

The Role of Root Crops, their Prospects and the Development needs in the Pacific (A Summary)

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Abstract

Root crops are important food sources among people in the South Pacific. These root crops are also used as animal feed but are grown primarily for human consumption. However, yields of rootcrops in the Pacific region are generally low and below the potentials of the crops as indicated by experimental results.

Topics on some important root crops grown in the Pacific, agronomic practices employed and constraints on production are pointed out in this paper. A UNDP/FAO root crop development project has been proposed towards the development of root crop production in the area.

Importance of the Root Crops in the South Pacific

There is not one root crop which could be described as the principal root of the Pacific. Most of the species attain pre-eminence as a reflection of the diverse cultural traditions of the people, historical influences and ecological and climatic requirements of the crops.

Taro and yam however are the most commonly important root sources of dietary carbohydrate and also of ceremonial standing. Their culture is reported from almost all territories. Yam is not often a dominant root crop, and in recent years there has been a relatively declining production in a number of territories. This is because of its demanding agricultural and labor inputs. Some mechanical trials however, were carried out in New Caledonia and Tonga during the past few years.

Sweet potato is of great importance in many countries; this is almost the only root crop of significance in the extensive highland regions of Papua New Guinea, and for this reason, protein level in the tubers is therefore a matter of considerable concern.

Cassava reaches high consumption levels in Fiji, Palau, and certain Caroline Islands. There is considerable and increasing interest in cassava in a number of territories as a potential food base for animal production industries.

Tannia (*Xanthosoma*) is a relatively new crop to the region. Although nowhere a dominant crop, the production of tannia, with its good yields and less cultural requirements than taro, is rapidly increasing in many territories and is likely to attain greater economic and dietary significance in the future.

Coarse taro (*Cyrtosperma*) is widely grown in Micronesia. It is particularly important on the atolls.

Giant taro (*Alocasia*) is an important reserve food crop in many situations. It figures strongly in the diets of the Polynesian people.

Polynesian arrowroot (*Tacca leontopetaloides*) is used in atoll agriculture and economies.

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Root crops yields in the Pacific Islands

	"Average" Range of Farmers Yields	"Average" Experiment Station Yields
Yams	6 – 11 T/ha.	
Taro	4 – 10 T/ha.	
Sweet potato	Up to 15 T/ha on irrigated land	Up to 22 T/ha.
Cassava	3 – 9 T/ha.	25 T/ha.
Tannia	10 T/ha.	28 – 35 T/ha.
	20 T/ha (all cormlets)	10/T ha (main corms only)
		40 T ha. (all corms)

TRADE AND LOCAL MARKETS

A. Overseas

1. Importing Territories of the Region	(metric tonnes)					
	1974					
a. American Samoa	450					
b. Guam	50					
c. New Caledonia	100					
2. Exporting Territories of the Region	(metric tonnes)					
	1973	1974	1975	1976	1977	1978
a. Fiji	–	250	–	528		–
b. Tonga			300		(804)	(409)
– swamp taros (1)					450	150
– tarotaruas (2)					48	100
– yams					43	45
– kape (3)					255	98
– cassava					8	16
c. Western Samoa						
– taro and taamu (4)	1,258	2,642	596	2,322	1,755	3,407
1. swamp taro	= <i>Colocasia esculenta</i>					
2. tarotarua	= <i>Xanthosoma sagittifolium</i>					
3. kape	= <i>Alocasia macrorrhiza</i>					
4. taamu	= <i>Alocasia macrorrhiza</i>					

The major destination of Western Samoan produce and also that of Tonga and Fiji, is New Zealand.

Total annual trade could on rough estimates amount to 3,000 tons of fresh roots per year. In this, taro is by far the major root traded in the region. Exports from these three territories are increasing at the moment.

B. Local Markets

In all territories root crops are sold in local markets. For some of them like taro, and mainly yam the supply is determined by environmental conditions and also by traditional agricultural methods.

Present Agronomic Practices

With few exceptions, the production of root crops is effected within subsistence types of agricultural systems. These systems are frequently well adapted to environmental conditions so that they are efficient at the level of technologies employed and conserve natural resources of fertility.

The growing of numerous cultivars of a species is typical in all the territories. In the taro exporting territories however, certain cultivars are recognized as desirable for the market and are widely grown.

Fertilizers and herbicides are rarely used. Rotation cropping systems are a feature of gardens, but on irrigated fields taro could be planted year after year.

Seldom are measures taken for the control of pests and diseases. Systems of land preparation are nearly always manual, but in several territories there is a limited availability of cultivation machinery to prepare soil. Planting and harvesting however remain almost totally manual operations.

Constraints on the Production and Development of Root Crops

There are a number of constraints which operate on the production and development of root crops in the Pacific Region. Many of these constraints are common to all territories. They may be classified into four groups:

1. Agronomic
 - use of cultivars of inadequate potential yield
 - low level of agronomic inputs
 - seasonal production for some species (yam)
 - losses from pests, diseases and viruses
 - lack of mechanical system of production
2. Technology
 - little feed technology research to identify and promote industrial uses
 - few processing facilities
 - few resources for animal feeding trials
3. Economic
 - high price of root crops in the market
 - fluctuating market prices due to irregular supplies
 - variable quality of produce
 - need for more market research
 - rice consumption in tending to increase in many islands.
4. Administrative
 - insufficient research and extension staff
 - lack of interest in root crops in some islands by research and extension staff

Research Activities on Root Crops

In the past few years, some research programmes on root crops have been carried out in some territories:

Fiji: integrated research programmes sponsored over three years by FAO and still carried out by the Agronomic Research Station of Koronivia. Mechanization of root crop

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production has been a subject of research, mainly on taro and yam.

Papua New Guinea: considerable agronomic research programmes for root crops – collection and evaluation of sweet potato in the Highlands.

Western Samoa: nutritional studies on taro (foliar analyses programme).

Solomon Islands: extensive studies of virus and other diseases, particularly on taro (*Colocasia*).

New Caledonia: some work on yam mechanical cultivation – yam research programme – taro disease studies.

American Samoa: work with preemergent herbicides and paraquat in taro – studies on cultural methods and sizes of planting material on yields of taro.

French Polynesia: fertilization on taro (*Colocasia*) – pests and disease control.

Tuvalu: variety collection of *Colocasia* and *Cyrtosperms*.

As far as *food technology* is concerned, the Food Technology Laboratory in the region is at Alafua College in Western Samoa. Studies are carried out on the use of taro flour as a base for baby foods. Also receiving attention is the incorporation of cassava flour with wheat flour for backing products, and cooked taro and cassava sold frozen in plastic bags.

Some animal feeding studies with dried and fresh root materials alone or mixed with other food sources are conducted in some territories, particularly with pigs. The territories are Tonga, New Caledonia, Western Samoa.

The UNDP/FAO Root Crop Development Project for the Developing Countries of the Pacific

(from Dr. Basil Williams, FAO Tropical Agronomist)

An FAO mission on Root Crops Development in the Pacific from September to November 1975 proposed an intercountry project for funding to UNDP, New York, in January 1976. As a result of financial difficulties experienced by UNDP over the period 1975 to 1976, implementation of the project had to be deferred.

In May 1978 however, a Root Crop Agronomist, Dr. Basil Williams, was appointed by FAO on a Preparatory Assistance Mission and took up duties in Suva on June 26, 1978. January 1980 is now the target date for implementation of the project.

Project Objective

a. Long Term Objectives

– Promotion of greater self-sufficiency and reliability in the production and supply of food from local sources. It focuses attention on those tropical root crops which have served as the traditional staple foods of the Pacific peoples for centuries and is intended to be one among the many measures already taken by governments of the region to accomplish this end.

b. Immediate Objectives

– Support and assistance to Department of Agriculture with ongoing work on root crops' improvement in the fields of Agronomy, Crop Protection, Production Economics and Processing and Agriculture Extension.

– Establishment of an Information, Advisory and Training Service for national personnel whose duties and responsibilities include root crops production and development.

– Identification of the major cultural, economic and technological constraints to root crop production and development of appropriate measures to counteract them.

Role, Prospects and Needs of Root Crops in the Pacific

Project's Duration and Services

The Project will be of five years and five months duration, and is estimated to cost US\$1.23 million.

This estimate provides for:

- a. The services of a Tropical Agronomist/Project Manager.
- b. An Extension Agronomist/Communications Specialist.
- c. Consultant Services and locally recruited support personnel.
- d. Associate Experts and INSTA Personnel (FAO's In-service Training Awards Programme).
- e. Costs of attendance of national staff at Universities, group and inservice training courses, study tours and of mounting farmer demonstrations.
- f. Support to collaborating regional institutions and Departments of Agriculture.

Project coordination

Project coordination will be achieved at two levels:

- a. At country level through an advisory technical committee.
- b. At the Regional Level through a Regional Advisory Technical and Co-ordinating Committee.

Pending formal endorsement of the project document by Governments, UNDP and FAO have extended the Preparatory Assistance Phase of the Project until Dec. 31, 1979.

CONCLUSION

The growing of root crops is an intimate part of the life styles of the Pacific peoples. Rapidly increasing populations in the region, little improvement in the technology of producing root crops and, in some instances, an actual decline in production accompanying the change from subsistence to cash oriented economies, have altered demand/supply balance for roots in the local markets. As a result they are now often relatively high priced commodities. These high prices, among other factors, have encouraged an increasing consumption of rice and wheat flour products, the imports of which can weaken national economies.

Yields of root crops in the Pacific region are generally low and far below the potentials of the crops indicated by experimental results including those from within the region.

Existing animal industries depend largely on expensive imported rations which inhibit their expansion. Several Pacific countries are believed to have potential for developing their livestock industries, particularly of pigs and poultry, up to the level of their national requirements through level development of their root crops production.

Therefore the UNDP/FAO regional project is designed to make a significant contribution towards meeting these aspirations.

During the Sixth Meeting of Permanent Heads of Agriculture and Livestock Production Services, which was held in Noumea, New Caledonia, from 23 to 27 July 1979, this project was strongly supported by participants and the following recommendation taken:

"The Conference recommended that:

- (a) The Permanent Heads of Agriculture and Livestock Production Services should constitute the Regional Advisory Technical and Co-ordination Committee proposed for the project:

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- (b) The conveners of meetings of this body – the South Pacific Commission and the University of the South Pacific School of Agriculture at Alafua – should each arranged to mount these meetings in alternative years to ensure that matters relating to the project are discussed each year;
- (c) The School of Agriculture and FAO should explore means of jointly funding attendance of delegates at the meeting when scheduled to take place at USP/SOA (School of Agriculture)".

It must be noted that the South Pacific Commission organized a Regional Technical Meeting on the Production of Root Crops in Suva, Fiji, from 24 to 29 November 1975. The Report of the Meeting and the Collected Working Papers presented during the Conference (SPC Technical Paper No. 174) were published in due course.

In connection with root crops research in the Pacific the following publications appeared since 1977:

SPC Advisory Leaflet No. 3 (1977) – Taro Leaf Blight

SPC Advisory Leaflet No. 8 (1978) – Alomae and Bobone Diseases of Taro

SPC Information Document No. 44 (1979) – Taro Tissue Culture Manual by J. Arditti and M.S. Strauss

– An SPC Handbook "*Taro Production in the South Pacific*" is in preparation. It will be published in 1980.

References

- FAO MISSION REPORT ON ROOT CROPS DEVELOPMENT IN THE PACIFIC – December 1975 – by Mission Officers: Dr. J. Keith Templeton, FAO Agronomist Leader of Mission, and Mr. Michel Lambert, Tropical Agriculturist, South Pacific Commission, Noumea, New Caledonia.
- REPORT OF THE SIXTH MEETING OF PERMANENT HEADS OF AGRICULTURE AND LIVESTOCK PRODUCTION SERVICES, Noumea, New Caledonia, from 23 to 27 July 1979 (Working Paper No. 18).
- THE TRADE REPORT FOR THE YEAR 1976 – Parliament of Fiji – Parliament Paper No. 18 of 1978.
- QUARTERLY STATISTICAL BULLETIN – 1st Quarterly January – March 1979 – Department of Statistics – Apia, Western Samoa.
- QUARTERLY FOREIGN TRADE REPORTS (1977 and 1978) – Issued by Statistics Department, Government of Tonga, Nuku alofa, Tonga.
- STORAGE AND PROCESSING OF ROOT CROPS IN THE SOUTH PACIFIC, by Michel Lambert. – Small-Scale Processing and Storage of Tropical Root Crops, edited by Donald L. Plucknett – Westview Tropical Agriculture Series, No. 1.