified into a number of varieties. The Kwanga people distinguish 39 varieties of *Dioscorea alata* (Table 1), 38 of *D. esculenta* (Table 2), 24 of taro (Table 3), 65 of banana (Table 4) and 9 of sago (Table 5)<sup>3</sup>. These classifications are not scientific, and are based solely on indigenous criteria. The classification uses the indigenous language, and it varies according to language groups. Therefore, this classification applies only to Kwanga-speaking people, who number around 13,000<sup>4</sup>. The indigenous people are able to distinguish these varieties, and can tell the differences by the leaves and the other plant parts, even when the crops are young and not ready for harvest. These classifications are learned through repeated work in the gardens. By learning the meaning of indigenous names, it may be postulated how they classify these crops. Crop classification is based on the following criteria:

- 1) form
- 2) color
- 3) size
- 4) using the name of a similar form
- 5) dietary characteristics
- 6) agronomic characters
- 7) processing characters
- 8) ways of bearing fruits
- 9) ways of introduction
- 10) other

In this classification, it should be stressed that crops are classified by gender, that is, into male or female (Table 6). In the case of *Dioscorea alata*, 19 varieties are male, and 20 are female. Among the bananas, 31 are male, and 34 are female. As for

**Table 1.** Folk Classification of *D. alata* in Kwanga, Papua New Guinea

	Local name	Gender	Meaning of name
1	<i>abmerkongo</i>	m.	The shape resembles a bird.
2	<i>asanani</i>	m.	Smells like a dog.
3	<i>bali</i>	f.	Introduced from a place called Bali.
4	<i>betu</i>	f.	Introduced from a place called Betu.
5	<i>kinjanani</i>	f.	Many shoots come out.
6	<i>lisiteye*</i>	m.	The shape becomes like a hand.
7	<i>lisiteye*</i>	f.	
8	<i>namblo</i>	m.	Introduced from a place called Namblo.
9	<i>nokobnani*</i>	m.	Female yam.
10	<i>nokobnani*</i>	f.	
11	<i>naniabukyalanbai</i>	f.	It looks like wings of a bird called talangau.
12	<i>naniafisha</i>	m.	The inside is white.
13	<i>nanibasunuku*</i>	m.	It tastes good.
14	<i>nanibasunuku*</i>	f.	
15	<i>nanigwasi</i>	m.	The color is similar to a plant called daka.
16	<i>nanihorkle*</i>	m.	The skin peels off easily.
17	<i>nanihorkle*</i>	f.	
18	<i>naniili</i>	f.	It looks like nuts.
19	<i>naniniyaka</i>	m.	The leaf color is similar to the moon.
20	<i>nanirabaul*</i>	m.	Introduced from Rabaul.
21	<i>nanirabaul*</i>	f.	
22	<i>nanitambesiki*</i>	m.	The shape is similar to seeds of a plant.
23	<i>nanitambesiki*</i>	f.	
24	<i>naniwabi</i>	f.	Liver (It tastes like animal liver.)
25	<i>naniwapnalo*</i>	m.	Red <i>naniwabi</i> .
26	<i>naniwapnalo*</i>	f.	
27	<i>naniwarumbo</i>	m.	It tastes like cucumber.
28	<i>naniurbla*</i>	m.	The shape of its leaves is like a plant called tanget
29	<i>naniurbla*</i>	f.	
30	<i>nanixatla</i>	f.	No meaning.
31	<i>obkosumbori</i>	m.	It looks like a small snake.
32	<i>rabaul</i>	f.	Introduced from Rabaul.
33	<i>sulka</i>	f.	Introduced from a place called Sulka.
34	<i>suweriga</i>	m.	The inside is hard.
35	<i>tambagar</i>	f.	Introduced from a place called Tambagar.
36	<i>tombounani</i>	m.	Introduced from a lower elevation.
37	<i>wasnani</i>	f.	Introduced from the place of white men.
38	<i>wasnanisunja</i>	f.	The inside is hard like stone.
39	<i>yarwayi</i>	m.	Found in the forest.

Notes: The letters m and f indicate male and female respectively.

Those with asterisks are classified as either male or female.

**Table 2.** Folk Classification of *D. esculenta* in Kwanga, Papua New Guinea

	Local name	Gender	Meaning of name
1	<i>aku</i>	f.	Its roots appear from down below.
2	<i>angwasi</i>	m.	No meaning.
3	<i>alikro</i>	f.	The skin peels off easily.
4	<i>arksame</i>	f.	Introduced from a place called Arksame.
5	<i>bacheki</i>	f.	Small like babies.
6	<i>bakabtoko</i>	m.	Red and long.
7	<i>bakabwuri</i>	m.	Long like bird tales.
8	<i>bakabmasagowoe</i>	m.	Borrowing the name of a place called Arksame.
9	<i>bakapsambu*</i>	m.	The shape resembles a cassowary.
10	<i>bakapsambu*</i>	f.	
11	<i>bakapwolo*</i>	m.	The shape resembles a bird.
12	<i>bakapwolo*</i>	f.	
13	<i>bakbale</i>	m.	Bad.
14	<i>bakfanje</i>	f.	The leaves resemble sago petioles.
15	<i>bakloko</i>	f.	No meaning.
16	<i>baknijaba</i>	f.	No meaning.
17	<i>bakomtasi</i>	f.	The interior color resembles the skin of cuscus (an opossum).
18	<i>baksherkunya</i>	f.	It becomes like a tree.
19	<i>baksisinjolo</i>	f.	The skin peels off easily.
20	<i>bakyende</i>	m.	It resembles a fish.
21	<i>basminja</i>	f.	It resembles tree leaves.
22	<i>borraki</i>	f.	Introduced from a place called Borraki.
23	<i>hambogosunja*</i>	m.	It is as hard as stone.
24	<i>hambogosunja*</i>	f.	
25	<i>haukle</i>	f.	The interior color is black.
26	<i>hausembe</i>	f.	It resembles a kind of grass.
27	<i>kambaimbaje</i>	m.	Yam of bad spirit.
28	<i>kawanka</i>	f.	Introduced from a place called Kawanka.
29	<i>mainkiebi</i>	m.	Easy to cook.
30	<i>muxau</i>	f.	The inside looks like milk.
31	<i>nuku</i>	m.	Introduced from a place called Nuku.
32	<i>sima</i>	f.	Short.
33	<i>surmbulan</i>	m.	Introduced from a place called Surmbulan.
34	<i>waintombo</i>	f.	Short and thick.
35	<i>wanhawa</i>	f.	Introduced by a person called Wanhawa.
36	<i>wangisai</i>	m.	Thin.
37	<i>warsanklambi</i>	m.	No meaning.
38	<i>wasara</i>	m.	Introduced from a place called Wasara.

Notes: The letters m and f indicate male and female respectively.

Those with asterisks are classified as either male or female.

**Table 3.** Folk Classification of *Colocasia esculenta* in Kwanga, Papua New Guinea

	Local name	Gender	Meaning of name
1	<i>yagorombuknalo</i>	f.	Red taro introduced from a place called Yagorombuk
2	<i>yagorombuk</i>	f.	Introduced from a place called Yagorombuk.
3	<i>sabafai</i>	f.	It has short leaves.
4	<i>makam</i>	f.	Introduced from a place called Markham.
5	<i>tarui</i>	f.	No meaning.
6	<i>abkumbu</i>	f.	Its leaves resemble the flying fox.
7	<i>nasikunasi</i>	f.	No meaning.
8	<i>hafarnasi</i>	f.	Introduced by a person called Hafar.
9	<i>nasisikakre</i>	f.	No meaning.
10	<i>nasimankubya</i>	f.	It resembles a tree.
11	<i>oskins</i>	f.	Introduced from a place called Hoskins.
12	<i>kanabuku</i>	f.	Introduced from West New Britain.
13	<i>arubanjasi</i>	f.	No meaning.
14	<i>nasimurongo</i>	f.	Introduced from a place called Murongo.
15	<i>nasiukumbungwar</i>	f.	No meaning.
16	<i>nasiopmisa</i>	f.	The petiole color is like snakeskin.
17	<i>imbrangen</i>	f.	Introduced from a place called Imbrangen.
18	<i>kuwanganasi</i>	f.	Taro of Kwanga.
19	<i>kindam</i>	f.	The petiole color is similar to boiled shrimp.
20	<i>nasiwarsihi</i>	f.	It resembles breadfruits.
21	<i>nasixoko</i>	f.	It resembles potatoes.
22	<i>nasiapsambarke</i>	f.	The color is like parrot wings.
23	<i>angarnasi</i>	f.	Introduced from a place called Angar.
24	<i>aloweinam</i>	f.	Introduced from a place called Weinam.

Notes: The letters m and f indicate male and female respectively.

**Table 4.** Folk Classification of *Musa spp.* in Kwanga, Papua New Guinea

	Local name	Gender	Meaning of name
1	<i>alamurlobo</i>	m.	It resembles a bandicoot.
2	<i>amayau</i>	m.	
3	<i>amberyawo</i>	f.	
4	<i>amberkrato</i>	m.	
5	<i>apkumlobo</i>	f.	It resembles a kind of bird.
6	<i>arkalobo</i>	f.	Its leaves are white.
7	<i>bali</i>	f.	Introduced from a place called Bali.
8	<i>hametu</i>	f.	
9	<i>holan</i>	m.	Introduced from West Irian.
10	<i>ingyaplobo</i>	f.	It resembles grubs.
11	<i>kalapua</i>	f.	The name in other language group.
12	<i>kiaukiau</i>	m.	
13	<i>kleplobo</i>	f.	It tastes good in soup.
14	<i>kleplobonalo</i>	f.	Red <i>kleplobo</i> .
15	<i>kolobo</i>	f.	Banana for planting around houses.
16	<i>labangai</i>	m.	Introduced from a place called Labangai.

This table continues to next page.

17	<i>loboa</i>		Good bananas.
	a <i>loboamburi</i>	m.	
	b <i>loboanalo</i>	m.	Red <i>loboa</i> .
	c <i>lobofasiyam</i>	m.	For cooking in fire.
	d <i>lobohakayau</i>	m.	
	e <i>lobolopkwasi</i>	m.	It resembles a kind of bird.
	f <i>lobolopyende</i>	f.	It resembles a kind of fish.
	g <i>lobomelekumang</i>	m.	It has big fruits.
	h <i>lobosumakoro</i>	f.	It has short fruits.
18	<i>lopermau</i>	f.	The fruits stand upward.
19	<i>lophumu</i>	f.	
20	<i>lopmansarkau</i>	f.	The name in other language group.
21	<i>lopmiri</i>		It resembles a kind of fruit.
	a <i>lopmiriapumbersei</i>	m.	The top resembles the head of a bird.
	b <i>lopmirihishombo</i>	f.	It resembles a kind of bird.
	c <i>lopmirisingiswei</i>	f.	Introduced from a place called Singiswei
	d <i>lopmiriuku</i>	m.	It quickly absorbs water when boiled.
22	<i>lopmkaunanda</i>	f.	Each bunch does not have many fruits.
23	<i>lopringo</i>	m.	Its skin looks beautiful.
24	<i>lopsari</i>	m.	
25	<i>loposemama</i>	f.	It has many flowers.
26	<i>lopsrumba</i>	m.	
27	<i>lopswale</i>	m.	
28	<i>loptomboko</i>	f.	
29	<i>mihiyam</i>	f.	
30	<i>mukmblo</i>	f.	The color is like milk.
31	<i>naklobo</i>	m.	The shape of its fruits is like sago leaves.
32	<i>pondo</i>	m.	Introduced from a place called Pondo.
33	<i>saina</i>	f.	Introduced from China.
34	<i>saitene</i>		
	a <i>saiteneapkumbono</i>	m.	
	b <i>saitenekurnam</i>	m.	Introduced from a place called Kurnam.
	c <i>saitenenalo</i>	m.	Red <i>saitene</i> .
35	<i>samelombo</i>	m.	
36	<i>sasaabi</i>	m.	
37	<i>swit banana</i>	m.	The name in other language group.
38	<i>takawabe</i>	m.	Introduced from a place called Takawabe.
39	<i>tukuru</i>	f.	
40	<i>ugyasiklobo</i>	f.	Seed of <i>tulip (Gnetum gnemon )</i>
41	<i>uklobo</i>	f.	It grows near water.
42	<i>ukundu</i>	f.	
43	<i>wanamaslobo</i>	f.	
44	<i>wanrop</i>	f.	
45	<i>waslobo</i>	f.	
46	<i>waslobhumu</i>	f.	
47	<i>yamasai</i>	m.	The shape of bunches is like a comb.
48	<i>yamkundu</i>	f.	The name in other language group.
49	<i>yamkwari</i>	m.	The name in other language group.
50	<i>yamsankrembu</i>	m.	The name in other language group.
51	<i>yamtombolou</i>	f.	The name in other language group.
52	<i>yanwolo</i>	m.	The name in other language group.
53	<i>yawa</i>	f.	

Notes: The letters m and f indicate male and female respectively.

**Table 5.** Folk Classification of *Metroxylon sagu* Rottb. in Kwanga, Papua New Guinea

	Local name	Gender	Meaning of name
spineless	1 <i>naksapmama</i>	f.	It has much fiber.
	2 <i>kiempa</i>	f.	It melts quickly.
	3 <i>minaku</i>	m.	It grows tall like trees.
	4 <i>nakainje</i>	m.	Its leaves resemble <i>Saccharum edule</i> .
	5 <i>nakusia</i>	m.	It resembles coconut copra.
	6 <i>nakapsambu</i>	f.	It resembles the cassowary.
	7 <i>nakafija</i>	m.	Its petioles are white like cockatoo.
spiny	1 <i>nakrame</i>	m.	It has spines.
	2 <i>krumbuwalau</i>	f.	It has short spines.

Note: The letters m and f indicate male and female respectively.

**Table 6.** Varieties of crops in Kwanga, Papua New Guinea

Crops	No. of varieties	Male	Female
yam ( <i>Dioscorea. alata</i> )	39	19	20
yam ( <i>D. esculenta</i> )	38	16	22
taro ( <i>Colocasia esculenta</i> )	24	0	24
banana ( <i>Musa spp.</i> )	65	31	34
sago ( <i>Metroxylon sagu</i> Rottb.)	9	5	4

sago, 5 varieties are male and 4 are female; all varieties of taro are female. This distinction is independent of biological sex, and therefore, is best referred to as 'gender.' The meaning of this division will be discussed later.

How have the Kwanga come to grow so many varieties? One reason is that they are eager to acquire new varieties. When they find new varieties in other locations, they try to acquire them through barter with some of their own, or buying with cash, and bring them back to the village. Or, when there is a marriage, the bride is usually supposed to move to the groom's village, and brides are expected to bring their own crops from their villages. Through these activities, new crop varieties are acquired. The Kwanga test new varieties in their own garden, and when they find them to be desirable, they continue to cultivate them; if it is not, they are discarded. Therefore, the varieties they have now are the result of these selections.

## 5. Personification, or Anthropomorphism of Crops

Crops in the Sepik Area are often personified and treated as if they were human. For example, in the Sepik River valley, men growing yams often use the expression ‘my children’ to refer to their yams (Kaberry 1941/42; Tuzin 1972). In the same area, when people plant yams, they plant them with other crops within the same garden plot, saying that the yams will not feel lonely that way. People often plant *Dioscorea esculenta*, *D. alata* and taros together, saying that *D. esculenta* and *D. alata* are a married couple, and that the taros are their children (Toyoda 2002).

Gender classification of crops is an example of personification of crops. Some crop varieties are categorized into male or female, and as a result of this classification of gender, the number of varieties is increased.

From the fact that those varieties introduced from another area also carry a gender designation, it is estimated that the people decide each crop’s gender by some criteria. It appears that if the harvested plant part is long, it is considered to be male, and if short, female. Local people have confirmed that this is the case, although they do not articulate any reasons why they distinguish gender for crops.

This association of crops with gender is reflected in the manner in which they are grown. It is thought that women can adversely affect the growth of certain crops. Some folk varieties of yams are categorized as male, to be used in rituals, and are planted in a special plot. Women are restricted from these areas because they are considered to be ‘polluted.’ If a woman were to go into one of these special male plots, people believe that the crops would be spoiled.

Noncrop objects are also classified into male or female. For example, rocks are classified into male or female, depending upon their form. As in the case of yams, long ones are considered to be male and short, round ones female<sup>5</sup>).

The significance of crop gender is unclear. There is no taboo on men eating male crops nor women eating female crops. When local people are asked about the

meaning of gender for crops, they reply that they do not know, saying that they are just following the traditions of their ancestors.

## **6. The Logic of Multicropping**

Multicropping is reasonable from the perspective of ecology and agronomy, and the same applies to growing many kinds of varieties, even if they are of one botanical species. It may be an adaptation to the changeable climate of the tropics, and to those instances when a particular variety is subject to and damaged by a disease.

However, if asked about the reason why they cultivate many kinds of crops at the same time, the local people answer that they do it because they want to get a variety of flavors. They explain that they would be bored if they keep eating the same thing, and that they try to enjoy different flavors by cultivating many kinds of crops. This is the only reason the local people give, and they deny any other reasons explained to them. Even when the logic of ecology and agronomy are explained, they say that they do not think of such reasons, stating that those are the ways of others and not theirs.

It is true that the local people do not have many different ways of preparing food, nor do they use many seasonings. In the case of yams, cooking is by boiling with coconut milk, baking on an open fire, or steaming. Salt is the only seasoning occasionally used. It is reasonable, therefore, to maintain and cultivate numerous varieties in order to enjoy different flavors.

The author tried to determine if the Kwanga have any other reasons why they grow many crop varieties at the same time. For example, it may be surmised that the food is available at any time because of the variability of the harvest periods. Or, each crop has its own social roles, such as for exchange gifts and part of the bride price, and as a result of this, they have come to have many varieties of crops. But the local people disagree with these explanations, saying that they do not consider such possi-



bilities.

## **7. Discussion**

Although it is speculated that the Kwanga grow many kinds of crops for ecologically and agronomically rational reasons, it has become clear that they are not conscious of such reasons. They say that they do so just because they want different flavors, and do not consider any other reasons, such as avoiding the risk of loss in certain crops.

There are two possible ways to understand this phenomenon. One is that their rationality is similar to our, modern, Western, ecological and agronomic logic. They formerly did multicropping for ecologically and agronomically rational reasons, but for some reasons they do not recognize those meanings any longer. They may have lost the meaning or reasons for their behavior, and simply follow the traditions of their ancestors.

The other possible explanation is that their rationality is different from ours, and they do not consider Western ecological and agronomic rationality. They grow many kinds of crops with another logic, such as enjoying different flavors. It appears to outsiders at first sight as if the local people have similar rationality in their activities to us. But the local people have their own rationality and it is from our prejudice that we find ecological and agronomical rationality in their behavior.

In the background of the first possibility, there is our tendency to see rationality in local people's behavior, although they appear mysterious at first sight. We tend to think that the rationality should be there even in the cases that we do not understand, and that it is not yet found and understood by outsiders. In fact, there have been some cases that we have found to be rational, although they had been considered to be irrational at first<sup>6</sup>.

The local people's knowledge about crops and ways of cultivation is quite substantial, and from this point, it is reasonable to assume that the local people should consider rationality when they grow many kinds of crops. It could be possible that

they formerly had reasons for multicropping, but they may have forgotten those reasons and that they do it now without thinking of the reasons for the behavior. Or, it is possible that the reasons may have been replaced with other handy reasons, such as enjoying many kinds of flavors. In any case, the behavior has persisted, but its logic or meaning may have been forgotten. It is reported that whole sets of rituals and dances are often imported from another culture area, without a deep understanding of the meanings (Mead 1938, Toyoda 2002). In these cases, it might be reasonable to think that most of the local people, if not all, just follow the ancestral behavior without considering the meaning. The gender of crops might apply to this case as well.

The available data on this issue are insufficient to judge which of the two possibilities explored is most appropriate. This issue not only applies to this particular area of Papua New Guinea, and the specific issue of multicropping, but also to many related issues in other locations. Further intensive research in particular areas, as well as additional comparative analysis are required for the issue to be better understood.

### **Acknowledgement**

A series of research studies, on which this paper is based, was financed by the following funds and organizations; Tokyo University of Agriculture, Grant-in-Aid for Scientific Research of Japan Society for the Promotion of Science (14401016, 16401032), Sago Palm Special Fund from Japanese Society for Tropical Agriculture (1993). I would like to express my gratitude to them. I am also indebted to Mr. Kawabata, who has kindly helped with my research in the Sepik area, Papua New Guinea. Lastly but not the least, I wish to extend my thanks to the villagers of Wanjeaka, who warmly accepted me during my stays. Successful completion of this research is largely due to their kind assistance.

### **Notes**

- 1) Nakao used the term 'vegeculture' for this vegetative propagation (Nakao 1966, Sasaki 2002)

- 2) Since species are classified into many varieties, it might be called 'multi-variety growing', instead of 'multicropping'. But I will employ the term multicropping, since it is more widely in use.
- 3) The description of indigenous names follows Brison (1992), but not all the pronunciation is fully checked. Therefore, the description is tentative.
- 4) It is possible that the classification of other adjacent language groups overlaps Kwanga's classification). Some crops have been introduced from other areas, and in these cases, most often the names have been carried with them.
- 5) The association of maleness and being long and straight seems to have its basis in phallic imagery.
- 6) In the tropics, local people usually sow seeds without plowing the ground surface. This has been explained as laziness on the part of local people. However, it is now understood that this method is rational in tropical climates where rain falls heavily, in that it slows the process of decomposition of organic matter (Shigeta 1994).

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\* This paper first appeared in Karafir, Y. P., F. S. Jong and V. E. Fere (eds.) *Sago Palm Development and Utilization: Proceedings of the Eighth International Sago Symposium*, Universitas Negeri Papua, pp. 209-216, 2006, titled 'Multicropping in Sago (*Metroxylon Sagu* Rottb.) Growing Areas of Papua New Guinea'.