



# An Overview of The Traditional Use of Sago for Sago-based Food Industry in Indonesia

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## **Abstract**

*The use of sago had been practiced traditionally since ancient times by people who live in sago producing areas in Indonesia, and it had been able to gradually create sago-based food industry. As a result, sago has become an important raw material. Nevertheless, most sago-based food industry occurs naturally without an integrated comprehensive plan. The processing skills are inherited from the ancestors and handed down to the next generation continuously. In addition, there are many descriptions of the traditional way to prepare foods from sago. Surely, the wider utilization of sago can be a catalyst for rural industrial development. Thus, this paper is intended to deliver information about the diversity of traditional use of sago for sago-based food industry from all the major sago-producing areas in Indonesia in order to focus the farmers', entrepreneurs', and Indonesian government's attention. It is predicted that sago demands in the future will increase. The sustainability of sago as a raw material for sago-based industry, however, will not be discussed in this paper. Further studies on that is needed*

**Keywords:** Sago-based food Industry, Sago Palm, Sago Starch, The use of Sago.

## **1. INTRODUCTION**

**Sago** (English) or **Sagu** (Indonesia and Malaysia) is the extracted starch from sago palm (*Metroxylon spp*) [1]. Sago has been consumed as a traditional staple food since ancient times by people who live in sago producing areas in Indonesia [2]. For traditional society, sago is not only as a major component of diet, but also has a central position in myth and ritual, which has been brought into symbolic relationship with the twins concepts of germination of plants and generation of humans [3]. Sago palm has been recognized as the oldest food plants for human being [4].

Sago has long been known and used for food industry in cottage and in home industry level [5]. Based on biology dictionary, food industry is the industry concerned with processing, preparing, preserving, distributing,

and serving of foods and beverages. The utilization of sago traditionally had been able to gradually create sago-based food industry. As a result, sago has become an important raw material now. Nevertheless, most sago-based food industry occurs naturally without an integrated comprehensive plan. The skills in sago processing are inherited from the ancestors and handed down to the next generation continuously [6].

Apart from the importance of sago for sago-based food industry, sago has a big opportunity in food industry sector. This is because this sector dominates the number of micro and small industries in Indonesia by giving contribution of 35.47% (64.53%: other industries in 22 sectors. Total N =3,505,064) [7]. Therefore, the objective of this study is to deliver information about the diversity of traditional use of sago for sago-based food

industry from all the major sago-producing areas in Indonesia in order to focus the farmers', entrepreneurs', and Indonesian government's attention.

## 2. THE METHODOLOGY OF STUDY

This overview study uses sources from 30 literatures namely scientific papers including journals and proceedings (53.33%), books (26.66%), thesis (6.66%), annual report (3.33%), and others (10%) such as encyclopedia, dictionary and *youtube* video. Its range of published years is from 1977 to 2015.

## 3. THE BENEFIT OF SAGO

Sago has many advantages compared to other commodities [8], particularly compared to rice and wheat flour because the consumption pattern of staple food in Indonesia is dominated by rice (78.4%) and followed by wheat flour (14.73%), while sago ranked at sixth place (1.07%) after cassava (2.88%), sweet potato (1.48%) and corn (1.38%) [9].

Sago benefit in its compositions. It has a high carbohydrate content (84.7g per 100g), which is higher than rice (80g per 100g) and wheat flour (77.3g per 100g) [10]. Minister of Agriculture once said that sago as a local food has a great potential to be developed in supporting food diversification because it contains a high carbohydrate [11]. Sago also has a low calorie and fat content, which are good for diet. Its protein content is very low and free from casein and gluten, so it is good to be consumed as a non-allergic food [12]. In addition, sago is safe to be consumed by diabetic people because it does not raise blood glucose levels immediately (low glycemic index). As a resistant starch, sago can prevent the risk of constipation and colon cancer [13].

Sago benefit in its utilization. Various sago-based foods can be made, and it can give business opportunity and home industry to grow [14]. Sago even can substitute wheat flour in producing white bread, biscuit and cookie. The substitution in the range of 30%~40% will not give any effect related to the quality of product [15], [16].

Sago has a high potency to be produced. Sago palm can produce up to 25 tons of starch per hectare per year; it is higher than other source of carbohydrate crops namely rice (6

tons), wheat (5 tons) [17]. Sago palm area in Indonesia is huge, it is about 1.28 million ha or 51.3% of the total sago area in the world [18] and its utilization is only 10% or about 128.106 ha [19].

## 4. THE UTILIZATION OF SAGO

The traditional use of sago for sago-based food industry is categorized in 6 ways: (1) sticky dough where it is considered as *nasi* (cooked rice) such as *Papeda/ kapurung/ sinonggi*, (2) roasted sago such as *Sagu lempeng/ Dange/ Sagu rangi*, (3) sago noodle, (4) various of snacks, (5) sago pearls, (6) and dried refining sago starch [15], [20]–[22]. These various utilizations of sago cannot be separated from its starch uniqueness. Sago is easy to gelatinize; as it requires a low temperature for gelatinization, it has a high adhesiveness and it is easy to be molded [23].

Commonly, sago is prepared by pouring a little amount of hot water into starch and stirring properly until it becomes sticky dough. The dough can be consumed with some side dishes or further processed [24], [13].

### 4.1 Papeda/ Kapurung/ Sinonggi

*Papeda* is a native food to Maluku and Papua, made only from fresh sago and it is considered as *nasi* (cooked rice) by the local people [22]. *Papeda* is made by mixing the starch with water until suspension is formed. Hot water is added slightly over the starch while keep stirring until the color of suspension is evenly distributed and it becomes sticky. It is served separately with side dishes namely *kuah kuning* or yellow fish soup, and vegetable.

*Kapurung* is a traditional food of Luwu, South Sulawesi. The process of making *kapurung* is slightly similar as *papeda*, however, after the suspension becomes a gel, the paste is then shaped into small chunks by using bamboo chopsticks. Paste is then mixed with fish, shrimp and vegetable in a container [15].

*Sinonggi* is usually referred as *papeda* of Southeast Sulawesi. The process of making *sinonggi* and the way of serving is almost similar as *papeda*, however, *sinonggi* is eaten with a mixed vegetable soup (*mossonggi*), which contains spinach, rounded small eggplant (*palola*), and other local vegetables.

*Papeda*, *kapurung* and *sinonggi* had enlivened culinary world in Indonesia as a sago-based food Industry. Some restaurants had been established even in big cities such as Makassar and Jakarta. For instance, there was no *Kapurung* restaurant in Makassar before 1999. The number of the restaurant has increased from 1 restaurant in 1999 to 23 restaurants in 2012 [25]. Furthermore, *Kapurung* Restaurant does not only sell *Kapurung* as the main menu, but also other sago-based products such as *dange*, *ongol-ongol* and *bagea* to be offered to the consumer.

#### 4.2 Roasted Sago

Roasted sago is popular especially in Eastern Part of Indonesia. It is called *dange* (South Sulawesi) or *sagu lempeng* (Maluku and Papua), and it is eaten with grilled fish or by dipping it into hot water or hot tea. Basically, HMT (Heat Moisture Application) method that is a heat treatment application on the certain moisture level of starch, is applied in the process of making roasted sago [21]. Fisherman prefers to bring roasted sago when they go to sailing due to its durability and high resistance to common damaging factors during transportation and storage. So far, there is no report about damage by spoilage, which is caused by molds and insects. Roasted sago is relatively non-hygroscopic, however, it is easy to swell quickly when it is dipped in liquid or beverage [22].

*Dange* is made by mixing wet and dried sago until the mixture becomes crystal, then it is put into heated mold clay, and heated again for a second. After ejected from the mold, it is allowed to cool first and then ready to be packaged [21]. *Sagu lempeng* is made by using wet sago. Then it is sifted twice to form crumbs and to obtain a fine starch. Starch then is ready to put into heated mold clay called *forna*, covered with banana leaves and allowed to be cooked for 15-20 minutes [15].

Roasted sago is also known as *sagu rangi* in Bogor, West Java. It is processed to become porridge by adding palm sugar and coconut milk inside. Different with *dange*, *sagu rangi* is made from dried starch by pouring water around 34-45%. Starch is then put into steel plate mold and heated again for a second. After ejected from the mold, it is put under sunlight for a while and ready to be packaged [21].

#### 4.3 Sago Noodle

Noodle or *Mie* is the popular food, flexible and has no inferior impression. As a result, various sago-based noodle processed food can be found in Sumatera namely *mie laksa*, *mie goreng sagu* and *mie tarempa* [21], even, nowadays almost all sago produced in Meranti District, Riau, Sumatera, is delivered to Cirebon, West Java, to be sold for *sohun* glass noodle manufacture [26] with modern technology.

However, sago noodle can be made manually at home industries by using traditional equipment by local people. There are 6 stages in sago noodle processing: starch gelatinization, dough formation, molding, cooking, soaking and place for draining. In gelatinization stage, hot water and food dye are added until gel is formed, then add sago starch slightly over the gel until dough formed. At this stage, dough is ready to be molded. While molding process is running, boiled water is prepared to put molded noodle until it floats, then the noodle is set to be drained. The next process is putting noodle under running water for several hours, then place for a dry. Adding a little bit vegetable oil is needed to avoid the noodle to be sticky. At this stage, sago noodle is ready to be used as a raw material to make some sago-based noodle processed food. [21].

#### 4.4 Snacks (*Bagea*, *Ongol-ongol*, *Cendol*)

*Bagea* is common name for traditional sago-based cookie, known in Maluku, Papua, and South Sulawesi with pale brown color and can be found in various forms, mostly in circle form. The other materials for making *bagea* are sugar, walnut, peanut, vegetable oil, cinnamon and clove powder. [27]. It is known also as *bagea manado*; sticks shaped sago cookie which is wrapped in sago leaves [22]. In Maluku and Papua, *bagea* is sometimes wrapped in banana leaves. *Bagea* is made by mixing starch with eggs, walnut and salt. Then it is wrapped by using sago or banana leaves. After wrapping process finish, starch is ready to be heated in a pot [15].

*Ongol-ongol* and *cendol* are traditional snack from West Java, *Ongol-ongol* has a brown color with small ball shape while *cendol* has a green color with small oval shape. Both of them has elastic texture and use brown sugar and coconut in their preparation [28]. The

preparation of *ongol-ongol* is similar to *papeda*, but it is mixed with brown sugar, the paste is shaped into small sphere and sprinkled by coconut crumb. It is not served with fish and vegetables as *papeda* is served [15].

#### 4.5 Sago Pearls

Sago pearl is a kind of sago-based food product with small (about 2 mm diameter) opaque balls and dry. It is colored naturally white, or artificially pink/red. Sago pearls is made traditionally by local society and is used for making dessert, snack and porridge. In cookpad.com, there are 45 recipes of making various products by using sago pearls [29].

Sago pearls is preserved for extended periods because it only contains 1-2% of moisture content. Traditionally, it is made from mixture of wet sago, rice bran and grated coconut. The important part of this process is left overnight of the mixture to gives sufficient time for certain microorganism, yeasts, and lactobacilli to reveal to the mixture a slightly acidic flavor and to propose carbon dioxide. The mixture is then put onto *pandanus* leaves, mixed properly, and starting the process of mixture forms into small balls which is sometimes assisted by addition of dried starch. Next, colorization process, and is continued to the baking process by using 1x2 m of hearth for 20-30 minutes [30].

#### 4.6 Dried Refining Sago Starch

An innovation process from wet sago can result dried starch which has smoother and whiter starch. The preparation of dried starch is done manually, it is started by leaching the wet sago with distilled water, then allow it to precipitate for 3 hours to separate water and starch. The water is then disposed manually. Next, the left starch is dried under sunlight for a couple of days. Dried starch is ready to be sieved by using 120 mesh of sieving.

Dried refining sago starch is used as a material for making cookie, pudding, bread or other starch-based product. Nowadays, it has been sold in some traditional markets, mini markets and souvenir shop. In addition, for industrial purpose, dried refining sago starch has been produced in farmer level. For instance, around 30 years ago (1985), it was done in one of the villages in South Sulawesi. The starch was successfully marketed to supply some biscuits factories in Makassar, the capital city

of South Sulawesi [20]. In large scale, dried refining sago starch is also made by big manufacture in Bogor, Indonesia and it has been sold nationally.

### 5. SAGO-BASED FOOD PRODUCTS IN INDONESIA

More than 63 in total of sago-based food products are found in 21 of 33 provinces in Indonesia and some of them have been produced for food industry. Table 1 below shows sago-based products that have potency to be developed in supporting food diversification [9].

Table 1. Indonesian Sago-based Food Products

No	Province	Name of food	Raw material(s)
<i>Sumatera Island</i>			
1	Aceh	- Lempeng ubi kayu - Timpan sagu	- Sago - Sago & banana
2	West Sumatera	- Pinere - Lompong Sagu	- Sago - Sago & Banana
3	Riau Islands	- Laksa Sagu - Mie Laksa  - Kirai Sagu - Mie Goreng Sagu - Gobal Sagu - Mie Tarempa  - Lendod - Krenas	- Sago - Sago & <i>Tamban</i> fish - Sago noodles & Eggs - Sago - Sago noodles & Eggs - Sago - Pearl sago
4	Jambi	- Kue Satu	- Sago & Eggs
5	South Sumatera	- Pempek - Tekwan - Kipo	- Sago & mackerel - Sago & mackerel - Sago
6	Riau	- Sagu Rendang - Sagu Lemak - Sagu Stick	- Sago - Sago - Sago
7	Bangka Belitung	- Kericu	- Sago, squid eggs & eggs
<i>Kalimantan Island</i>			
8	West Kalimantan	- Mie Sagu	- Sago & Shrimp
9	Central Kalimantan	- Papeda - Sagu Goreng - Talam Jagung	- Sago - Sago - Sago & corn Starch

10	East Kalimantan	Bubur Gunting	Sago
<i>Java Island</i>			
11	West Jawa	- Sagu rangi* - Ongol-ongol* - Cendol* - Mie gleser* - Mie leor*	- Sago - Sago, brown sugar, coconut crumb - Sago, food dye - Sago - Sago
<i>Sulawesi Island</i>			
12	South Sulawesi	- Kapurung - Dange* - Bagea* - Sinole* - Lange* - Ongol-ongol* - Jalaure* - Cakko-cakko* - Cendol*	- Sago, fish, chicken & peanuts - Sago - Sago & palm Sugar
13	Southeast Sulawesi	- Sinonggi	- Sago
14	Central Sulawesi	- Papeda - Kapurung - Jepa	- Sago - Sago - Sago
15	North Sulawesi	- Bagea - Kenari*	- Sago & walnuts
16	Gorontalo	- Ilabulo - Kue Kokole - Duwo - Delepao - Ilepao* - Bagea*	- Sago & chicken liver - Sago - Sago & fish - Sago & fish - Sago
<i>NTT, Maluku and Papua Island</i>			
17	East Nusa Tenggara	- Akar Bilang	- Sago
18	Maluku	- Papeda - Sagu - Lempeng - Bagea - Sinoli - Buburnee*	- Sago - Sago - Sago - Sago - Sago
19	North Maluku	- Sagu lempeng - Papeda - Bagea kenari	- Sago - Sago & walnuts
20	Papua	- Papeda - Puding Sagu - Buah Merah - Bubur Kacang Sagu - Buburnee*	- Sago - Sago, red fruit & jackfruit - Sago & green beans - Sago
21	West Papua	- Papeda	- Sago

Source: [9] \*Compiled from many sources

## CONCLUSION

The experiences of local people in consuming sago have proven that sago has wider utilization. It can give opportunity to home industry to grow, and of course indirectly can give economic impact to the farmers.

Sago becomes an important raw material for food Industry and it is predicted that demand of sago in the future will increase.

Sago-based food products, with total 63 various of products that are spread in 21 of 33 provinces Indonesia, have provided a lot of benefits, and surely has a high potency to be developed further for wider acceptance purpose, especially in processing efforts in food industry sector.

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