

PROMOTING THE JAMAICAN BREADFRUIT



Prepared by: Ministry of Industry, Commerce, Agriculture and Fisheries,

Agricultural Services Unit

Hope Gardens, Kingston 6

Telephone: (876)927-1731-50

Fax: (876) 929-1792

Email: marketing@moa.gov.jm

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Crop Profile

The breadfruit (*Artocarpus altilis*) belongs to the moraceae family. There are three new cultivars that have been introduced in Jamaica; these are the Ma'afala, Otea and the Puaa. All three cultivars are seedless, shown in appendix I, II and III. Jamaicans distinguish the breadfruit types by their inner flesh colouration which is mainly yellow or white. The breadfruit with the yellow inner flesh, commonly called "yellow heart" is preferred in the market because of the sweet taste of its inner flesh. The fruit is an excellent source of carbohydrate and is also a major staple in Jamaica, especially for the rural population. Breadfruit consumption is at its highest during the peak seasons (July to October and December to February). Breadfruit is also important in the agro processing and export industries. Breadfruit is easy to grow, effortless to maintain and a possible solution to combat world hunger. The fruit tree takes approximately three years to mature.

Breadfruit Products:

- **Canned:** Breadfruit Chunks are prepared for the external market
- **Chips:** Breadfruit chips are popular in the local market and external markets
- **Gluten-Free (GF) Flour:** Breadfruit can be processed into gluten-free flour, far superior in taste, nutrition and structure to any other GF flour alternative.
- **Methods of Preparation:** Breadfruit is gluten-free and can be consumed at all stages of development: ripe as a fruit or mature as a vegetable- where it can replace conventional starches (Think of it as a tropical potato). As the fruit ripens, the starches convert to sugars and the flesh softens to a custard-like consistency. Aside from being eaten raw, breadfruit can be baked, boiled, candied, fried, pickled, roasted and steamed. The fruit can be shredded, dried for storage or easily processed into gluten-free flour.

WHY INVEST IN BREADFRUIT?

Great income earner: both locally and abroad

Demand: high in demand

Multipurpose: Not only a substantial food source, the breadfruit tree also provides a multitude of other advantageous uses.

Insect Repellent: In addition to being a safer alternative to DEET, the male breadfruit flower is highly effective at repelling mosquitoes and other insects.

Latex: The sap excreted from the breadfruit can be used as a waterproof caulking for watercrafts and homes, as well as chewing gum.

Animal Feed: Fallen fruits, as well as the leaves of the tree, can be used as nutritious animal feed.

Breadfruit health benefits

Many persons have become more health conscious and are indulging in a more healthy dietary intake in order to expand life expectancy, for this reason, the nutritional properties of breadfruit have attracted many consumers. Breadfruit is low in saturated fat, cholesterol and sodium and is high in vitamin C; it is also a good substitute for bread. The trading of breadfruit has been a thriving business both in the local and external markets. Below are some of its health benefits:

- Breadfruit helps persons who suffer with Celiac Disease because it has no gluten. It also has a small amount of flavonoid anti-oxidants in the form of Xanthine and Lutein which are Phyto-nutrients that improve eyesight. Yellow varieties have more of these compounds.
- Breadfruit nutritional properties shows that it is high in carbohydrates and a good source of antioxidants, calcium, carotenoids, copper, dietary fiber, energy, iron, magnesium, niacin, phosphorus, potassium, protein, thiamine, vitamin A and vitamin C.
- Breadfruit is a rich source of energy
- Breadfruit protects the body against heart disease and heart attacks. Breadfruit contains a significantly high amount of fiber. According to the American Heart Association fiber decreases bad cholesterol and triglycerides, which increases intake of fiber lowers LDL (bad) cholesterol levels in the body while elevating HDL (good) cholesterol level in the body. Therefore breadfruit protects the body against heart disease and heart attacks.
- Research shows that the fiber can control diabetes by reducing the absorption of glucose from the food we eat.
- Another health benefit of breadfruit is the support it provides to the proper functioning of our intestines and bowels. Fiber regulates bowel movements and clears out the build-up of waste from our intestines; eating breadfruit on a regular basis can reduce the risk of developing colon cancer.

PRODUCTION

In 2017 an estimated 24,198,040 kg (24,198Mt) of breadfruit was produced locally. Approximately 1000 hectares of unorganized breadfruit cultivation island-wide produced 23,581,000 kg (23,581Mt) of fruit annually, while trees grown from orchard produced approximately 617,040 kg (617MT) or 2.55% of total production. It is estimated that 40% of production was lost due to inappropriate reaping methods and improper post-harvest handling. Consequently the marketable yield was about 14,518,824 kg (14,519Mt). Over the five (5) year period 2013 to 2017, an average of 6.15% of the total marketable yield of production of breadfruit was exported whilst an average of 93.85 % was consumed locally.

Table 1

Estimated Annual Breadfruit Production (kg) for the Period 2013 to 2017

Year	Production (kg) Orchard	Production (kg) Unorganized Trees	Total (kg)	Total Marketable Yield (kg)	Exports	% Exports (Kg)	Assumed Local Consumption (ALC)	% ALC
2013	617,040	23,581,000	24,198,040	14,518,824	655,904	4.52	13,862,920	95.48
2014	617,040	23,581,000	24,198,040	14,518,824	845,297	5.82	13,673,527	94.18
2015	617,040	23,581,000	24,198,040	14,518,825	729,899	5.03	13,788,927	94.97
2016	617,040	23,581,000	24,198,040	14,518,826	974,937	6.71	13,543,889	93.29
2017	617,040	23,581,000	24,198,040	14,518,827	1,258,269	8.67	13,260,558	91.33
Total	3,085,200	117,905,000	120,990,200	72,594,126	4,464,306	30.75	68,129,820	
Average %						6.15		93.85

Source: Ministry of Industry ,Commerce, Agriculture and Fisheries, Fruit Tree Crop Project -Orchard Production

N. B. - Production data is not captured on an annual basis. Estimates are based on number of trees.

Supply Availability

Breadfruit trees are grown island-wide. However, the major producing parishes are St. Thomas, Portland, St. James, Westmoreland, St. Mary, Hanover and St. Catherine. In Jamaica, breadfruit is available all year round, but the peak bearing season occurs between August and November. The cost of production for one hectare, planting distance and yield over a ten year period is shown in appendix 1V.

Target Markets

Local fresh/agro processing market segment represents 93.85% of consumption

The local market outlets are parochial markets, restaurants, hotels, supermarkets and the agro processing sector.

In 2017, 1,258,269 kg (1,258Mt) of the fruit was exported by approximately 20 exporters while only two agro processors were recorded.

Table 1B

Export Value (US\$) By Destination Over a Five Year Period from 2013 to 2017

Destination	2013	2014	2015	2016	2017	Total	% Export
USA	696,726	579,497	612,284	1,054,077	1,257,954	4,200,538	70.42
UK	107,683	155,968	91,879	62,603	105,505	523,638	8.78
Canada	149,350	216,022	203,962	309,652	347,332	1,226,318	20.56
Others	1,904	1,085	8,134	2,446	761	14,330	0.24
Total	955,663	952,572	916,259	1,428,778	1,711,552	5,964,824	100.00
Source : Statistical Institute of Jamaica							

Table 1C

Export Quantity (Kg) By Destination over a Five Year Period from 2013 to 2017

Destination	2013	2014	2015	2016	2017	Total	% Export
USA	461,996	529,752	421,921	762,565	836,200	3,012,434	67.48
UK	72,260	131,439	87,860	54,061	91,510	437,130	9.79
Canada	119,974	183,813	216,054	155,755	329,401	1,004,997	22.51
Others	1,674	293	4,064	2,556	1,158	9,745	0.22
Total	655,904	845,297	729,899	974,937	1,258,269	4,464,306	100.00
Source: Statistical Institute of Jamaica							

Over the five year review period, 2013 to 2017 export quantity and value grew by 91.84% and 79.10% respectively . The main export destinations were the United States of America (67.48%), Canada (22.51%), the United Kingdom (9.79%) and other countries (0.22%).

Table 2

SUMMARY OF INVESTMENT COSTS AND EXPECTED RETURNS FOR A 1Ha BREADFRUIT ORCHARD										
ITEM	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10 - 20
TOTAL LABOUR COST	71,520.00	21,000.00	40,679.93	47,133.43	51,269.89	62,075.15	70,028.66	83,988.91	88,575.47	95,044.17
TOTAL MATERIAL COST	63,300.00	30,400.00	32,500.00	37,600.00	48,900.00	48,000.00	52,100.00	56,200.00	60,300.00	60,300.00
TOTAL EQUIPMENT COST	205,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL COSTS	339,820.00	51,400.00	73,179.93	84,733.43	100,169.89	110,075.15	122,128.66	140,188.91	148,875.47	155,344.17
GROSS REVENUE	0.00	0.00	992,636.57	1,290,404.81	1,488,954.85	1,935,607.21	2,233,375.45	2,903,467.64	3,039,622.74	3,350,120.00
NET INCOME	-339,820.00	-51,400.00	919,456.64	1,205,671.37	1,388,784.96	1,825,532.06	2,111,246.80	2,763,278.73	2,890,747.27	3,194,775.84
Assumptions										
Total Estimated Yield over 20 years (kg)	130,562									
Average Cost of Production (\$/kg)	\$11.39									
Estimated Farm gate Price (\$/kg)	\$132									
**Transportation Charges are not included due to the extreme variability of this factor, however it is important to note that it can significantly impact the COP										

Source: The Ministry of Industry, Commerce, Agriculture and Fisheries Economic Planning Division - October 27, 2017

Profitability

Based on the costing information showed in **table 2**, the average cost of production and farmgate price in 2017 were \$11.39/kg and \$132.00 /kg respectively. Therefore, in 2017 the cost of production – farmgate margin was approximately 1,058.91%.

Table 3

Farmgate – Retail margin , 2017

Year	Price (\$/kg)		% difference Between Farmgate - Retail
	Farmgate	Retail	
2017	132.00	176.00	33.33

Ministry of Agriculture ,RADA

Also, in 2017, farmgate-retail margin was 33.33% as shown in table 3. Hence it was extremely profitable to produce and sell breadfruits at the farmgate and retail market outlets,

EXTERNAL MARKETS

Major Exporting Countries: Hawaii, Africa, Jamaica and the Dominica Republic,

Major Importing Countries: United States, Canada and United Kingdom

Global Trade

As the world's population heads toward a projected 9.6 billion by 2050, producing enough healthy food in a sustainable manner will be a challenge. Breadfruit is one of the crops identified to assist in feeding the economies around the world. Breadfruit continues to be an important staple crop and a central part of traditional Pacific Agroforestry systems. Breadfruit is cultivated on most Pacific islands as a home garden or subsistence crop. It is also sold in local markets either as a fresh fruit or processed into chips.

Based on the unorganized nature of the breadfruit market, there has been no information on the size of the market globally; hence the global market production figures, size and value were not accessible. Commercialization of breadfruit on an industrial scale for export has yet to occur anywhere in the world.

Recently, 'Gluten free' has become one of the latest health food buzz words, the discovery that breadfruit is gluten free, will open a window of opportunity for a fruit most of the world knows little about.

The Ulu Summit sponsored by the American Samoa Department of Agriculture in conjunction with the A.S. Dept. of Commerce, the University of Hawaii Pacific Business Center Program and the U.S. Economic Development Agency (EDA) National University Center was designed to introduce breadfruit to the world market in the year 2012.

Breadfruit has been dehydrated and processed successfully into flour in Samoa, Philippines and Jamaica. However, efforts to expand the processing to a sufficiently industrialized scale for the introduction of breadfruit flour in the U.S. market, as a gluten free food product has not been tried.

The few countries developing breadfruit flour in the Pacific have yet to connect with a major distribution network in the U.S.

- See more at: <http://samoanews.com/?q=node/69274#sthash.Aapdp8V2.dpuf>

General Procedures for Exportation of Agricultural Produce

1. Obtain packing house requirements from the Plant Quarantine main office.
2. Make an appointment for the inspection of the packing house by a Plant Quarantine Inspector.
3. If the packing house is approved, the following must be provided:
 - Name and address of the company
 - Location of packing house
 - Name, address and telephone number of the contact person
4. If packing house is approved, the Chief Plant Quarantine Officer will prepare a letter to the Export Certification Officer, JAMPRO, requesting that they proceed with the certification process.
5. All produce for export must be prepared and packed in an approved packing house.
6. All produce must be appropriately packed in new, clean, properly labelled bags or boxes.
7. Labelling on packages must coincide with the information on the export documents.
8. A Plant Quarantine/ Produce Inspector must inspect all shipments.
9. Appointments for inspection must be made 24 hours in advance before the shipment is brought to the export complex or before the time when the inspector is to inspect the shipment at the packing house.

Contact the Ministry of Agriculture and Fisheries

Plant Quarantine main office

(876) 977-0637, 977-6992, 977-6401

Export Complex- Kingston

(876) 924-8906, 924-8736 924-8742

Export Complex- Montego Bay

(876) 940-9146, 940-5661

For further information, visit the MOAF website

<http://www.moa.gov.jm/PlantHealth/index.php>

Sanitary and Phytosanitary Export Requirements per Target Market

Breadfruit is one (1) of the Fifty-two (52) produce on the USDA Pre-Clearance Programme. This Pre- Clearance Programme is a collaboration between the USDA/APHIS International Services and the Government of Jamaica. To export produce to the **United States** that are under this programme, the following steps must be followed:

1. Ensure that the consignee is a registered company and has an import licence.
2. Register with the FDA
https://epermits.aphis.usda.gov/manuel/index.cfm?action=cirReportP&PERMITTED_ID-7658
3. Make booking with airline to ascertain cargo space- for e.g. Airline allotted 1000kg
4. Start the preparation of the breadfruit via the packing house for the 1000 ≤ allotment figure.
5. Call USDA and Plant Quarantine Division to make an appointment for inspection within 24 hours of produce departure. Inspection is done at the export facility at the airport (one in Kingston and another in Montego Bay). One stop facility which houses Plant Quarantine Inspection Services, USAD Inspection Services and Jamaica Customs.
6. Register with customs ASYCUDA System- Upload the quantity to be exported along with additional information as stated on the form.
7. Complete a commercial invoice at JAMPRO
8. Breadfruit is transported by air freight, therefore you take the produce at the Export Complex – Pay for the pre-clearance for the breadfruit
9. USDA and Plant Quarantine Inspectors inspect the produce, if it is approved, you will be certified by both groups of inspectors, a fee is paid for the pre-clearance
10. Collect tally sheet and dispatch forms from the airline.
11. Customs will stamp documents along with the required fee needed for the exportation
12. Proceed to the airline

Status - Standards being presently met- exports active

For further information, visit the MOAF website

<http://www.moa.gov.jm/PlantHealth/index.php>

United Kingdom

There is no permit requirement to export to the United Kingdom but you must be a registered exporter not only by the Ministry of Agriculture and Fisheries but also with Jamaica Promotion Corporation (JAMPRO).

Status- Standards being presently met- exports active

Canada

There is no permit requirement to export to Canada, but you must be a registered exporter not only by the Ministry of Agriculture and Fisheries but also with Jamaica Promotion Corporation (JAMPRO).

Status- Standards being presently met- exports active

Storage

Climate is an important factor for the location of the storage facility. Altitude reduces temperature by 10°C for every 1,000 meters of elevation. It also increases overall efficiency of the refrigeration equipment by facilitating heat exchange with ambient temperature, thereby reducing energy costs. Shading particularly of loading and unloading areas reduces differences between field and storage temperatures.

Recommended temperature and relative humidity for breadfruit and the approximate storage life under this condition is depicted in table 3A

Table 3A

CROP	TEMPERATURE (°C)	RELATIVE HUMIDITY (%)	STORAGE LIFE (days)
Breadfruit	13-15	85-90	14-42

Appendices

Appendix I



Ma'afala

Geographic Origin: Samoa

Fruiting Season: July–December, some off-season fruiting in January–May

Appendix II



Otea

Geographic Origin: French Polynesia

Fruiting Season: July–February, some fruiting may be observed in May

Appendix III



Puaa

Geographic Origin: French Polynesia

Fruiting Season: September–November

Puaa variety description

Fruit

Shape: Oval to heart-shaped

Skin Texture: Rough, irregularly raised, flattened

Weight (kg): 1.0–3.1

Average Weight (kg): 1.7

Length (cm): 12–22

Width (cm): 12–17

Average Size (cm): 17 x 14

Core size (cm): 10 x 4

Seeds: Seedless

The pale-yellow flesh is solid and dense, possessing a firm, yet tender, texture when cooked. It is best steamed, baked or boiled.

For additional commodity information and images, visit <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?4319>

Appendix IV

Cost of Production Estimates for a One Hectare Breadfruit Farm										
Item	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10
Labour Operations:										
Land preparation	35000									
Head trenches/maint.	7500	3000	3000	3000	3000	3000	3000	3000	3000	3000
Line & peg	6000									
Dig holes	3520									
Apply manure	2500	2500								
Head & drop plants	1500									
Plant & stake	1500									
Apply fertilizer	3000	4500	4500	4500	4500	4500	4500	4500	4500	4500
Supply seedlings	1500									
Apply herbicide	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Apply slugbait	1500	1500	1500							
Apply pesticides	1500	3000	4500	4500	4500	6000	6000	6000	6000	6000
Prune plants	3500	3500	3500	5250	5250	5250	7000	7000	8750	8750
Harvest produce			20680	26883	31020	40325	46529	60489	63325	69794
Sub - total	71520	21000	40679.9285	47133.4335	51269.89275	62075.15025	70028.65525	83988.90925	88575.47375	95044.16675
Material Inputs:-										
Pegs	1000									
Seedlings	36000									
N.P.K fertilizer	4100	8200	12300	16400	20500	24600	28700	32800	36900	36900
Manure	2000	2000								
Slugbait	5000	5000	5000	5000	5000					
Fungicide	7200	7200	7200	7200	14400	14400	14400	14400	14400	14400
Insecticide	8000	8000	8000	9000	9000	9000	9000	9000	9000	9000
Sub - total	63300	30400	32500	37600	48900	48000	52100	56200	60300	60300
Equipment:-										
Mist Blower & knap sack sprayer	95,000									
Irrigation Equipment	110,000									
Sub - total	205000									
Other Costs:										
Contingencies	13482	5140	7318	8473	10017	11008	12213	14019	14888	15534
Tools	3165	1520	1625	1880	2445	2400	2605	2810	3015	3015
Land Charges	6175	6175	6175	6175	6175	6175	6175	6175	6175	6175
Supervision	20223	7710	10977	12710	15025	16511	18319	21028	22331	23302
Sub - total	43045	20545	26095	29238	33662	36094	39312	44032	46409	48026
TOTAL	177865	71945	99275	113972	133832	146169	161441	184221	195284	203370
Estimated Output (kg/ha)	0	0	7520	9776	11280	14664	16920	21996	23027	25380
Estimated Farmgate Price (J\$/ kg)	132	132	132	132	132	132	132	132	132	132
Estimated Gross Revenue	0	0	992636.568	1290404.808	1488954.852	1935607.212	2233375.452	2903467.644	3039622.74	3350120.004
Estimated Net Income	-177865	-71945	893362	1176433	1355122	1789438	2071935	2719247	2844338	3146750
Assumptions										
Total Yield (kg) over 10 years	130,562		1. Land is mechanically Prepared							
Average COP Estimates (J\$/kg)	\$11.39		2. No yield is obtained until year 3							
Planting Distance	35' x 35'	10.67m x 10.67m								

Appendix V

Breadfruit Exporters

Company	Contact Name	Address	Telephone
1. Agriventures Jamaica Ltd.	Mr. Novell Quest	188 Spanish Town Road Kingston 11	(876)923-8462
2. Balfour Williams	Mr. Balfour Williams	Bushy Park P.O. St. Catherine	(876)445-7735
3. Bay Farms Jamaica Ltd.	Mr. Basil Senior		(876)909-0130
4. Belle Tropicals Ltd.	Ms. Idelle Brown	Unit# 1, Ballater Commercial Complex, 19 - 21 Ballater Ave.	(876)383-8870
5. Campbell's Green Inc.	Mr. Rupert Campbell	Top York Seaforth, St. Thomas	(876)856-7472
6. First Choice Export	Ms Thomas	188 Spanish Town Road Kingston 11	(876)438-6927
7. Marketing Development	Mrs. Rita Symes- Hilton	188 Spanish Town Road Kingston 11	(876)923-7050
8. Island Fresh Limited	Ms Simon Brown/ Annette Kennedy	188 Spanish Town Road Kingston 11	(876)758-3971/371-1150
9. PLG Import Export	Ms. Patsy Duncan	188 Spanish Town Road Kingston 11	(876)923-0775/937-6430
10. Victel Fresh Produce	Mr. Everette Telfar	Knightsville Yallahs, St. Thomas	(876)982-5165/858-4758
11. Wah Gwaan Foods	Ms. Sterling	2 Horatio Close, Kingston 19	(876)859-1277
12. Oswald Martin	Mr. Oswald Martin	Duncans P.O. Trelawny	(876)895-1273
13. Sunland Distributors		35 Lyndhurst Road, Kingston 10	(876)909-4470
14. S & S Export	Mr. Samuel Johnson	Richmond, Spauldings, Manchester	(876)471-2468/964-5149
15. Jamaica Farm Export	Mr. Staples	188 Spanish Town Road Kingston 11	(876)796-3150
16. Newton Wallace	Mr. Newton Wallace	Port Sea District, St. Elizabeth	(876)295-5203
17. Linky Fresh Food	Mr. Lincoln Nicholin	188 Spanish Town Road Kingston 11	
18. Cleveland Edwards	Mr. Cleveland Edward	188 Spanish Town Road Kingston 11	(876)758-8584
19. Silver Del Farms		Buff Bay, Portland	(876)810-5421
20. ABM Investment Ltd.	Mr. Anthony Mcleigsh	15 Lancaster Road, Kingston	(876)9080140

Source: Ministry of Agriculture & Fisheries, Plant Quarantine Produce Inspection

Appendix VI

Breadfruit Agro Processors

Company	Contact Name	Address	Telephone/Fax/Email
1. Tijule Company Ltd.	Mr. Newell	30 Paisley Avenue, Palmer's Cross, May Pen, Clarendon	Tel: (876) 986-4873 Fax: (876) 986-9680 Tijule01@yahoo.com
2. Stanmark Processors	Mr. Canute Sadler	South Haven, Yallahs, St. Thomas	Tel: 706-3344 Fax : (876) 982-5981 stanmarkprocessors@yahoo.com

Reference

Statistical Institute of Jamaica (STATIN) Export data for the period 2013-2017

Ministry of Industry, Commerce, Agriculture and Fisheries (MICAFA)..... Agricultural Marketing Information Division provided Farmgate, production data and crop area reaped

MICAFA – Economic and Planning Division ... Cost of Production data

Global trade..... <http://samoanews.com/?q=node/69274#sthash.Aapdp8V2.dpuf>

Sanitary and Phytosanitary Export Requirements per Target Market.....<http://www.moa.gov.jm/PlantHealth/index.php>