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Some Economic Aspects of Food Crop Production in the West Indies — John Cropper

The past few years have seen increasing interest in the West Indies in the production of food crops.[1] Several reasons can be advanced for this interest; and the particular situation of a territory will determine which of these are especially important:

(1) the rising volume and value of food imports

(2) the possibility of import replacement

(3) the need to find alternative use for the land now occupied by failing export crops

(4) the realisation that there are large areas under food crops, which have very low output

(5) the increasing demand for food in the local markets, and

(6) the (limited) possibility of exports.

The major food crops imported into the Area[2] are rice and temperate cereals (wheat and barley), and to a lesser extent maize (corn), Irish potatoes, 'peas, beans and lentils', and 'onions and garlic'; vegetable imports are relatively insignificant (Table 1).

It is generally agreed, however, that not all of these crops could be produced within the Area and must therefore continue to be imported unless acceptable substitutes can be found. Estimates have been made for Jamaica, Barbados, and Trinidad and Tobago of the possible degree of import replacement. These products are mainly of livestock origin, but gross savings on food crop imports would be about $17.430,000 (Table 2).

Table 2. **Value of possible imports savings for selected commodities: Barbados, Jamaica, Trinidad and Tobago, 1965, 1960, 1961**

Commodity		($1000)	
Meat	4031	2699	13650
Dairy Products	4194	3348	13977
Fish	—	11388	2885
Sugars	10	—	817
Oils and Fats	—	418	—
Animal Feeds	1600	—	—
Cereals	375	—	9211
Roots and Tubers	1400	325	255
Beans and Pulses		973	30
Other Vegetables			297
Fruits	500	665	445
Teas and Spices	—	305	1832
TOTAL	12109	20121	43419
TOTAL FOOD IMPORTS	29029	69301	64000

[1] For the purpose of this paper the "food crops' refers to the annual food crops — corn, roots, pulses aud vegetables.

[2] For the purpose of this paper the 'Area' refers to Jamaica, Barbados, the Windward and Leeward Island and Trinidad and Tobago.

Table 1. **Imports of Food Crops; the West Indies, 1964**

($'000)

	Ant.	B'dos.	Dom. (1963)	Gren. (1962)	J'ca.	Mont.	St. K. Nevis Ang.	St. L. (1963)	St. V.	T. & T.	Total
Rice	488	2373	135	298	9651	46	413	146	272	8552	22,374
Maize (corn) meal	—	374	3	8	1058	7	82	—	8	192	1,733
Cereals-unmilled, milled and preparations	1292	3407	821	1096	19963	221	996	1178	934	18645	48,554
Fresh Fruit	7	810	10	8	494	2	22	9	15	1150	2,526
Nuts (not for oil)	50	309	15	15	599	1	18	33	6	236	1,284
Dried Fruit	29	87	7	15	712	4	13	14	9	510	1,399
Preserved Fruit and Fruit preparations	249	638*	16	33	1549	8	16*	53	17	1233	3,813*
Potatoes (not sweet)	116	640	23	34	423	7	66	36	27	1581	2,953
Beans, peas, lentils etc.	52	482	64	39	1869	2	53	55	16	2087	4,719
Hops and other vegetable matter	63	206	6	9	557	—	8	11	6	806	1,671
Onions	57	295	34	48	708	5	36	68	29	593	1,874
Garlic	8	5	17	8	166		9		7	369	589
Tomato juice and in tins	3	370	19	4	92	19	42	46	6	79	680
Other preserved vegetables and preparations	143			21	1610				15	988	2,777
	2557	9996	1171	1634	39454	324	1773	1649	1367	37019	96,944

* Includes some citrus juice

Source: Overseas Trade Reports — collated in Edwards, D.T. & Cropper, J. (1967) *Agricultural Research in the West Indies: The Economic Background to Programmes of Livestock and Crop Investigations*, Department of Agricultural Economics and Farm Management, U.W.I., Trinidad

Sources: Gooding, E.G.B. (1966) **Cutting our Food Bill**, Barbados Sugar Producers Assoc. Inc. (Agronomy Unit), Unpublished
Anon (1963) **Agricultural Production: Trinidad and Tobago.** Report prepared for U.S.A.I.D., Unpublished
Ministry of Agriculture, Division of Economics and Statistics, Jamaica (1962) **Food Consumption in Jamaica**, Unpublished

Table 3. **Possible Release of Land, now in Crops, due to Improved Practices or Cessation of Production of Selected Crops: The West Indies**

Territories	*Area which might be released from use by:*				Total area in crops (1961)	Proportion of land in crops which might be released
	Sugar	Cotton	Banana(a)	Sugar Cotton Bananas		
			(acres)			(%)
Antigua	12,000	1,000	—	13,000	20,000	65
Barbados	?	—	—	?	62,200	—
Dominica	—	—	8,000	8,000	33,700	24
Grenada	—	—	2,500	2,500	41,200	6
Jamaica	?	—	42,500	42,500	571,000	7
Montserrat	—	1,000	—	1,000	10,000(b)	10
St. Kitts/Nevis/Anguilla	?	1,500	—	1,500	25,200	6
St. Lucia	—	—	9,500	9,500	45,200	21
St. Vincent	—	850	4,250	5,100	25,300	20
Trinidad & Tobago	?	—	—	?	432,000(b)	—
	12.000	4,350	66,750	83,100	1265,800	7

(a) Average banana output per acre is assumed to be able to double, even with present knowledge
(b) 1956/59

As new advances are made in the technology of crop production, it is likely that these estimates can be revised upwards.

It has been estimated that increasing production efficiency and the collapse of several traditional industries are likely to release about 83,000 acres of land in the Area for other uses — including food crops (Table 3).

Table 4. **Acreages of Major Food Crops by Territory: The West Indies, 1961**

Territory	Maize	Pigeon Peas and other Peas and beans	Sweet Potatoes	Tannia, Dasheen, Eddo	Yams	Cassava	Total
Antigua	661	122	630	73	198	—	1,684
Barbados	1,975	678	3,312	536	2,494	—	8,995
Dominica	9	15	164	2,188	176	230	2,782
Grenada	3,349	3,080	926	434	534	340	8,663
Jamaica	30,401	16,430	17,685	15,822	18,571	2,865	101,774
Montserrat (1966)	320	n.a.	810	n.a.	n.a.	35	1,165
St. Kitts/Nevis/Anguilla	461	326	1,321	217	447	—	2,772
St. Lucia	100	53	1,126	2,147	658	1,320	5,404
St. Vincent	547	687	1,476	1,015	522	210	4,457
Trinidad & Tobago (1966)	5,250(a)	5,782	2,183	9,062	2,584	8,041	32,902
All Territories	**43,073**	**27,173**	**29,633**	**31,494**	**26,184**	**13,041**	**170,598**

Source: 1961 Agricultural Census. Trinidad and Tobago — estimated by district agricultural officers, Montserrat — contained in ODM (1967) *Report of the Tripartite Economic Survey Mission to the Eastern Caribbean 1966*. H.M.S.O., London

(a) 2,6125,000 lb. at an assumed yield of 5000 lb. per acre.

In converting that part of the census figures recorded as '000 holes to acres, the following conversions were used. Yams — 2,000 holes per acre; 'tannia, dasheen, eddo', sweet potato and cassava — 3,000 holes per acre; pigeon peas and corn — 5,000 holes per acre; other peas and beans — 14,000 holes per acre.

Present uncertainties due to Britain's proposed entry into the European common market may increase this figure in the future.

The major food crops grown in the Area, according to the 1961 Agricultural Census are, in order of priority, based on acreages, maize (corn), 'tannias, dasheen and eddoes', sweet potatoes, pigeon peas and other peas and beans, yams and cassava. Vegetables do not appear in the Census figures, for the acreages in most islands are small (Table 4).

Projected increases in the demand for food crops show that the increases are likely to be greatest for vegetables and pulses (Table 5).

Table 5. **Actual and Projcted Demand for Food Crops: The West Indies, 1958, 1965, 1970, 1975**

CROP	Actual Demand 1958	Projected Demand 1965	1970	1975	Projected % increase in demand 1958 to 1975
			('000 lb.)		(%)
Vegetables	162	208	243	278	72
Roots & starchy Vegetables	624,500	722,800	797,100	877,100	40
Corn & corn meal	53	63	74	84	60
Pulses	44	56	66	76	74

Source: Foreign Regional Analysis Division, USDA (n.d.) *Projected Levels of Demand, Supply, and Imports of Agricultural Products of Jamaica, Trinidad and Tobago, Leeward Islands, Windward Islands and Britisch Guiana to 1975.* Jerusalem

Estimates made at the same time indicated that local production was not likely to meet this demand and that imports would have to rise particularly for roots and starchy vegetables, although increases for all commodities were expected to be at a high level (Tables 6 and 7).

Table 6. **Actual and Projected Home Production of Food Crops: The West Indies, 1958, 1965, 1970, 1975**

CROP	Actual Production 1958	Projected Production 1965	1970	1975	Projected % increase in production 1958 to 1975
			('000 lb.)		(%)
Vegetable	147	167	194	215	46
Roots & starchy vegetables	576,400	610,000	615,100	620,100	8
Coru & corn meal	37	43	46	48	29
Pulses	23	22	22	22	—2

Source: As Table 5.

Table 7. **Actual and Projected Imports of Food Crops: The West Indies, 1958, 1965, 1970, 1975**

CROP	Actual Imports 1958	Projected Imports			Projected % increase in imports 1958 to 1975
		1965	1970	1975	
			('000 lb.)		(%)
Vegetables	17	43	51	65	278
Roots & starchy vegetables	51,400	112,700	182,000	257,000	403
Corn & Corn meal	46	55	67	79	49
Pulses	24	37	47	57	98

Source: As Table 5.

Again, changes in technology may alter some of these estimates.

An examination of these figures supports the reasons given earlier for the increasing interest in food crops and also identifies those crops which merit most attention. But before any rational judgements can be made about he production of food crops in the various territories there is a real need for basic information on the economics not only of production, but also of marketing and to the national effect of any changes in production.

Information is needed to answer the following types of question:

What are the cost and return per acre of the various crops?
What profit can farmer expect per acre?
What is the cost of production per pound, and how does this compare with the price of imports both from inside and outside the Area?
What is the effect of changes in price on production and consumption?
What is the cost of transport between the islands, and is this transport available?
This paper is particularly concerned with the production aspects.

Review of the Work on the Economics of Food Crop Production

A review of the work on the economics of food crop production reveals that there is very little information available and that the answers to these questions are not forthcoming. Moreover, farmers and the technical and extension officers of the Departments of Agriculture — the persons concerned with growing the crops—are unaware of the financial aspects of production. This lack of information (and even of interest) can be attributed, I feel, to the absence of qualified agricultural economists in the Area as well as to the small scale, scattered distribution, and subsistence nature of these crops, particularly when compared with the well organised production of the export crops.

It will perhaps be of interest to review briefly te work on the economics of food crop production that is known to be in progress (or recently completed) in the various territories. I must apologise for any studies which are left out, but this will help to illustrate the poor communications, even between interested bodies using the same language. There are two general methods in which information of this nature can be obtained:

(1) studying commercial practice either by survey or case study;

(2) costing a research or demonstration farm on which crops are grown using omproved practices.

If carried out together, the information from these two methods is complementary, and can aid in gaining a fuller understanding of the potential for improvements.

Trinidad

The Texaco Food Crop Demonstration Farm (a joint venture involving the Ministry of Agriculture, U.W.I. and Texaco (Trinidad) Inc.) has been in operation for three years. Work, including costs and returns of production, has been carried out on the root crops[1] (including Irish potatoes), pigeon peas[2] and corn[3] and to lesser extent on onions, tomatoes, peppers and corrots[4]. Developments in the mechanisation of various operations in the production process have been particularly interesting, although it is unfortunate that the full value of this work has been lost, due to the lack of comparable figures on tradditional practices. It has been demonstrated, however, that large scale mechanised production of food crops is teehnically feasible and is worthy of commercial consideration.

A survey of the Aranjuez vegetable growing area[5] (which is sitated adjacent to the TFCDF) has shown that, although output and gross margin per acre are generally very high[1], there is considerable scope for improving margins both by cost reduction and by increasing output. Work at the TFCDF is likely to prove more beneficial to the gardeners

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[1] Cropper, J. (1967) *The Prospects for the Commercial Production of Irish and Sweet Potatoes in Trinidad,* Depertment of Agricultural Economics and Farm Management, U.W.I., Trinidad

Haynes, P. H. (1966) 'Yams as a Commercial Proposition', *Texaco in Agriculture,* Caribbean Printers, Trinidad

Haynes, P. H. and Thomas, S. M. (1967) 'Irish Potatoes 1964—1966' *TFCDF Bulletin 2,* Caribbean Printers, Trinidad

[2] Cross, L. A. (1966) 'The Pigeon Pea Today', *Texaco in Agriculture,* Caribbean Printers, Trinidad

[3] Anon (1966) 'Corn Production in Trinidad and Tobago' ,*Texaco in Agriculture,* Caribbean Printers, Trinidad

Tai, E. A. and Thomas, S. M. (967) 'Maize 1964—1966', *TFCDF Bulletin* (in press)

[4] 'Costs of Production in Lettuce (2 varieties), Okra, Sweet Pepper, Tomato, Spring Onion, Carrot', TFCDF (1965) (mimeo.)

[5] MacMillan, A. A. (1967) *Aranjuez: the Development of a Market Gardening Area,* Ph. D. thesis, U.W.I., Trinidad (in preparation)

[1] Tomato — Gross output $790.00, variable costs (includc labour) $560.00
Gross margin $230.00
Cabbage — Gross output $970.00, variable costs (include labour) $700.00
Gros margin $270.00
These figures are the average for crops (dry and wet season) in 1966 when cropping intensity was 2.7 crops per year and a dry season survey showed that 60% of the cultivated acreage was in tomato and 18% in cabbage.

of Aranjuez as greater attention is devoted to vegetables, although benefit is already being gained from he work done on mechanisation — particularly irrigation. Crops of major importance about which information on cost and returns is available are tomato and cabbage; figures are also presented for cucumber, sweet pepper, cauliflower and patchoi.

A study[2] which will include information on similar crops as well as some ground provisions and plantain[3] is now starting in South Trinidad on a settlement scheme for redundant oil workers. Results are, not expected for some time, at least in any published form.

Jamaica

The Twickenham Park project (run by the Ministry of Agriculture) has been in operation for two years. It is similar in approach to the TFCDF but has concentrated on vegetable crops rather than ground provisions, particularly tomatoes, peppers, beans, onions and cabbage. No results are yet available. Comprehensive surveys have been carried out among commercial producers into the production characteristics of Irish potatoes[1].

Barbados

Since its establishment the Barbados Sugar Producers' Association (Agronomy Unit) has been concerned with the major ground provision crops grown on plantations — yams, sweet potatoes and corn — and is now becoming interested in Irish potatoes as an alternative[2]. Costing of crops in Barbados is simplified by the large scale of production and the practice of paying for all work on a task basis.

Windward and Leeward Islands

There is no record of any work on the economics of food crops production in these islands in recent years. However, under a grant from the Ford Foundation, the Department of Agricultural Economics at U.W.I. in Trinidad is cooperating with the Departments of Agriculture in studying the economics of production on 'pilot' farms.

Grenada

As the first stage in a programme to establish six 'Food Crop Farms' two have already been set up. These are two-acre holdings, which it is intended should support a family who work full time on the farm, producing mainly vegetables. The farms are provided with irrigation, and

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[2] James, L. J. (1967) 'Lot 10 — The Human Factor in Change from Oil Worker to Farmer', *Proceedings of the Second West Indian Agricultural Economics Conference* St. Augustine, Trinidad (in press)

[3] Present results indicate that output from plantains will be over $1,000 per ace per year.

[1] Johnson, I. E. (1967) 'Development of the Irish Potato Industry in Jamaica' *Proceedings of the Second West Indian Agricultural Economics Conference* St. Augustine, Trinidad (in press)

[2] Gooding, E. G. B. (1967) 'Root Crops in the Barbadian Economy', *Prroceedings of the Second West Indian Agricultural Economics Conference*, St. Augustine, Trinidad, (in press)

in the initial period, are being closely supervised by the officers of the Department of Agriculture. Early results would seem to indicate that the farms have a promising future if various administrative difficulties can be overcome. By demonstrating the potential of small farms to produce a satisfactory living for a family, it is hoped that there will be an increase in vegetable production in the island, and that vegetable will be available at lower prices than present producers are prepared to accept. This increase should help to meet the growing demand for vegetables from the local population and from the tourist industry.

Antigua

In an island well known for its recurrent water shortages, the Department of Agricultural has a ten-acre, fully irrigated pilot farm, producing vegetables. The objective of this seemingly irrational scheme is to demonstrate the effective and profitable use of water for agricultural purpose, and to show the very high returns that can be obtained per acre[1]. The farm has been in operation for several years, but although individual crop cost and return records were kept for a short time, they have since been discontinued; consequently much of the value of the project has been lost, for the Department is now no more able to recommend the use of irrigation in vegetable production than it was at the inception of the scheme, It is hoped that recording of unirrigated food crop and vegetable production will also soon be started, which will provide a useful comparison with the information now being gathered about the irrigated crops.

St. Lucia

The Department of Agriculture is concerned about the dominance of bananas in the island (now over 70% of total exports) and is now looking for other crops, including food crops for local consumption. Agronomic experiments in the regions of higher altitude have shown that Irish potatoes can be grown successfully. In contrast to Antigua, costing work has probably been started too soon in this case, for the co-operating farmers have minimal experience in growing the crop, and the results must not therefore be regarded as representative of the potential of St. Lucia in the production of this crop.

This brief review of the work on the economics of food crop production in the Area shows not only that there is a shortage of information, but also that more attention is being given to vegetables than to ground provisions. In view of the figures presented earlier this emphasis would not seem to be justifiable, for ground provisions occupy the majority of the land under food crops and the projected increase in imports is greater for 'roots and starchy vegetables' than for vegetables and also relates to much larger quantity.

Value of Work on Economics of Food Crop Production

With the growing volume of work on the economics of production, it

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[1] In the first year of commercial operation, gross output was $14,000 ($1,400 per acre) and in the current year is confidently expected to exceed $20,000. These figures compare favourably with those quoted ealier for the Aranjuez area in Trinidad which has been established for a much longer period, although in Antigua professional technical advice is readily available.

will eventually be possible to make comparison between islands in the production efficiency of various crops. If it can be shown that an island has a comparative advantage in the production of a particular crop and that production costs are considerably lower it would be worthwhile to consider a trading agreement with the other territories in the Area, similar to the Guyana Rice Agreements. Agreements of this nature to promote intra-Caribbean trade[1] are desirable from the consumers point of view fo they should result in reduced costs of production and therefore in lower prices. At the farm level, specialisation (the result of expanded and rationalised production in an individual island, arising from a trade agreement), would cause a reduction in unit costs, and increased output and profit per acre. In view of this Societies objective in fostering greater intra-Caribbean trade and cooperation, this aspect of the work should be of particular inerest, and I would like to comment the Society for it efforts to act as a 'clearing house' for this type of information..

Inter-island comparisons are, of course, not the only reason for collecting information on costs and returns. For the farmer, information of this type about several crops can aid in rational selection of crops on the basis of profitability, and can also lead to improvements in the production efficiency of individual crops. Extension officers who have this information are more able to carry out their duties in advising farmers, rather than by just recommending the adoption of new practices the financial benefits of which are rarely known.

In furtherance of policy of imports substitution it is necessary that Government should know the costs of production and yield of the various crops. It can be determined whether a crop can be produced at a lower cost than the import price or whether it is necessary that farmers be subsidised in order to prevent a rise in price of the product on the home market.

The fear is often expressed by farmers quite apart from worries about tax labililty that Government will use the cost and return figures to regulate farmers' prices and so reduce profits. While this may be true in some cases, it is also possible that information will lead to the establishment of realistic and higher price for the farmers' crops. At the same time the farmer has the opportunity to improve the general efficiency of his farm business and of individual enterprises, by using the information contained in the records.

This paper has briefly reviewed the current work on the economics of crop poduction in the Area, and has outlined some of the advantages to be gained from work of this nature. Although the volume of work would appear to be increasing, too much emphasis is being placed on the vegetable crops rather than on the traditional and more important food crops, such as yams, sweet potatoes, pulses and corn. It is hoped that future programmes will take note of this and attempt to remedy the deficiency.

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[1] See Beeford, G. L. and Guscott, M. H. (1967) 'Intra-Caribbean Agricultural Trade', *Studies in Regional Economic Integration*, Vol. 2, No. 2, ISER, Jamaica