GROWING FOOD ON CORAL ATOLLS

By E. Lefroy, Rural Development Officer, D.P.I.
Arawa, North Solomons Province

INTRODUCTION

People living on low coral islands face some very special problems in growing food. The soil is little more than fine coral rubble, there is a limited supply of fresh water and there is a constant salt-laden wind blowing across the island. This article describes how these problems are overcome by atoll people, in order to grow their staple crop, swamp taro (*Cyrtosperma chamissonis*).

The four atolls referred to lie between 2° and 5° south of the equator to the northeast of Bougainville island in North Solomons Province. From east to west, they are: Nukutapu (Tasman Island), Tauu (Mortlock Island), Kilinailau (Carterets Island) and Nuguria (Fead Island).

THE ATOLL ENVIRONMENT

A coral atoll is a ring-shaped reef with a lagoon in the middle. Dotted along the reef are small coral sand islands. These vary in number from five in the case of Kilinailau to fifty on Nuguria atoll. These islands are rarely more than 2 m above sea level, and owing to the shape of the reef, not often more than 400 m wide. This means that there is a constant salt spray blowing across the islands from the lagoon and the ocean. During the stormy season, between November and February, strong winds and high tides sometimes cause flooding.

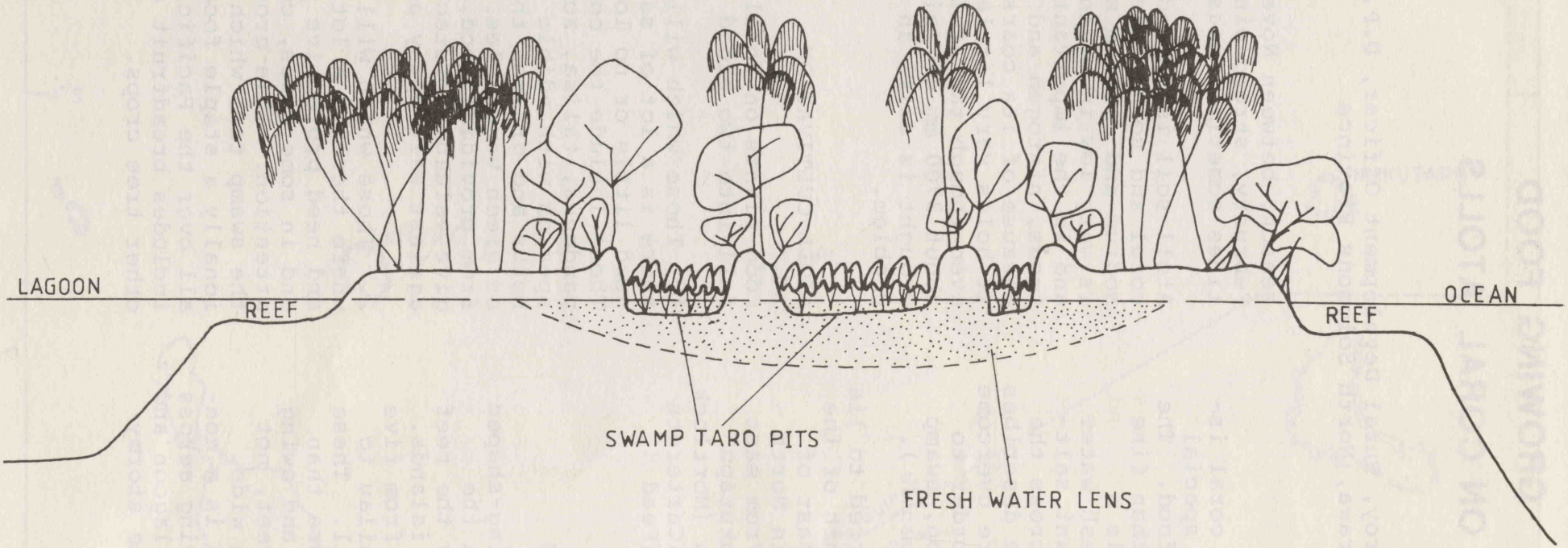
Atoll soil is formed from dead coral and so has plenty of sodium and calcium salts. It is very low in organic matter and in the important plant foods, nitrogen and phosphorus. Because of its coarse structure it holds very little water, so even though the atolls receive about 3700 mm of rain per year, drought is still an occasional problem.

ATOLL CULTIVATION

Food plants on coral atolls fall into two broad classes:

1. Those which will grow where there is a lot of salt, and need little or no looking after. These include the coconut palm, pandanus, talisa, some mangrove species with edible fruit, some herbs and grasses that are used as green vegetables. Apart from providing food, they also give valuable protection against salt spray and wind.

2. Those which will not grow where there is a lot of salt, and need protective planting and in some cases, constant attention. This group includes the swamp taro which is traditionally a staple food on atolls all over the Pacific. It also includes breadfruit and some other tree crops.



An atoll island in cross section

The success of the second group depends on fresh water that is found at a depth of about 2 m on the larger islands, where rain water, which has filtered through the sand, lies within the island's subsoil. Only islands of about 4 hectares and larger have this fresh water 'lens'.

GROWING SWAMP TARO

The swamp taro was introduced to these atolls by Polynesians travelling west from Samoa and Tahiti. This form of cultivation is kept up today by the present atoll people, who are a mixture of Polynesians, Melanesians and Micronesians.

Together with a few atolls in Solomon Islands and to the north of mainland P.N.G., these are some of the last islands in the Pacific where swamp taro is still the staple food.

Using the fresh water 'lens', a method of growing swamp taro has evolved that largely overcomes the problems of poor soil structure, poor fertility, salt spray and lack of fresh water.

Pits are dug down to the fresh water level in the centre of the larger islands. The leaf litter from several species of trees which are known for their composting qualities is put in these pits again and again. All this composting eventually produces a rich dark soil in the bottom of the pits. Swamp taro is planted in these pits, often between raised ridges of swamp soil. Leaf litter is then regularly placed at the base of each plant.

Some of these pits or swamps cover up to 1000 square metres, which means first taking out about 2000 tonnes of sand and broken coral. Most of this digging was done when these atolls were first settled by Polynesians between 500 and 1500 years ago.

The soil removed is heaped into protective banks up to 3 m high around the edge of each pit. The banks are used as a system of high pathways between the

A taro swamp on Tauu atoll

pits and support coconut palms, breadfruit, pau nut and various other tree crops.

On Nuguria, Tauu and Nukutapu atolls, taro gardens are found only on the largest islands in each group, taking up as much as 40 hectares in the centre. On the Kilinailau atoll, the taro swamps are smaller and less elaborate, occurring in the centre of all five islands where people live.

Despite the care taken with the growing of swamp taro, some swamps are sometimes flooded by sea water during bad storms. This causes the tubers to rot and will kill the whole plant unless it is quickly replanted in a salt-free area. As the swamp taro takes two to three years to produce edible tubers, this can have a serious effect on the food supply where there is a lot of flooding. At such times the diet consists mainly of fish, coconut and rice, when available.

ATOLL FOOD PLANTS

Below are listed some of the main food plants which are found on the four atolls. The botanical, pidgin and local names are given, in that order, after the common English one. The initials after the local names refer to the atolls where the food is used. (Ng = Nuguria; T = Tauu; Nk = Nukutapu; K = Kilinailau.)

Coconut
(*Cocos nucifera*, kokonas, te niu (T, Ng, Nk), wele (K))

Coconut is by far the most plentiful species on all the atolls. It was introduced in ancient times. It gives most of the oils, some of the vitamins and minerals, and almost all of the fluid in the diet.

Mature swamp taro, over three years old

Swamp taro
(*Cyrtosperma chamissonis*, kano kano, te puraka (T), vakehu (Nk), pulaka (K))

Introduced in ancient times, traditionally the staple food and thought to be very important, swamp taro takes up more time and effort than any other crop. It is eaten most days on Tauu and Nuguria, but less often on Nukutapu and Kilinailau. There are two kinds. On some of the atolls more rice is now being eaten. Therefore, less time and effort are being put into growing swamp taro.

Banana
(*Musa* sp., banana, te huti (T, Ng, Nk), poso (K))

The banana has been an important crop since ancient times, particularly after storm damage when it is the first to give edible fruit. There are seven varieties on Kilinailau, and five on the other islands.

Breadfruit
(*Artocarpus altilis*, kapiak, te kuru (Ng, Nk, T), baliau (K))

Established in the islands in ancient times, this was once a much more important part of the diet. It is now found in the centre of most of the islands large enough to have a fresh water lens. It is harvested two or three times a year.

Pandanus
(*Pandanus tectoris*, marita, te hara (T, Ng, Nk), herana (K))

Pandanus was on the atolls before they were settled. It is still very common on Nuguria, Tauu and Nukutapu. The mature fruit are eaten fresh, and the leaves are used for thatching.

Sugar cane
(*Saccharum officinarum*, suga, puku toro (T), tohu (Ng), toho (K))

Sugar cane is seen on all the islands, but is most common on Nuguria.

True taro
(*Colocasia esculenta*, taro tru, taro (T, Ng), pupu (Nk), tama (K))

Five varieties of true taro grow on Tauu, and it is generally grown as a secondary crop in the drier areas of the taro gardens. It has been known since ancient times.

Chinese taro
(*Xanthomosa saggitifolium*, kong kong, kong kong (T, Ng, Nk, K))

Chinese taro was introduced quite recently. Like true taro, this grows in drier parts of the taro swamps. It is looked upon as a standby crop.

Giant taro
(*Alocasia* sp., paragum, te kape (T, Ng), tahela (K))

Giant taro is another standby crop. It has grown in the islands since ancient times. It may be found growing in the coconut area on the islands which have gardens.

Pawpaw
(*Carica papaya*, popo, memeapu, (T, Ng), mamioto (Nk), mamioko (K))

Lately introduced and not very plentiful, pawpaw is seen growing between the houses in the villages.

Pumpkin
(*Cucurbita* sp., pumpkin (T, Ng, Nk, K))

Apart from pawpaw, pumpkin is the only food plant recently

True taro interplanted with swamp taro

introduced which is seen very much. Like pawpaw it is found growing between the houses in the villages.

Yam
(*Dioscorea* sp., yam, te auhi (T, Ng), tehui (Nk), patu (K))

The yam has been grown in the islands since ancient times and is still a valuable standby on Kilinailau. It is less important on the other three atolls.

Aquatic sweet potato
(*Ipomea aquatica*, kang kong, kang kong (K))

The aquatic sweet potato is a very useful leaf vegetable which was recently introduced and has proved to be ideally suited to the swamp taro pits. However, the only atoll on which it is grown very much is Kilinailau.

Cassava
(*Manihot esculenta*, tapiok, tapiok (T, K))

Cassava is sometimes grown on banks around the taro pits, but not very successfully. It was introduced to the atolls recently.

Polynesian arrowroot
(*Tacca leontopetaloides*, - , piakere (T, Ng))

The starchy tubers of this fleshy broadleaved plant are scraped and rinsed to provide 'tepia', not unlike sago. It is found amongst coconuts on the garden islands and sometimes in the village on Nuguria atoll. It has been known in the islands since ancient times, but is now eaten only occasionally.

Purslane
(*Sesuvium portulacastrum*, - , te riata (Ng))

Purslane is a small, flat succulent (thick and fleshy) herb, found by settlers near the shore on each atoll. It is sometimes eaten as a green vegetable on Nuguria.

Mangrove
(*Bruguiera gymnorrhiza*, mangro, te tono (Ng, Nk))

Mangrove is native to the seaward side of islands on Nuguria and Nukutapu atolls. Sometimes the germinating fruit is collected, and eaten after boiling and soaking for several hours.

Pau nut
(*Barringtonia* sp., pau, te karu (T, Ng, Nk), ketema (K))

These are used more on Kilinailau than on the other islands, but have grown on the atolls since ancient times. Now they are found on banks between the taro pits, and in the village.

Polynesian chestnut
(*Inocarpis edulis*, aila, pol (K))

Unlike taro or banana, but like many of the other tree crops, this is more important on Kilinailau because it will still grow in spite of a few floods or high tides. It has grown from ancient times.

Sago palm
(*Metroxylon* sp., saksak, ataho (K), saksak or tepia (T, Ng))

There are a few sago palms on the other islands, but this tree is grown mainly on Kilinailau. It provides both a standby food crop, and material for thatching.

Pouteria
(*Pouteria maclyana*, buk buk, te natu (T, Ng, Nk), rotsil (K))

This is a large tree with a large, sweet fruit shaped like an egg. It has grown on Nuguria, Tauu and Nukutapu since ancient times.

TABLE 1. DIET OF CHILDREN ON NUKUTAPU, 5 OCTOBER 1979

Food	Number of students eating it on that day	Total number of times it was eaten
Kuru *	38	89
Rice	36	61
Fresh fish	35	48
Kulau	30	45
Dry coconut	27	37
Tea/coffee	24	40
Mangrove fruit	24	52
Biscuits	4	55
Banana	4	5
Tin fish	3	4
Pawpaw	3	3
Swamp taro	3	5
Flour/bread	2	2
Tin meat	1	1
Crab	1	1

* Coconut embryo (germinated dry nut).

Terminalia
(*Terminalia cattapa*, talisa, koto (K))

This is a large tree with an edible nut which has probably grown on the lagoon shore since before the arrival of the first settlers.

Malay apple
(*Eugenia megacarpa*, lau lau, te kahika (Ng))

Some trees are found among the taro gardens on Nuguria. The Malay apple has grown on the atolls since ancient times.

WHAT NUKUTAPU CHILDREN EAT

A survey was made on 5 October 1979, to see what 42 Standard 4 and 6 children had eaten on that day. The results of the survey are shown in the table above. A boat had visited the islands only two weeks before, so rice was quite plentiful.

FURTHER READING

Lambert, M. (1978). Atoll cultivation. *South Pacific Bulletin* (3): 8-11.

Massal, E. and Barrau, J. (1956). *Food Plants of the South Sea Islands.* South Pacific Commission, Technical Paper No. 94 Noumea.

Reynolds, S.G. (1977). Growing vegetables on coconut fibres. *World Crops* 29: 266-269.

Weins, H. (1962). *Atoll Environment and Ecology.* Yale University Press, New Haven, U.S.A.