

AGRICULTURE AND POPULATION IN THE MORTLOCK ISLANDS

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The writers describe the growing population pressure and unique agricultural system of one of the loneliest groups of islands in the Territory of Papua and New Guinea. They point out that the small island population is likely to double by 1970, but say that more efficient use of the limited agricultural land for subsistence gardening, coupled with rat control and water conservation measures, should ensure the support of the increased population. An interesting sidelight is the description of the introduction of a new method of growing taro (Colocasia), which has resulted in a greatly increased output.

Part I.—The Geographical Background

THE Mortlock Islands are a low coral group about 170 miles east-north-east of Bougainville and four degrees south of the Equator. There are eleven named islands arranged around the circumference of a lagoon, about eight miles across. A ring of reef surrounds the atolls, giving them some protection from the open sea and wind. The Mortlocks are more sheltered than the neighbouring Cartaret Islands, which are severely windswept and are sometimes inundated.

On the Mortlocks, sandy loam soils have built up and these have a poor to fair humus content. There is a freshwater lens at slightly above sea-level.

The village area for the group is on Nukatoa Island, while the principal subsistence food, taro, is grown mainly on Taku Island, in an 85-acre swamp.

The People

The people are of Polynesian origin and have inter-married in some cases with Melanesian pre-war immigrants.

The result is a pleasing, predominantly Polynesian type of fine stature and apparently happy disposition. Family groups are exceptionally large and healthy children abound.

When visited, the village was beautifully tended. The people were well-dressed in colourful lap-laps and their carriage and attitude offered a refreshing change from Melanesian drabness. Not one physical imperfection was observed in the whole population, but one youth is insane and one man blind, both afflicted after birth. Infanticide was practised up to two years ago and is probably the reason for such perfection.

Land Tenure

Little investigation was carried out in this sphere but ultimate ownership is believed to be communal under the leadership of the Tereki who is King. The Tereki in this case is Peo—also the Luluai. The Tereki is assisted by the Teburin or Tultul. The patrol was assured that land disputes were unheard of. Usually the Tereki conducted the business on the people's behalf.

* The authors are the District Agricultural Officer and Agricultural Officer at Bougainville. This article was compiled from two departmental reports, the first made by Mr. Curtis following a preliminary visit to the Mortlocks and neighbouring groups in 1957 and the second by Mr. Boag a year later.

The first part is drawn mainly from Mr. Curtis' report, which went into considerable detail about the geographical and population background of the Mortlocks and other islands, and also pointed out the probability of a population pressure problem. The second part comes from Mr. Boag's report, written after he carried out the detailed agricultural investigation of the island.

In presenting this article, the Editor of the *Papua and New Guinea Agricultural Journal* hopes that contributions of this kind will be a regular feature of subsequent issues. It is planned to print a number of agricultural patrol reports which, over a period, will build up a picture of the agricultural variety of the Territory of Papua and New Guinea.

Customs

The people have their own religion and associated rites for all occasions. Ratu is the god who lives in their midst and controls all things. He is assisted by a number of lesser, however quite efficient, gods who control the people's everyday lives. Pukena is the god of tambus and troubles, including pregnancy, and Fakeva is the god of water in all places.

It is probable that there is an agricultural god and future patrols would do well to make the relevant inquiries and make their plans accordingly. For example, the people were told to mulch their gardens with plant and fish remains during this patrol. By virtue of different tambus on various persons this may be impossible for a few—fish remains have to be returned to the sea, the use of seaweed may be forbidden to some and so on.

The living standard seems to be high with little evidence of European influence, although the demand for money is there. Their culture is apparent in their houses which are pandanus-roofed, coconut-walled oblong buildings. The interiors are orderly and clean, and are crammed with plaited coir rope, fish lines, carved chairs, mats and other articles of everyday life. Singings or dances are impromptu, with hula-style dancing and singing.

Population

1950—274.	1954—305.
1952—294.	1955—321.
1953—305.	1956—338.
1957—356.	

The population had an increase of 5.3 per cent. in 1956-1957 period and an increase of 21 per cent. over the last five years.

Should the present rate of increase continue, the population will be doubled in or around 1970. A more intense and specialized system of agriculture could probably carry the additional population if the present climatic conditions continue and the pests and rodents are eradicated.

Part II.—AGRICULTURAL SURVEY

The principal purpose of the second patrol, agriculturally, was to determine the subsistence position in relationship to the present and

future needs of the people. To facilitate matters, each of the more important crops to the subsistence economy of the islands will be dealt with separately.

(1) *Swamp Taro*. (*Cyrtosperma chamissonis*)
(Mortlock—"Tepuraka". West Polynesian—"Puraka".)

Swamp taro is by far the most important food crop of the Mortlock Islanders. Cultivation of the crop is carried out on one island only, Taku, which has an overall area of approximately 175 acres and of which 85 acres is taken up by the swamp area, where *Cyrtosperma* is cultivated.

The *Cyrtosperma* pits in use to-day are those which were constructed by the ancestors of the islanders when the atoll group was first settled and have been in constant use since that time. The cultivation of the *Cyrtosperma* in the main garden area is purely a man's work and fragmentation of plot ownership is much in evidence, with each adult male controlling one, two, three or more plots widely scattered throughout the swamp area. The patrilineal inheritance of land is rigidly controlled and land cannot pass from one clan to another.

It is estimated that of the 85 acres within the swamp area, 15 acres are taken up by tracks for access. In the main these access tracks through the swamp follow the lines of heaped-up material which were thrown up during the initial construction of the pits. These also serve as division boundaries for clan and family plots and usually range from six to eight feet in height and 18 to 24 feet in width at their base.

Some instances were noted where the family plots had been recently extended by cutting into the division banks. The bringing into use of a further *Cyrtosperma* pit is customary in some families with the birth of a boy. By the time the boy has attained adulthood the new pit has weathered and is in a satisfactory condition to support the taro. However, the practice is limited and would appear to be reserved to celebrate the male birth.

The planting of *Cyrtosperma* is by suckers which develop from the base of the parent plant during the third year, or by replanting the top of the harvested plant. Planting is carried out along the edges of two to three feet deep pits or channels which are dug within the main pit area to gain direct access to the fresh water lens (see sketch).

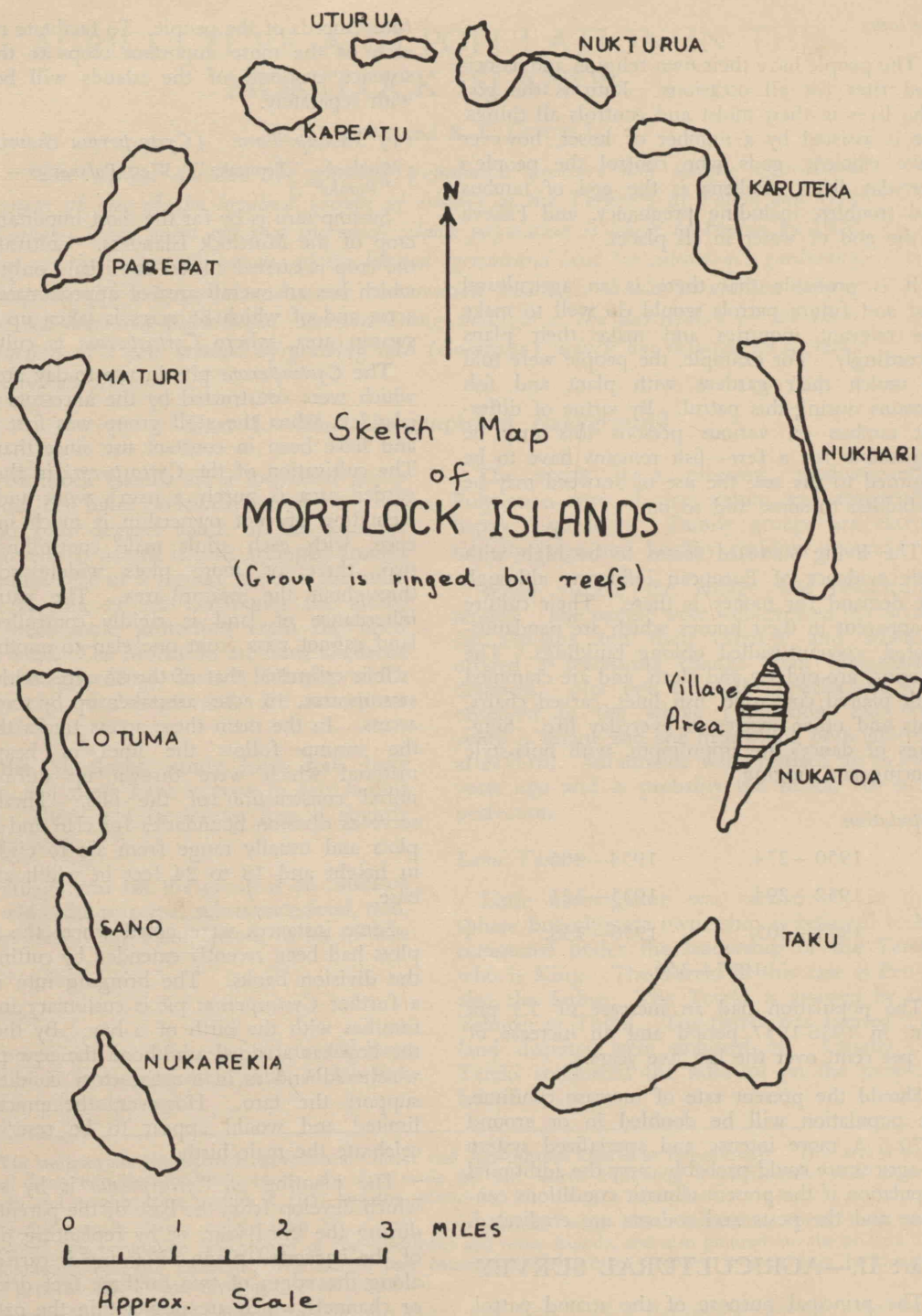


FIG. 1.—Sketch map.

Propagation by the first method produces harvestable plants in $3\frac{1}{2}$ to 4 years whilst propagation by the second results in plants being ready for lifting at three years.

As each plant is harvested, the vacated hole is given immediately replanted but no attention is given the new plant until it commences growth, when it receives regular applications of leaf mulch. From the islanders' point of view, the purpose of leaf mulch is merely to protect the soil around the young plant from the heat of the sun and keep the soil cool. The more mulch, the cooler the soil and the better the *Cyrtosperma*, in the view of the people.

The fact that mulching also fertilizes the soil and provides the essential plant nutrients is apparently not appreciated by the people.

Leaf material for mulching is taken mainly from a broad-leaved tree of unknown species which is propagated throughout the coconut area for the above purpose. No use is made of a creeping legume observed growing on the beach just above high water mark nor of the few *Erythrina* trees present. Education in the use of all vegetative matter for mulching could do much to improve the productivity of the *Cyrtosperma* plots.

It was noted in many of the plots inspected, that the few marginal rows of *Cyrtosperma* were of considerable age and had received added attention. These plants are apparently reserved for some special occasion whilst the central plot area supplies the bulk of the food. With con-

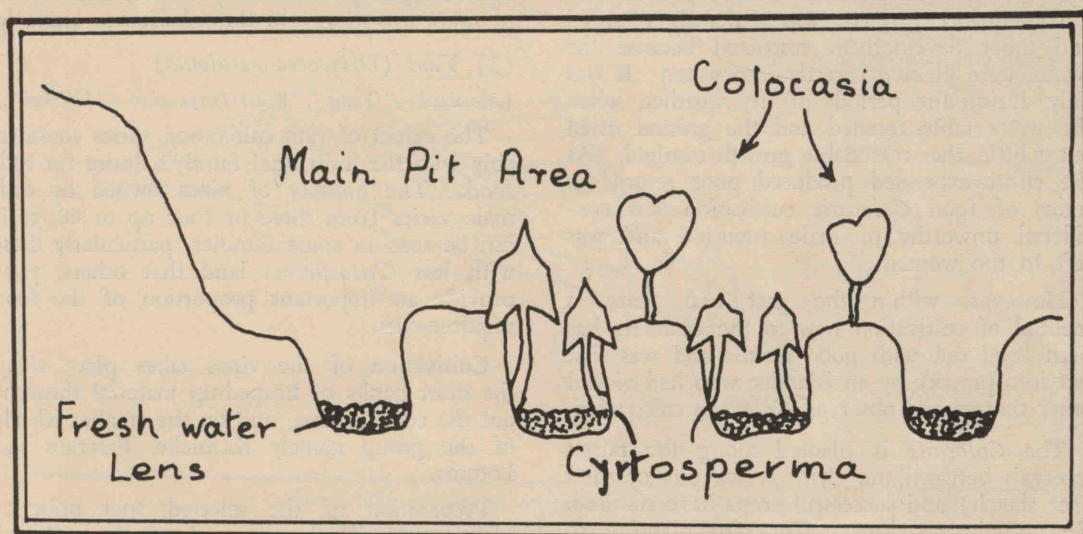


FIG. 2.—Taro cultivation diagram.

It can thus be appreciated that tuber size and rapidity of growth of the plants are determined by the amount of work expended in tending the plants and that the amount of food that can be produced is dependent on the industriousness of the individual. Great pride is attached to the growing of *Cyrtosperma* and a competitive spirit prevails, where each and every individual strives to produce the biggest and best tubers in a given period. Should one individual produce tubers of a larger size than normal, a precedent is set which everyone endeavours to attain. Social standing in the island is determined to a great extent by the size of tubers one is able to produce.

siderable numbers of plants of five to nine years of age present in the plots, it would appear that the need for more intensification of cultivation has not arisen and that sufficient *Cyrtosperma* is available for all.

It is thought that the overall population could safely double itself before any undue pressure of overpopulation was felt. However, although in theory it would appear that the future position regarding the availability of land for *Cyrtosperma* is satisfactory when considered for the whole population, it is probable that a few individuals will be short of swamp land for the crop.

This situation, where a few individuals are short of swamp land, is in evidence now, but no undue concern is displayed over the matter as other crops can be cultivated outside the swamp area. More intensive methods of cultivation could do much to alleviate the position in regard to those whose clan land has been subdivided into progressively smaller units over the years.

(2) *Colocasia Taro* (*Colocasia esculenta*)

Until recently, the cultivation of *Colocasia* has, traditionally, been attended to by the women. A small area of approximately seven acres is set aside within the swamp, where the women tend their *Colocasia*. Being taro, the people naturally considered that similar conditions as those for *Cyrtosperma* were necessary for its growth. As a consequence, growth was generally retarded and tuber development restricted because the plants were planted directly into water. It was only during the periods of dry weather, when the water table receded and the ground dried out a little, that reasonable growth resulted. As the effort expended produced poor returns in terms of food *Colocasia* cultivation was considered unworthy of male attention and was left to the women.

However, within the past two years, a method of cultivation new to the islanders has been tried out with good results and was first put into practice by an islander who had visited other centres and observed *Colocasia* cultivation.

The *Colocasia* is planted along the raised intervals between the *Cyrtosperma* pits or rows (see sketch) and successful crops have resulted. The usual procedure is for taro planting to follow along behind in areas of harvested *Cyrtosperma* as the young replanted *Cyrtosperma* leaves do not produce any shade problems. From the third year of growth of the *Cyrtosperma*, the large leaves shade out the intervals and prevent further planting of *Colocasia*.

However, with judicious mulching, good quality *Colocasia* tubers are produced and the practice is becoming generally accepted.

If mulching is continued and the intervals are allowed a year or two to lie fallow, the practice should do much to increase the productivity of the gardens and ensure an item of food much relished by the people. It is somewhat difficult to assess the proportion of requirements that is supplied by taro but it is considered that

once the above practice is firmly established, a fifth to a quarter of food requirements could come from this source.

It was noted that, since the realization that *Colocasia* will grow much more satisfactorily in drier soil conditions than those of the swamp area, cultivation of the crop is commencing in the coconut fringe. The few plots of *Colocasia* in this area exhibited normal growth and would undoubtedly produce well in these soil conditions, previously considered suitable only for *Xanthosoma* and *Alocasia* taros, yams and the few plants of Polynesian arrowroot (*Tacca leontopetaloides*).

With this area being available for *Colocasia* the cultivation of the crop should, over the next few years, considerably increase and become of more importance to the subsistence economy.

(3) *Yam* (*Dioscorea esculenta*)

(Mortlock—"Taufi". West Polynesian—"Ufi Lei".)

The extent of yam cultivation varies considerably with the individual family's desire for such food. The number of vines owned by each male varies from three or four up to 40, so it can be seen in some families, particularly those with less *Cyrtosperma* land than others, yams provide an important proportion of the food requirements.

Cultivation of the vines takes place along the drier banks of heaped-up material throughout the coconut area, and on the smaller islands of the group namely Karuteke, Farefatu and Lotuma.

Preparation of the selected spot prior to planting entails the removal of the soil and filling of the hole with leaf mulch and top soil gathered from beneath trees. The vines are supported by nearby saplings and are harvested as such food is required. No organized storage of the tubers is practised as they can remain in the ground for two to three years and are harvested as required.

Within the families who experience a shortage of *Cyrtosperma*, the proportion of the annual requirements supplied by yams would probably be in the vicinity of 25 per cent. If the need arose, much more intensive cultivation of the crop could be carried out, particularly along the division banks as only isolated vines were noted during the course of inspection of the *Cyrtosperma* pits.

(4) *Coconut*. (*Cocos nucifera*)
(Mortlock—"Tenui". West Polynesian—"Nui".)

The coconut, as elsewhere in island subsistence agriculture, commands a place of considerable importance in the subsistence of the Mortlocks. The palm is present on all islands of the group with the greatest concentration being on the main garden island, Taku. Here, most of the approximately 90 acres outside

in drums under a few sheets of iron or under coconut palms. It is only during the periods of dry weather that the people have to make use of large numbers of "Kulaus" for the provision of drinking and cooking water.

The recommended provision of a large galvanized iron catchment area with tank storage facilities would greatly benefit the people by providing, in a normal year, a plentiful supply

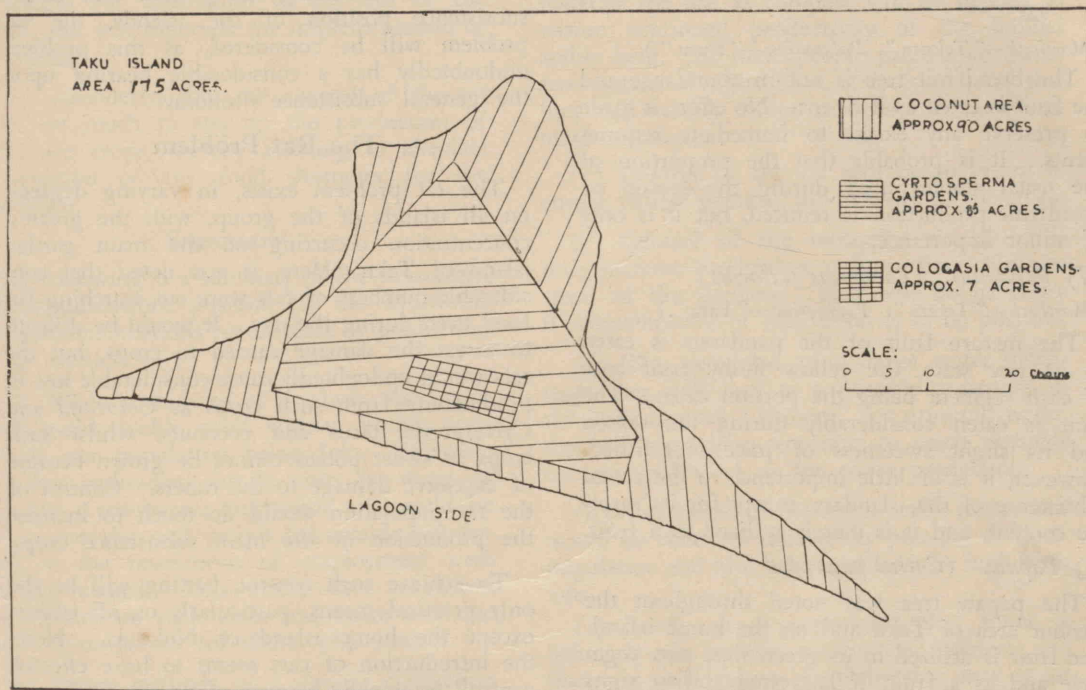


FIG. 3.—Sketch map of agricultural areas, Taku Island.

the swamp area has been planted to palms, the planting being carried out during the German Administration.

An exceedingly large number of nuts is used daily for the preparation of coconut "cream" which is an essential ingredient in the cooking of *Cyrtosperma*. Each household also has a considerable store of germinated nuts for use by the aged and infirm and for young children. The coconut "apple" of the germinated nut is the portion used.

The use of the immature nut or "Kulau" for drinking purposes, is not as greatly practised as it might be considered for an atoll where water problems usually exist. The people depend, when possible, upon rain water caught

of good water and by allowing more coconuts to reach maturity for eventual use as food or as copra.

On the home island of Nukutoa, each household has one or two palms reserved for the sole purpose of "toddy" collection. It is either used fresh as a beverage or it is concentrated over a slow fire for the production of a molasses. Little evidence was noted where the "toddy" was allowed to ferment to produce an intoxicating drink.

(5) *Subsistence Crops of Minor Importance*
(a) "Konkon" taro. (*Xanthosoma* sp.)

Small plots of *Xanthosoma* taro were noted throughout the coconut area on Taku, but the crop is usually only cultivated as a standby in

case of any minor *Cyrtosperma* failure, and to provide the occasional meal by way of a change of diet.

(b) *Alocasia* spp.

(Mortlock—"Tekape". Polynesian—"Kape".)

Similar uses as for *Xanthosoma* but less used due to the requirement of special cooking preparations to remove oxalate crystals.

(c) *Breadfruit*. (*Artocarpus altilis*). Seedless var.

(Mortlock—"Tekuru". Polynesian—"Kuru".)

The breadfruit tree is not in abundance and the fruit is eaten as it ripens. No effort is made to preserve any excess to immediate requirements. It is probable that the proportion of the usual staples used during the season of breadfruit production is reduced, but it is only of minor importance.

(d) *Pandanus*. (*Pandanus tectorius*)

(Mortlock—"Tefara". Polynesian—"Fara".)

The mature fruit of the pandanus is eaten in its raw state, the yellow fleshy fruit base of each segment being the portion eaten. The fruit is eaten considerably during the season and its slight sweetness of juice is relished. However, it is of little importance to the actual subsistence of the islanders, except for its carotene content, and it is merely utilized as a fruit.

(e) *Papaw*. (*Carica papaya*).

The papaw tree was noted throughout the coconut area of Taku and on the home island. The fruit is utilized in its green state as a vegetable and as a fruit, if harvested at first signs of ripening. If allowed to remain too long on the tree, the fruit is quickly destroyed by rats. The papaw has some prominence in the subsistence of those families who have a slight shortage of swamp land for *Cyrtosperma*.

(f) *Banana*. (*Musa* spp.)

The banana is cultivated on the five main islands of the group, namely Taku, Nukutoa, Karuteke, Farefatu and Lotuma. Both the cooking and common eating varieties are present, the former being used for the occasional change of diet and the latter as a fresh fruit.

(g) *Polynesian Arrowroot*. (*Tacca leontopetaloides*).

(Mortlock—"Piakere". Polynesian—"Pia".)

This plant was evident in scattered plots throughout the coconut area on Taku, but is generally not seriously cultivated. It is har-

vested for its starch for the occasional meal, but generally the work involved in reducing the starch to an edible condition rules it out as being a crop of any great importance. However, when the starch is prepared, it is mixed with grated coconut for the baking of cakes, which are mainly used as food for children. The prepared starch is known locally as "Tepia".

Before summarizing the present and future subsistence position of the islands, the rat problem will be considered, as this problem undoubtedly has a considerable bearing upon the general subsistence economy.

The Rat Problem

The rat problem exists, in varying degrees, on all islands of the group, with the greatest concentration occurring on the main garden island of Taku. Here, it was noted that considerable numbers of rats were out searching for food even during the day. It would be difficult to assess the damage caused to crops, but the rats would undoubtedly cause considerable loss in productivity from such crops as *Colocasia* and *Cyrtosperma* taros and coconuts, whilst such crops as sweet potato cannot be grown because of excessive damage to the tubers. Control of the rat population would do much to increase the production of the main subsistence crops.

To achieve such control, baiting will be the only practical means, particularly on all islands except the home island of Nukutoa. Here, the introduction of cats seems to have effected control, principally because of its small size and the fact that it is inhabited. During the time the patrol was on the islands, a number of baits was laid out to test the degree of acceptance of the baits by the rats. The poison used for the preparation of the baits was A.N.T.U.

In the first instance, coconut meat was used as a base, with the powder being dusted on to the meat. Baits were readily taken and consumed within a short period during the day. In the second instance the powder was mixed with a grain mash, at the proportion of one to 20, and the prepared mixture distributed in paper bags.

As coconuts are plentiful, use will be made of these as a base for any poison when the programme for the control of the pest is put into practice.

General baiting would need to be carried out over the whole of the island and it is probable that 90 per cent. of the rats could be eradicated with the initial baiting. Periodic baiting after this should ensure control, if not complete eradication of the pest.

Any such scheme for the control of the rats will need to be carried out by the people themselves. Two islanders have been brought back to Sohano for instruction in the use of the poison, and will supervise the implementation of the scheme.

It is considered that the control of the rat would do much to step-up the production of subsistence crops, thereby assisting to alleviate the position of any food shortages for the population.

Summary

The following is a summary of the considered general subsistence position of the Mortlocks with recommendations for increase of production of the staples :—

(a) When considered as a whole, the population could double itself without undue pressure of our population being felt. However, as a few individual family units are short of land for *Cyrtosperma* cultivation, it would be well to consider such people for outside employment, if the restrictions of employment were partially relaxed. This would serve to relieve the pressure on such units and make available ample *Cyrtosperma* for those who remain.

(b) Better methods of *Colocasia* cultivation now being practised will do much to increase the proportion of requirements supplied by taro.

Colocasia cultivation could be increased by those families short of swamp land for *Cyrtosperma*.

(c) Much more use could be made of the yam than is now being done. Cultivation of the crop could be greatly increased, particularly along the tracks throughout the swamp area and on the drier soils of the other smaller islands.

(d) Education in the use of all vegetative material for use as compost will be needed to ensure continued productivity of the limited arable land. As these people practise an intensive system of agriculture, it is considered that they will readily accept any proposed new cultural techniques.

(e) Control of the rat will be necessary to ensure fullest possible productivity of all crops.

(f) Control of the mosquito would indirectly increase production as more time could be spent in the gardens. This will be necessary if intensification of cultivation is to be possible.

(g) The provision of a large water catchment area will lead to a possible reduction in the utilization of "Kulaus" for drinking water, thus allowing more coconuts to reach maturity for eventual food or for copra production.

(h) Relaxation of the employment restrictions would do much to relieve any pressure of overpopulation and also help to reduce the high birth rate.

(i) Briefly, it is considered that there is definitely no present subsistence problem and that any such future problems that may occur can be overcome with the implementation of the above recommendations.

REFERENCE

BARRAU, J. J. 1956. *Polynesian and Micronesian Subsistence Agriculture*. S.P.C., Noumea.