Adding value of local food culture: Aroi-aroi - A Relative of the Queen of the fruit

Aroi-aroi or Garcinia forbesii King, is a relative of the ‘Queen of Fruit’ the mangosteen (Garcinia mangostana). This underutilised fruit species is quite unheard of compared to its economically popular cousin. In the olden times, aroi-aroi trees grew copiously being part of the Malaysian diet and for their known curative properties. Sadly, they have become less popular and utilised as younger generations tend to rely on cash crops and modern medicines. Under the UNEP/GEF project “Conservation and sustainable use of cultivated and wild tropical fruit diversity: Promoting sustainable livelihoods, food security and ecosystem services,” attention was redrawn on the importance of aroi-aroi as a nutrition source and in providing livelihoods to many rural households. The project also illustrated good practices and practical examples of the successful use and maintenance of the fruit and its market potential.

Get to know more of Aroi-Aroi
Aroi-aroi commonly grows along the west coast of the Malaysian state Sabah, as wild species in the lowland forests in the foothills of the Crocker Range and as semi-wild or cultivated fruit trees in home gardens and orchards of Papar district. According to Salleh bin Sawal, a farmer and staunch promoter of aroi-aroi, three landraces can be found locally: Aroi Batu, Aroi Tulen and Aroi Jambu. Aroi Batu, which literally means ‘stone’ (Batu), is used mostly for its hard rind that has a distinctly sour taste. The processed rind condiment is usually mixed with fish or local dishes like curries (e.g. Kari Ikan) or soup (e.g. Assam Laksa) to give a sour flavour. Aroi Tulen and Aroi Jambu serve as cleaning agents especially for metals such as bronze or silver. The metal object can be simply left overnight soaked on water with fresh rinds to bring back the original luster. All these three varieties have medicinal properties. Dried rinds soaked in water become swelled and is boiled into a concoction which is used to treat coughs or minor stomach ailments or even to help women recover after childbirth. The woman normally drinks the water believed to have properties aiding in shrinking the womb.

Postharvest handling
Aroi-aroi rinds are marketed in dry form at farm gate price ranging from RM 15.00 (US$ 5) to RM 25.00 (US$ 8). Two entrepreneurial farmers, Mr. Salleh bin Sawal and Mr. Meon bin Gimbul, have ventured into drying rinds for income source. But they do this in the traditional way. Under the current UNEP/GEF Project, the Department of Agriculture Sabah plans to introduce a simple solar dryer for small-scale processing to the two farmers with the hope of improving the quality of the final product. With the use of solar dryer, the rinds would be drier, less mouldy and shelf-life would be longer resulting in more quality end product. Also, losses due to unfavourable weather conditions during the drying process would be reduced. This would especially be helpful with the recent increase in the demand for aroi-aroi rinds. Upon knowing about the project and the potential benefits that could be gained from it, other farmers have shown interest to cultivate the
fruit species. Currently, Mr. Wong and the farmers are exploring and testing the best techniques that would ensure quality produce with the least investment cost. Mr. Wong also stresses that more scientific research, particularly on the nutrition and health aspects, are required to determine other value adding products that can be produced from aroi-aroi, for specific consumer needs.

**Diversity conservation**

The past decade saw a surge in similar ‘re-discovered and re-invented’ products based on traditional knowledge (TK), especially those on health and nutrition. Dr. Salma Idris, the National Project Coordinator and Senior Scientist in plant diversity at the Malaysian Agricultural Research and Development Institute (MARDI), explains that the potential for small-scale processing and income generation of the three landraces, based on their distinct uses and market preferences, will help maintain their diversity. Not much research has so far been done on the genetic diversity of *G. forbesii*. The species *G. forbesii* is originally a dioecious species, having male and female trees, which are normally characterised by high levels of genetic diversity. However, almost all aroi-aroi trees that have been found in the Papar district are female. “Some male trees may exist but not in the area,” confirms Mr. Wong. Most seeds from Aroi-Aroi are apomorphic (does not involve fusion of male and female gametes) and produce trees that are clones of the female parent, thus, limiting the genetic diversity within its population. Dr. Idris explains however that “farmers could distinguish three distinct varieties or forms of aroi-aroi, indicative of some genetic diversity apparent within this species. This is quite interesting as this is not common within other *Garcinia* species.”

‘Aroi-Aroi’ cultivation is mainly for domestic use and consumption. Older generations have played a vital role in keeping the cultivation of this crop and in passing on traditional knowledge for generations. But due to its limited use and value, younger generations have lost interest in growing the fruit. Recently, interest has emerged among farmers as they have started to raise aroi-aroi seedlings for replanting in their own gardens and to share with other families who want to plant the crop. In doing so, a steady and adequate production volume can be met to supply the local demand and product innovations, leading to increased income and improved livelihoods among fruit farmers and rural households.

Inter-species diversity is also enhanced through continued use and planting of aroi-aroi trees, alongside mangoes, the major cash crop that is widely grown in home gardens and orchards in this region. This will improve inter-specific richness and evenness in the area and strengthen the use and maintenance of multi-species home gardens rendering farmers more resilient against external shocks like volatile prices and changing weather and climatic conditions. Besides conserving valuable genetic resources, multi-species gardens support important ecosystem services like the provision of food for animals and birds and canopy cover to improve microclimates and give shade to other species.

Clearly, through local exchange of genetic material, traditional knowledge and innovative adaptations, farmers and researchers have been able to promote sustainable agriculture, conserve rare and localised varieties and enhance food and nutrition security. This story from the field showcases a practical example that has been identified as one of the good practices for scaling up under the UNEP/GEF project.

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*Photo credit:* S Idris, William Wong and Bhuvon Shapit
*Designed by:* Ambika Thapa, Biiversity International

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A researcher from MARDI, Ms. Mirfat bt. Hj. Ahmad Hasan Salahuddin, did a study which estimates the levels of vitamins, minerals and antioxidants of the aroi-aroi skin and flesh. Research results revealed that aroi-aroi flesh has higher free radical scavenging activity (FRSA) (compared to that of red apple with an IC50 value of 47.34 mg/mL. Free radical scavenging assay is the oldest indirect method that measures antioxidant activity of the corresponding fruit extracts. Antioxidants are widely used in dietary supplements and have been investigated for their prevention of diseases such as cancer, coronary heart disease and even altitude sickness and considered very high value traits. Also, it showed a slightly higher antioxidant activity (52.8%) compared to red apple (51.1%). This antioxidant activity may be attributed to the presence of antioxidant compounds, phenolic and vitamin C. The antioxidant activity was observed to increase with vitamin C content. The fruit was also found to contain higher vitamin C level compared to apples, though, still relatively low at 20 mg/100g. The presence of calcium of about 170 mg/100g in the flesh and 260 mg/100g in the aroi-aroi skin suggested that it is a good source of calcium.