

Folk Nomenclature and Traditional knowledge of breadfruit [*Artocarpus altilis* (Parkinson) Fosberg] Diversity in the Caribbean

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Abstract

Since its introduction in the Caribbean islands in 1793, breadfruit has had a diverse history in the region, and there is a considerable repository of traditional, yet undocumented knowledge of the crop, among residents of the region. Consequently, it remains underutilized as a food source, despite recognition of its potential to contribute to food and nutrition security. Understanding the folk taxonomy and traditional knowledge associated with its diversity and utilization is a prerequisite to develop programs for its commercial production and utilization. This study was conducted among 170 respondents, who were selected across the Caribbean by using a combination of simple random and snowball sampling techniques to collect and document information on the ethnobotany and traditional knowledge associated with breadfruit biodiversity, including systems of naming, identification and classification of breadfruit cultivars or types. Breadfruit has a high socio-cultural value and is produced for both home use and sale by most respondents (68%). The genetic diversity of breadfruit managed by the respondents is also important as a total of 51 vernacular names were uncovered with nine of those names recorded for the first time in this study. Breadfruit types were identified by morphology and agronomic characteristics, with other important traits relating to use and cooking quality. Classification of breadfruit cultivars or types was based on eating - quality, most suitable methods of preparation and ease of cooking. The ethnobotanical and traditional knowledge obtained from this study may be useful in assessing the genetic diversity of breadfruit and guiding future community-based conservation and classification studies of this important crop resource in the Caribbean. This is crucial to support the commercialization of breadfruit to improve its contribution to food and nutrition security.

Introduction

Breadfruit [*Artocarpus altilis* Parkinson (Fosberg)] was domesticated in Oceania but is now widely distributed throughout the tropics (Zerega, Ragone, and Motley 2004). In 1793, the British sea captain William Bligh successfully transported 682 breadfruit plants along with other plants of economic importance from Tahiti and Timor to the Caribbean islands (Bligh 1976). French voyagers also collected one seedless breadfruit in Tonga, which was distributed to French colonies throughout the Caribbean islands in the 1790s (Leakey 1977). The introduction of breadfruit was envisaged to help reduce food shortages which severely affected the region and breadfruit was considered the ideal crop based on earlier reports by European explorers in the Pacific, who saw it as easy to produce and reliable source of food in the Pacific islands (Leakey and Roberts-Nkrumah 2016; Powell 1977).

The breadfruit plants introduced by Bligh were delivered directly to St. Vincent and Jamaica from which planting materials were subsequently distributed to other countries of the British West Indies (Roberts-Nkrumah 2007). However, planting was mainly done on marginal lands to avoid competition with sugar cane, which was the main economic crop throughout the region (Powell 1977). Furthermore, breadfruit was not immediately favoured for human consumption by the local population and only periodically became a major source of food after emancipation in 1834 (Roberts-Nkrumah 2007). Since then, while the crop has played important roles in food security and livelihood for many householders, especially, in

rural communities, it has remained underutilized in the wider community. Hence, its full commercial potential has not been fully developed or realised in the Caribbean (Roberts-Nkrumah 2018).

Although, several breadfruit germplasm introduced in the 1980 and 1990s to the Caribbean islands have been clearly identified and characterized, the diversity of the original germplasm widely distributed throughout the Caribbean remain mostly unknown (Roberts-Nkrumah 2018). Those varieties introduced in 1793 were not fully identified, although Bligh reported that he had five seedless types from Tahiti, and two from Timor (one seedless and one seeded type) (Bligh 1976). Though, in an earlier ill-fated voyage in 1789, Bligh recorded the names of eight cultivars: 'Appeere' 'Awanna', 'Eroroo', 'Mire', 'Oree', 'Patteah' and 'Rowdeeah' (Bligh 1792). Both sets of plants were collected from the same source, and it is likely that materials introduced in 1793 were from among the same eight cultivars recorded in that first voyage (Bligh 1976; Leakey and Roberts-Nkrumah 2016). In the St. Vincent Botanic Garden, where some of the plants introduced by Bligh were planted, the garden curator described six seedless breadfruit varieties, which were distinct in seasonality, fruit size and shape (Guilding, 1825). Leakey (1977) reported five seedless varieties of breadfruit found in St. Vincent followed later by Andrews and Mason (1991) who described seven breadfruit types, while Roberts-Nkrumah (1997) reported 25 cultivar names in a survey of the island. In Jamaica, where almost half of the original plants, brought to the region, were delivered (Bligh, 1976), Weir et al. (1983) recorded four cultivars while Webster (2006) also described four cultivars but with some differences in cultivar names, while Roberts-Nkrumah (2008) reported eight cultivar names. Andrews and Mason (1991) also reported four named cultivars in Grenada, and three each in St Lucia and Dominica.

Preservation and transmission of traditional knowledge of breadfruit biodiversity, production, utilization and conservation have been recognized as essential for the promotion of breadfruit for food and nutrition security in the Caribbean islands (Roberts-Nkrumah and Legall 2013). Limited documentation of this traditional or localized knowledge, which often relies on oral transmission from one generation to the next, may likely contribute to the underutilization of the crop in the region. In the Pacific, traditional knowledge was deemed the most valuable tool for cultivar identification of breadfruit and the disappearance of many cultivars was related to the inter-generational loss of this knowledge (Ragone and Wiseman 2007). Furthermore, by understanding traditional knowledge associated with breadfruit, researchers in the Republic of Marshall Island (RMI) discovered that two local cultivars were neglected and were threatened by extinction because they bore smaller sized fruits and were not as prolific as other cultivars (Englberger et al. 2014). As food supply and consumption become more globalized, knowledge accumulated over millennia for underutilized crops like breadfruit could disappear in a few generations, even in very remote areas, if it is not documented (Ragone et al. 2004; Lee et al. 2001). Documentation of traditional knowledge and how it can be used to enhance breadfruit production, utilization and conservation is still needed in the Caribbean. Consequently, the objectives of this study are to present information on folk nomenclature and traditional knowledge associated with breadfruit diversity and to investigate systems of naming, identifying, and classifying breadfruit cultivars or types in the Caribbean islands.

Methods

Area of study

The Caribbean is located southeast of North America, east of Central America and northwest of South America and consists of most islands of the Lesser and Greater Antilles including mainland territories wholly or partially washed by the Caribbean Sea. The present survey was conducted in four islands, namely Jamaica in the Greater Antilles and St. Vincent and the Grenadines, St. Kitts and Nevis, and Trinidad and Tobago in the Lesser Antilles (Fig 1). For St. Vincent and the Grenadines, the survey was conducted only on the main island of St. Vincent and not in the Grenadines islands. Trinidad and Tobago were treated as two separate islands, while data from St. Kitts and Nevis were combined because of the small sample size from both islands. These countries were selected based on historical association with breadfruit importation to the Caribbean and documentation of breadfruit promotion activities. They also represent different sub-regions within the wider Caribbean.

Data Collection

Ethnobotanical surveys were conducted between 2012 and 2015, among 170 key respondents (Fig. 1). Two combined methodologies were used to acquire and verify local knowledge of breadfruit. Therefore, respondents were acquired by targeted selection of knowledgeable individuals and random snowball sampling. Literature reviews and discussions with key informants were done to provide the background context of breadfruit diversity and status of breadfruit in the region. Knowledgeable individuals included employees of relevant Government authorities viz. the Ministries and Departments of agriculture, regional breadfruit researchers and propagators, and farmers involved in previous breadfruit surveys across the Caribbean (Roberts-Nkrumah 1997; Roberts-Nkrumah and Legall 2013). Selection of key informants was done deliberately (Tongco 2007; Mugisha et al. 2014) based on their knowledge of breadfruit diversity and distribution in each of their respective countries. Subsequently, respondents were selected using a combination of simple random and snowball sampling techniques based on information from these key informants (Espinosa, Bieski, and Martins 2012; Salganik and Heckathorn 2004). Therefore, interviews were conducted only with respondents who understood the aim of the study and gave their consent.

Respondents were interviewed in person using a structured questionnaire designed by the researchers and was pre-tested in Trinidad. Generally, respondents were asked about their knowledge of the local names used for breadfruit, naming of and description of cultivars or types, their local use, agro-industrial applications if any, and consumption patterns.

Data Analysis

Descriptive and inferential statistical data analysis were carried out using IBM SPSS Version 21 (IBM Corporation 2012). Descriptive statistical methods included frequencies, percentages, and means. Inferential statistical methods included Chi-square of association.

Results

Demographics of respondents

Table 1 provides a summary of the number and demographics of respondents in the survey. One hundred and seventy respondents were interviewed throughout the study. Respondents from Jamaica and Trinidad comprised a majority of the respondents (26% and 23.5%, respectively). Most of the interviewees were males (57.6%). In the main, respondents were from rural areas (54.1%) when compared to those from semi-urban (31%) and urban (14.7%) areas.

Breadfruit Production Systems in the Caribbean

Based on respondents' responses in this survey, breadfruit production in the Caribbean occurs in four types of production systems. These are border plantings, home gardens, mixed cropping and pure stands or commercial settings. Border plantings characterized as single or scattered trees planted along the boundaries of farms (35%) and trees in home gardens (33.5%) represented the two more common systems of production. This was followed by mixed farming with other perennial or annual crops (29.4%) (Fig. 2). Pure-stand breadfruit orchards though rare (1.8%) was observed in two locations in Jamaica and one in Trinidad. There were no significant association ($\chi^2 = 16.03$, $df = 12$, $p=0.190$) in the distribution of production systems among islands.

Breadfruit cultivation for food, gift-giving or individual household sales were important in the region. Respondents cultivated breadfruit in their home gardens or farms for family/personal use (home) or gift only (20%), for sale only (12.4%) or both home use or gift and sale (67.6%) (Fig. 3). While, household use and individual sales were the most frequent activity surrounding the reason for cultivation, this did not differ significantly ($\chi^2 = 6.26$, $df = 8$, $p=0.0618$) among the four islands.

Breadfruit diversity and descriptive vernacular names used in the Caribbean

In the present study, 38 vernacular names of breadfruit were reported by respondents among the countries surveyed. The largest number of cultivar names were recorded in St. Vincent (23) followed by Jamaica (15), Tobago (4), Trinidad (2) and St. Kitts and Nevis (2). Four of these cultivar names were shared among islands while several names were used on only one island (Table 2). Twenty-one of the 23 cultivar names identified in St. Vincent, were recorded only on that island. Similarly, 13 of the 15 vernacular names recorded for Jamaica, was not shared with any other island in the survey. One unique

vernacular name 'Chouf chouf' was recorded for Tobago. All cultivar names used in Trinidad and St. Kitts were either shared with other islands or between those two islands.

When vernacular names recorded in this survey were combined with those reported in earlier studies, a total of 51 names are known throughout the Caribbean (Table 2). Nine unique vernacular names were recorded for the first time in this survey. These included, 'Brambram,' 'Couscous,' 'Finney' and 'Monkey breadfruit' from Jamaica, 'Mary Grace,' 'Hard Nature,' 'Red Bread,' and 'Smooth Skin' from St. Vincent and 'Choufchouf' from Tobago (Table 2).

Folk nomenclature and identification of breadfruit types in the Caribbean

Respondents who were knowledgeable of breadfruit diversity used different approaches to identify, name, and then classify breadfruit types or cultivars. For identification, respondents in this survey used 16 descriptors related to morphological characteristics (skin texture, fruit size, fruit shape, skin color, pulp color, leaf shape), and agronomic characteristics (time of bearing, time to maturity). Respondents perceived a range of breadfruit types with each having distinct features and they used a combination of these descriptors to identify breadfruit types or cultivars. The most frequently mentioned descriptor used for identification of breadfruit was pulp color (77%), followed by skin texture (58%) fruit size (30%) and leaf shape (25%).

The pulp color states identified were white, cream, light yellow and yellow. The yellow pulp color of cultivar 'Yellow'/'Yellow Heart' was often used as a benchmark for comparison to other cultivars. For example, a respondent referring to the pulp color of 'Timor' suggested that the pulp was not as yellow as 'Yellow Heart.' This was interpreted to mean that 'Timor' had a light-yellow pulp. Skin texture was also an important feature in cultivar identification and naming. Cultivars such as 'Macca' in Jamaica, 'Kashee Bread' in 'St. Vincent' and 'Choufchouf' in Tobago, were all identified firstly by their very rough skin. The names given to these cultivars are also based on their very rough to spiky skin.

Leaf shape was also used to describe cultivars, and in some cases, it was the first descriptor used, for those with distinct leaves (Fig. 4). For example, the leaf of cultivars 'Cassava' in Jamaica and 'Captain Bligh' in St. Vincent were readily identified by their leaves which had very deep sinuses (Fig 4). In Jamaica, the names 'Timor' and 'St. Kitts' refer to the same cultivar, but both names were never used in the same location. However, when asked to give key identifying characteristics, respondents who used those names always gave the description for a cultivar with unusual entire or dentate leaf on the upper one third.

Traditional knowledge of breadfruit names and their classification in the Caribbean

Many of the vernacular names encountered in this survey were often very descriptive and reflect variation in fruit morphology, cooking and eating-quality and association with people, places and things (Table 4). Some of these names were passed down from generation to generation and used by respondents without an understanding of their meaning. However, there were other names for which respondents have perceived meaning. Vernacular names such as 'Timor,' 'St. Kitts' and 'England' are all based on names of places (Table 4). Some vernacular names were based on people associated with the specific cultivar/ type. For example, the vernacular name 'Captain Bligh' was based on the name of the sea captain who introduced breadfruit to the Caribbean.

Based on respondents in this survey, three criteria were used to classify breadfruit cultivars in the Caribbean. These were eating - quality, most suitable method of preparation and ease of cooking (Table 5). Moreover, three types of breadfruit were distinguished based on eating - quality, namely 'excellent', 'good' and 'poor'. Cultivars or types with excellent eating - quality usually have yellow pulp, are soft, with a smooth texture when cooked and are often described as having a great mouthfeel. Cultivars with good eating - quality generally have cream to light yellow pulp and are described as having good mouthfeel and flavor. Poor eating - quality among breadfruit means firm pulp which is dry and with poor flavor. Those cultivars generally have white to cream colored pulp. Words such as 'stringy,' 'barky' and 'strany' were often used to describe these cultivars.

In St. Vincent and Jamaica, breadfruit cultivars were distinguished on the basis of most suitable method of preparation, roasting or boiling. This does not mean that cultivars could not be prepared using both methods and or another method of preparation. However, both roasting and boiling were popular in those countries, with roasting being more favoured. Cultivars that were more suitable for roasting, tend to roast easily and have great flavor and eating - quality. Cultivars that generally did not roast very easily or did not have great flavor when roasted were better for boiling. After classifying cultivars based on most suitable method of preparation, respondents further classified cultivars based on ease of cooking; easy and hard. Cultivars that were easy to roast or boil takes less time than those that were hard to cook. This method of classification also contributed to cultivar names such as 'Easy Roast,' 'Hard Nature' and 'Hard to Roast.'

Discussion

Breadfruit production is an important part of the livelihood of many communities across the Caribbean. It is of nutritional, socio-cultural, environmental, and economic importance and has a role to play in food and nutrition security in the region. This study explored the ethnobotanical and traditional knowledge associated with breadfruit in the English- speaking Caribbean islands to record the patterns or system associated with identifying and distinguishing breadfruit types or cultivars and understanding the biodiversity that exists. Data collected from key informant and respondents confirmed that there is a wealth of traditional knowledge associated with breadfruit biodiversity in the region.

The results of this study indicate that breadfruit was widely cultivated in home gardens and on farms with other crops. The planting of breadfruit in home gardens across the Caribbean shows that breadfruit is a valuable food crop for individual households especially in rural communities that accounted for most respondents. However, other factors such as availability of adequate space for trees to grow are also likely to influence the prevalence and number of breadfruit trees in home gardens (Gloster and Roberts-Nkrumah 2012). The practice of planting breadfruit trees in home gardens can be linked to the planting of breadfruit on “provision grounds”, which were designated areas on estates where the enslaved population were allowed to grow their own food during the period of slavery (Beckford 1985; Barickman 1994). Although, the enslaved African did not initially favour breadfruit, it was still widely considered important, especially during food crises.

The on-farm cultivation of breadfruit with other crops can also be linked to “provision grounds”. Provision grounds which consisted of mixed agriculture systems are the precursors of subsistence agriculture found throughout the Caribbean today (Beckford 1985). Breadfruit was either planted on these provision grounds, or on marginal lands, but never in the main production area because it was not viewed as an economic crop. It was also planted as border crops and used as windbreak and shade for other more economically important crops. For example in Trinidad and Tobago, breadfruit was often planted as a shade crop for cocoa (*Theobroma cacao*) which was grown mainly to be exported (Roberts-Nkrumah and Legall 2013). The production of breadfruit as a main crop is still not widespread throughout the region. However, this does not diminish its value and importance for food and nutrition security, which was underscored by most respondents who considered breadfruit important for either home consumption, for sale or both. These results are consistent with reports of increasing consumer appreciation and demand for breadfruit, which could eventually result in greater demand and production (Roberts-Nkrumah and Legall 2013; Gloster and Roberts-Nkrumah 2012; Roberts-Nkrumah and Badrie 2005). Furthermore, breadfruit has been recognized by the International Treaty on Plant Genetic Resources for Food and Agriculture which has listed it as one of the 35 priority crops to be conserved for food and nutrition security (FAO 2009).

This study also confirmed the depth of traditional knowledge of breadfruit biodiversity, and traditional methods used to distinguish breadfruit types in the Caribbean, which are important for conservation. Respondents used diverse traits related to agro-morphology, cooking methods, eating - quality, postharvest handling, and agronomic traits to identify, classify and describe breadfruit types. Although many vernacular names were recorded in different locations, the descriptions given suggest that same or similar types were sometimes called by different names in different locations. For example, vernacular names such as ‘Yellow Heart,’ ‘Yellow,’ ‘Creole,’ and ‘Common’ appear to describe the same cultivar. ‘Yellow Heart’ was recorded in Jamaica, ‘Yellow’ was recorded in Trinidad, Tobago and St. Kitts while ‘Creole’ and ‘Common’ were both recorded for St. Vincent. This is also true for the vernacular names ‘Cassava’ and ‘Captain Bligh’ which appears to be describing the same cultivar based on morphological features in Jamaica and St. Vincent, respectively. Even within the same island or country different vernacular names were used to describe cultivars that appear to be identical. In Jamaica, the vernacular names ‘Timor’ and St. ‘Kitts’ were used for the same cultivar which is usually distinguished from other cultivars as having an

unusual leaf shape. Therefore, the range of breadfruit accessions and understanding the traditional system of classification are important because farmers and planters over time develop skills to manage and select cultivars that they recognize. This could determine the range of diverse types they manage and conserve which could eventually influence the evolution and adaptability of the crop (Adoukonou-Sagbadja et al. 2006).

The current study also showed that many factors could influence cultivar names. Some cultivars were named after people, places, other crop plants, ease of cooking, frequency of occurrence, food items and words used in a local dialect. Vernacular names such as 'Timor', 'St. Kitts' and England were all named after places. It was not clear how the name 'St. Kitts' became a breadfruit cultivar name however, the name 'England' showed a direct link to the nationality of the voyagers who collected and introduced breadfruit to the Caribbean. Some misconceptions were found, and this may be due to lack of proper documentation of traditional knowledge. For example, in Jamaica, the name 'Timor' is believed to indicate the country where this cultivar was collected. However, cross checking this vernacular name with descriptions provided by the curator of the St. Vincent Botanical Garden who received the breadfruit plants, indicated that the Timor breadfruit variety introduced to the Caribbean had leaves with deep sinuses (Leahey 1977; Hooker 1828). From this description, it appears 'Cassava' or 'Captain Bligh' are the cultivars linked to the country of Timor. Therefore, as a vernacular name 'Timor' would best be used for those cultivars and not the cultivar with dentate leaves as is now widely used and accepted. Nevertheless, this study corroborates previous studies showing that traditional vernacular names of breadfruit are typically based on morphological traits, and that morphological comparisons among cultivars remain very important in understanding breadfruit biodiversity in any geographic region (Ragone 1995).

Conclusions And Recommendations

Breadfruit vernacular names and system of naming, describing, and classifying breadfruit types varied in different countries, and within countries. Furthermore, clear morphological variations were observed, and in some cases, breadfruit types could be easily distinguished. However, there were some cultivars with the same names but appeared morphologically distinct. Therefore, further studies are needed to understand the extent to which vernacular names represent genotypes that show distinct morphological, biochemical, and molecular characteristics in the Caribbean. This could lead to a new and comprehensive classification scheme for breadfruit in the region and is important for conservation of the existing breadfruit germplasm.

Declarations

Ethics statement

The studies involving human participants were reviewed and approved by The University of The West Indies. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Competing interest

The authors declare that they have no competing interests”.

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Authors contributions

OOD, and LBRN conceived the study and developed the questionnaire. OOD, LBRN and MCG conducted the survey and carried out field work. OOD drafted the manuscript and performed statistical analysis. LBRN and ATA revised and edited the manuscript. All authors contributed to the article and approved the submitted version.

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References

1. Adoukonou-Sagbadja, H., A. Dansi, R. Vodouhè, and K. Akpagana. 2006. "Indigenous Knowledge and Traditional Conservation of Fonio Millet (*Digitaria exilis*, *Digitaria iburua*) in Togo." *Biodiversity and Conservation* 15 (8):2379-2395. doi: 10.1007/s10531-004-2938-3.
2. Andrews, L., and G. Mason Jr. 1991. "Production of Breadfruit (*Artocarpus altilis*) in the Eastern Caribbean." Post-Harvest Management of Tropical Fruits and Ornamentals in the Caribbean Region, Trinidad and Tobago, 18-22 November, 1991.
3. Barickman, Bert J. 1994. "“A Bit of Land, Which They Call Roça”: Slave Provision Grounds in the Bahian Recôncavo, 1780-1860." *Hispanic American Historical Review* 74 (4):649-687.
4. Beckford, George L. 1985. "Caribbean Peasantry in the Confines of the Plantation Mode of Production." *International Social Science Journal* 37 (3):401-414.
5. Bligh, William. 1792. "A Voyage to the South Sea: Undertaken by Command of His Majesty, for the Purpose of Conveying the Bread-fruit Tree to the West Indies, in His Majesty's Ship the Bounty, Commanded by Lieutenant William Bligh. Including an Account of the Mutiny on Board the Said

- Ship, and the Subsequent Voyage of Part of the Crew, in the Ship's Boat, from Tofoa, One of the Friendly Islands, to Timor, a Dutch Settlement in the East Indies." In: Austria: G. Nicol. <https://books.google.tt/books?> (accessed September 12, 2016).
6. Bligh, William. 1976. *The Log of H. M. S. Providence 1791-1793*. England: Genesis Publications Limited.
 7. Englberger, Lois, Rebecca Lorennij, Mary Taylor, Valerie Saena Tuia, William Aalbersberg, Usaia Dolodolotawake, Lydia Tibon, Jorelik Tibon, and Julia Alfred. 2014. "Carotenoid Content and Traditional Knowledge of Breadfruit Cultivars of the Republic of the Marshall Islands." *Journal of Food Composition and Analysis* 34 (2):192-199. doi: 10.1016/j.jfca.2012.05.002.
 8. Espinosa, Mariano Martinez, Isanete G. C. Bieski, and Domingos Tabajara de Oliveira Martins. 2012. "Probability Sampling Design in Ethnobotanical Surveys of Medicinal Plants." *Revista Brasileira de Farmacognosia* 22:1362-1367. doi: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-695X2012000600023&nrm=iso.
 9. FAO. 2009. International Treaty on Plant Genetic Resources for Food and Agriculture. Rome, Italy: FAO.
 10. Gloster, Michael, and Laura B. Roberts-Nkrumah. 2012. "The Importance of Breadfruit Grown in Home Gardens in St. Vincent and the Grenadines." Proceedings of the Caribbean Food Crop Society 48th Annual Meeting 2012, Playa del Carmen, Mexico, 20-26 May, 2012.
 11. Hooker, Joseph Dalton. 1828. "*Artocarpus incisa*. Bread-Fruit Tree (α and β)." *Curtis Botanical Magazine* 55:2869-2871.
 12. IBM Corporation. 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corporation.
 13. Leakey, C. L. A. 1977. Breadfruit Reconnaissance Study in the Caribbean Region. Cali, Colombia: CIAT/Interamerican Development Bank.
 14. Leakey, Colin, and Laura B. Roberts-Nkrumah. 2016. "The Introduction of the Breadfruit [*Artocarpus altilis* (Parkinson) Fosberg] to the West Indies - The Role of Sir Joseph Banks." *Tropical Agriculture (Trin.)* 93 Special Issue 1:32-40.
 15. Lee, Roberta Anne, Michael J. Balick, Dana Lee Ling, Francisco Sohl, Berry J. Brosi, and William Raynor. 2001. "Cultural Dynamism and Change - An Example from the Federated States of Micronesia." *Economic Botany* 55 (1):9-13. doi: 10.1007/bf02864542.
 16. Mugisha, Maud Kamatenesi, Savina Asimwe, Agnes Namutebi, Anna-Karin Borg-Karlson, and Esezah Kyomugisha Kakudidi. 2014. "Ethnobotanical Study of Indigenous Knowledge on Medicinal and Nutritious Plants Used to Manage Opportunistic Infections Associated With HIV/AIDS in Western Uganda." *Journal of Ethnopharmacology* 155 (1):194-202. doi: <https://doi.org/10.1016/j.jep.2014.05.012>.
 17. Powell, Dulcie. 1977. "The Voyage of the Plant Nursery, H.M.S.Providence, 1791–1793." *Economic Botany* 31 (4):387-431. doi: 10.1007/BF02912555.

18. Ragone, Diane C. 1995. "Description of Pacific Island Breadfruit Cultivars." *Acta Horticulturae* 413:93-98.
19. Ragone, Diane C., Gaugau Tavana, Joan M. Stevens, Patricia Ann Stewart, Rebekka Stone, Paul Matthew Cox, and Paul Alan Cox. 2004. "Nomenclature of Breadfruit Cultivars in Samoa: Saliency, Ambiguity and Monomiality." *Journal of Ethnobiology* 24 (1):33-50.
20. Ragone, Diane C., and Jim Wiseman. 2007. "Developing and Applying Descriptors for Breadfruit Germplasm." *Acta Horticulturae* 757:71-80.
21. Roberts-Nkrumah, L.B. 2018. *The Breadfruit Germplasm Collection at the University of the West Indies, St Augustine Campus*. Kingston, Jamaica: University of the West Indies Press.
22. Roberts-Nkrumah, Laura B. 1990. "The Breadfruit in Jamaica -A Review." *Jagrist* 2 (2):4-9.
23. Roberts-Nkrumah, Laura B. 1997. "Towards a Description of the Breadfruit Germplasm in St Vincent." *Fruits* 52 (1):27-35.
24. Roberts-Nkrumah, Laura B. 2001. "Bearing Characteristics and Yield in Young Trees of Selected Caribbean Breadfruit (*Artocarpus altilis* (Park.) Fosberg) Cultivars." Proceedings of the Caribbean Food Crop Society 37th Annual Meeting 2001, Port of Spain, Trinidad and Tobago, 15-20 July, 2001.
25. Roberts-Nkrumah, Laura B. 2007. "An Overview of Breadfruit (*Artocarpus altilis*) in the Caribbean." *Acta Horticulturae* 757:51-60.
26. Roberts-Nkrumah, Laura B. 2008. "Breadfruit Germplasm Collection and Evaluation at the University of the West Indies." Overcoming Challenges to Develop Sustainable Agri-Food Systems in the Tropics Port of Spain, Trinidad and Tobago, November 30 - December 5, 2008.
27. Roberts-Nkrumah, Laura B., and Neela Badrie. 2005. "Breadfruit Consumption, Cooking Methods and Cultivar Preference among Consumers in Trinidad, West Indies." *Food Quality and Preference* 16 (3):267-274.
28. Roberts-Nkrumah, Laura B., and George Legall. 2013. "Breadfruit (*Artocarpus altilis*, Moraceae) and Chataigne (*A. camansi*) for Food Security and Income Generation: The Case of Trinidad and Tobago." *Economic Botany* 67 (4):324-334.
29. Salganik, Matthew J., and Douglas D. Heckathorn. 2004. "Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling." *Sociological Methodology* 34 (1):193-240. doi: 10.1111/j.0081-1750.2004.00152.x.
30. Tongco, Ma Dolores C. 2007. "Purposive Sampling as a Tool for Informant Selection." *Ethnobotany Research and Applications* 5:147-158.
31. Webster, Seymour A. 2006. *The Breadfruit in Jamaica: A Commercial and Horticultural Perspective*. Portland, Jamaica: Seymour Webster.
32. Weir, Colin, Egbert A. Tai, and Cynthia Weir. 1983. "Breadfruit." In *Fruit Tree Crop Production in the Caribbean Region*, 98-105. Barbados: Caribbean Development Bank.
33. Zerega, Nyree J. C., Diane C. Ragone, and Timothy J. Motley. 2004. "Complex Origins of Breadfruit (*Artocarpus altilis*, Moraceae): Implications for Human Migrations in Oceania." *American Journal of*

Tables

Table 1. Number and demographics of respondents in the survey

Island	Respondents					Island Total (n)
	Gender		Location			
	Male	Female	Urban	Semi-urban	Rural	
Jamaica	71.1%	28.9%	11.1%	28.9%	60%	45
St. Kitts	46.2%	53.8%	7.7%	23.1%	69.2%	13
St. Vincent	57.6%	42.4%	15.2%	24.2%	60.6%	33
Tobago	46.2%	53.8%	12.8%	38.5%	48.7%	39
Trinidad	57.5%	42.5%	22.5%	135%	42.5%	40
Respondents Total	57.6%	42.3%	14.7%	31.2%	54.1%	170

Table 2. Breadfruit vernacular names and descriptions in the Caribbean as reported in the literature, and observed in in *situ* collections and recorded in the present study

No.	Vernacular names	Country/Island	Descriptions based on respondents	Descriptions based on literature search	References
1	Banbran	Jamaica	ND	Fruits are round and small	(Leakey 1977; Roberts-Nkrumah 2008)
2	Banjam	Jamaica	Fruits are large with white to pale yellow flesh and very rough skin, bear throughout the year and easy to cook	ND	(Roberts-Nkrumah 2008)
3	Black Breadfruit	St. Vincent and the Grenadines	Fruits are large, round with smooth skin	Fruit are oval with relatively rough and light green skin	(Roberts-Nkrumah 1997)
4	Bois Pain	St. Lucia	ND	Medium sized fruit with yellow flesh	(Andrews and Mason Jr. 1991)
5	Brambram*	Jamaica	Large fruits with smooth textured pulp, very rough skin and easy to roast	ND	ND
6	Butter Breadfruit	St. Vincent and the Grenadines	Small to large round fruit. Pulp color is very yellow and excellent texture	Fruits are subglobose, have relatively rough green skin	(Roberts-Nkrumah 1997)
7	Butterheart	St. Vincent and the Grenadines and Tobago	Small to large round fruit. Pulp color is very yellow and excellent texture	Fruits are subglobose, have relatively rough green skin	(Roberts-Nkrumah 1997)
8	Captain Bligh	St. Vincent and the Grenadines	Medium sized fruit with yellow pulp and excellent for cooking. Leaves have very deep sinuses	Subglosoe fruit with fairly rough and light green skin. Leaves have thin lobes.	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991; Leakey 1977)
9	Cassava	Jamaica	Medium sized oval fruit with a yellow pulp. Easy to cook.	Small to medium size fruit with pale yellow pulp with good flavor	(Webster 2006; Roberts-

			Leaves have very deep sinuses.	and long shelf life. Leaves have deep sinuses, and sometimes there is sub-lobing	Nkrumah 2001; 2008)
10	Cocobread	St. Vincent and the Grenadines	Very large fruit with smooth skin, easy to cook and has an excellent mouthfeel.	Large oval fruit, with very smooth skin and yellow flesh. Wrinkled leaves	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991; Leakey 1977)
11	Common	St. Vincent and the Grenadines	Smooth skin, yellow flesh, easy to cook. Very popular	Smooth to rough skin, yellow fleshed fruit	(Roberts-Nkrumah 1997; 2008; Leakey 1977)
12	Choufchouf*	Tobago	Round, medium sized fruit with very rough skin and creamish to white pulp that is easy to cook	ND	ND
13	Couscous*	Jamaica	Medium to large round or oval fruit with very rough skin. Creamish to a pale-yellow pulp. Easy to cook. Leaves are wrinkled	ND	ND
14	Creole	St. Vincent and the Grenadines	Smooth skin, yellow flesh, easy to cook. Very popular	Round smooth, light green skin	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991)
15	Dessert	St. Vincent and the Grenadines	Large fruit with thick yellow pulp and very easy to cook	Oval fruit with fairly smooth yellow green skin	(Roberts-Nkrumah 1997)
16	England	St. Vincent and the Grenadines	Medium sized fruit with yellow pulp and excellent for cooking. Leaves have very deep sinuses	Subglosoe fruit with fairly rough and light green skin. Leaves have thin lobes.	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991;

17	Finey*	Jamaica	Small to medium fruit, round or oval fruit with yellow to bright yellow pulp. Easy to roast and of very good eating – quality	ND	ND
18	Floater	St. Vincent and the Grenadines	Large fruit with smooth skin and yellow pulp	Large round fruit with smooth skin and yellowish cream pulp	(Roberts-Nkrumah 1997)
19	Green Skin	Grenada	ND	Medium sized fruit, yellow flesh	(Andrews and Mason Jr. 1991)
20	Hard Nature*	St. Vincent and the Grenadines	Medium sized rough-skinned fruit with white to a creamish pulp. Hard to cook	ND	ND
21	Hogpen	St. Vincent and the Grenadines	Large round fruit, smooth skin, thick yellow pulp. Easy to cook.	Medium sized round fruit with smooth, light green skin, yellowish cream pulp	(Roberts-Nkrumah 1997)
22	Hope Marble	St. Vincent and the Grenadines	Small round fruit with smooth skin, and yellow to very yellow pulp. Very easy to cook	Small, sub-globose fruit with smooth green skin and light yellow pulp	(Roberts-Nkrumah 1997; 2001; 2008)
23	Kashee Bread	St. Vincent and the Grenadines	Medium to large oval fruit, with very, very rough skin and yellow flesh. Leaves are lopsided and drooping.	Medium sized, spiny fruit; yellow flesh. Wrinkled or puckered and drooping leaf	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991)
24	Kele kele	French colonies in the Caribbean	ND	Seedless	(Leakey 1977)
25	Koshi	St. Vincent and the Grenadines	ND	Large, round, and rough skinned. Yellow flesh with excellent eating - quality	(Leakey 1977)

26	Lawyer Caine	St. Vincent and the Grenadines	Medium sized, oval fruit with slightly yellow pulp. Fairly easy to cook.	Medium sized, round fruit with smooth, light yellow green skin and yellowish cream pulp.	(Roberts-Nkrumah 1997)
27	Liberal	St. Vincent and the Grenadines	Round fruit with creamish pulp. Easy to cook. Bears off-season.	Oval fruit with fairly rough, light green skin and pale cream pulp	(Roberts-Nkrumah 1997)
28	Lulu	St. Vincent and the Grenadines	Very large fruit, with rough skin. Easy to cook and roast.	Large, oval with rough to spiny green skin and whit to cream pulp	(Roberts-Nkrumah 1997)
29	Macca	Jamaica	Large fruits with smooth, soft textured, pale yellow-to-yellow pulp, very rough skin and easy to roast. Has good eating - quality.	Fruits are medium to large, round or oval and skin has very pronounced raised polygons resulting in a rough surface. Pulp color if pale yellow to bright yellow with good eating - quality.	(Webster 2006; Roberts-Nkrumah 1990; 2008)
30	Man Bread	Jamaica	Large oval fruit with smooth to slightly rough skin, yellow to very yellow pulp and easy to cook.	ND	ND
31	Mary Grace*	St. Vincent and the Grenadines	Round or oval fruit, with smooth skin, creamish pulp with firm texture and good for roasting	ND	ND
32	Massa	St. Vincent and the Grenadines	Large, round, smooth skin and white pulp	Medium sized fruit white flesh; smooth to slightly rough.	(Andrews and Mason Jr. 1991; Roberts-Nkrumah 1997)
33	Monkey Breadfruit*	Jamaica	Round, medium sized fruit with very rough skin and creamish to yellow pulp that is easy to cook	ND	ND

34	Old wind	St. Vincent and the Grenadines	ND	Medium sized round fruit with smooth, light yellow-green skin and yellowish cream pulp.	(Roberts-Nkrumah 1997)
35	Ordinary	St. Lucia	ND	Medium sized fruit, yellow flesh	(Andrews and Mason Jr. 1991)
36	Pika	Grenada	ND	Medium sized, spiny fruit with yellow flesh. Wrinkled or puckered and drooping leaf	(Andrews and Mason Jr. 1991; Roberts-Nkrumah 2008)
37	Prickly Walled	Jamaica	ND	Fruit skin has elongated soft spines, and the cultivar is not very common.	(Weir, Tai, and Weir 1983)
38	Ready Roast	St. Vincent and the Grenadines	Medium to large fruit with thick yellow pulp and very easy to cook	Oval fruit with fairly smooth yellow-green skin	(Roberts-Nkrumah 1997)
39	Red Bread*	St. Vincent and the Grenadines	Large, oblong fruit with slightly rough skin and thick very yellow pulp	ND	ND
40	Sally Young	St. Vincent and the Grenadines	Very large, round fruit with smooth to rough skin and creamish pulp. Easy to cook.	Fruit are oval with slightly rough, light green skin and pale color pulp	(Roberts-Nkrumah 1997)
41	Soursop	St. Vincent and the Grenadines	Medium sized fruit with very rough skin. White pulp and difficult to cook. Leaves are narrow and dull	Fruits are oval, with slightly rough, light green skin and pale cream pulp	(Roberts-Nkrumah 1997)
42	Smooth Skin*	St. Vincent and the Grenadines	Medium to large fruit with thick yellow pulp and very easy to cook	ND	ND
43	St. Kitts	Jamaica	Round, small to medium fruit with	Fruits are oval or round and small to	(Weir, Tai, and Weir

			light yellow to yellow pulp, easy to cook. Leaves range from having one	medium with pale yellow pulp. Leaves are entire with dentate margin	1983; Webster 2006)
44	Timor	Jamaica	Round, small to medium fruit with light yellow to yellow pulp, easy to cook. Leaves range from having one or two short lobes on the upper one-third to having no lobes.	Fruits are oval or round and small to medium with pale yellow pulp. Leaves are entire with dentate margin.	(Roberts-Nkrumah 2001)
				Fruits are small and very inferior. Leaves have very deep sinuses almost reaching the midrib.	(Hooker 1828; Leakey 1977)
45	White	St. Vincent and the Grenadines, Grenada and St. Lucia	Large, round, smooth skin, and white pulp	Medium sized fruit white flesh; smooth to slightly rough.	(Roberts-Nkrumah 1997; Andrews and Mason Jr. 1991)
46	White Heart	Jamaica	Large, round, smooth skin, and white pulp	Small to very large fruit with white pulp, difficult to cook and poor flavor	(Weir, Tai, and Weir 1983; Webster 2006)
47	Yam Paine Blanc	Dominica	ND	Light green skin and cream flesh	(Andrews and Mason Jr. 1991)
48	Yam Paine Common	Dominica	ND	Medium sized fruit, yellow flesh	(Andrews and Mason Jr. 1991)
49	Yam Paine Juane	Dominica	ND	Medium sized fruit, yellow flesh	(Andrews and Mason Jr. 1991)
50	Yellow	Trinidad and Tobago and St. Kitts and Nevis	Medium to large fruit, round or oblong fruit with pale to bright yellow pulp. Easy to roast and have good eating - quality	Medium to large fruit, round or oblong fruit with pale to bright yellow pulp. Easy to roast and have good eating - quality.	(Roberts-Nkrumah 2001)
51	Yellow Heart	Jamaica	Medium to large fruit, round or	Medium to large fruit, round or oblong fruit	(Weir, Tai, and Weir

oblong fruit with
pale to bright yellow
pulp. Easy to roast
and have good
eating - quality

with pale to bright
yellow pulp. Easy to
roast and have good
eating - quality.

1983;
Webster
2006)

*Vernacular names first reported in this study, ND: No data

Table 3. Descriptors used by respondents for the identification of breadfruit types in the Caribbean

Identification and characterization criteria	Respondents* (%)	Criterion category	Cultivar names
Plant Morphology			
Pulp color	77	White	White, White Heart, Captain Bligh
		Cream	Macca
		Light yellow	Timor, St. Kitts
		Yellow	Yellow Heart, Butterheart
Skin texture	58	Smooth	Black Breadfruit, Smooth Skin, White, White Heart, Yellow Heart
		Sandpapery	Red Bread
		Rough/Spiny	Macca, Choufchouf, Waterloo, Monkey Breadfruit
Fruit size	30	Large	Black Breadfruit, Sally Young, Waterloo
		Medium	Lawyer Caine, Soursop
		Small	Hope Marble
Leaf Characteristics	25	Deeply lobed	Cassava
		Moderately lobed	White Heart, Yellow Heart
		Slightly lobed on the upper one-third of the leaf to entire	Timor, St. Kitts
Fruit shape	16	Round	Lawyer Caine, Dessert
		Oblong	Red Bread
		Irregular	Choufchouf
Skin color	10	Brown	Yellow Heart
		Green	Green Skin, Soursop
		Yellow green	Kashee
Core size	5	Large	Brambram, Banjam

Identification and characterization criteria	Respondents* (%)	Criterion category	Cultivar names
Agronomic characteristics	15	Small	Hogpen, Dessert
		June to September	Yellow Heart
		December to February	
		Year round	Liberal, St. Kitts
Time to fruit maturity	4	Fast	Yellow Heart
		Slow	Cassava
Other			
Frequency of occurrence	5	Common	Common, Creole, Ordinary, Yellow
		Rare	Couscous, Choufchouf, Brambram

*Percentage of respondents using identification criteria for distinguishing breadfruit cultivars

Table 4. Breadfruit vernacular names after places, people, things, distribution, and names of plants

Naming of cultivars	Vernacular names and implications for their meaning
After names of places	Timor: This cultivar is believed to have be the Timoran cultivar introduced by Captain William Bligh) St. Kitts: In some parts of Jamaica, this cultivar is believed to be introduced from the island of St. Kitts. England: Cultivar named after the country England which introduced Breadfruit to the Caribbean
After names of people	Sally Young (name of a local citizen of St. Vincent for which the variety became associated with) Mary Grace (name of a local citizen of St. Vincent for which the variety became associated with) Captain William Bligh: Cultivar named after the sea captain that introduced breadfruit to the Caribbean
After names of plant	Cassava (Implying the cultivar has leaf with very deep lobes similar to the plant Cassava) Soursop (implying the cultivar has rough skin similar to Soursop)
Based on frequency of occurrence	Common, Creole and Ordinary (These names suggest that the cultivar is common seen and used or is much acquainted.
Based on locally used words	Macca, Kashee (These words mean thorns in Jamaica and St. Vincent respectively. As cultivar names, they refer to the thorny appearance and feel of the skin of these cultivars.
Typical use	Dessert (the fruit is considered to have good quality to be used for dessert) Hog Pen (this cultivar is used to feed pigs because of poor quality).
After food items	Butter, Butter Heart (refers to the soft, smooth texture of the fruit pulp. It also relates to the similarity in color between the pulp color and yellowness of butter.
Based on ease of cooking	Ready Roast (implies easy to roast) Hard Nature (means a hardy variety that is hard to cook). Hard to Roast (implies difficult to roast)
Based on pulp color	Yellow, Yellow Heart, Butter Heart, White, White Heart (implies cultivar with yellow or white pulp color)

Table 5. Respondents' classification of breadfruit cultivars in the Caribbean

Identification and characterization criteria	Criterion category	Characteristics of each category	Examples of cultivars given by respondents
Eating - quality	Excellent	Gives a pleasant/smooth mouth-feel and flavor and may even be consumed without any protein food	Cocobread, Kashee Bread, Dessert, Yellow Heart
	Good	Good texture mouthfeel and flavor	Couscous, Macca
	Poor	Has a hard texture and poor mouthfeel. Often described as stringy	White, Soursop, Hard Nature, Hard to Roast
Most suitable method of preparation	Roasting	Roasts easily and has good flavor and texture	Yellow Heart, Easy roast, Butter, Dessert
	Boiling	More suited to boiling than roasting	White Heart, Couscous, Banjam
Ease of cooking (roasting or boiling)	Easy	Cooks very easily	Easy Roast, Brambram, Couscous, Dessert
	Hard	Hard to roast or boil	Hard to Roast, Soursop, Hard Nature

Figures

Figure 1

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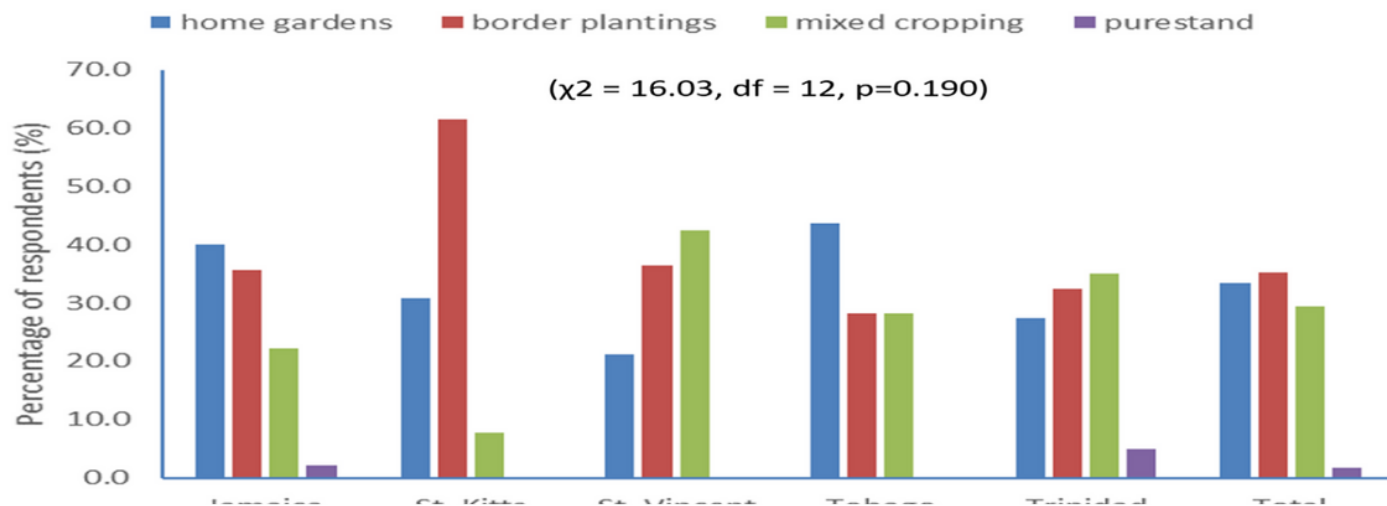


Figure 2

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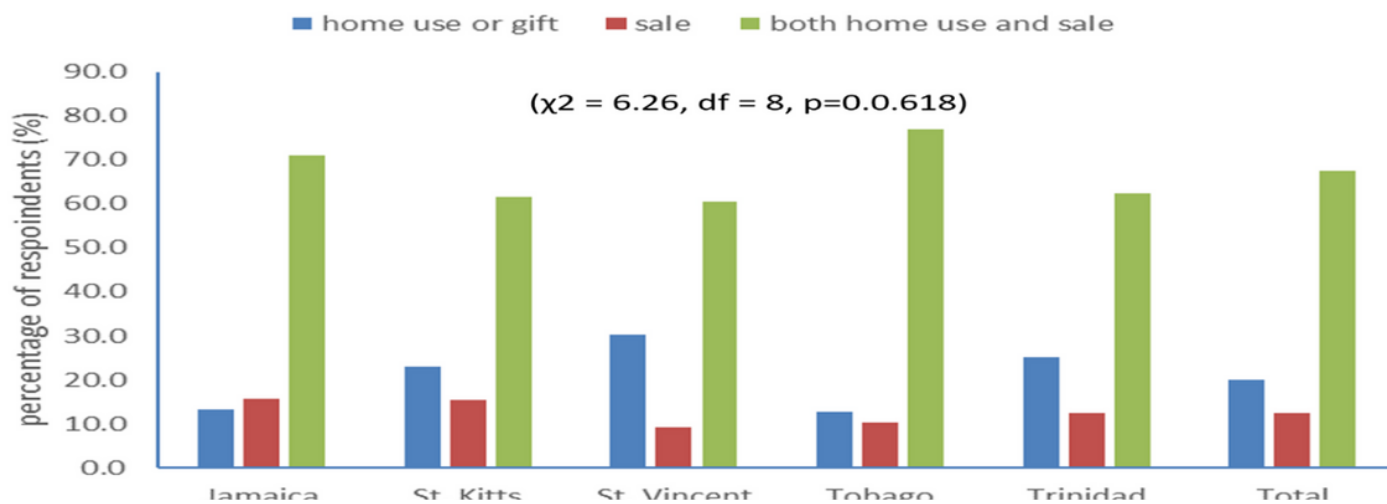


Figure 3

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Figure 4

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