

# Sago

**Sago** /'seɪɡoʊ/ is a starch extracted in the spongy center, or pith, of various tropical palm stems, especially *Metroxylon sago*. It is a major staple food for the lowland peoples of New Guinea and the Moluccas, where it is called *saksak*, *rabia* and *sagu*. A type of flour, called *sago flour*, is made from sago. The largest supply of sago comes from the East Indies. Large quantities of sago are sent to Europe and North America for cooking purposes. It is traditionally cooked and eaten in various forms, such as rolled into balls, mixed with boiling water to form a paste, or as a pancake. Sago is often produced commercially in the form of "pearls". Sago pearls can be boiled with water or milk and sugar to make a sweet sago pudding.<sup>[1]</sup> Sago pearls are similar in appearance to tapioca pearls and the two may be used interchangeably in some dishes.

The name *sago* is also sometimes used for starch extracted from other sources, especially the sago cycad, *Cycas revoluta*. The sago cycad is also commonly known (confusingly) as the sago palm, although this is a misnomer as cycads are not palms. Extracting edible starch from the sago cycad requires special care due to the poisonous nature of cycads. Cycad sago is used for many of the same purposes as palm sago. In Sri Lanka it is known as *sawu* or *sau* (Sinhalese: සවු) and is used to prepare a congee named *sawu kanda* (Sinhalese: සවු කැඳ). In India, it is known as Sabudana.



Sago palms (*Metroxylon sago*) in New Guinea

The fruit of palm trees from which the sago is produced is not allowed to ripen fully. The full ripening completes the life cycle of the tree and exhausts the starch center to produce the seeds. It leaves a hollow shell and causes the tree to die. The palms are cut down when they are about 15 years old, just before they are ready to flower. The stems, which grow to 30 feet (9 meters high), are split out. The starch pith is taken from the stems and ground to powder. A single palm yields about 800 pounds (360 kilograms) of starch. The powder is kneaded in water over a cloth or sieve. It passes into a trough where it settles. After a few washings, the flour is ready to be used in cooking.

## Sources, extraction and preparation

### In India::

**PROCESS OF SAGO PRODUCTION** 1. Washing of large sized raw material (Tapioca Root). 2. Peeling the skin from Tapioca Root. 3. Crushing in rollers to make pulp. 4. Sending the pulp for separating coarse particles to shifter. 5. Screening to get required size starch materials and coarse particles for further crushing. 6. Allowing 3 to 8 hours to settle down the starch material in settling tank. 7. From settling tank, the settled Starch is partially dried and sent for further processing like powdering, granulation, roasting, solar drying and polishing . Finally, to be marketed as shiny beads.

## Palm sago

The sago palm, *Metroxylon sagu*, is found in tropical lowland forest and freshwater swamps across Southeast Asia and New Guinea and is the primary source of sago. It tolerates a wide variety of soils and may reach 30 meters in height. Several other species of the genus *Metroxylon*, particularly *Metroxylon salomonense* and *Metroxylon amicarum*, are also used as sources of sago through Melanesia and Micronesia. In addition to its use as a food source, the leaves and spathe of the sago palm are used for construction materials and for thatching roofs and the fibre can be made into rope and mats.

Sago palms grow very quickly, in clumps of different ages similar to bananas, one sucker matures, then flowers and dies. It is replaced by another sucker, with up to 1.5 m of vertical stem growth per year. The stems are thick and are either self-supporting or have a moderate climbing habit and the leaves are pinnate. Each palm produces a flower at the tip of the palm, unlike a typical coconut palm, sago reproduces only once before dying. Sago palms are harvested at the age of 7–15 years, just before flowering, when the stems are full of starch stored for use in reproduction. One palm can yield 150–300 kg of starch.

Sago is extracted from *Metroxylon* palms by splitting the stem lengthwise and removing the pith which is then crushed and kneaded to release the starch before being washed and strained to extract the starch from the fibrous residue. The raw starch suspension in water is then collected in a settling container.

## Cycad sago

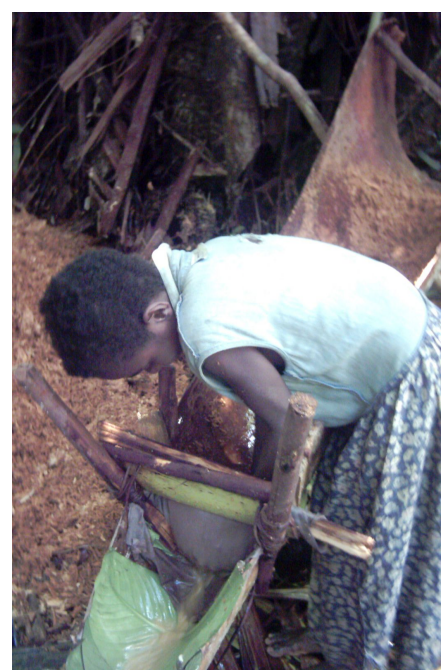
The sago cycad, *Cycas revoluta*, is a slow-growing wild or ornamental plant. Its common names "Sago Palm" and "King Sago Palm" are misnomers as cycads are not palms. Processed starch known as sago is made from this and other cycads. It is a less-common food source for some peoples of the Pacific and Indian Oceans.

Unlike *Metroxylon* palms (discussed above), cycads are highly poisonous: most parts of the plant contain the neurotoxins cycasin<sup>[2]</sup> and BMAA. Consumption of cycad seeds has been implicated in the outbreak of Parkinson's Disease-like neurological disorder in Guam and other locations in the Pacific. Thus, before any part of the plant may safely be eaten the toxins must be removed through extended processing.

Sago is extracted from the sago cycad by cutting the pith from the stem, root and seeds of the cycads, grinding the pith to a coarse flour and then washing it carefully and repeatedly to leach out the natural toxins. The starchy residue is then dried and cooked, producing a starch similar to palm sago/sabudana.



A sago palm being harvested for sago production



A sago starch filter

## Uses

### Nutrition

Sago from *Metroxylon* palms is nearly pure carbohydrate and has very little protein, vitamins, or minerals. 100 grams of dry sago typically comprises 94 grams of carbohydrate, 0.2 grams of protein, 0.5 grams of dietary fiber, 10 mg of calcium, 1.2 mg of iron and negligible amounts of fat, carotene, thiamine and ascorbic acid and yields approximately 355 calories. Sago palms are typically found in areas unsuited for other forms of agriculture, so sago cultivation is often the most ecologically appropriate form of land-use and the nutritional deficiencies of the food can often be compensated for with other readily available foods.

Sago starch can be baked (resulting in a product analogous to bread, pancake, or biscuit) or mixed with boiling water to form a paste. It is a main staple of many traditional communities in New Guinea, Borneo, Maluku and Sumatra. In Brunei, it is used for making the popular local cuisine called the ambuyat. It is also used commercially in making noodles and white bread. Sago can also be ground into a powder and used as a thickener for other dishes, or used as a dense flour. It can be made into steamed puddings such as sago plum pudding.

In Malaysia, the traditional food "keropok lekor" (fish sausage) uses sago as one of its main ingredients. In the making of the popular keropok lekor of Losong in Terengganu each kilogram of fish meat is mixed with half a kilogram of fine sago, with a little salt added for flavour. Tons of raw sago are imported each year into Malaysia to support the keropok lekor industry.

In 1805, two captured crewmembers of the shipwrecked schooner *Betsey* were kept alive until their escape from an undetermined island on a diet of sago.<sup>[3]</sup>

Pearl sago closely resembles pearl tapioca. Both typically are small (about 2 mm diameter) dry, opaque balls. Both may be white (if very pure) or colored naturally grey, brown or black, or artificially pink, yellow, green, etc. When soaked and cooked, both become much larger, translucent, soft and spongy. Both are widely used in Indian, Bangladeshi and Sri Lankan cuisine in a variety of dishes and around the world, usually in puddings. In India, pearl sago is called *javvarisi* (Tamil), *sabudana* (Hindi), সাবুদানা (Sabudana) in Bengali & સબુદાના in Gujarati, *sabbakki* (Kannada) and *saggubeeyam* (Telugu) among other regional and local names and is used in a variety of dishes such as desserts boiled with sweetened milk on occasion of religious fasts.

In the UK, both sago and tapioca have long been used in sweet milk puddings.

In India, sago starch is used to make the snack food known as far-far.



A sago pancake



Pearl sago

## Textile production

Sago starch is also used to treat fibre, making it easier to machine. This process is called sizing and helps to bind the fibre, give it a predictable slip for running on metal, standardise the level of hydration of the fibre and give the textile more body. Most cloth and clothing has been sized; this leaves a residue which is removed in the first wash.

## Other uses

Sago starch is also used as a key material input in the paper, plywood and textile industries and is used to make adhesives, paper, ethanol, high fructose glucose syrup, maltodextrin, cyclodextrin and monosodium glutamate.

Sago starch can be converted further through fermentation for producing biodegradable plastic and ethanol (gasohol). Its residual biomass can similarly be used as a feedstock for the production of power and heat.

Because many traditional people rely on sago as their main food staple and because those supplies of sago are not unlimited, in some areas commercial or industrial harvesting of wild stands of sago can conflict with the food needs of local communities.

## References

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## Further reading

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## External links

- Species profile for *metroxylon sagu* (<http://www.agroforestry.net/tti/Metroxylon-sagopalm.pdf>)
- <http://www.fao.org/ag/agA/AGAP/FRG/AFRIS/Data/416.HTM>

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