

***SPONDIAS DULCIS* L.: AN IMPORTANT ACIDULANT SPECIES IN BAY ISLANDS**

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ABSTRACT

Souring agents are one of the important constituents of many vegetarian and non-vegetarian Indian cuisines. *Amra* is one of the popular underutilized species in the Bay Islands, which is commonly used as an acidulant and as salad by the island dwellers. During present study, physicochemical parameters were assessed in the mature green fruits grown in the island conditions. Results revealed that fruit pulp had 8.32 °B total soluble solids, acidic pH of 3.54, titratable acidity of 0.38 % (citric acid equivalent), ascorbic acid of 35.49 mg/100g and 108 mg/ 100 g GAE of total phenolic content. Fruits could be processed into different products and the species could be popularized as a component of homestead gardens in other regions as well.

Keywords: Home garden, souring plant, tropical islands

INTRODUCTION

Tropical Andaman and Nicobar Islands (ANI) in the Bay of Bengal, India are known to harbor rich diversity of agri-horticultural crops, including both native and introduced species (Singh *et al.*, 2016). The region has a confluence of flora from major biodiversity hotspots and species of Indian, Malayan, Thai, Burmese and Indonesian origin have been reported from these islands, with high degree of endemism (Pandey & Diwakar, 2008). The islands also hold considerable diversity in terms of ethnicity as six aboriginal tribes and settler communities from various parts of the country including Bengali, Tamil, Telugu, Malayali, Ranchi etc. are present in the islands. Being situated away from the mainland India, sustainable utilization of locally available resources is a viable option to meet the nutritional requirement of the local people and reduce dependence on mainland supplies. Underutilized fruits are amongst the most important groups of horticultural crops, which are known

to contribute in the nutritional and livelihood security of the island dwellers and native tribes (Singh *et al.*, 2012).

Spondias dulcis L. (syn. *S. cytherea*) is one such Polynesian tree species of Anacardiaceae family, which has been reported to occur in wild as well as homestead gardens of ANI (Singh *et al.*, 2002). It is commonly known as *amra* in local languages. Both mature unripe and ripe fruits are sold in the local markets (Figure 1) during July- August and ethnic communities use them for variety of purpose. Present report concerned documentation of morphological and biochemical parameters, and uses of the fruits of *S. dulcis* grown in the tropical ANI.

MATERIALS AND METHODS

Fully mature unripe fruits of *S. dulcis* (Figure 2) were purchased from the weekly vegetable and fruit market from Junglighat, South Andaman, India. These fruits were collected from the local homestead gardens and brought for

sale by the vendors. Observations on various morphological parameters were recorded following standard procedures. For dry matter content determination, known quantities of pulp and peel tissues were dried in oven till constant weight was obtained and dry matter content (%) was determined as $DM = \frac{\text{final weight of sample}}{\text{initial weight of sample}} \times 100$. Total soluble solids and pH were determined using digital refractometer (Atago, Japan) and digital pH meter (Hanna, USA), respectively. For determining titratable acidity (% FW) of the pulp, extracts were titrated against NaOH (0.1 N) using phenolphthalein as indicator. Parameters such as ascorbic acid (mg/100g, FW) and total phenolic content (mg/100 g Gallic Acid Equivalent, FW) were determined using standard procedures (Sadasivam & Manickam, 2008).

RESULTS AND DISCUSSION

Various morphological parameters of fruits have been presented in Table 1. Fruits were ovoid and polar length varied between 7.30 and 9.20 cm, while mean polar circumference was 16.71 cm. Equatorial length and circumference were found to be 8.71 and 14.93 cm, respectively. Each fruit weighed between 61.45 and 90.88 g with a mean weight of 73.74 g. Fruits grown under French West Indies conditions have been reported to be comparatively heavier with average weight of 115 g (Franquin *et al.*, 2005). About 68% pulp recovery was obtained from the fruit, which is the economic portion of the fruit. Each fruit had single spiny stone (5.93 g), which was difficult to separate from the pulp. Peel was 1.67 mm thick at green mature stage, which decreased

during ripening. On an average, dry matter content of pulp was found to be 16.29 %, while that of peel was 18.86%.

Biochemical parameters of *amra* fruits grown in islands are presented in Table 2. In green mature fruits grown in ANI, total soluble solids were found to be 8.32 °B with acidic pH of 3.54 and titratable acidity of 0.38 % (citric acid equivalent). Fruits are crispy and are consumed fresh after peeling as such or along with salt by almost all the settler communities and Nicobarese tribe. Fruits had 35.49 mg/100g of ascorbic acid content, which is easily available to the consumers especially when used in raw form. Further, about 108 mg/ 100 g GAE of total phenolic content was recorded in the pulp. Earlier report suggested that fruits grown in French West Indies had higher TSS, titratable acidity, ascorbic acid and total phenolic content (Franquin *et al.*, 2005) than those recorded during present study probably because of variation in the genotype and agro-climatic conditions.

Conventionally, mature fruits are utilized as souring agent in preparation of various dishes by Bengali and Tamil communities. Unripe fruits are added in the fish and vegetable curries to impart sourness. Generally, it is employed in preparations requiring mild sourness, wherein strong acidulants are not preferred. Further it is also used in the preparation of chutneys and pickles. Fruits have potential for value addition in the form of pickles, jelly, marmalade etc. (Singh *et al.*, 2002). As the species is known to tolerate variety of soils (Singh *et al.*, 2012), it could be easily domesticated (Singh *et al.*, 2016) and hence could be promoted for cultivation in home gardens. It could not only help in getting produce for family

consumption but also help in getting additional benefits from sale. Apart from *amra*, fruits of *Garcinia cowa* Roxb. ex DC, *G. xanthochymus* Hook f. & Thom.,

Elaeagnus latifolia Linn. and *Baccaurea ramiflora* Lour. have been reported to be used as souring agents in the Bay Islands (Ellis, 1990).

Table 1: Morphological parameters of mature fruits of *amra* (*Spondias dulcis*)

Parameter	Range	Mean \pm SEM
Polar length (cm)	7.30- 9.20	8.06 \pm 0.185
Polar circumference (cm)	15.70-18.30	16.71 \pm 0.251
Equatorial length (cm)	8.10-9.50	8.71 \pm 0.172
Equatorial circumference (cm)	14.10-15.90	14.93 \pm 0.213
Fruit weight (g)	61.45- 90.88	73.738 \pm 3.295
Pulp weight (g)	35.87- 65.71	48.01 \pm 4.909
Pulp (%)	51.35 – 77.46	67.99 \pm 4.502
Peel thickness (mm)	1.43 - 1.86	1.67 \pm 0.087
Peel weight (g)	9.51- 20.67	13.09 \pm 2.036
Seed weight (g)	5.04 -6.88	5.93 \pm 0.300
Dry matter content of pulp (%)	15.89- 16.50	16.29 \pm 0.200
Dry matter content of peel (%)	18.26- 19.31	18.86 \pm 0.311

Table 2: Biochemical parameters of mature fruits of *amra* (*Spondias dulcis*)

Parameter	Mean \pm SEM
Total soluble solids	8.32 \pm 0.427
pH	3.54 \pm 0.027
Titrateable acidity (%)	0.38 \pm 0.000
Ascorbic acid (mg/100g)	35.49 \pm 3.225
Total phenolic content (mg/ 100 g GAE)	108.14 \pm 4.055



Figure 1: Mature unripe (left side) and ripe (inside the crate) fruits of *amra* being sold in a local market at South Andaman Island.



Figure 2: Whole and cut open fruit of *amra*

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