

Wild Mangoes – An Incredible Wealth for Posterity

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Abstract

For an inquisitive mind, the transformation of the name *amra* to mango is as interesting as the transition of the fruit from the Himalayan foothills to the far corners of South America. Mango (*Mangifera indica*) itself comes in literally thousands of varieties with every wild plant bearing its characteristically featured fruits. The fruits come in a wide array of sizes, colours, pulp features and tastes. This diversity of mango fruits ultimately climaxes into a much higher culinary diversity and numerous end uses including medicinal ones. Mango (*Mangifera indica*) originated in north-eastern India, the Indo-Myanmar border region, and Bangladesh, where it is still found as a wild tree with very small fruits. It is also observed in the lower Himalayan tract, near Nepal, Bhutan, and Sikkim. Globally more than 60 species were listed showing the highest diversity in the heart of the distribution area of the genus *Mangifera*, i.e., the Malayan Peninsula, Borneo, and Sumatra. Mango has been under cultivation for at least 4,000 years with over 1,000 varieties under cultivation. Most of these varieties were evolved as selections made from open-pollinated mango seedlings. Wealth of these wild mango varieties could be an incredible source of germplasm for evolving new varieties for the posterity. The present article performs a short tour in this mango wilderness through national and international literature for the enthusiastic students, researchers and farmers.

Key words: Mango, wild, wealth, posterity

Introduction

Mango with its many species has its own natural biodiversity. Species, *Mangifera indica* is commercially cultivated. Among the other species, the occurrence of *Mangifera sylvatica* in the north-eastern parts of India or *Mangifera andamanica* in the Andaman group of islands is worth-mentioning. Variability of this dimension of mango results from the chance seedlings and seed propagation either by natural elements (seed dispersion) or anthropologically over a long period (Figure 1). This demands preservation of these wild mango species for posterity.

Mango: The Name

The name “Mango” came through various transitions. It originated in the wild in India’s foothill forests. Since Sanskrit language was predominant, it came to be known as “*aamra-phalam*”, which after evolution of the Hindi language became “*aam-phal*”. When it travelled from its homeland to the southern parts of India, it became “*aam – kaay*”. *Kaay* in Tamil being synonym of *phal* gradually became “*maamkaay*”. People in Kerala changed it further to “*maanga*.” When the Portuguese arrived in Cochin, they were charmed by this fruit and called it “*manga*” which the British included in their vocabulary as “mango”. And this is now

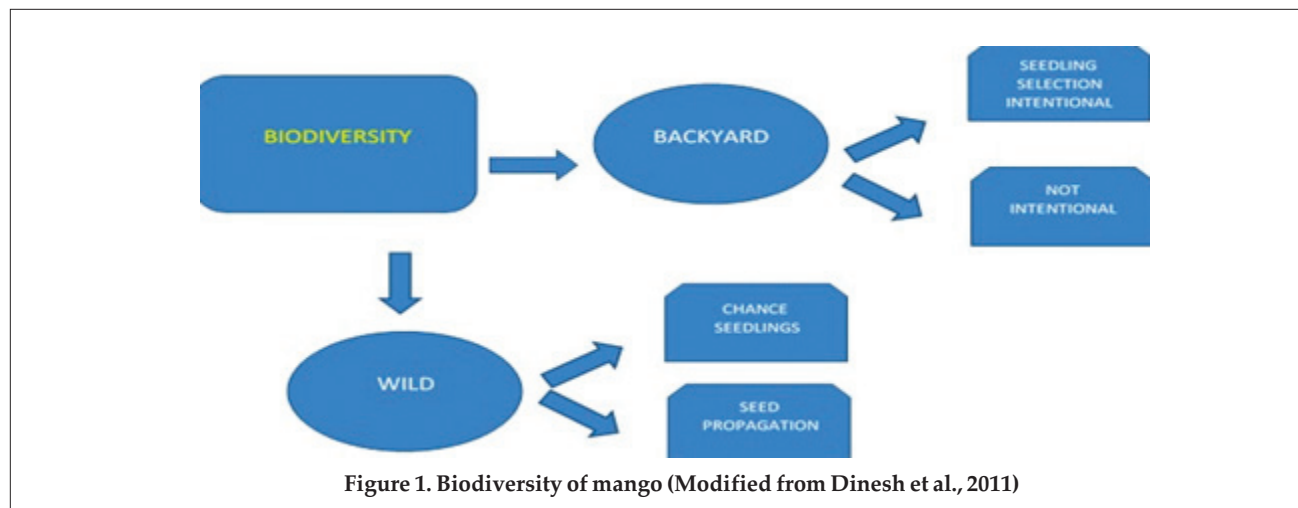


Figure 1. Biodiversity of mango (Modified from Dinesh et al., 2011)

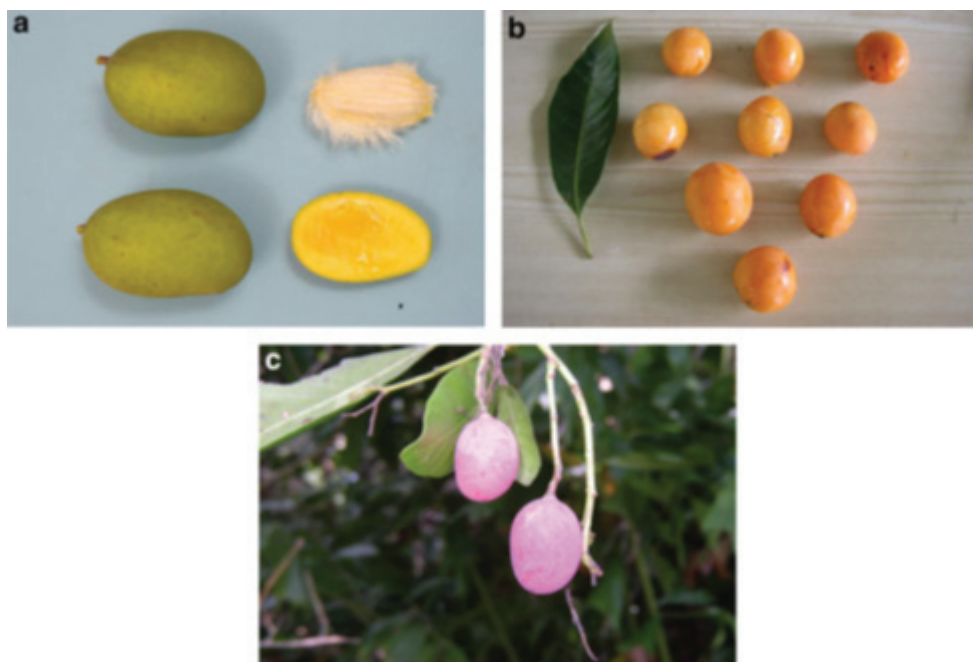


Figure 5. Diversity in wild mango species. (a) *Mangifera odorata*, (b) *Mangifera andamanica* and (c) *Mangifera griffithii*
(Source : Dinesh et al., 2011)

consumes most of its own mango production (Anonymous, 2018b).

There are 73 genera and 1,000 species of mango. The edible fruits are produced by 27 species of the genus. Wild mangoes are potentially valuable for the breeding programmes. Some species (for example, *Euantherae* and *M. pentandra*) carry horticultural importance. India is still maintaining genetic diversity of wild mango due to a large geographical area, and diverse climatic conditions (Figure 4) in spite of wild mangoes being considered as vulnerable to extinction. The fruits of wild species including *M. andamanica*, *M. camptosperma*, *M. griffithii*, and *M. nicobarica* are eaten by the tribes of Andaman (Figure 5). Mango was gradually spread to other parts of the globe (Tables 1, 2).

Edible wild bush mangoes (*Irvingia gabonensis* Engl and *Irvingia wombolu* Vermoesen), identified by the International Centre for Research in Agroforestry, are considered as the priority wild fruit tree species for domestication to produce edible fruits and seeds (Ladipo et al., 1995; Adebayo-Tayo et al., 2006). In Cameroon, these wild tall mango trees (~ 50 m high and 2½ m in diameter), with grey-coloured bark, are identified (Table 3). *Irvingia gabonensis* is “sweet” and the other has a bitter “skin” (*I. wombolu*). “Andok”, the powder prepared from these species, provides energy, macronutrients, calcium, and iron. Fruit of *I. gabonensis* weighs about 200 g, while the *I. wombolu* weighs about 85 g when harvested. Both varieties do not produce

fruits during the same season. *Irvingia gabonensis* produces fruits from June to August, while *I. wombolu* produces during January to March. In the search for the ancestors of the mango (*Mangifera laurina*), kuini (*Mangifera odorata*), bembangan (*Mangifera pajang*), bachang (*Mangifera foetida*) and the white mango (*Mangifera caesia*) were identified. These wild mangoes still dominate the remnant forests in some places in Asia, Indonesia and Malaysia and are present in some home gardens in these regions.

There are total 72 species of genus *Mangifera*. Most of them are now surviving in the rain forests of Malaysia and Indonesia (Figure 6). Apart from the widely cultivated mango *Mangifera indica*, there are other species cultivated for fresh fruits to a limited extent (For example: *M. sylvatica* Roxb. in Andaman, Nepal and Eastern Himalayas; *M. foetida* Lour, *M. caesia* Jack in Malaysia, Philippines and Indonesia; and *M. odorata* Griff. in Malaysia and Philippines) (Singh et al., 2016). Evidence of how the mangoes travelled from its home turf is not well documented. It is based on traveler’s tale, Chinese traveler Hu En Sung, Marco Polo, Babar and of course authenticated records kept in the Moghul annuals (Figure 7).

Wild Mangoes: Need for their Conservation

There is a great interest and necessity to preserve the wild mangoes globally through efforts of collecting them, planting them in orchards or botanical gardens and to carry out information campaign to keep them conserved in the wild. Efforts to preserve these unique

Table 2. Different mango species and their distribution in Asia

Countries	Mango species
Andaman Island (India)	<i>Mangifera andamanica</i> King
Assam	<i>Mangifera khasiana</i> Pierre
Banda Island	<i>Mangifera rumphii</i> Pierre
Borneo	<i>Mangifera spathulaefolia</i> Bl.
Burma, Malaya, Indochina	<i>Mangifera pentandra</i> Hook. f.
Burma, Malaya, Sunda Archipelago, Philippines	<i>Mangifera longipes</i> Griff.
Burma, Siam	<i>Mangifera caloneura</i> Kz.
Burma, Siam, Cochinchina, Sumatra	<i>Mangifera camptosperma</i> Pierre
Ceylon	<i>Mangifera zeylanica</i> Hook. f.
Cochinchina	<i>Mangifera cochinchinensis</i> Engl.
Cochinchina, Siam	<i>Mangifera Mangifera duperreana</i> Pierre
India, Burma, Indochina	<i>Mangifera sylvatica</i> Roxb.
Java	<i>Mangifera gedebe</i> Miq.
Malacca	<i>Mangifera gracilipes</i> Hook. f.
Malacca, Siam, Indochina	<i>Mangifera oblongifolia</i> Hook. f.
Malacca, Sumatra, Java	<i>Mangifera caesia</i> Jack.
Malay, Sumatra, Borneo	<i>Mangifera quadrifida</i> Jack.
Malaya	a. <i>Mangifera foetida</i> Lour. , b. <i>Mangifera griffithii</i> Hook. f., c. <i>Mangifera lanceolata</i> Ridl., d. <i>Mangifera longipetiolata</i> King, e. <i>Mangifera maingayi</i> Hook. f., f. <i>Mangifera microphylla</i> Griff. ex Hook. f., g. <i>Mangifera sclerophylla</i> Hook. f., h. <i>Mangifera superba</i> Hook. f.
Malaya Peninsula and Archipelago	<i>Mangifera kemanga</i> Bl.
Malaya, Philippines	<i>Mangifera odorata</i> Griff.
Malaya, Sunda Archipelago, Anambas Island, Indochina	<i>Mangifera macrocarpa</i> Bl.
Malaya, Sunda Archipelago, Philippines	<i>Mangifera caesia</i> Jack.
New Guinea, Celebes, Solomon Island	<i>Mangifera minor</i> Bl.
Philippines	a. <i>Mangifera altissima</i> Blanco , b. <i>Mangifera merillii</i> sp. nov., c. <i>Mangifera monandra</i> Merr., d. <i>Mangifera philippinensis</i> sp. nov.,
Sarawak	<i>Mangifera beccarii</i> Ridl.
Sarawak	<i>Mangifera havilandi</i> Ridl.
Siam	<i>Mangifera siamensis</i> Warbg ex Craib
Siam, Malaya, Sumatra	<i>Mangifera lagenifera</i> Griff.
Sumatra	<i>Mangifera rigida</i> Bl.
Sumatra, Java	<i>Mangifera similes</i> Bl.
Timor, Banda, Sumatra	<i>Mangifera timorensis</i> Bl.
Tropics of old world	<i>Mangifera indica</i> Linn.

Source: Mukherjee (1948); Dinesh et al. (2011)

Table 3. Characteristics of two different wild mangoes

Characteristics	<i>Irvingia gabonensis</i> Engl*	<i>Irvingia wombolu</i> Vermeesen**
Common name	Wild mango, African mango, bush mango, dika or ogbono	Bitter bush mango, dry season bush mango (En). dika, odika, manguier sauvage, chocolatier, ogbono (Fr)
Tall (m)	40	25-30
Diameter (m)	1.0	0.8
Type	Eating Bush	Cooking Bush
Bark colour	Grey to yellow grey	Grey
Taste	Sweet	Bitter skin
Germination rate (%)	80	80
Geography		
	Bioclimate	Humid forest zone of Cameroon
	Altitude (m)	200–500
MAR (mm)	1200-1500	> 1500
Nutrition	Fat and protein-rich nuts	
Soil***	Depth	Deep
	pH (soil reaction)	4.5-7.5
Use	<ul style="list-style-type: none"> ◆ Consumable fruits fresh, ◆ Preferred for jelly, jam, juice and wine ◆ Black dye for cloth coloration from pulp. 	<ul style="list-style-type: none"> ◆ The seeds are used for making a mucilaginous sauce in cooking ◆ The bark is used in the treatment of diarrhea ◆ Agroforestry
	Nutrition (edible seeds per 100 g)	
	Calorie	697
	Fat (g)	67
	Carbohydrate (g)	15
	Protein (g)	8.54
	Water (g)	4
	Calcium (mg)	120
	Iron (mg)	2.4
Nutrition (edible pulp per 100 g)	Calorie	61
	Fat (g)	0.2
	Carbohydrate (g)	15.7
	Protein (g)	0.9
	Water (g)	81
	Calcium (mg)	20
	Iron (mg)	2
	Phosphorus (mg)	40

*https://en.wikipedia.org/wiki/Irvingia_gabonensis; *<https://www.prota4u.org/database/protav8.asp?g=pe&p=Irvingia+wombolu+Vermeesen> ***http://www.worldagroforestry.org/treedb/AFTPDES/Irvingia_wombolu.PDE; Source: Bhattacharyya et al. (2018)

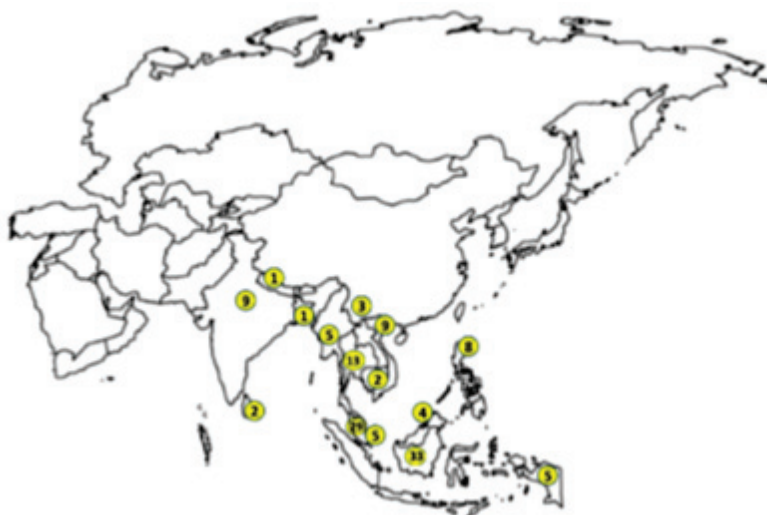


Figure 6. Spatial distribution of seventy-two different wild species of genus *Mangifera* in Asia. The values in circle indicate numbers of wild species growing natural in the respective countries

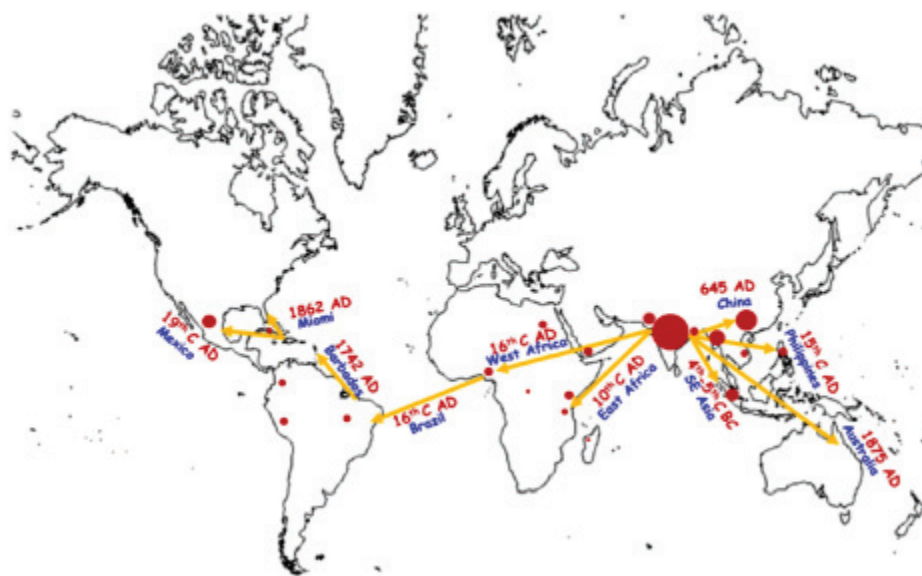


Figure 7. Production volume, represented by area of the circles, in the top twenty mango producing countries and adoption of mango cultivation in different regions of the world over the last 2500 years after its origin and domestication in India

Mangifera spp. and their sister species and genus are essential. These wild varieties are a great source as vegetables, salads, pickles and *chutneys*. These are storehouse of gene pools for evolving future mango varieties with unique qualities like sweetness, flavour and disease resistance. Other qualities like skin colour, shorter ripening period, smoother skin and pulp help breeders to suit these qualities in the new varieties to be evolved. Most importantly, these species possess tremendous endurance to storm and hurricane which is an important criterion for these to survive in the coastal plains and hills. The present commercial

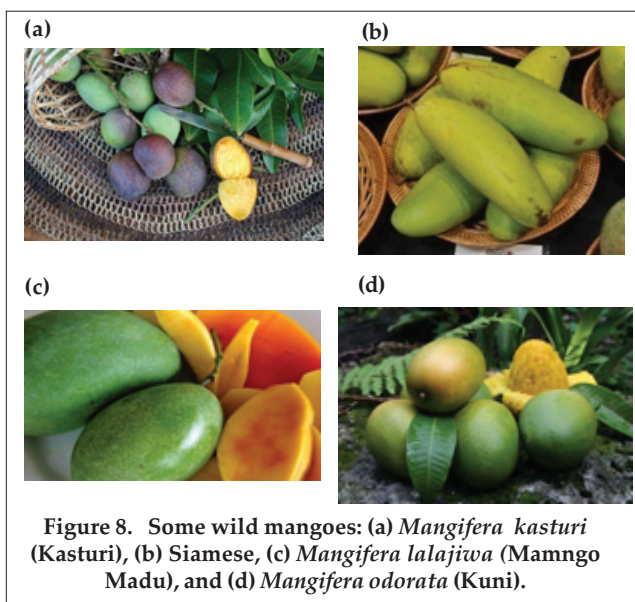
cultivars can be strengthened for climate resilience by use of wild types in the crop improvement programme of mango. According to their importance and gradual process of extinction, Mukherjee (1985) prepared a list of these species (Table 4). These wild, edible mangoes are in danger of extinction and most certainly represent the important resources for the future of mangoes. The importance of conserving these species and their genetic potential is recognized by the scientific community.

Mention must be made of other forms of wild growing forms of the mango, *Buchanania obovata*, a medium sized

Table 4. Mango species under threat	
Type of threat	Mango spp.
Rare	1. <i>Mangifera andamanica</i>
	2. <i>Mangifera camptosperma</i>
	3. <i>Mangifera gedebe</i>
Endangered	1. <i>Mangifera cochinchinensis</i>
	2. <i>Mangifera flava</i>
	3. <i>Mangifera lagenifera</i>
	4. <i>Mangifera pentandra</i>
	5. <i>Mangifera reba</i>
	6. <i>Mangifera superba</i>
Vulnerable	1. <i>Mangifera duperreana</i>
	2. <i>Mangifera inocarpoides</i>
	3. <i>Mangifera monandra</i>
	4. <i>Mangifera timorensis</i>
	5. <i>Mangifera zeylanica</i>

Source: Mukherjee (1985); Dinesh et al. (2011)

tree native to Australia, in the Anacardiaceae family; *Cordyla africana*, a large tree native to eastern Africa, in the Fabaceae family; *Irvingia gabonensis*, a large tree native to western Africa, belonging to the Irvingiaceae family. In search for the ancestors of the mango in the wild particularly, *Mangifera* sp., the following species were found: *Kastoore* (*Mangifera casturi*), *Mangifera laurina*, *kuini* (*Mangifera odorata*), *bembangan* (*Mangifera*



pajang), *bachang* (*Mangifera foetida*) the white mango (*Mangifera caesia*) and mango madu *Mangifera lalajiwa*. *Kastoore* is a vigorous tree that forms a tight, upright canopy with shiny, dark green leaves contrasted with bright red new growth. The fruits are blue when ripe.

The flesh is deep orange and juicy, almost addictive with sweet flavour resembling passion fruit with lychee. This is resistant to storms and can provide a good root stock for grafting (Figure 8).

Conclusion

Wild species of the genus *Mangifera* can be considered as sources of supplemental food, nutritionally balanced diets, timber, fuel wood, bioactive compounds, household income, and national revenues. Moreover, many related species of *M. indica* could be important for crop improvement purposes, for use as rootstocks, for processing, and for consumption. Moreover, the possibilities should be explored, and such promising species need to be domesticated and commercialized as unexploited sources of revenue and also as good sources of improved nutrition.

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