

Urban Consumers' Perception on Processed Fruit Products in Kurunegala District

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ABSTRACT

A significant portion of the locally grown fresh fruits goes waste due to lack of processing opportunities. With a view to identify potential processed products and the consumer preferences for product types, a study was conducted using urban consumers of Kurunegala District, Sri Lanka. The availability of processed fruit products were reported using a sample of 30 supermarkets. A questionnaire based consumer survey was conducted to assess the consumer attitudes on five major products namely, jam, cordial, juice, pickle and chutney. Their considerations on 14 factors when purchasing the products were evaluated. Based on the outcome of study, potential processed forms have been suggested for selected fruit species. When purchasing the selected processed fruit products, consumers' main concern was on flavour, fruit species, price and package size while the brand, label information and certifications gained moderate attention. While advertising was the least considered factor, their considerations on nutritional facts, additives and preservatives and the country of origin were also relatively low. Yellow colour was most preferred for jam, cordial, juice (RTS drink/fruit nectar) and pickle while Brown was most liked for chutney. Moderate sweetness and sourness were preferred over high or low levels in jam, cordial, juice and chutney while moderately sour and spicy pickle was preferred. Impression on lack of safety was the major limitation which prevented purchase of processed fruit products.

KEYWORDS: Availability, Consumer preference, Processed fruits, Urban

INTRODUCTION

The diverse agro-climate in Sri Lanka accommodates over 50 fruit species which can be grown in different areas of the island (Anon, 2015). The country produces about 540,000 mt of fruits annually (Anon, 2013). Most of this production is consumed locally while only 2% is exported (Harvey, 2006).

The health benefits of fruits are well known as they provide essential vitamins, minerals and dietary fibre. The daily requirement of fruits for a balanced diet is 112 g per person (Anon, 2011). However, the average daily fruit consumption of Sri Lankans is 40 g per person, which is one of the lowest in Asia. More than 96% of the entire fruit production in the country is available for consumption in fresh form without any value addition. However, it is estimated that 30-40% of all fruits goes waste as post-harvest losses (Esham and Usami, 2006). This is particularly evident in the peak period. On the other hand, prices of fresh fruits unreasonably rise in the off season which is one of the underlying reasons of poor fruit consumption among Sri Lankans.

Whilst most fruits are best eaten fresh, processed fruits can be acceptable alternatives (Anon, 2007). The goal of processing is to deter microbial spoilage and natural physiological deterioration of the plant cells. This process not only enhances the life of perishable products but also helps withdraw the surplus produce from

the market in the glut period, stabilizes the prices and assists in maintaining a stock of fruits to meet the demand in off-seasons (Anon, 2007).

The fruit processing industry also contributes to economic development both directly and indirectly by expanding an array of supporting businesses (Anon, 2005). A thorough understanding of the factors, which affect consumer preferences for processed fruit products is essential for the development of new products and to enhance the quality of existing products.

The objective of this study was to find out the variety of processed fruit products in the market and assess the consumer perception towards five highly demanded product types (Ekanayake *et al.*, 2014) in urban areas of Kurunegala district. The outcome will help identify the possibilities of introducing processed products from under-exploited species and contribute to develop products preferred by the consumers.

MATERIALS AND METHODS

Sample and Data Collection

The study was conducted in areas within 5 km radius from six towns namely, Kurunegala, Kuliyaipitiya, Wariyapola, Narammala, Mallawapitiya and Polgahawela of Kurunegala District (North Western Province) from January to May 2016. The available fruit based

processed products were identified in 30 randomly selected supermarkets. For the consumer survey, five highly demanded product types reported by Ekanayake *et al.* (2014) namely, jam, cordial, juice [ready-to-serve (RTS) drinks/fruit nectar], pickle and chutney were used. A structured, pre-tested questionnaire was used in the face-to-face interviews conducted with 200 randomly selected households.

Data Analysis

Data were analyzed descriptively using MS Excel. Average values were taken for each factor. The factors were price, brand, country of origin, package size, acidity, colour, flavour, label information, nutritional facts, additives and preservatives, certification (e.g. ISO / SLS), fruit species, past purchase experience and advertising.

RESULTS AND DISCUSSION

Availability of Processed Fruit Products

Altogether 24 fruit species have been used in processed forms (Table 1). However, products from apple, date and pomegranate were imported while both imported and local products were available from strawberry. About 12 product types were available. The number of fruit species used in processed forms in the descending order were, fruit nectar (18), cordial (15), RTS drink/juice (13), jam (11), jelly (8), chutney (7), fruit-in-syrup (6), candy (5), pickle (3), canned fruit (2), paste (2) and dried fruit snacks (2) (Table 1). The number of processed product types from different species, in the descending order were, mango (*Mangifera indica*; 10), pineapple (*Ananas comosus*; 8), orange (*Citrus sinensis*; 7), lime (*Citrus aurantifolia*; 6), papaya (*Carica papaya*; 6), guava (*Psidium guajava*; 5), passion fruit (*Passiflora edulis*; 5), strawberry

(*Fragaria×ananassa*; 5), apple (*Malus domestica*; 4), grapes (*Vitis vinifera*; 5), tamarind (*Tamarindus indica*; 4), wood apple (*Limonia acidissima*; 3), banana (*Musa spp*; 2), ambarella (*Spondias dulcis*; 2), goraka (*Garcinia quaesita*; 2), lemon (*Citrus limon*; 2), mandarin (*Citrus reticulata*; 2), nelli (*Phyllanthus emblica*; 2), and pomegranate (*Punica granatum*; 2). Anoda (*Annona spp.*), beli (*Aegle marmelos*), date (*Phoenix dactylifera*), and melon (*Citrullus lanatus*) had one product each.

Potential for New Products

Mango and pineapple have been exploited by the processing industry at a relatively higher level. However, many other species, including banana which is the most abundantly produced fruit, had limited processed forms. Moreover, some highly seasonal fruits such as rambutan (*Nepheleum lappaceum*), mangosteen (*Garcinia mangostana*), avocado (*Persea americana*) and durian (*Durio zibethinus*) have not been used for processing. Considering the availability and popularity in the international market, potential processed forms have been suggested for selected fruit species in Table 2.

Consumer Survey

Demographic information of consumers

Out of the respondents participated in the consumer survey, 77% were females while 23% were males (Table 3).

Reasons for processed fruit consumption.

Out of five options, each consumer was given the freedom to select more than one option. A majority (61.5%) of them indicated ‘Convenience’ as the reason for consuming processed fruits. It could be attributed to the busy life style of urban consumers.

Table 1. Availability of processed fruit products in urban areas of Kurunegala District

Products	Apple	Ambarella	Anoda	Banana	Beli	Date	Goraka	Grapes	Guava	Lemon	Lime	Mango	Mandarin	Melon	Mixed fruit	Nelli	Orange	Passion fruit	Papaya	Pineapple	Pomegranate	Strawberry	Tamarind	Wood apple
Jam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cordial	+	-	-	-	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+
Fruit nectar	+	+	+	-	-	-	-	+	+	+	+	+	+	-	+	+	+	+	+	+	-	+	+	+
RTS Drink	+	-	-	+	-	-	-	+	+	-	+	+	-	-	+	-	+	+	+	+	+	-	-	+
Chutney	-	+	-	-	-	+	-	-	-	-	+	+	-	-	+	-	-	-	-	+	-	-	+	-
Jelly	+	-	-	-	-	-	-	+	-	-	+	+	-	-	+	-	+	-	-	+	+	+	-	-
Pickle	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	+	-	-	-	-	-
Canned fruit	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-
Fruit in Syrup	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+	+	+	+	-	-	-	-
Dried fruit snacks	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Candy	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	+	-	-	-	-	+	+	-
Paste	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-

+ indicates presence of products, - indicates absence of products. Mixed fruit products contain two or more species out of banana, mango, pineapple, papaya, orange and passion fruit

Table 2. Proposed processed products from potentially important fruit species in Sri Lanka

Product	Potential species
Juice/RTS drink	Anoda, Banana, Beli, Cashew apple, Jackfruit, Mangosteen, Sapota, Watermelon
Jam	Banana, Beli, Cashew apple, Dragon fruit, Guava, Jackfruit, Pomegranate, Rambutan, Sapota
Dried fruit snacks	Durian, Guava, Jackfruit, Mango, Mangosteen, Pear, Pineapple, Sapota
Fruit in syrup / Fruit in juice	Mandarin, Mangosteen, Pear, Rambutan
Fruit in flavoured jelly	Mandarin, Mango, Papaya, Pear, Strawberry
Canned pulp	Passionfruit
Puree	Mango, Strawberry
Dip	Avocado
Pickle	Ambarella, Cashew apple, Jackfruit, Lovi (Mauritius plum)
Chutney	Cashew apple, Guava, Jackfruit

Taste was also an important reason as mentioned by 47% of respondents (Figure 1). Thus, the demand and acceptance for processed fruit products among urban consumers is likely to increase in future.

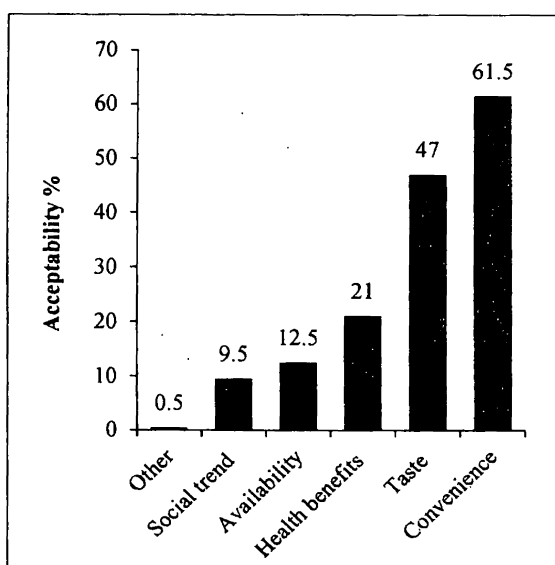


Figure 1. Reasons for consuming processed fruit products by urban consumers

Table 3. Descriptive statistics of the sample

Attribute	Percentage of participants (%)
Gender	
Male	23
Female	77
Education	
Primary	4
O/L	27.5
A/L	43
Diploma	10
Degree	14
Postgraduate	1.5
Employment	
Government	20
Private	29
Own business	16.5
Not employed	34.5
Income Level (RS. / month)	
Below 25,000	21.5
25,000 – 50,000	42
50,000 – 75,000	20
75,000 – 100,000	13.5
Above 100,000	3

Consumers' Perception on Processed Fruit Products

When purchasing the selected processed fruit products, consumers' main concern was on flavour, fruit species, price and package size as indicated by their higher average values (Figure 2; Table 4). They had moderate consideration on Brand, label information and certification details. Advertising, nutritional facts, country of origin, and the information on additives and preservatives gained least consideration. Consumers paid more attention to fruit species even within the same product category. Fruit juice is available either as RTS drink or fruit nectar. The juice percentage is higher in RTS drink compared to that of fruit nectar. However, nearly 18% of respondents were not aware of the difference and they considered both as the same. For those selected products, local producers (e.g. MD, KVC, CIC and Kist) have dominated the market and therefore, consumers' consideration on Country of origin was low. The product prices change based on the package size. Therefore, a high consumer attention was on the package size. The level of consideration on individual products are presented in Table 4.

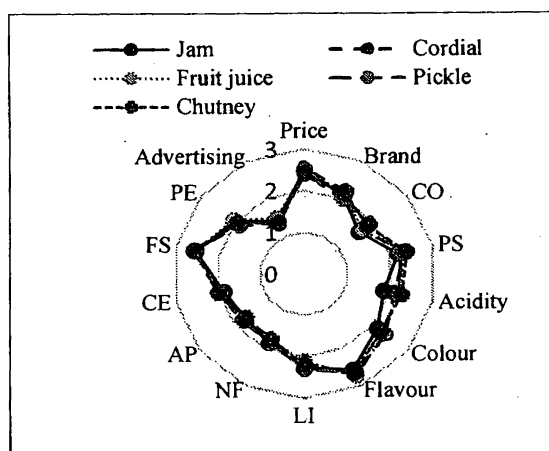


Figure 2. Perception on attributes of processed fruit products. (CO-Country of origin, PS- Package size, LI- Label information, NF- Nutritional facts, AP- Additives and preservatives, CE- Certification, FS- Fruit species, PE- Past purchase experience

Table 4. Perception on attributes of processed fruit product

	Price	Brand	Country of origin	Package size	Acidity	Colour	Flavor	Label information	Nutritional facts	Additives and preservatives	Certification (e.g. ISO,SLS)	Fruit species	Past purchase experience	Advertising
Jam	2.49	2.07	1.60	2.19	1.85	2.13	2.57	2.28	1.85	1.71	1.88	2.54	2.01	1.40
Cordial	2.54	2.20	1.70	2.34	2.11	2.35	2.69	2.24	1.74	1.71	1.97	2.58	2.02	1.37
Fruit juice	2.48	2.15	1.68	2.34	2.19	2.32	2.74	2.10	1.77	1.68	1.95	2.56	2.08	1.48
Pickle	2.41	2.00	1.91	2.24	2.22	2.24	2.65	2.30	1.83	1.80	2.02	2.59	1.89	1.35
Chutney	2.45	2.13	1.85	2.39	2.27	2.23	2.65	2.17	1.80	1.73	2.00	2.56	1.96	1.37

Maximum averages value=3 and lowest average value=1

When purchasing jam, cordial, juice (RTS drink/fruit nectar) and pickle, yellow colour products received the highest consumer preference. However, with regard to chutney, brown colour was most preferred (Table 5). green was the least preferred colour for these products.

Higher consumer preference was towards jam, cordial, Juice and chutney with Moderate Sweetness and Sourness levels. Further, pickle with moderate sourness and spiciness was preferred (Table 6).

Table 5. Consumer preference for colour when purchasing jam, cordial, ready-to-serve (RTS) drink/fruit nectar, pickle and chutney

Colour	Yellow	Orange	Red	Brown	Green
Jam	1.67	-	1.88	2.44	-
Cordial	1.80	2.35	3.25	3.74	3.86
RTS drink/ Fruit nectar	1.86	2.45	3.24	3.35	4.09
Pickle	2.48	3.20	3.24	2.57	3.52
Chutney	2.67	2.77	2.92	2.47	4.12

For Colour of Jam, maximum average value- 1, minimum average value- 3. For Colour of Cordial, RTS drink/Fruit nectar, Pickle and Chutney, maximum average value- 1, minimum average value- 5

Limitations for Processed Fruit Consumption

Out of the four options viz. lack of safety, cost, low palatability and unavailability, each consumer was given the freedom to select more than one option. Among the factors which limited consumption of processed fruit products, the impression on lack of safety due to addition of preservatives, artificial colours and flavours were expressed by 58% of respondents (Figure 3). It was followed by the high cost (43%). It indicates that the use of natural flavours/colours and relatively safer preservatives, and simultaneously increasing the consumer awareness on that would likely to increase popularity of processed products.

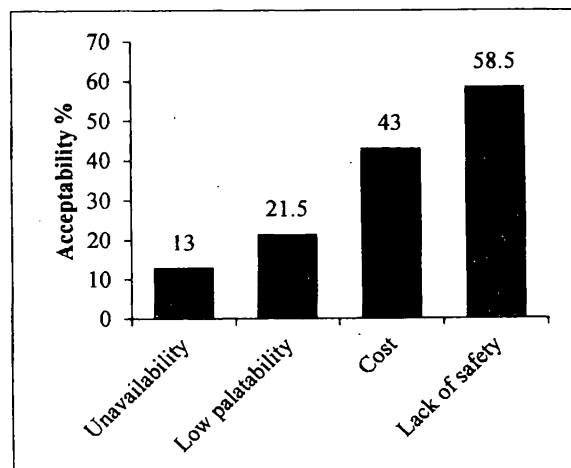


Figure 3. Limitations for the purchase of processed fruit product

Table 6. Consumer preference for sweetness, sourness and spiciness when purchasing jam, cordial, ready-to-serve (RTS) drink/fruit nectar

	Jam	Cordial	RTS drink/ Fruit nectar	Pickle	Chutney
Sweetness					
High	2.3	2.27	1.77	-	2.53
Moderate	1.4	1.44	1.68	-	1.36
Low	2.3	2.29	1.95	-	2.11
Sourness					
High	2.7	2.62	2.56	2.33	2.55
Moderate	1.5	1.43	1.48	1.41	1.35
Low	1.9	1.99	2.08	2.26	2.09
Spiciness					
High	-	-	-	2.30	-
Moderate	-	-	-	1.30	-
Low	-	-	-	2.39	-

Maximum averages value- 1 and lowest average value- 3.

CONCLUSIONS

This study revealed that commercial exploitation of the available fruit species in Sri Lanka for processing is low. While entrepreneurs should be encouraged, research on new product development and their physico-chemical properties is a must. Consumers' purchasing decision is mostly based on flavor and price. However, issues in lack of safety prevented consumers from purchasing the

products. Therefore, developing products with no or minimum levels of artificial compounds would promote their consumption.

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