
Tropical Root Crop Statistics: A World Perspective

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ABSTRACT

Analysis of the world root crop statistics show that main producers are China, Nigeria and Brazil. The main crops are cassava and sweet potatoes. Most of the world production is consumed as subsistence products on the farms. Contribution of tropical root crops in the national economy of Papua New Guinea, Fiji and Japan, representing a subsistence, semi-subsistence and commercialized economy, respectively, showed a sharply declining influence. Future outlook for tropical root crops is likely to be strongly influenced by population growth and urbanization. Urbanization is likely to pose major problems for food production in the developing nations.

Cassava, sweet potatoes, yams and taro are the most important tropical root crops produced and consumed in the world. About 3 billion people or 70% of the world's population consume these crops on a fairly regular basis. At least half consume tropical root crops as staple foods. Most production is consumed as subsistence products in the tropical world. Both rural and urban populations dependent on tropical root crops for subsistence, comprise some of the poorest people on earth. There is a world of poverty, malnutrition and hunger. In some societies strong dietary preferences have developed for certain root crops going back as long as recorded human history. As such, tropical root crops have strong connotations with the culture and traditions of many nations in the world (Coursey, 1978). Hence development efforts in tropical root crops are very much a part of the overall development efforts directed at the world's poor.

Production and Consumption

The harvested area and the production statistics of cassava, sweet potatoes, yams, taro and potatoes by major world divisions are shown in Tables 1 and 2. These Tables are derived from FAO Production Yearbooks (various years) which annually report the harvested area and production statistics by individual nations. Prior to 1975 the area and production of yams and taro were also reported individually by each nation but these have now been combined with other roots and tuber crops. Hence total and country estimates of yams and taro are now difficult to obtain.

In terms of total world production the important tropical root crops are cassava and sweet potatoes. These together account for 92% of the world's production of tropical root crops. Yams and taro are much less important. Potatoes are mostly produced in the subtropical and temperate regions of the world and their production in the tropics is limited to only about 18% of the world production.

Nevertheless, potatoes are important food crops in the tropical highlands of many nations in North Central America, South America and Asia.

Table 3 shows the ranking of the world's leading tropical root crop producers. Important features of this Table are the high concentration of total world production of sweet potatoes in China (81.2%) and yams in Nigeria (78.4%). In the case of cassava Brazil leads with 20.1% of the total world production but other nations such as Thailand, Indonesia, Zaire and Nigeria are also important producers. Nigeria, Ghana and Japan are important producers of taro. If the production of cassava, sweet potatoes, yams and taro in each country are combined then the world's leading producers are China, Nigeria and Brazil.

Table 1. Area harvested (1000 ha).

	Cassava	Sweet potatoes	Yams	Taro	Potatoes
Africa	7,294	767	1,928	669	595
N. C. America	160	211	18	-	675
S. America	2,610	196	9	-	995
Asia	3,841	12,046	7	61	3,129
Oceania	20	113	13	32	46
Europe + USSR	-	13	-	-	12,590
World	13,926	13,345	1,975	762	18,030

Note: All data are for 1980 except for yams and taro which are for 1974.

Source: FAO Production Yearbooks.

Table 2. Production (1000 t).

	Cassava	Sweet potatoes	Yams	Taro	Potatoes
Africa	46,773	4,955	18,643	3,397	4,918
N. C. America	1,024	1,269	227	-	17,447
S. America	30,556	1,699	50	-	9,332
Asia	43,559	98,596	30	699	34,434
Oceania	222	600	187	257	1,199
Europe + USSR	-	135	-	-	158,389
World	122,134	107,254	19,137	4,352	225,718

Note: All data are for 1980 except for yams and taro which are for 1974.

Source: FAO Production Yearbooks.

Table 3. Ranking of world's leading tropical root crop producers (% of total).

Cassava	Sweet potatoes	Yams	Taro
Brazil (20.1)	China (81.2)	Nigeria (78.4)	Nigeria (40.1)
Thailand (11.1)	Vietnam (2.2)	Ivory Coast (8.3)	Ghana (27.6)
Indonesia (10.9)	Indonesia (1.9)	Ghana (3.1)	Japan (13.3)
Zaire (10.2)	India (1.5)	Dahomey (3.1)	Papua New Guinea (4.9)
Nigeria (9.0)	Japan (1.3)	Togo (3.1)	Ivory Coast (4.3)
Totals (61.3)	(88.1)	(96.0)	(90.2)

Note: All data are for 1980 except for yams and taro which are for 1974.

Source: FAO Production Yearbooks.

Tropical root crops are a major source of food in the world. The annual global per capita consumption of cassava, sweet potatoes, yams and taro is 57 kg, comprised of 28 kg, 24 kg, 4 kg and 1 kg, respectively. To this could be added production and consumption of potatoes in the tropics, about 9 kg per capita per year for the world. Root crops compare favorably with other major world food crops such as rice (paddy) and wheat with corresponding figures of 90 kg and 100 kg per capita per year.

Consumption of tropical root crops by country varies considerably. The world's leading producers, China, Nigeria and Brazil, have annual per capita consumption of 107 kg, 364 kg and 217 kg, respectively. Nigeria has one of the highest per capita consumption rates in the world at 364 kg, comprised of 195 kg of yams, 143 kg of cassava, 23 kg of taro and 3 kg of sweet potatoes.

Most tropical root crops are consumed as fresh human food. Only a small fraction are used for animal feed, processed into human food or manufactured into industrial products. International trade in tropical root crops is also limited on a global scale. However, some countries, such as Thailand and Indonesia, are important exporters of cassava pellets for animal feed to EEC countries.

Contribution to National Economy

The importance of tropical root crops to the national economies of each producing nation varies considerably. However, instead of reporting masses of inter-country data showing similar patterns, it was decided to choose three different countries and give detailed information on each so that the global range is covered. The countries chosen are Papua New Guinea, Fiji and Japan. In each country the tropical root crops have markedly different levels of influence on the overall national economy.

Papua New Guinea is representative of an almost pure subsistence economy, heavily dependent on tropical root crops for staple foods and where over 90% of the total production is utilized for farm family subsistence. Fiji represents a semi-subsistence economy where root crops are still very important in the peoples' diet and where about 67% of the total production is consumed by the rural population, the remainder by the urban population who purchase root crops for cash. Japan represents a highly commercialized economy, where root crops are one group among several staple foods and where over 70% of the total production is purchased

and consumed by the urban population. Each of these countries represent an interesting case into which other tropical root crop producing nations in the world can be categorized. Hence the following discussion applies to any nation in the world, depending on which group it belongs.

Table 4 shows the contribution of tropical root crops to the national economy of Papua New Guinea, Fiji and Japan. Highlights of this Table from an almost pure subsistence economy of Papua New Guinea to a highly commercialized economy like Japan reveal: (1) average yield of four root crops increase markedly; (2) annual per capita consumption decreases substantially; (3) degree of fresh food utilization decreases and that of processed foods, animal feeds and non-food usage increases significantly; (4) contribution of food energy and protein supply from root crops in the total diet of an adult decreases sharply; (5) degree of farm household subsistence decreases while consumption by urban population increases greatly; (6) in terms of total economic activity the per capita income levels and gross domestic product increases substantially; and (7) overall contribution of root crops in the agricultural economy decreases sharply.

What are the implications of these findings? First, tropical root crops are important food products in countries that are strongly agricultural, especially where subsistence and semi-subsistence characteristics are prevalent. In these situations production and consumption are an integral part of farm household decisions. Also the marketing structure and distribution channels are undeveloped or poorly developed and very little cash sales take place. Second, technological development, industrialization and urbanization lead to reduced dependence on root crops as fresh human food. Other foods, especially the storable grains such as rice and wheat products, may become important in the human diet. However a greater fraction of total production of root crops is processed into human or animal feeds or is utilized for non-food purposes. Marketing and distribution channels become well organized and developed. The urban populations become the major users of fresh root crops and processed products.

Future Outlook

The future development of tropical root crops will be strongly influenced by population growth and urbanization. In those countries which are heavily dependent on root crops for human food the demand for root crops will be directly associated with population growth. Given the present population growth rates of 2.2% in many tropical root crop consuming nations of Central and South America, Africa and Asia, the problem of maintaining even the present levels of subsistence will become acute since national populations are likely to double within 32 years or by year 2015. That is, in just over three decades more than 3 billion people will be directly dependent on tropical root crops for their staple foods. Altogether more than 6 billion people will consume these crops on a fairly regular basis. Hence the problems of meeting such growth in food needs will be enormous both for national governments and on a global perspective. Major efforts must be directed to increasing tropical root crop production. Hence in many developing nations dependent on tropical root crops, staple food supply will be the major problem for the future and one that cannot be ignored from agricultural policy formulation and decision-making.

Table 4. Contribution of tropical root crops in three national economies.

Parameters	Papua New Guinea	Fiji	Japan
1. Main crops (in order of importance)	Sweet potatoes Taro Yams Cassava	Cassava Taro Yams Sweet potatoes	Potatoes Sweet potatoes Taro Yams
2. Area (1000 ha)	144	9	229
3. Production (1000 t)	914	116	5,346
4. Yields (t/ha)	6.3	12.	23.3
5. Population (1000)	3,082	639	116,782
6. Consumption (kg/capita)	297	182	46
7. Utilization:			
fresh food (%)	99	94	42
processed food (%)	-	1	8
animal feed (%)	1	5	10
non-food (%)	-	-	40
8. Energy supply:			
% kJ per adult unit per day	64	27	7
9. Protein supply:			
% g per adult unit per day	36	12	3
10. Human consumption:			
subsistence farm products (%)	93	67	28
urban population (%)	7	33	72
11. Income levels per capita (US\$)	646	1,360	13,662
12. Contribution to agricultural economy (%)	25	10	2

Source: (1) Cooperators in Root Crop Statistics Project from various countries.
(2) FAO Production Yearbook, 1980 and 1974.
(3) UN Statistical Yearbook, 1979-80.

Urbanization is likely to have an opposite effect on the demand for tropical root crops in the fresh food form. Although there will be increased demand for processed human and animal food or for industrial products the sum total will be an overall reduction in demand. However this reduction will have to be compensated for by a concomitant increase in demands for storable convenience foods such as rice and wheat products. This, in itself, will be a major dilemma for the developing nations which can be demonstrated in this way. Tropical root crops, by their biological nature, are highly efficient producers of kilojoules (kJ) per unit of input such as land, labor or capital (Chandra, 1980; Evenson and De Boer, 1978). Under the same level of inputs the tropical root crops are capable of producing more kJ per ha per unit time than any other crop, except perhaps sugar cane. In other words, tropical root crops, compared to other crops such as rice, have particularly suitable production functions. Developing nations where tropical root crops are an important component of the diet of the majority of the population, should have a first priority for food production programs based on root crops. Thus tropical root crops have a major role in supplying food needs of future world populations.

Conclusions

Tropical root crops are staple foods for more than a third of the world's population. Most production is concentrated in Central and South America, Central Africa and South and East Asia. The main producers are China, Nigeria and Brazil. The main crops are cassava and sweet potatoes. A large proportion of the total world production is consumed as subsistence products on the farms.

The contribution of tropical root crops was analysed for the national economies of Papua New Guinea, Fiji and Japan. They represent an almost pure subsistence economy, a semi-subsistence economy and a highly commercialized economy, respectively. The contribution of tropical root crops to the national economies decreases sharply from pure subsistence to highly commercialized economy. The future outlook for tropical root crops in each nation will be strongly influenced by two factors: population growth and urbanization. The former is likely to increase demands, the latter is likely to decrease demands. Urbanization will pose major problems for food production strategies in the developing nations in the future.

Bibliography

- Chandra, S. Root crops in Fiji: Part 2 development and future food production strategy. *Fiji Agric. J.* 42(1), 1980, 11-17.
- Coursey, D.G. Some ideological considerations relating to tropical root crop production, in the adaptation of traditional agriculture. Ed. E.K. Fisk, Development Studies Centre, Australian National University Press Monograph 11, 1978, 131-141.
- Evenson, J.P. and De Boer, A.J. Role of root and tuber crops in food production strategy for semi-subsistence agriculture. *Agricultural Systems* 3, 1978, 221-232.
- FAO Production Yearbook. FAO Publication, 1974-80.
- UN Statistical Yearbook. UN Publication, 1979-80.