

indigenous food preservation

Saving it for hard times

Temotu is the easternmost province of the Solomon Islands, one of the Melanesian island nations in the Western Pacific Ocean. The islands of Temotu, also known as Santa Cruz, are separated by more than 300 km of ocean from the other islands of the Solomons. These rainforest-clad islands are in the equatorial zone and receive abundant rainfall of 4000 mm annually, with a temperature range of 23-32°C. Although there is no distinct dry season, the heaviest rains occur from November to May, during the southern hemisphere's cyclone season.

Islanders practise shifting cultivation of yams, taros, sweet potato and cassava in family gardens. Tree crops including breadfruit, forest nuts, oceanic lychee and a variety of other fruits, seeds and legumes are also cultivated in multistorey gardens surrounding the villages and throughout the tribal landholdings. Cash crops are coconut and cacao. External inputs are only rarely available. Islander agriculture is a good example of an indigenous low-external-input system.

Within the province there are two distinct cultural groups. The Melanesian people live on the larger volcanic islands, while the Polynesian people inhabit tiny outer islands on the watery fringe of the province. While these two groups cultivate essentially the same crops, their postharvest handling of these is very different. The Melanesian people have developed a unique drying technology for breadfruit, taro and other forest crops, while the isolated Polynesian Islanders prefer to use their own methods of anaerobic fermentation in earthen pits to preserve their foods.

Drying nambo

Nambo is the local term for dried starchy foods having a biscuit-like crispness. Traditionally Islanders dried breadfruit (*Artocarpus altilis*), certain taros (*Alocasia* and *Crytosperma* spp) and *oki* or Tahitian chestnut (*Inocarpus fagiferus*), but today most nambo production is limited to breadfruit.

Making nambo is usually a community effort directed by the women. Extended family groups come together to dry large quantities of breadfruit once or twice a year when the fruit is in season. The fruits are harvested when fully mature, yet still firm, and roasted over an open fire the next day. Fifty to 100 fruits are roasted at a time in large fires until the skin becomes black and hard like charcoal and the flesh softens. This is also the preferred method for preparing breadfruit to eat immediately. When cool, the roasted fruits are peeled with the flat of a knife to flake off the

Stories are still told in the villages of Temotu Province about the trading voyages of their ancestors, in outrigger canoes across the open ocean. Their boats were laden with products to trade with neighbours on distant islands. Some of the foods had been dried to preserve them for the long voyages. While the outriggers are no longer used, the traditional drying technology and inter-island trade is still an important part of their lives. Susan Brown and Edward Mayer tell how the Islanders dry and ferment foods for storage and transport.

Susan Brown and Edward Mayer

crisp burnt skin. The tender flesh is then cut into small wedge-shaped chunks of about 2 cm x 3 cm.

Drying takes place on a variation of the Pacific Island stone or pit oven. A pit of appropriate size, determined by the amount of breadfruit to be dried, is lined with porous coral rock. A wood fire is built in it and additional coral rock is placed on the fire to be heated until red hot. For normal baking, volcanic stones are used in the ovens, but the calcium in the coral is thought to enhance the nambo flavour. A

drying rack to hold the breadfruit chunks is built from woven bamboo splits or from the root of the pandanus palm. More commonly used today is a rack made of wire mesh used for drying chili peppers or coconut.

When the wood has burned down the coals, the fire no longer smokes and the rocks are glowing red hot, the rack is put in place about 1 m over the oven, either suspended by rope or set on rock or timber supports. The rack holds a 6-8 cm deep layer of breadfruit chunks that are mixed periodically to prevent burning. Woven pandanus mats or thatched leaf panels are draped from the drying rack to enclose the fire and prevent heat loss. Heat continues to radiate from the ovens for about 12 hours. As the rocks cool, the rack can be lowered to use the heat more efficiently. Factors determining drying time are humidity, variety of breadfruit, amount of fruit held in the tray, type of wood burned and oven size.

When the nambo is thoroughly dried and cool and its texture is crisp and crunchy, it is packed in woven coconut-leaf baskets. These are lined with several layers of a large dried forest leaf that is known to prevent humidity and moisture from spoiling the nambo. The baskets sealed in this manner are stored in the kitchen rafters above the cooking fires. Alternatively, any available storage containers, tins and plastic bags are now used. Nambo keeps for 6 months to 1 year and is redried if it absorbs any moisture during storage. Extremely popular as a snack, nambo is eaten alone and with the local forest nuts, ngali (*Canarium* spp), alite (*Terminalia catalpa*) and cut (*Barringtonia* spp) nuts. It is also cooked with coconut milk and eaten with green leafy vegetables.

Pit fermenting masi

Pacific Islanders probably developed ways of fermenting foods as a response to the unpredictable and irregular weather patterns of the region. The Islands are vulnerable to destructive storms, cyclones and tidal waves, which can ruin subsistence crops and leave people without food for periods of 6 months or more before new plantings and the established tree crops once again become productive. The technique of pit fermentation is widespread throughout Polynesia, from the outer Temotu in the west to the Marquesas Islands in the east. The fermented foods stored in pits remain edible for indefinite periods of time. On many of the Islands, including Tikopia and Anuta in Temotu Province, they are also dietary staples, eaten and enjoyed daily.



Louisa Sakinga mixes curry flavoured nambo on the drying rack.

Production of *masi*, the local name for these fermented foods, is a simple low-technology, low-input process. Foods most commonly used include breadfruit, cassava, unripe plantain or banana and *tenatu*, a popular forest fruit (*Burkella obovata*). The process will be described using cassava, one of the most popular types of *masi*.

After harvesting, the cassava is peeled, cut into large pieces and either placed in baskets and submerged in fresh water for 3 days or soaked in a plastic bucket, changing the water once or twice during the 3 days. Most other foods are prepared for fermentation without soaking. Once softened, the cassava is crumbled by hand into granules and is ready for fermentation.

Pit sites are on the well-drained soils of the higher areas of these small islands. The pits range in size from 70 cm diameter X 70 cm deep for family use, to large communal pits used for storage in case of natural disaster and for use during feasts. The soil on the sides of the pit is firmly packed. Then it is lined with 4-5 layers of woven coconut-leaf panels and then 4-6 layers of the fresh broad leaves of a local *Heliconia* variety, which grows profusely in any wet area.

The prepared cassava is put into the pit and packed firmly to remove any air pockets. This is extremely important because it is an anaerobic fermentation process, and spoilage will occur around an air pocket. The pit is then sealed by

covering the food with layers of *Heliconia* leaf, with the coconut-leaf panels on top, similar to the pit lining. Clean rocks are piled on top of the covered food to press and seal it off.

Initially, food is interred in the pit for at least 6 weeks, during which fermentation occurs. After this period, the *masi* stabilises and ages. The pit is periodically opened to remove *masi* for use, or to add additional food to ferment. The *masi* is eaten as a traditional island pudding by mixing in with coconut milk, wrapping it in banana leaves and baking it in the stone oven.

Similar to other fermented foods such as cheese and wine, flavour develops as the *masi* ages. Pits are maintained for many years. Periodically, when the leaves of the lining begin to deteriorate due to the weather and soil moisture levels, the *masi* must be removed and the pit relined. Islanders have added a final lining of polyethylene sheets in a recent innovation that extends the length of time between relining.

Problems and potentials

A local youth group from the Reef Islands presently runs a marketing cooperative to sell nambo in Honiara, the capital of the Solomon Islands, where the product is well-known and enjoyed. Unfortunately, the quality of the nambo is often poor. Improvements need to focus on:

- storage, to eliminate smoky taste and off-color caused by storage above the cooking fires;

- packaging to insure freshness;
- selection of the best breadfruit varieties for flavour and texture.

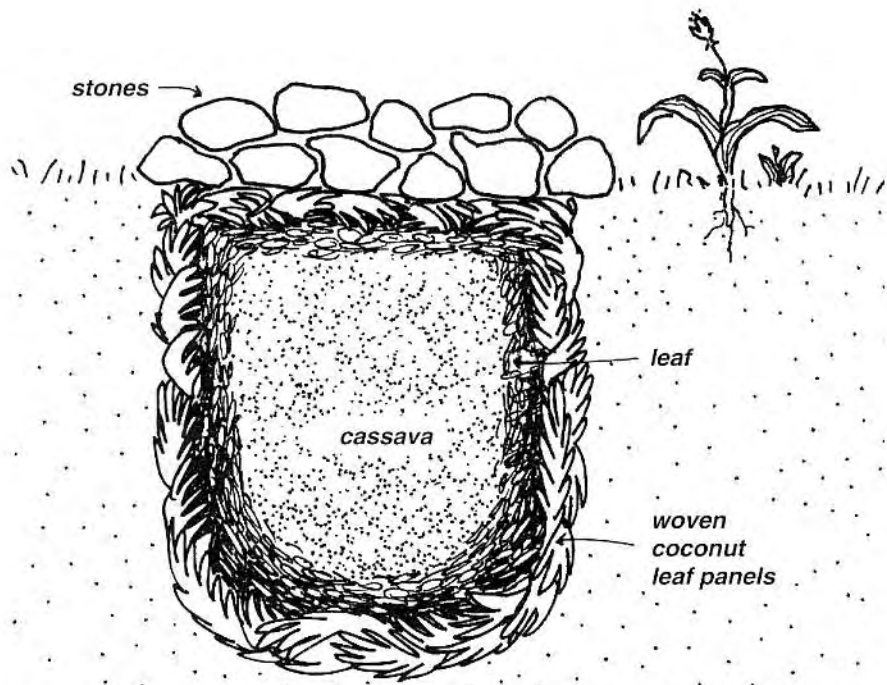
There is also potential for improving nambo's marketability by adding flavouring. While we were Peace Corps Volunteers in Temotu, we initiated a small flavouring trial together with a local producer, Louisa Sakinga. Small quantities of nambo were made in three flavours: curry, garlic and soy sauce. Other nambo producers were sceptical at first but, after tasting the finished product which had a unique pleasing flavour and good quality, many felt they would like to try this innovation themselves.

The nambo-making process needs much firewood. This could become a critical issue as the province population continues to increase and nambo marketing grows in volume. Because of a natural abundance of suitable fuelwood in the past, there is no tradition of planting such species. Therefore, any development of the nambo-making process must include adequate plans to ensure a sustainable supply of wood.

In the case of *masi*, there are currently no commercial uses for it, although there is potential for drying the fermented product and grinding it to a flour to be used in biscuits, breads and other baked goods. To make commercial production easier, producing *masi* in large sealed plastic buckets could be tried.

Sadly, *masi*-making traditions are slowly being abandoned. Due to population pressure, Islanders are moving away in increasing numbers and often are ashamed to make *masi* in outside communities. *Masi* production is also being neglected at home because of the increased availability of packaged foods. This is an unfortunate development, because fermentation enhances the food's nutritional value, especially B vitamins, and because *masi* can be stored indefinitely.

Nambo and *masi* are two indigenous postharvest products which have economic potential and good food value and which provide food security for the Solomon Islanders. It is important to encourage these processing traditions through economic development which includes improvements in these techniques.



Fermentation pits can vary in size from 70 cm diameter and 70 cm deep to communal pits used for storage in case of natural disaster and for use during feasts. (Drawing made by Susan Brown/Puck Sluijs).

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