

Underutilized Fruit Species Conservation in Malaysia

Noorlidawati Ab Halim and Nik Rozana Nik Mohd Masdek
Economic and Social Science Research Centre
Malaysian Agricultural Research and Development Institute
Persiaran MARDI-UPM, 43400 Serdang, Selangor, Malaysia

Email: noorlida@mardi.gov.my

Introduction

Malaysia has an ideal climate for the growth of various varieties of fruits, besides being rich with a diversity of genetic resources. Most of these fruits are grown to tap into its high commercial value, either for direct consumption or for processing. Fruit species can be categorized in terms of its plant status, potential use and popularity. Generally, more than 370 species of fruits can be found in Malaysia and 16 species are classified as primary fruits, while the rest are new or rare fruits, which also referred to as underutilized fruit species. Some examples of underutilized fruits in Malaysia are *Mangifera ceasia* (locally known as 'binjai'), *Phyllanthus* (cermai), *Garcinia atroviridis* (asam gelugor), *Mangifera odorata* (kuini) and *Pithecellobium jiringa* (jering). Most underutilized fruits are left within semi-wild conditions without any proper care. These fruit trees are mostly found in the village, for example in yards, in small orchards along with other fruit trees, or at the edge of the forest. Underutilized fruit trees are potentially commercialized as it contains high levels of nutrients and suitable to be eaten fresh or processed (Rukayah, 2001). It is worth to pay attention to the exploration and exploitation of these new sources of fruits to increase its economic value, and to ensure an optimal use of diversity of local resources. Production of these fruits can be commercialized to increase the income and living standard of the growers. The value of these rare fruit species which have not been exploited can provide many economic benefits to the growers' livelihood. Therefore, conservation efforts for these indigenous fruits, combined with proper management could provide practical alternatives in the collection of traditional underutilized varieties of these rare fruit species, to provide diversification in agriculture production.

Underutilized fruit species

Underutilized fruit species are scattered around the country. These fruits have their own specialty and uniqueness. Many of these fruit species have not been fully exploited and no proper documentation on the status and distribution of them are done in the country. Raziah *et al.* (2008a) stated that there are ten rare fruit species (see Appendix 1) which have been identified as having the potential to be grown and can generate high income to the growers. Among the potential uses of these fruits aside from being eaten fresh, are that they can also be processed to add value, be used as salads and dressings, as a vitamin or food supplement, a source of medicinal value when other parts of the plant are utilized including the flower, bud, leaf or root, and for landscaping purposes. Table 1 presents the fruit distribution data for major fruit species, and other fruits (including new, rare and wild fruits).

Table 1. Fruit distribution; planted, harvested and production, Malaysia, 2015

State	Fruit	Planted area (ha)	Harvested area (ha)	Production
Peninsular Malaysia	Major	145,196.0	112,160.3	1,262,319.6
	Others	2,617.0	2,219.9	27,556.5
	Total	147,813.0	114,380.2	1,289,876.1
East Malaysia	Major	49,133.1	31,515.9	289,373.5
	Others	2,762.7	1,812.0	10,021.9
	Total	51,895.8	33,327.9	299,395.4
Malaysia	Major	194,329.1	143,676.2	1,551,693.1
	Others	5,379.7	4,031.9	37,578.4
	Total	199,708.8	147,708.1	1,589,271.5

Source: DOA, 2016

Underutilized fruit species are mostly grown in the hamlet tradition, around the house (normally outside the gate or in the backyard), or in semi-wild conditions in the villages. However, these fruit trees are seen as decreasing because many areas have been used for housing areas and other developments. Thus, conservation and collection of genetic resources are important to ensure that the source of new genetic fruits is sustained. Government through the National Agro-Food Policy (2011-2020) developed strategies to promote the fruits industry by exploiting the potential of underutilized fruits that have received less attention, through: i) build up R&D to develop new varieties and improve existing varieties including plant resistance to disease; ii) strengthen the conservation of underutilized fruit for *in-situ* and *ex-situ*; and iii) reinforce the use of underutilized fruits functionality through ethno botanical and biochemistry studies.

A study by Raziah, *et al.* (2008b), found that most of the growers surveyed were understood and had the awareness about the importance of conservation of biological plant diversity. They were ready to contribute more to any conservation efforts and programs undertaken by either government or private organizations. A selection by Malaysian Agricultural Research and Development Institute (MARDI) and promotion by Department of Agriculture (DOA) can be made for underutilized fruits that have potential commercial value, as a reference or for research purpose. Conservation of underutilized fruits can be carried out continuously in several ways in the village, forest or places that have been identified as having a wide variety of plant species.

Strategies for enhancing farm conservation for underutilized fruits

Assessment of the diversity of different crops is considered important for conservation to take place. Recently, there has been some research conducted as an initiative to re-collect and maintain these species. These efforts provide great assistance towards the conservation of underutilized fruits. Considering the constraints and issues faced by the growers in conserving the underutilized fruit trees, there are strategies that could be implemented to enhance farm conservation and utilization such as:

- i. Collecting original, rare and wild fruit species in Arboretum for research or educational uses;
- ii. Planting rare fruit species with a large canopy in recreational parks or forests;
- iii. Encourage the planting of these species in small plots in the house. For example each household can plant one or two species;
- iv. Train selected farmers on the management of underutilized fruit trees, pest management, and other needed skills. Encourage them to plant new superior varieties, and provide incentives to support poor farmers, as planting initiatives;

- v. Promote market for fruit landraces by strengthening the network between producers, traders and consumers;
- vi. Plant species of underutilized fruits as an element of the landscape in schools, institutions of higher learning, playgrounds, hotels, etc;
- vii. Plant suitable species in cities as street trees, for example on the divider areas or by the roadside;
- viii. Ensure the existence of species by restoring these trees. Explore the possibility of processing underutilized fruits into products;
- ix. For almost-extinct trees, special care should be made to prevent extinction. Impose fines for any individuals who are caught cutting or damaging the underutilized fruit trees;
- x. Disseminate information to increase public awareness about the existence of this species of fruits and their nutritional content; and
- xi. Enhance of R&D activities on the collection, conservation and utilization of underutilized fruits to promote the fruits industry.

CONCLUSION

The underutilized fruits are very important for environmental conservation, socio-economic contribution as well as the development of the overall economy. However, this industry was abundant and left behind without government incentives for many years. Further research and development on the conservation and utilization should be carried out towards improving the usefulness of underutilized fruit species by understanding the richness of species' diversity, and to ensure the sustainability of this species on farm. Besides that, on farm conservation for these home-grown fruits, if given proper management, could provide practical alternatives in collecting traditional underutilized varieties of these rare fruit species, to assist and complement the collection done by institutional organizations. Support and involvement of institutional users or agencies in the development of new fruit management is seen as capable to ensure the sustainability of this fruit species. Intervention and strategies proposed for the conservation and utilization of these fruits hopefully could increase the livelihood of the growers' community especially in the rural areas. The conservation and sustainability of these fruit species are also important to ensure that the future generations will continue to exploit their benefits in the future.

REFERENCES

- DOA. (2016). Fruit Crop Statistics 2015, Department of Agriculture, Ministry of Agriculture and Agro-based Industry, Malaysia. Retrieve from www.doa.gov.my on 1st Jun 2016
- MOA. (2016). National Agro-Food Policy (2011-2020). Ministry of Agriculture and Agro-based Industry, Malaysia.
- Raziah. M.L., Alam. A.R., Salma. I., A.Rahman. M., Kadajah. A., Ariffin. T. (2008a) Socio-economic dimensions on conservation and utilization of tradisional fruit species diversity in home gardens and orchards in Peninsular Malaysia, MARDI Report No. 208 (2008)
- Raziah. M.L., Engku Elini. E.A., Alam. A. (2008b) Economic valuation of agro-biodiversity: Willingness to pay (WTP) for conservation of rare fruits species in Malaysia. Economic and Technology Management Review. Vol. 3 (2008): 13-22
- Rukayah. A. (2001). Buah-buahan Nadir Semenanjung Malaysia. Second Edition. Dewan Bahasa dan Pustaka.

Appendix 1

List of other (minor) fruit crops by local, English and botanical names

Local Name	English Name	Botanical Name
Abiu	(Abiu)	<i>Pouteria caimito</i>
Anggur	Grape	<i>Vitis Vinifera</i>
Asam gelugor	(Asam gelugor)	<i>Garcinia atroviridis</i> Griff.
Avocado	(Avocado)	<i>Persea Americana</i>
Bacang	Horse Mango	<i>Mangifera foetida</i> Lour
Bambangan	Johey Oak	<i>Magnifera Panjang</i>
Berangan	Chestnut	<i>Castanea</i>
Belimbing Buluh	(Belimbing Buluh)	<i>Cucumber Tree</i>
Belimbing Hutan	(Belimbing Hutan)	<i>Baccaurea Angulata</i>
Belunu	Horse Mango	<i>Magnifera foetia</i> Lour
Bidara Siam	(Bidara Siam)	<i>Jujube</i>
Binjai	Malaysia Mango	<i>Mangifera caesia</i>
Cermai	(Cermai)	<i>Phyllanthus</i>
Dabai	(Dabai)	<i>Canarium odontophyllum</i>
Durian Belanda	Sour-sop	<i>Annona muricata</i> L.
Gajus	Cashew	<i>Anacardium occidentale</i> L.
Jambu Air	Water Rose Apple	<i>Eugenia aquea</i> Burm. F.
Jambu Air Madu	Wax Apple	<i>Syzygium samarangence</i>
Jambu Air Mawar	Water Rose Apple	<i>Eugenia aquea</i> Burm. F.
Jambu Bol	Malacca Jambu	<i>Eugenia malaccensis</i> L.
Jering	(Jering)	<i>Pithecellobium jiringa</i> Prain.
Kabung/Enau	(Kabung/Enau)	<i>Arenga pinnata</i>
Kedondong/Amra	(Kedondong)	<i>Spondias pinnata</i>
Kepayang	(Kepayang)	<i>Pangium Edulele</i>
Kelubi	(Kelubi)	<i>Salacca</i>
Kuini	(Kuini)	<i>Mangifera odorata</i> Griff.
Kundang	(Kundang)	<i>Bouea macrophylla</i> Griff.
Longan	(Longan)	<i>Nephelium longana</i> Camb.
Markisa	Passion Fruit	<i>Passiflora edulis</i>
Mata Kucing	Cat's Eye	<i>Nephelium malaiense</i> Griff.
Mentega	Butter Fruit	<i>Diospyros blancoi</i>
Mesta	(Mesta)	<i>Nephelium sp.</i>
Nam-Nam	(Nam-Nam)	<i>Cynometra</i>
Nona Srikaya	Sweet-Sop	<i>Annona squamosa</i>
Nona Kapri	Custard Apple	<i>Annona reticulate</i>
Petai	(Petai)	<i>Parkia speciosa</i> Hassle.
Pisang Kaki	Persimmon	<i>Diospyros kaki</i> Linn.
Pulasan	(Pulasan)	<i>Nephelium ramboutan</i> Leenth.
Rambai	(Rambai)	<i>Baccaurea motleyana</i> Muell
Salak	(Salak)	<i>Salacca edulis</i> Reinw.
Sentol	(Sentol)	<i>Sandoricum koetjape</i> (Burm.)
Sukun	(Sukun)	<i>Artocarpus altilis</i> Fosberg
Tarap	(Tarap)	<i>Ertocarpus Odoratissairmus</i>

Date submitted: Sept. 9, 2016

Reviewed, edited and uploaded: Sept. 9, 2016