

PRESERVATION AND QUALITY ASPECTS OF SELECTED SRI LANKAN FRUITS

"The international network on preserving safety and nutrition of indigenous fruits and their derivatives"

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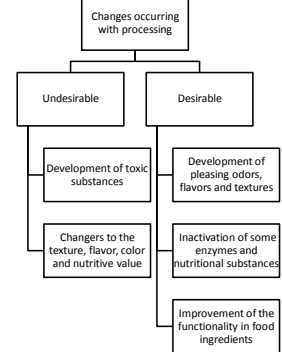
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Introduction



Introduction Contd.

- Lime, Tamarind and Garcinia are some of the seasonal fruits those are traditionally used for cooking in Sri Lanka
- The preservation is mainly done by indigenous methods:
Sun drying, Kiln drying, heating, cooling (chilling & freezing), reduction of water activity by adding common salt, concentration & dehydration
- Lime juice for soft drinks is preserved using preservatives

Introduction Contd.

- The processed products obtained from indigenous preservation methods lead to a poor quality end products
- Therefore, crops are still considered as underutilized crops in Sri Lanka
- The compositional changes with processing have not being studied sufficiently

Importance of fruits

Lime




- Lime is well known for Vitamin C – 29mg/100g (35% of the adult requirement), a powerful water soluble natural anti-oxidant
- However, this Vitamin C content drops sharply in processing
- The fruit is low in calories, 29 cal/100 g, one of the lowest among the citrus group
- Rich in dietary fiber (7.36% of RDA) (Kumari, 2010)
- Lemon is one of the very low glycemic fruits

- Citric acid is present up to 8% in its juice. Citric acid is a natural preservative, aids digestion and it also helps in dissolving kidney stones
- The fruit is also a good source of B-complex vitamins such as pantothenic acid, pyridoxine, and folates (The herbal resource, n.d.)
- Lime also contains a healthy amount of minerals like iron, copper, potassium, and calcium

- In addition, lime extracts and lime essential oils are frequently used in perfumes, cleaning products, and aromatherapy
- However, lime harvesting is limited to 2-3 months, preservation is a must.
- But preserved juice is not processed and available for sale in the country. Surplus is exported as dried lemon
- The maximum storage duration of fresh lime is three months but, lime juice is used almost every day for cooking

Lime processing
Citrus aurantifolia




Drying of Lime

Drying characteristics and energy use efficiency of whole lime (black lime) under different drying conditions has shown changes in rate of drying with the drying temperature (Kumari, 2010)

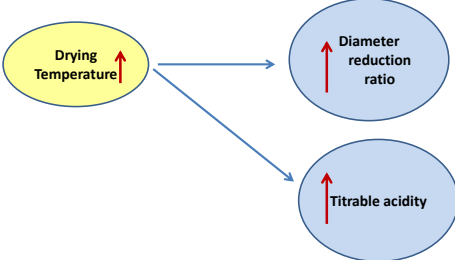
Drying of whole lime

☐ Changes in the equilibrium moisture content with drying temperature as follows



Amaratunga et al., 2003

Experiment for hydrated lime has shown



- Rate of change of color depend on the Drying Time and Drying Temperature
 - Drying Temperature ↑ ↓ Greenness
 - Drying Temperature ↑ ↑ Darkness
 - Fruit initial Moisture ↑ ↑ Rate of change of colour
- Amaratunga et al., 2003

The Lime
Dried at higher temperatures (70 °C and 100 °C) produced black lime
Preferred in Saudi Arabia

The Lime
Dried at lower temperatures (45 °C 60 °C) brownish and lighter in color
Preferred by other Gulf countries

Fresh juice storage

- Fresh lime juice can be frozen and store for 9-12 months without any chemical preservatives.
- The frozen product when packaged properly, can be used daily without off flavours & microbial spoilage.
- However, the Vitamin C content drops drastically during storage. (Dharmasena, 2011)

Tamarind - *Tamarindus Indica*

Importance


Sweet and tangy tamarind is one of the widely used condiments by South Asians

Sticky pulp is a rich source of **non-starch polysaccharide** or dietary fiber such as *gums, hemicelluloses, mucilage, pectin* and *tannins*

100 g of fruit pulp provides 5.1 or over 13% of dietary fiber requirement

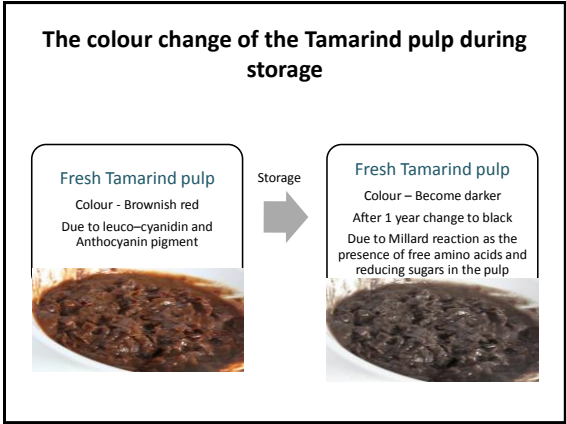
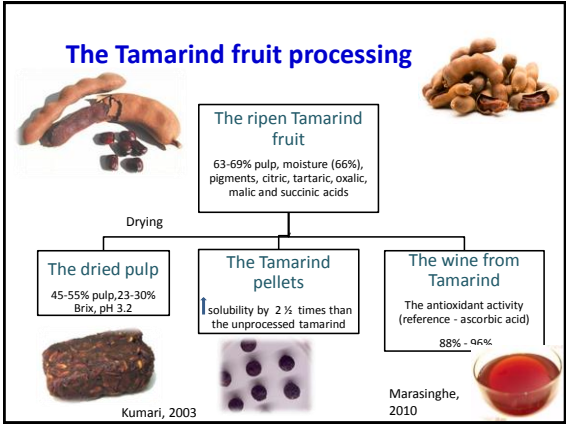
Dietary fiber in the food increases its bulk and bowel movements thereby help prevent constipation

The fiber also binds to toxins in the food thereby help protect the colon mucus membrane from cancer causing chemicals (Shankaracharya, 1998)



- Dietary fibers bind to bile salts (produced from cholesterol) and decrease their re-absorption in the colon; thereby help excretion of "bad" or LDL cholesterol levels from the body
- Tamarind is rich in **tartaric acid** that gives a sour taste to food but is also a very powerful antioxidant (Anti-oxidant E334). It helps body protect from harmful free radicals
- Volatile phytochemicals such as *limonene, geraniol, safrole, cinnamic acid, methyl salicylate, pyrazine* and *alkylthiazoles* account for the medicinal properties of Tamarind (Tamarind nutrition facts, n.d.)

- It is a good source of minerals like copper, potassium, calcium, iron, selenium, zinc and magnesium. Potassium is a component of cell and body fluids that helps control heart rate and blood pressure
- Rich in many vital vitamins including thiamin, vitamin A, folic acid, riboflavin, niacin, vitamin-C that are essential for optimum health (Tamarind nutrition facts, n.d.)
- There is no scientific evidence on nutritional quality after various traditional processing

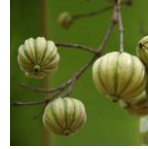


Tamarind processing industry at present

- The main products are salted & sundried pod packed in consumer packages and Tamarind paste
- Tamarind drink is served in some star class hotels
- Farmers collect pods, de-shell, partially dry under Sun and sell them to the collectors at a very low price
- Two food processing companies process a small quantity into paste and sold in the city centers. There profit for the value addition is 100- 300%

Garcinia

Garcinia cambogia



- A fruit - Too acid in fresh
 - Tartaric acid (10.6 %)
 - Reducing sugars (15%)
 - Phosphoric acid (1.52%)
 - Hydroxycitric acid (HCA) is the main bio-active chemical



Importance

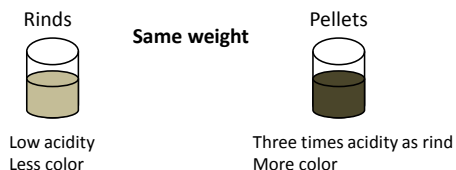
- Hydroxycitric acid or HCA is gaining a reputation for assisting weight loss through appetite suppression and by reducing the body's ability to form adipose (fatty) tissue during times of overeating (believed to be through inhibiting the body's ability to convert carbohydrates to fats) (The herbal resource, n.d.)
- Garcinol is known to lower acidity in the stomach and protects the gastric mucosa, reducing gastric ulcers

- The ability of HCA to reduce blood lipid levels and naturally lower blood cholesterol is another property of this amazing natural medicine
- More recently, it has been proposed that *Garcinia cambogia* has a hepatoprotective ability against external toxins, such as alcohol
- A recent study reported that Garcinia prevented liver cells from becoming fibrotic and stopped cell damage caused by high blood lipid levels (The herbal resource, n.d.)

Garcinia processing

Garcinia pellets

- Variations after boiling in a water bath



Amaratunga et al., 2003

Processing industry at present

- The trees are grown mainly in the home gardens in the wet zone of Sri Lanka
- The well ripen fruits are collected after natural fall and sun dried the rind or sometimes dry in a firewood kiln
- Product is purchased by the collectors and finally goes to the wholesale buyers for distribution
- Recently, a food processing company has introduced the paste to the supermarkets in the cities
- The main use of the dried fruit is for cooking fish

- The famous sour baked fish curry in a clay pot is known as “Colombo curing” or locally called as “Ambul thiyal”. Fish is wrapped with a mixture of Garcinia paste, black pepper & salt (Chillie powder - optional)
- This well known delicacy consumes much of the dried fruit
- In addition, dried rind is added in small quantities in cooking many other dishes as well
- Since the dried rind is very hard and rubbery, making it to a paste is a hard job. Therefore, the demand for processed forms are increasing at village level as well as in cities

- Processing high quality Garcinia products at community based level or under SMEs has a very high market potential
- This will contribute to the rural poverty reduction through livelihood income generation
- High quality products can be exported as organic products through proper networking of organic exporters, Producers & processors

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