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ABSTRACT

The paper presents an overview of the history of the principal tree fruits grown on the Southeast Asian mainland, making use of data from biogeography, archaeobotany, iconography and linguistics. Many assertions in the literature about the origins of particular species are found to be without empirical basis. In the absence of other data, comparative linguistics is an important source for tracing the spread of some fruits. Contrary to the Pacific, it seems that many of the fruits we now consider characteristic of the region may well have spread in recent times.

INTRODUCTION

This study ¹⁾ is intended to complement a previous paper on the history of tree-fruits in island Southeast Asia and the Pacific (Blench 2005). Arboriculture is very neglected in comparison to other types of crops, yet there is considerable cultural evidence that fruits are significant both in terms of subsistence and in terms of symbolism. Compared to the Pacific, archaeobotanical materials from mainland Southeast Asia remain slight and provide almost no pointers as to the history of fruit cultivation (cf. Bellwood 1997; Kyle Latinis 2000; Higham 2002; Glover and Bellwood 2004). Current ethnographic practice is important, but recent decades have seen a massive growth in the commercial fruit trade, and many species offered in markets today have spread recently obscuring a more 'traditional' repertoire of tree-crops.

As a consequence, comparative linguistics is a useful tool in understanding the history of fruits. By tracing the names of fruits across languages it is possible to gain some idea of their antiquity and the routes by which they have spread. The relatively strong

empirical base for Pacific languages is not matched for mainland phyla such as Austroasiatic, Daic, Sino-Tibetan or Hmong-Mien, so accounts based purely on Austronesian tend to give a one-sided picture. Although occasional detailed accounts of individual languages exist (e.g. Vidal 1962 for Lao), without comparative lexical databases this does not advance the project. However, the diversity of language phyla on the Southeast Asian mainland will sometimes allow us to unravel the routes whereby fruit cultivation spread through the analysis of loanwords (e.g. Mahdi 1998).

DNA analysis of the affinities of tropical fruiting genera has only just begun, but we may well expect the results to emend or revise radically the conclusions of phenotypic analyses, as in the case of the persimmon, where Yonemori *et al.* (1998) showed from the amplified cpDNA of *Diospyros* spp. in Thailand that its affinities were quite different from those proposed in Ng (1975, 1976).

The literature on the tropical fruits of Southeast Asia is dominated by work aimed at producers and marketers, principally in the United States. As a

consequence, it is replete with doubtful transcriptions of vernacular names and unsupported assertions as to the origin of many fruit-trees. Much of the data gleaned from handbooks, even those compiled by reputable agencies, is simply repeated from earlier treatises and is without empirical foundation. In particular, the 'distribution' often given does not clearly distinguish a centre of origin from a translocated nucleus. Admittedly this is a distinction often hard to make, and there is a considerable literature on the potential for oceanic dispersal of some species. This lack of precision in the sources should be borne in mind when assessing the claims below.

The most significant early writer on useful plants in this region was G.E. Rumphius (1628-1702) (Figure 1), whose masterpiece, *Herbarium amboinense*, was only finally published in 1741-55. Rumphius (a Latinisation of Dutch Rumpf) was the first to describe and depict many of the important useful plants of the region and to make notes on their regional distribution. The work of Da Orta (1563) concerns India, but he makes many useful statements about the trade in fruits in the region. In the last few decades, there has been an expansion of reference material on Southeast Asian fruits, notably Ng (1975,



Figure 1 G.E. Rumphius (1628-1702)

1976), Chin and Yong (1982), Morton (1987), Corner (1988), Eisemann and Eisemann (1988), Piper (1989), Verheij and Coronel (1992), Othman and Subardhabandhu (1995), Tirtawinata *et al.* (1995), CIFOR (1996), Hutton (1996), Fernandez (1997), Walter and Sam (1999 [2002]), Tate (2000), Puri (2001), Jensen (2001), Subhadrabandhu (2001) and Mazumdar (2004). Some of these accounts are more scientific than others, and many include statements about the origins of fruit species that are highly speculative.

The botanical definition of a fruit is broadly the seed-bearing part of the plant and by this definition most fruits are small, inedible and often toxic. Nuts are similarly the seeds inside the fruits. This paper uses a more colloquial idea of a fruit as a plant product with edible flesh and possibly edible seeds, thereby including some species with edible nuts. The list includes fruits which are cultivated at least in some localities and those which are more than simply famine foods. In this paper I have confined the listing to fruit-trees, thus omitting for example, the banana, but also the many trees protected and cultivated for other reasons. Fruit-bearing cultivated and wild vines such as the water-melon are also excluded.

NOTES ON INDIVIDUAL SPECIES

The Appendix Table lists all the major fruit-tree species, with vernacular names in the principal languages of mainland Southeast Asia, where these can be determined. The following notes provide a brief commentary on these species. Scientific names are not very stable, as witness the recent change of *Eugenia* spp. to *Syzygium* spp., so I have tried to use the most authoritative ones available.

Bael (*Aegle marmelos* Correa)

The bael grows wild from central and southern India across to the dipterocarp forests of Southeast Asia (Morton 1987: 187-190; Sunarto 1992) and may

have originated in the Himalayan foothills. Bael wood charcoal occurs in Neolithic contexts in the middle Ganges (1900-1300 BC) (Saraswat 2004: 519). The *bēl* tree is cultivated throughout India, mainly in temple gardens, is both treated as sacred and has extensive medicinal uses. The Sanskrit name, *bilva*, may itself be derived from a Dravidian language (e.g. Tamil *vilvam* (வில்வம்)). Distinct roots exist for bael in south, south-central and north Dravidian (Burrow and Emeneau 1984: 1591, 1725, 3949) pointing to an introduction after the splitting up the family into modern branches. The Malay name, *bilak*, derives directly from Sanskrit and the tree was almost certainly brought to Java with the Hindu presence from the sixth century, when it appears to have spread eastwards to the lesser Sundas. The Thai, Lao and Vietnamese names are all etymologically related and it is possible the bael spread independently in this region. The Portuguese early recognised the medicinal value of the bael and it is first referred to in 1563 (Burkill 1936: 56).

Cashew (*Anacardium occidentale* L.)

The cashew is native to a wide swathe of Amazonia, but the domestic types now grown worldwide originate in northeast Brazil, whence the name, taken from Tupi *caju* (Cundall 1995). It was spread by the Portuguese throughout the Southeast Asian region, but apparently initially as a soil improver. It was later valued for the fruit, and only recently for the nut, which is now a major item of international trade (Johnson 1973). In Burmese, Khmer and Thai, the cashew is compared to the mango, but in Malay it is treated as a kind of *Syzygium* sp. (*jambu*).

Pineapple (*Ananas comosus* (L.) Merr.)

Like the cashew, the pineapple was transported from the Amazon with its Tupi name, *nana*, which was borrowed into Portuguese and thence into Malay. It was probably first brought to Southeast Asia in the seventeenth century. The exact history of its

transmission around the region is unrecorded, but in Thai the pineapple is compared to the jackfruit.

Soursop (*Annona muricata* L.)

Sweetsop (*Annona squamosa* L.)

Bullock heart (*Annona reticulata* L.)

All three cultivated *Annona* spp. originate in tropical America, particularly the West Indies and the adjacent mainland. The soursop may have been first brought to Southeast Asia not by the Spanish but by the Dutch, as the Malay name, *durian belanda*, means 'Dutch durian'. There has been some controversy over the antiquity of *Annona* spp. due to excavation reports of its early presence in India (see Saraswat and Pokharia 1999) but Asouti and Fuller (2007: 77) support the conventional view of a post-Portuguese introduction. Burkill (1936: 167) gives a name, *nanjka manila*, suggesting that the soursop may also have been brought across the Pacific by the Spanish. The names for *A. reticulata* and *A. squamosa* are intriguing, since they relate to the scientific name, *Annona*, which itself appears to derive from an Amerindian word. *Lonang* for *A. reticulata* simply exchanges the initial n- for l-. The Thai names are borrowings from Malay, re-analysed as Thai words. Burmese, Khmer and Vietnamese terms all recognise these three fruits are from the same family but do not borrow from Malay. The Chinese treat the sweetsop as the *fān lì zhī*, 番荔枝, or 'foreign litchi'.

Bignay, Chinese laurel, currant tree, salamander tree (*Antidesma bunius* Spreng.)

The natural distribution of the bignay is from the Himalayas to northern Queensland, although it is absent in the Malay peninsula and is cultivated rather than wild in much of mainland Southeast Asia. One of the earliest authors to describe it, Rumphius (1741), proposed its translocation in prehistory from the mainland to the islands. The unrelated names in the main Southeast Asian languages also point to its ancient establishment throughout the region.

Luk-nieng (*Archidendron jiringa* (Jack) I. C. Nielsen)
Archidendron jiringa is a cultivated fruit tree occurring wild from southern Thailand into Malaysia and the Indonesian islands. Its exact origin is unknown but it appears to have been translocated in prehistoric times. It can be eaten raw as a vegetable but has an objectionable smell and so is often boiled several times before eating. The Burmese name appears to be borrowed from Thai.

Areca nut (*Areca catechu* L.)

The areca nut is most commonly chewed today together with betel pepper (*Piper betle* L.) but the two plants have very different geographical origins. The areca nut occurs across a wide area of Southeast Asia and the Pacific and also in India, where it may be translocated (Bavappa and Nair 1978). Areca palm is one of the few species for which there are some archaeobotanical materials; betel staining was detected on teeth at the Nui Nap burial in Vietnam some 2000-2400 BP (Oxenham *et al.* 2002). These authors also note that contemporary Chinese sources



Figure 2 ? Areca palm on the Bayon

regarded betel chewing as characteristic of Indochina. Denham (2004) suggests that areca nuts occurring at Kuk swamp in New Guinea were part of an early agricultural system. Mahdi (1998) has discussed the linguistic evidence for these two plants. Malay *pinang* for areca is widely reflected in the Austronesian world, and proto-Chamic is also **pināŋ*. Chinese *bīn láng* (檳榔), first attested in 110 BC, is probably borrowed from a Western Austronesian language. Figure 2 shows what is most probably an areca palm on the Bayon at Angkor in Cambodia, indicating its importance by the twelfth century.

Breadfruit (*Artocarpus altilis* (Parkinson) Fosberg.)

The breadfruit was domesticated in New Guinea (Ragone 1997: 18). Seeded breadfruit occurs wild only in New Guinea where it is a dominant member of secondary lowland forests. Although transmitted widely throughout the Pacific in prehistoric times, it may well have only spread westward in the last few centuries. Crawford (1820: 413) argued that it has spread to Java from the Moluccas as a result of trade in the previous century. The Malay names distinguish between seeded (*kelur*) and unseeded (*sukun*) types and the name for the seeded type seems to have been borrowed into Thai and thence into Khmer.

Jackfruit (*Artocarpus heterophyllus*, Lam.)

Chempedak (*Artocarpus integer* Merr.)

There are two cultivated jackfruits, *Artocarpus heterophyllus*, the jackfruit proper, which is native to India and the chempedak which is probably indigenous to the Malay peninsula (Jansen 1992a). Wood charcoal from the jackfruit has been identified in the central Ganges valley from the Senuwar period II (1300-700 BC) (Saraswat 2004). Despite the repeated claims of an introduction from India to Southeast Asia (e.g. Burkill 1936: 255; Tate 2000) the indigenous names for jackfruit do not support this. The linguistic evidence suggests two separate centres of domestication, one in India, whence the *#panas*

and #*katahal* roots derive, and another in Southeast Asia (probably the Malay peninsula), representing the *nangka/khanun* roots. Table 1 shows a conspectus of Asian names for jackfruit;

Table 1 Vernacular Asian names for jackfruit

India	Attestation	East and SE Asia	Attestation
Tamil	palaa பாலா	Malay	nangka
Telugu	panasa	Tagalog	langka
Kannada	halasina hannu	Lao	mak mii
Malayalam	chakka	Thai	khà nōon ขนุน
Hindi	kaṭahala कटहल	Burmese	pein nei
Marathi	p ^h anas	Khmer	khnaor
Oriya	panasa	Vietnamese	mít
Sinhala	kos	Chinese	bō luó mì 菠萝蜜
Bhojpuri	katahar	Korean	ba ra mil 바라밀
Bengali	kāṭhal কাঁঠাল		

#*panas* is originally of probable Dravidian origin (cf. the Telugu name) but would have been borrowed early into Indo-Aryan, as it is attested in both Sanskrit and Pali as well as some modern Indian languages. It was also borrowed into Burmese, though probably from a modern language such as Oriya rather than Pali. The Malay name *nangka* is not of Sanskrit origin, and neither are the other regional names. It seems likely that the Thai name is a metathesis of Malay, thus *nang + ka* becomes *kha + non* and that this is then borrowed into Khmer as *khnaor*. Lao *mi* and Vietnamese *mit* are clearly cognate and the likely source of the Chinese name (*bō luó mì* 菠萝蜜) which was in turn borrowed into Korean. The English name ‘jack’ is from Portuguese *jaca*, which in turn derives from Malayalam *chakka*.

The fame of the jackfruit spread early, as it is referred to a Chinese account of Malacca from 1416 and was apparently known to Pliny. The jackfruit was probably carried to the East African coast by Indian traders, for both Malagasy *finésy* and Swahili *finesi* appear to derive from a *panasa* form (perhaps Telugu). Figure 3 shows a probable representation of either jackfruit or cempedak on the Bayon.

Bilimbi (*Averrhoa bilimbi* L.)

Carambola, star-fruit (*Averrhoa carambola* Linn.)



Figure 3 ? Jackfruit on the Bayon

The origin of the bilimbi is probably the Moluccas, but today it is cultivated throughout the region. It easily escapes from cultivation and is found semi-wild in much of South Asia. The Malay name is almost certainly borrowed from names widespread in island Southeast Asia and probably borrowed into Thai, although the *ta-* prefix is somewhat mysterious. Khmer has apparently borrowed the name from Thai. The spread of the bilimbi across to India with the Malay name intact presumably dates from the trade contacts that brought the bael in the opposite direction. The carambola appears to reconstruct in Tai languages and may well have been spread originally by its speakers. It seems to have made the same journey as the bilimbi, since not long after the Portuguese became established, Da Orta (1563) recorded it growing in Goa. It must therefore have been translocated to India considerably before the sixteenth century.

Rambai (*Baccaurea motleyana* Muell. Arg)

The rambai originated in Indonesia and Malaysia and seems to have spread northwards to Thailand only recently, where the local name associates it with foreigners (perhaps the Portuguese?).

Burmese grape (*Baccaurea ramiflora* Lour.)

The origin of the Burmese grape is uncertain, as it is found in cultivation from Nepal to the Andaman islands and into Indonesia. Most researchers guess

that it must be somewhere on the Southeast Asian mainland or perhaps China, since it is common in Yunnan. All the vernacular names are completely different from one another, suggesting a long establishment in the region.

Sugar palm, Palmyra palm, Toddy palm

(*Borassus flabellifer* L.)

The sugar palm is apparently identical to the African *B. aethiopum*, and its ultimate origin is disputed. It seems to be indigenous to Malesia as well as India, to judge by the incidence of wild stands. However, it seems that it was only perceived as useful in Southeast Asia as a consequence of the Hindu impact, as the indigenous names derive from Sanskrit. A similar root occurs throughout Dravidian (Burrow and Emeneau 1984: 2599²) and this was probably borrowed into Sanskrit. Curiously, its original use was not those for it is most known today, roofing, sugar and toddy, but as dried leaves for writing material. The Malay name, *lontar*, derives from a metathesis of Sanskrit (*tāla*, ताल, ‘palm’ + *ron* ‘leaf’) and variants of this occur along the island chain as far as Timor (Burkill 1936: 350). Moreover, indigenous names throughout Southeast Asia and in China are variants on the same *lon* + *tar* formulation, including the metathesis, arguing that they all derive from the same period of contact.

Gandaria, Marian plum (*Bouea macrophylla* Griff.)

The gandaria is native to north Sumatra, Peninsular Malaysia and west Java (Rifai and Kartawinata 1991) and is grown as a fruit tree in Thailand and Sumatra. The Khmer name is apparently borrowed from Thai. The date and direction of its spread is unknown.

Papaya (*Carica papaya* L.)

The papaya is probably native to Central America, but was carried to other parts of tropical America and the Caribbean by the Spanish in the early sixteenth century (De Oviedo y Valdés 1535; Storey 1976). Papaya itself derives from an Arawakan word for the

fruit. It was also Spaniards who carried seeds to the Philippines about 1550 and the papaya diffused both to the remainder of Southeast Asia and to India. A version of the word papaya still survives in the Philippines, where the fruit is known as *kapaya* and similar names. Hindi *papīṭā* (पपीता) is presumably also from the same, ultimately Spanish source. Burkill (1936: 465) explains that the papaya became known in Bali as *gedang castela*, ‘Spanish banana’, and the *castela* element became in turn Malay *ketala*. The Thai name also appears to refer to the route of the diffusion of the papaya, deriving from Malacca, the Portuguese trading town.

Star-apple (*Chrysophyllum cainito* L.)

The origin of the star apple is uncertain; it was formerly thought to be indigenous to Central America but may well be from the Caribbean (De la Cruz 1992). It probably spread to the east coast of tropical America in pre-Columbian times and was brought to Southeast Asia by the Spanish in the sixteenth century. The Malay name borrows directly from the common Spanish name, while the Thai name looks suspiciously like a loan from English, so its spread in the region may well be recent. The Khmer name means ‘cow’s milk’, referring to the milky fluid exuded when the fruit is cut open.

Citrus spp.

The taxonomy of wild and cultivated *Citrus* spp. remains problematic, both due to outcrossing and habitat destruction leading to uncertain distributional data. Saraswat (1997) reports *C. lemon* from the late Harappan (Baran phase) site of Sanghol in Punjab (early second millennium BC) but the species identification is questionable (Asouti and Fuller 2007).

Lime (*Citrus aurantifolia* Swingle)

Lemon (*Citrus × limon* (L.) Burm.f.)

The origin of the lime and lemon remains doubtful

but they were probably both developed from the citron (*Citrus medica*) which may be native to a zone from the central Himalayas to Yunnan (Gaoligong Mountains). That #*lim-* is root reflected in Malay and in many Austronesian languages, suggests that it an old cultigen. Mahdi (1998) noted the Sanskrit *nimbū* in the Rājanighaṇṭu (1235-1250 AD), although this might have been borrowed from Dravidian, for example Tulu *nimbe*. It was presumably borrowed into Persian *limu*, ليمو, and thence to English 'lime'. Whether the Thai name, *naw*, also reflects Malay *limaw*, is uncertain, as names for the lime fall under general terms for *citrus* spp. Nonetheless, the lime is a good candidate for the return voyage to the coasts of Southeast India from the Malay peninsular, along with the noni.

Kaffir lime (*Citrus hystrix* D.C.)

The origin of the unfortunately named Kaffir lime is generally given as Malesia or Southeast Asia but beyond that it seems to be uncertain. It is grown in almost every country in the region, as much for the flavouring of the leaves as for the fruit itself. The vernacular names connect it with the ordinary sweet orange, although it presumably spread much more recently than *C. hystrix*.

Pomelo (*Citrus maxima* Merr.)

The pomelo is native to Southeast Asia as far as Fiji and the Friendly Islands and may have been introduced into China around 100 BC (Morton 1987). It is now cultivated over most of the region.

Mandarin (*Citrus reticulata* Blanco)

The mandarin orange as well as the sweet orange are cultivated forms of *Citrus aurantium* L. *sensu lato*. The wild populations that gave rise to this have not been identified with certainty, although they may be closest to *C. indica* Tanaka which has been found in the Khasi hills, Eastern Assam and adjacent regions (Tanaka 1958; Malik *et al.* 2006). Intriguingly, *C.*

indica is known in the Garo language as *memay naranj*, which could possibly be one of the sources of the widespread names for 'orange' (e.g. Portuguese *naranja*). There is no clear evidence for the date of its spread.

Sweet orange (*Citrus sinensis*)

Almost all sources agree that the sweet orange was domesticated in China although its ultimate source may be *C. indica*, as with the mandarin orange (see above). Although the sweet orange only reached Europe in the fourteenth century, it seems to have become widespread in Southeast Asia before that. Chinese *chéng* (橙) appears to be the source of many terms in Southeast Asia, for example Lao *kièŋ*, Vietnamese *cam*, Burmese *thung*. Others, like the generic Khmer *kro:c* for *citrus* spp. derive from pre-existing wild *citrus* species. One Malay name, *limau wangkang*, appears to refer to a Chinese provenance. Paradoxically, Malay *limau* is borrowed into modern-day Chinese *níng méng* (柠檬) (<*limeng*) for the lemon or lime. A reconstruction for proto-South-Dravidian, **ize*, points to an Iron Age introduction into South India, although via what route is unknown (Fuller in press).

Wampee (*Clausena lansium* Skeels)

The wampee originates in southern China and north-central Vietnam where a large number of domesticated types have been developed (De Bruijn 1992). The tree has been introduced to the rest of Southeast Asia, where it has been reported from Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore and Thailand. Malay and Vietnamese borrow directly from Chinese *huang-p'í* (whence also the English name) while Thai and Lao compare it to the orange. The spread of the wampee is thus probably quite recent.

Water banyan (*Cleistocalyx operculatus* var. *paniala*)

The water-banyan grows from the Himalayas to

western Malaysia and up into southern China and the northern provinces of Thailand where it is cultivated. The fruit is sour and slightly astringent and is eaten fresh and pickled. *Cleistocalyx operculatus* is a well-known medicinal plant, the buds of which are commonly used as an ingredient of tonic drinks in southern China.

Coconut (*Cocos nucifera* L.)

The origin of the coconut is much disputed; it was formerly claimed that it originated in the New World because its nearest botanical relatives are located there (Child 1974). Harries (1990) argues that its origin lies in Malesia and the distribution of *Cocos* spp. is a relic of Gondwanaland. It evidently reconstructs to a deep level in Austronesian; Ross (1996: 195) quotes a reconstruction **niuR* for coconut in proto-Oceanic and Mahdi (1998: 395) **niəuR* for proto-Philippines. The Thai name was apparently borrowed into Lao, while the Burmese name is apparently borrowed from a Daic language, as it has the *mak-* prefix for 'fruit' typical of Thai. Mahdi (1998: 396) argues that the coconut was carried to Sri Lanka and India prior to the second century BC and it occurs at Arikamedu in a Roman horizon. Tamil *tēṅkāy* (தேங்காய்) can be analysed as 'fruit of the south,' presumably referring to a Sri Lankan origin. South Dravidian (loaned into Indo-Aryan) has an elaborate vocabulary referring to dried coconut flesh, whence the English word 'copra'. Sanskrit *nārikela* (नारिकेल) is also intriguing, since it might be a composite of the two Austronesian words for 'coconut', *nyiuR* and *kelapa*, or at least incorporate elements from these roots. By the fifth century the coconut was known to the Greeks, as the term *argellia* (<*nārikela*) appears in the writings of Cosmas Indicopleustes.

Longan (*Dimocarpus longan* Lour.)

The longan is native to southern China and historical records place it there more than 2000 years ago. Ke *et al.* (2000) suggest that Yunnan was its original centre,

basing their argument on palynological evidence. It is grown throughout mainland Southeast Asia, although it only fruits irregularly in the Malay peninsula (Wong and Saichol 1992). The longan is apparently also common in Réunion and Mauritius as a result of the Indian Ocean trade. Tracing the etymologies of this word involves a certain amount of speculation; Thai *lam yai* could be a version of the Chinese name, which would then be borrowed into Lao. The addition of the nasal in Lao makes it possible that it was further borrowed into Vietnamese without the *lam* element. At least one of the Khmer names is also borrowed from Thai. The spread of the longan out from China may thus be quite recent.

Mabolo (*Diospyros blancoi* A. DC.)

The mabolo is indigenous to the low and medium altitude forests of the Philippines and is commonly cultivated for its fruit and as a shade tree (Morton 1987: 418-419). The tree was introduced into Java and Malaya, probably in the nineteenth century. Its Malay name means 'butter fruit', with the word for butter itself borrowed from Spanish. Thai borrows directly from the Filipino name (Utsunomiya *et al.* 1998).

Argus pheasant tree

(*Dracontomelon dao* (Blanco) Merr. and Rolfe)

The Argus pheasant tree appears to be native to a large region stretching from Southeast Asia to Melanesia. It is one of the few species for which an archaeobotanical record exists. A nut recovered from the Philippines was dated to 2200-1500 BP (Paz 2005). It may well have been taken into cultivation several times.

Durian (*Durio zibethinus* L.)

The durian, perhaps originating in Borneo, spread in pre-European times throughout the Malay peninsular and some of the Indonesian islands. The limited viability of the seeds prevented its further spread, and the rulers of Burma used runners to carry fruits

to Ava (Burkill 1936: 887). It was further dispersed throughout the mainland by Europeans during the nineteenth century, and has only recently become a major traded fruit. Most mainland names, including Chinese *liú liǎn* (榴蓮), are borrowings from Malay *durian*, reflecting this recent spread.

Indian gooseberry (*Emblica officinalis* Gaertner)

(= *Phyllanthus emblica* L.)

The Indian gooseberry is indigenous to tropical South and Southeast Asia and is cultivated in home gardens in India, Malaysia, Singapore and southern China. *Emblica officinalis* fruits have been identified from Kunal in Haryana at 2400-2200 BC (Saraswat and Pokharia 2003). The Malay name, interestingly points to the port city of Melaka (Malacca), a Portuguese base, and suggests that it was either brought by the Portuguese or spread by them. The Thai and Khmer names are also interlinked, and it is likely that the inland spread of the Indian gooseberry is quite recent.

Indian plum (*Flacourtia rukam* Zoll. and A. Mortizi)

The Indian plum, *Flacourtia rukam*, is native to a wide region from Malaysia to the Solomons but has been widely distributed to the Southeast Asian mainland, Polynesia and India (Hendro Sunarjono 1992). The vernacular names provide no evidence for the timing or direction of its spread.

Mundu (*Garcinia dulcis* Kurz)

Mundu originates in island Southeast Asia but seems to have been domesticated early and carried to mainland areas. It is now cultivated as a home garden plant in Thailand and other Southeast Asian countries.

Mangosteen (*Garcinia mangostana* L.)

The mangosteen is only known as a cultivated species, although there may be wild forms in Malaysia. It closely resembles *G. hombroniana* and *G. malaccensis*, which are indigenous in Malaysia (the former also



Figure 4 Dragon-fruit

occurs in the Nicobar Islands). The mangosteen may be an allotetraploid hybrid of these two species; if so, it originated in Peninsular Malaysia (Richards 1990; Jansen 1992b). Ellis (1775) was the first European to describe the '*mangostan*' (<Filipino *mangustan*). It is cultivated throughout the region, but the vernacular names appear to be all cognate with one another, suggesting that it has only spread relatively recently. Malay has *mangis*, whereas all the other languages have -t- following the stem suggesting the name was borrowed from a Filipino language.

Dragon fruit, pitahaya

(*Hylocereus undatus* Britt. and Rose)

The dragon fruit is a striking fruit from Central America. Vietnam is a major producer and it is now found in markets throughout the region (Figure 4). All the vernacular names translate as 'snake scales' or similar and it is likely this is a twentieth century introduction to the region.

Langsat (*Lansium domesticum* Corr.)

The langsat originated in western Malaysia and is common both wild and cultivated throughout the Archipelago and on Luzon. It is much grown, too, in southern Thailand and Vietnam and flourishes in the Nilgiris and other humid areas of South India. Despite this wide distribution, all the vernacular names borrow directly from Malay *langsat* and its spread must be very recent.

Lychee (*Litchi chinensis* Sonn.)

The lychee is usually considered to have been domesticated in lowland provinces of Kwangtung and Fukien in southern China. The earliest known record in Chinese literature dates from AD 1059. It has apparently spread out from the region over the last thousand years because many languages borrow from Chinese. It was introduced into Burma in the seventeenth century and later to India, the Caribbean and has now become a major world fruit.

Mango (*Mangifera indica* L.)**Horse mango** (*Mangifera foetida* Lour.)

The mango proper, *Mangifera indica*, originates in India or Burma but probably spread to Southeast Asia with the waves of Hindu colonisation (Mukherjee 1972; Kostermans and Bompard 1993). Mango can be reconstructed as Proto-Dravidian **mām* and is thence borrowed into numerous Indo-Aryan languages. Lopes de Castanheda's *The Historie of the Discoverie and Conquest of the East Indias* mentions *mangas* as an Indian fruit (Lichefield 1582) and English 'mango' comes from Tamil *maangai* (மாங்காய்). Wood charcoal finds (post c. 1300 BC) from the sites of Narhan and Senuwar in the middle Ganges plain give a date for mango in North India (Saraswat 2004). Asouti and Fuller (2007: 75) identified *Mangifera* charcoal and fragments of kernel endocarps from late Neolithic levels at Hallur, near the Western Ghats. Although Burrow and Emeneau (1984: 1076, 2401, 3907, 3919, 3975) distinguish distinct roots in South and Central Dravidian, the common *ma-* element makes it look as these were originally the same and have become differentiated by compounding. This element is also borrowed into Sanskrit *mākanda*, 'mango tree' and appears metathesised in Bengali (মাঙ্গা). One Malay name, *mempelam*, is originally Sanskrit *man palam*, borrowed into Malayalam as *mampalam*.

The horse mango, *Mangifera foetida*, is confined to Southeast Asia but has probably been cultivated for a long time, as its vernacular names are different



Figure 5 Mangoes? represented on reliefs on the Bayon

in each major language. Indeed it is likely that this is the original referent of the names for mango, such as Khmer *sva:y* and Vietnamese *xoài*, and that these were transferred to the ordinary mango on its arrival. Figure 5 shows a possible representation of the mangoes on a relief on the Bayon at Angkor. The fruits have the characteristic shape of mangoes, but mangoes do not normally grow this way, suggesting artistic licence.

Kuwini (*Mangifera odorata* Griffith)

The origin of the kuwini is disputed, but it may have first developed in Malaya; it is now found throughout the mainland of Southeast Asia, western Indonesia and Guam. Research by Teo *et al.* (2002) shows that it is not a distinct species but a hybrid of *M. indica* and *M. foetida*. When it spread and who carried it is unknown.

Sapodilla (*Manilkara zapota* (L.) van Royen)

The sapodilla is native to the Yucatan, southern Mexico, and adjacent Belize and northeast Guatemala. Early in colonial times, it was carried to the Philippines. The Malay term *ciku* must have been brought by the Spaniards as it is cognate with Nahuatl *chikl*, probably altered by a pseudo-etymology relating it to Spanish *chico* 'small'. The Thai term compares it to *Mimusops kauki*, a tree with a distribution encompassing tropical America and Southeast Asia. The name was borrowed into Khmer and Lao from

Thai.

Noni (*Morinda citrifolia* L.)

The origin of the noni or Indian mulberry is disputed. Walter and Sam (1999: 193) claim its homeland is in northern Australia, the home of many related species, but Morton (1992: 241) points out that the noni can spread on ocean currents and may also originate in Southeast Asia. It is very striking that the vernacular names across a large swathe of languages appear to be related. Tamil *nunā* (நூணா) is related to the #*noni* forms in many Austronesian languages and also to the mainland; Vietnamese *nhau*, Lao *nho*, and Khmer *nhô srôk*. All of this points to an origin on the Southeast Asian mainland and a spread both to island Southeast Asia and thence to the Pacific and westwards across to South India. Other Indian names are quite different and point to separate introductions or diffusion from further north.

Mulberry (*Morus alba* L.)

Morus alba is now widespread and feral in the Punjab and the upper Ganges valley and its charcoal has been reported from Indian sites, although these are probably wild. Mulberry has been cultivated as silkworm food in China as much as 4000 years ago (Wang Zichun 1987). The date of domestication of the mulberry is not known exactly but by the Western Zhou Dynasty (c. eleventh century BC - 221 BC) mulberry trees were already being cultivated on a large scale. Despite this, none of the Southeast Asian names resemble Chinese, suggesting the source of the tree in Southeast Asia was from the west. The Malay name, *tut*, is apparently related to one of the names in Arabic. The Thai name, *mon*, perhaps reflects an association with the Mon people; the Thai name was in turn borrowed into Khmer. The mulberry seems to have been carried early across the Indian Ocean for it is well-established in Zanzibar under the name *mforsadi* (Williams 1949).

Jamaica cherry (*Muntingia calabura* L.)

The Jamaica cherry is indigenous to South-Central America and the Caribbean and is now widely cultivated in the tropics (Verheij 1992). The Malay name refers to a Thai origin, while Thai and Khmer names simply assign the fruit to foreigners. The Portuguese are the most likely distributors of this fruit, which was probably first carried to Thailand or Vietnam and then subsequently spread to Malaya.

Rambutan (*Nephelium lappaceum* L.)

The rambutan is commonly cultivated throughout the islands of Indonesia and Southeast Asia and said to have been introduced by Arab traders into Zanzibar and Pemba³). Its exact origin is unknown, as it is typical of deserted settlements in the Malay peninsula. The diversity of indigenous names suggests it was spread long ago. In recent years, the rambutan has been the focus of a major international trade and 'new' cultivars (? from Thailand) have spread throughout mainland Southeast Asia.

Avocado pear, alligator pear

(*Persea americana* Miller)

The avocado probably originated in the Chiapas-Guatemala-Honduras region, whence it spread to the whole of Central and northern South America. It seems to have been first introduced into Southeast Asia in the nineteenth century, probably from the Caribbean. The Spanish name, *avocado* (< Nahuatl *ahuacatl* 'testicle'), is borrowed directly into Malay and thence into Thai and Khmer (and possibly Burmese?).

Star-gooseberry (*Phyllanthus acidus* (L.) Skeels)

Morton (1987) states that the star-gooseberry originated in Madagascar and was carried to Southeast Asia in prehistoric times. This seems unlikely, as no evidence is given for this statement, and standard sources on Malagasy ethnobotany do not even record this species. Its history is thus unknown. It is common

in the Pacific islands, Southeast Asia, and in India in home gardens.

Guamachil, Manila tamarind

(*Pithecellobium dulce* (Roxb.) Benth.)

The guamachil originates in Central America but is now grown in most Southeast Asian countries. Although the fruit is eaten it may have been translocated primarily for its numerous medicinal properties. Burkill (1936: 1791) notes that the name in the Philippines derives from a Mexican source, suggesting that it was the Spaniards who brought it to the region in the sixteenth century. The vernacular names all compare it to the tamarind; Malay names it the ‘Dutch tamarind’ and the Thai name, borrowed into Lao and Khmer, also treats it as a type of tamarind.

Taun tree

(*Pometia pinnata* J.R. Forster and J.G. Forster)

The taun is indigenous to a broad zone from Sri Lanka to Vanuatu, Fiji and Samoa with outliers in southern China and Indochina, and was later carried to further Polynesia in the post-European era (Thomson and Thaman 2005). Kirch (1989: 236) recorded the taun in the Mussau islands at 3200 BP. Ross (1996: 212) reconstructs **tawan* for proto-Oceanic (hence the name of the tree) and this clearly has cognates in Philippines languages. Information on the taun on the mainland is very limited and it is not included in most reference guides, despite having vernacular names in Thai and Vietnamese. It may well have spread recently northwards in recent times.

Pomegranate (*Punica granatum* L.)

The pomegranate tree is native to a zone stretching from Iran to the Himalayas and has been cultivated since ancient times throughout the Mediterranean region. Persian *dulim* is borrowed into Sanskrit as *daadima* (दाडिम) and thence into numerous modern-day Indian languages. It seems that the pomegranate

was spread in Southeast Asia during the early period of Indian migrations, as it appears in Malay as *delima* and was further borrowed into Thai and thence into Khmer.

Guava (*Psidium guajava* L.)

The guava is native to central America, and was probably carried to Southeast Asia by the Spanish or Portuguese. Crawford (1820: 429) records a Malay term, *jambu Portugal*, comparing the guava to *Syzygium* spp. Another Malay name, *kampuchia*, suggests that at least one type may have been brought from Cambodia. The Thai name also attributes a foreign origin to the guava.

Salacca, snake fruit (*Salacca zalacca* (Gaertner) Voss)

Salacca is cultivated in Thailand, throughout Malaysia and Indonesia as far as the Moluccas, and has been introduced into New Guinea, the Philippines, Queensland (Australia) and Pohnpei Atoll (Schuiling and Moge 1992). It appears that the Thai name is borrowed from Malay as the final -k is weakened to -ʔ. One of the Khmer names is then borrowed from Thai, pointing to a relatively recent spread of this fruit.

Santol (*Sandoricum koetjape* (Burm. f.) Merr.)

The santol probably originates in Cambodia, Laos and Malaya, and was carried by trade to India, the Andaman Islands, Malaysia, Indonesia, the Moluccas, Mauritius, and the Philippines. It has related names in all the main languages of Southeast Asia, seemingly originating from Thai. The Tagalog name, *santor*, is also reflected in Guam, while one Indian name, *visayan*, points to the Visayas in the Philippines, as its source. Unlike most of the other fruits under discussion, it seems the Burmese name is borrowed from Thai.

Ambarella

(*Spondias dulcis* Forst. (syn. *S. cytherea* Sonn.)

The ambarella is native to the eastern Pacific and has

been introduced into tropical areas of both the Old and New World (Morton 1987: 240–242). It was undoubtedly spread through the Southeast Asian mainland in post-European times, since it is given the name *farang* in Thai and is subsequently borrowed into Lao, Khmer and probably Vietnamese.

Water apple (*Syzygium aqueum* (Burm. f.) Alston)

Malay Apple

(*Syzygium malaccense* (L.) Merr. and Perry)

Java apple

(*Syzygium samarangense* (Blume) M. and P.)

All three species presumably originated in Southeast Asia, *Syzygium*⁴ *aqueum* occurring more widely and *S. malaccense* being more restricted to Java, Sumatra and Peninsular Malaysia (Panggabean 1992; Whistler and Elevitch 2005). Portuguese traders carried the Malay apple from Malacca to Goa and from there it was introduced into East Africa. Both *Syzygium* spp. have the name *jambu* in Malay, which is borrowed as *chomphu* into Thai and thence into Khmer. Since Thai, *chomphu*, Khmer, *chumpu krâhâ:m* and Vietnamese *cay dao* are all borrowed from Malay *jambu* (<Sanskrit *jambu* (जम्बु)), it was probably only dispersed throughout the mainland in the post-European era.

Jambolan (*Syzygium cumini* L.)

The jambolan is native in India, Burma, Ceylon and the Andaman Islands but spread south from Burma as a cultivated plant as well as being brought directly to island Southeast Asia from India. All the *Syzygium* spp. in Southeast Asia incorporate the Sanskrit name *jambu* (जम्बु), but the *-lan* element seems to have been added in Southeast Asia. There is no trace of the Dravidian roots Tamil *nāval* (நாவல்) and Telugu *nēreḍu* (Burrow and Emeneau 1984: 2375, 2378). The jambolan was then carried back across the Indian Ocean to Zanzibar and Pemba and the adjacent coast, where its Swahili name, *mzambaru*, derives from Malay.

Rose-apple, Malabar plum

(*Syzygium jambos* (L.) Alston)

The rose apple is so widespread in the Indo-Pacific region that its original place of domestication is unknown, although Van Lingen (1992) argues for mainland Southeast Asia and Morton (1987) for India. The *jambu* element in its names is of Indian origin (cf. *S. cumini*). *Syzygium malaccense* is considered the primary species in Thai since the name is borrowed without qualification, as opposed to *Syzygium jambos*. The Malay apple has a distinctive name in Khmer as in Vietnamese, suggesting that it spread earlier than the rose-apple. English ‘rose-apple’ appears to be a calque from an Indian name, as languages such as Marathi have *gulābī jāmba* (गुलाबीजांब), i.e. rose + plus *jambu*.

Tamarind [Indian date]

(*Tamarindus indica* Linn. (1753))

The tamarind is now generally considered to be of West African origin, despite its scientific name (<Arabic *tamr hindī* تمر يندھ = ‘date of India’) but to have spread to India at an early date (Burkill 1997: 169-176). It is at least possible that this is a disjunct distribution (Asouti and Fuller 2007: 98). Charcoal from a tamarind tree has been identified from Narhan site in the middle Ganges at some 1300 BC (Saraswat *et al.* 1994). Gunasena and Hughes (2000) note that it is referred to in the Brahmasamhita scriptures (1200-200 BC) and in Buddhist sources from around AD 650. Muṇḍā names are not uniform, indicating it was not known to proto-Munda speakers and indeed it appears that the Muṇḍā root *tittin* may be borrowed from Dravidian (Zide and Zide 1976: 1299). Even within Dravidian, the *#cintam* root is not attested in North Dravidian, pointing to its absence in the earliest period.

Indian Ocean traders presumably carried the tree from India to Southeast Asia at an uncertain date (Ochse and Bakhuizen Van Den Brink 1980: 431-433). Shorto (2006: 459) points to a loanword

from Pali, *ambila* meaning 'sour', which appears in a number of Austroasiatic languages (e.g. Old Khmer *amvil*, Sre *mil*). It is likely this is responsible for modern Hindi *imli* (इमली). None of the Southeast Asian names seem to be related to those of India (e.g. Bengali *tētul*, Sinhala *siyambala*, Telugu *chintapandu* (చింతపండు), Tamil *cintam* (சிந்தம்) and Malayalam *puli*, Kannada *hunase*. This scatter of names does seem to support a late introduction of tamarind (*contra* arguments in Asouti and Fuller 2007: 98). The Malay name, *asam jawa*, simply means 'sour fruit of Java' and it seems possible that it was borrowed into Thai, s→kh and thence into Lao.

Sea-almond (*Terminalia catappa* L.)

The exact origin of the sea-almond is unknown, since it is spread from India through Southeast Asia to the Eastern Pacific and Melanesia (Morton 1985). Southeast Asian names do not relate to those of India or indeed to one another and it seems likely the sea-almond was taken into cultivation a number of times. Asouti and Fuller (2007: 85) note that *T. catappa* is almost certainly a late introduction into India where its seeds are eaten and the galls used for ink. Archaeobotanical materials place it in the Bismarcks at 4250-4050 BP, and it was well-known to the early Austronesians as Ross (1996: 215) cites proto-Oceanic **talise*, and Dempwolff (1938) **talisy* for proto-Malayo-Polynesian.

Indian jujube, ber (*Zizyphus mauritiana* Lamk.)

There is much confusion in the literature concerning the taxonomy of the jujubes (*Zizyphus* spp.). The Indian jujube, *Zizyphus mauritiana*, is assumed to be domesticated in India (Yamdagni 1985; Pareek 2001; Fuller 2006: 51). Its remains occur widely in Neolithic and later sites throughout South Asia (Fuller 2002). The great diversity in China, where numerous cultivars exist, is of *Z. jujuba* Lam. (also *Zizyphus zizyphus* (L.) H Karsten). This occurs wild in montane regions of central China, Qin Ling mountains and



Figure 6 Indian jujube, ber (*Zizyphus mauritiana* Lamk.)

northwards to Mongolia and Tibet (Jin *et al.* 1999). The Indian jujube is known in Malaya and Indonesia by the Sanskrit name *badara* (बदर), pointing to its Indian origin. A root appears to be reconstructible for South Dravidian (Burrow and Emeneau 1984: 402) which is quite distinct from the Indo-Aryan forms. However, other Malay names, *bedara china* and *langkeng*, indicate that *Z. jujuba* was brought directly from China. The Thai, Lao and Vietnamese names all appear to be etymologically connected, and unrelated to Chinese, so they probably reflect an ancient introduction to the Southeast Asian mainland, unrelated to Indian contact. Figure 6 shows modern cultivated jujubes.

SYNTHESIS AND CONCLUSIONS

A previous study of fruits in the Pacific and island Southeast Asia suggested strongly that the cultivation of fruit trees was deeply embedded in the culture of island populations who have been domesticating, ennobling and moving such trees around for millennia. Both linguistic data and archaeobotanical material provide support for this conclusion (Blench 2005). Given the importance of fruit today in mainland Southeast Asia, it was initially expected that, despite the more exiguous archaeological material, a generally similar situation would obtain. However, the materials analysed here point generally in the opposite direction, namely that fruit cultivation

was very unimportant prior to European contact, with the movements from India that led to the founding of the Indianised states one source of 'new' fruits.

The Hindu religious influence on the Southeast Asian region dates from the sixth century and fruits brought at this time include the bael, *Aegle marmelos*, the jackfruit, *Artocarpus heterophyllus* and the mango, *Mangifera indica*. The reliefs at Angkor provide some iconographic evidence for this process. However, there is also some evidence for fruits that traversed the ocean in the opposite direction, for example the bilimbi and carambola, the lime, the coconut, the langsat, the noni and the santol.

The Portuguese seem to have been very active in both diffusing fruits they encountered in the New World, with Amerindian names preserved intact in several cases, but also encouraging trade in or actively translocating indigenous fruit species from one region to another, most particularly from the Malay peninsula and the Indonesian islands to the Southeast Asian mainland countries. Table 2 shows a count of the origins of fruit species considered in this paper;

Table 2 Origins of fruit species cultivated today in mainland Southeast Asia

Source	Code	No.
Fruits indigenous to the Southeast Asian mainland	A	22
Fruits indigenous to island Southeast Asia	B	6
Fruits from the Pacific region	C	2
Fruits from India	D	7
Fruits from China	E	6
Fruits from the New World	F	13
Unknown	G	7
Total		63

Another intriguing conclusion is the apparent lack of a flow of cultivated species into Burma. To judge purely by the linguistic evidence, Thailand was a major focus of the secondary diffusion of fruits, with Lao names almost always following directly from Thai. Khmer and Vietnamese often borrow from Thai, although Vietnamese has a number of unexplained names. However, Burmese almost never has a name

that resembles these other languages, suggesting either that it is a very creative language, or more likely, that fruit species were brought from a different direction, perhaps via the Bay of Bengal. Even so, it is hard to identify obvious loanwords from Indian languages. This situation remains to be explained.

This lack of widespread early fruit cultivation may in some part explain why so little archaeobotanical material has been recovered from Southeast Asian mainland sites, although it is also true that the advanced flotation techniques that are revolutionising African archaeobotany seem to be rarely used, perhaps because of the emphasis on monuments, art historical materials and trade goods. Although rice is often recovered, evidence for other subsistence crops is fragmentary at best, despite clear synchronic evidence for their antiquity.

Our understanding of the introduction and spread of fruits in this region is limited by the exiguous archaeobotany and even the comparative linguistic data remains weak. But surprisingly, it seems that many of the fruits we think of as characteristic for the Southeast Asian region have only spread quite recently. More in-depth searches of historical records, expanded ethnobotany and archaeobotany can all contribute to a more rounded picture.

Notes

1) This paper was originally presented at the 11th EURASEAA Conference in Bougon, 26th September, 2006, but was deemed too lengthy for the proceedings and has therefore been revised for Linguistics, Archaeology and the Human Past. I would particularly like to acknowledge the comments of Dorian Fuller, who is almost entirely responsible for the references to inaccessible Indian sources, as well as observations on taxonomy and advance copies of some of his publications. Special thanks to Tsho Beima, who kindly went through the Chinese transcriptions, tone-marking and checking the match with characters. Gerard and Som Diffloth, in Siem Reap, were invaluable guides both to the monuments at Angkor and to modern fruits available in Cambodian

markets.

2) The published version does not give North Dravidian cognates, but these are shown in the online version.

3) Although if this is true, the rambutan bears an entirely local name, *mshokishoki*, which is not an Arabic loanword (Williams 1949).

4) All the *Syzygium* spp. are known in earlier sources as *Eugenia* spp.

5) Online at: <http://dsal.uchicago.edu/dictionaries/burrow/>

References

- Allen, B.M. (1975) *Common Malaysian fruits*. Longman Malaysia, Kuala Lumpur.
- Asouti, Eleni and D.Q. Fuller (2007) *Trees and woodlands of South India: an archaeological perspective*. Left Coast Press, Walnut Creek, Ca.
- Bavappa, K.V.A. and M.K. Nair (1978) Cytogenetics of *Areca catechu* L., *A. triandra* Roxb. and their F₁ hybrids (palmae). *Genetica* 49(1): 1-8.
- Bellwood, P. (1997) *Prehistory of the Indo-Malaysian archipelago*. second revised edition. University of Hawai'i Press, Honolulu.
- Blench, R.M. (2005) Fruits and arboriculture in the Indo-Pacific region. *Bulletin of the Indo-Pacific Prehistory Association* 24: 31-50.
- Burkill, I.H. (1936) *A dictionary of the economic products of the Malay Peninsular*. Ministry of Agriculture, Kuala Lumpur.
- Burkill, H.M. (1997) *The useful plants of west tropical Africa*. Families M-R. Royal Botanic Gardens, Kew.
- Burrow, T. and M.B. Emeneau (1984) *A Dravidian Etymological Dictionary*. Oxford University Press, Oxford⁵).
- Child, R. (1974) *Coconuts*. Longman, London.
- Chin, H.F. and H.S. Yong (1982) *Malaysian fruits in colour*. Tropical Press, Kuala Lumpur.
- CIFOR (1996) *Manual of forest fruits, seeds and seedlings*. CD-ROM. CIFOR, Jakarta.
- Corner, E.J.H. (1988) *Wayside Trees of Malaya*. 2 vols. third edition. Malayan Nature Society, Kuala Lumpur.
- Crawford, John (1820) *History Of The Indian Archipelago: Containing An Account Of The Manners, Arts, Languages, Religions, Institutions And Commerce Of Its Inhabitants*. 3 vols. Constable, Edinburgh.
- Cundall, E.P. (1995) "Cashew *Anacardium occidentale* (Anacardiaceae)", in J. Smartt and N.W. Simmonds (eds.) *Evolution of crop plants*. Longman Scientific & Technical, Singapore. pp.11-13.
- Da Orta, Garcia (1563) *Colóquios dos Simples e Drogas da Índia*. Imprensa do Rei, Goa.
- De Bruijn, J. (1992) "Clausena lansium (Lour.) skeels", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia. 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp.141-143.
- De la Cruz, Jr., F.S. (1992) "*Chrysophyllum cainito* L. and *Artocarpus odoratissimus* Blanco", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia. 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp. 115-117 and 94-96.
- De Oviedo y Valdés, Gonzalo Fernández (1535 [1851-1855]) *La Historia general de las Indias*. Complete work not published till 1851-1855, when it was edited by J.A. de los Rios. for the Spanish Academy of History, Seville.
- Dempwolff, O. (1938) *Vergleichende Lautlehre des austronesischen Wortschatzes. Band 3: Austronesisches Wörterverzeichnis*. Beihefte zur Zeitschrift für Eingeborenen-Sprachen 19. Dietrich Reimer, Berlin.
- Denham, T. (2004) The roots of agriculture and arboriculture in New Guinea: looking beyond Austronesian expansion, Neolithic packages and indigenous origins. *World Archaeology* 36: 610-20.
- Dy Phon, P. (2000) *Plants used in Cambodia. Plantes utilisées au Cambodge*. Imprimerie Olympic, Phnom Penh.
- Eisemann, F. and M. Eisemann (1988) *Fruits of Bali*. Periplus Editions, Berkeley.
- Ellis, John (1775) *A description of the mangostan and the bread-fruit ... the first, esteemed one of the most delicious, the other, the most useful of all the fruits of the East Indies : To which are added, directions to voyagers, for bringing over these and other vegetable productions, which would be extremely beneficial to the inhabitants of our West India Islands*. The author, London.
- Fernandez, D.G. (1997) *Fruits of the Philippines*. Bookmark, Manila.
- Fuller, D.Q. (2002) "Fifty years of archaeobotanical studies in India: Laying a solid foundation", in S. Settar and R. Korisettar (Eds.) *Indian archaeology in retrospect, Vol. III: Archaeology and Interactive Disciplines*. Manohar, Delhi. pp.247-363.
- Fuller, D.Q. (2006) Agricultural Origins and Frontiers in

- South Asia: A Working Synthesis. *Journal of World Prehistory* 20(1): 1-86.
- Fuller, D.Q. (in press) "Non-human genetics, agricultural origins and historical linguistics in South Asia", in M. Petraglia and B. Allchin (eds.) *The evolution and history of human populations in South India*. Springer, Netherlands. pp.389-439
- Glover, Ian and Peter S. Bellwood (eds.) (2004) *Southeast Asia: from prehistory to history*. Routledge Curzon, London.
- Gunasena, H.P.M. and A. Hughes (2000) *Tamarind: Tamarindus indica L.* University of Southampton, Southampton.
- Harries, H.C. (1990) "Malesian origin for a domestic *Cocos nucifera*", in P. Baas, K. Kalkman and R. Geesink (eds.) *The Plant Diversity of Malesia*. Kluwer, Dordrecht. pp.351-357.
- Hendro Sunarjono, H. (1992) "*Flacourtia rukam* Zoll. & Moritzi", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp.168-169.
- Higham, Charles (2002) *Early cultures of Mainland Southeast Asia*. River Books, Bangkok.
- Hutton, W. (1996) *Tropical fruits of Malaysia and Singapore*. Periplus Editions, Singapore.
- Jansen, P.C.M. (1992a) "*Artocarpus integer* (Thunb.) Merr.", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp.91-94.
- Jansen, P.C.M. (1992b) "*Garcinia L.*", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Wageningen: Pudoc. pp.175-177.
- Jensen, M. (2001) *Trees and fruits of Southeast Asia: an illustrated field guide*. Orchid Press, Bangkok.
- Jin, C. et al. (1999) Ethnobotanical studies on wild edible fruits in Southern Yunnan: folk names; nutritional value and uses. *Economic Botany* 53: 2-14.
- Johnson, D.V. (1973) The botany, origin, and spread of the cashew (*Anacardium occidentale L.*). *Journal of Plantation Crops* 1: 1-7.
- Ke, Guangwu, Wang, Changchun and Tang, Zifa (2000) *Palynological studies on the origin of longan cultivation*. Paper presented at the First International Symposium on Litchi and Longan, Guangzhou, China, 19-23 June, 2000.
- Kirch, P.V. (1989) Second millennium arboriculture in Melanesia: archaeological evidence from the Mussau islands. *Economic Botany* 43: 225-240.
- Kostermans, A.J.H. and S.M. Bompard (1993) *The Mangoes: Their Botany, Nomenclature, Horticulture and Utilization*. IBPGR and Linnean Society of London. Academic Press, London.
- Kyle Latinis, D. (2000) The development of subsistence models for Island Southeast Asia and Near Oceania: the nature and role of arboriculture and arboreal-based economies. *World Archaeology* 32(1): 41-67.
- Lichefield, Nicholas (1582) *The first booke of the historie of the discoverie and conquest of the East Indias, enterprised by the Portingales, in their daungerous nauigations, in the time of King Don Iohn, the second of that name VVhich historie conteineth much varietie of matter, very profitable for all nauigators, and not vnpleasaunt to the readers. Set forth in the Portingale language, by Hernan Lopes de Castaneda. And now translated into English, by N.L. Gentleman*. Thomas East, London.
- Mahdi, W. (1998) "Linguistic data on transmission of Southeast Asian cultigens to India and Sri Lanka", in R.M. Blench and M. Spriggs (eds.) *Archaeology and Language II*. Routledge, London. pp.390-415.
- Malik S.K., R. Chaudhury, O.P. Dhariwal and Rajwant K. Kalia (2006) Collection and characterization of *Citrus indica* Tanaka and *C. macroptera* Montr.: wild endangered species of northeastern India. *Genetic Resources and Crop Evolution* 53(7): 1485-1493.
- Mazumdar, B.C. (2004). *Minor Fruit Crops of India: Tropical and Subtropical*. Daya, Delhi.
- Morton, J.F. (1985) Indian almond (*Terminalia catappa*), salt-tolerant, useful, tropical tree with 'nut' worthy of improvement. *Economic Botany* 39(2): 101-112.
- Morton, J.F. (1987) *Fruits of Warm Climates*. The author, Miami.
- Morton, J.F. (1992) The ocean-going noni, or Indian Mulberry (*Morinda citrifolia*, Rubiaceae) and some of its "colorful" relatives. *Economic Botany* 46: 241-256.
- Mukherjee, S.K. (1972) Origin of mango (*Mangifera indica*). *Economic Botany* 26(3): 260-264.
- Ng, F.S.P. (1975) The fruits, seeds and seedlings of Malayan trees I - XI. *Malaysian Forester* 38: 33-99.
- Ng, F.S.P. (1976) The fruits, seeds and seedlings of Malayan

- trees XII - XIV. *Malaysian Forester* 39: 110-146.
- Ochse, J.J. and R.C. Bakhuizen Van Den Brink (1980) *Vegetables of the Dutch East Indies*. A. Asher, Amsterdam. [Translation of Indische Groeten first published 1931].
- Othman, Y. and S. Subardhabandhu (1995) *The production of economic fruits in South-East Asia*. Oxford University Press, Kuala Lumpur.
- Oxenham, Marc F., Cornelia Locher, Nguyen Lan Cuong and Nguyen Kim Thuy (2002) Identification of Areca catechu (Betel Nut) Residues on the Dentitions of Bronze Age Inhabitants of Nui Nap, Northern Vietnam. *Journal of Archaeological Science* 29: 909-915.
- Panggabean, G. (1992) "*Syzygium aqueum* (Burm.f.) Alst., *Syzygium malaccense* (L.) M. & P, and *Syzygium samarangense* (Blume) M. & P.", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA. Pudoc, Wageningen. pp.292-294.
- Pareek, O.P. (2001) *Ber*. University of Southampton, Southampton.
- Paz, Victor (2005) Rock Shelters, Caves, and Archaeobotany in Island Southeast Asia. *Asian Perspectives*, 44(1): 107-118.
- Piper, J.M. (1989). *Fruits of South-East Asia: facts and folklore*. Oxford University Press, Singapore.
- Puri, R.K. (2001) *Bulungan Ethnobiology Handbook*. CIFOR, Bogor.
- Ragone, D. (1997) *Breadfruit. Artocarpus altilis (Parkinson) Fosberg*. IPGRI, Rome.
- Richards, A.J. (1990) Studies in *Garcinia*, dioecious tropical forest trees: the origin of the mangosteen (*G. mangostana* L.). *Botanical Journal of the Linnean Society* 103: 301-308.
- Rifai, M.A. and K. Kartawinata (1991) "Germplasm and the conservation of Indonesian medicinal plants", in Heywood, V., Synge, H. and O. Akerele (eds.) *Conservation of medicinal plants*. Cambridge University Press, Cambridge. pp.281-292.
- Ross, M. (1996) "Reconstructing food plant terms and associated terminologies in Proto-Oceanic", in J. Lynch and Fa'afa Pat (eds.) *Oceanic studies: proceedings of the first International Conference on Oceanic Linguistics*. Pacific Linguistics, Canberra. pp.163-221.
- Rumphius, G. (1741-55) *Herbarium amboinense*. Uytwerf, Amsterdam.
- Saraswat, K.S. (1993) Plant economy of late Harappan at Hulas. *Puratattva* 23: 1-12.
- Saraswat, K.S. (1997) Plant Economy of Barans at ancient Sanghol (ca. 1900-1400 B.C.), Punjab. *Pragdhara (Journal of the U. P. State Archaeology Department)* 7: 97-114.
- Saraswat, K.S. and A.K. Pokharia (1999) Sanghol, Dist. Ludhiana, Punjab. *Pragdhara (Journal of the U. P. State Archaeology Department)* 9.
- Saraswat, K.S. (2004) "Plant economy of early farming communities", in B.P. Singh (ed.) *Early farming communities of the Kaimur (excavations at Senuwar)*. Publication Scheme, Jaipur. 416-535.
- Saraswat, K.S., N.K. Sharma and D.C. Saini (1994) "Plant economy at ancient Narhan (ca.1,300 B.C. -300/400 A.D.)", in Singh, P. (ed.) *Excavations at Narhan (1984-1989)*. Banaras Hindu University, Varanasi. pp.255-346.
- Saraswat, K.S. and A.K. Pokharia (2003) Kunal (29° 30' N; 75° 41'E), District Hissar. *Indian Archaeology 1996-97 - A review*: 229-232.
- Schuiling, D.L. and J.P. Mogege (1992) "*Salacca zalacca* (Gaertner) Voss", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA. Pudoc, Wageningen. pp.281-284.
- Smitinand, Tem (2001) *Thai plant names*. s.l.: Herbarium, Royal Forest Department.
- Shorto, H. (2006) *A comparative Mon-Khmer dictionary*. PL-579. ANU, Canberra.
- Storey, W.B. (1976) "Papaya - *Carica papaya* (Caricaceae)", in N.W. Simmonds (ed.) *Evolution of crop plants*. Longman, London. pp.21-24.
- Subhadrabandhu, Suranant (2001) *Under-Utilized Tropical Fruits Of Thailand*. FAO, Bangkok.
- Sunarto, A.T. (1992) "*Aegle marmelos* (L.). Correa", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA. Pudoc, Wageningen. pp.59-60.
- Tanaka, T. (1958) The origin and dispersal of citrus fruits having their centre of origin in India. *Indian Journal of Horticulture* 15: 101-115.
- Tate, D. (2000) *Tropical fruit of Thailand*. Asia Books,

- Bangkok.
- Teo, L.L., R. Kiew, O. Set, S.K. Lee and Y.Y. Gan (2002) Hybrid status of kuwini, *Mangifera odorata* Griff. (Anacardiaceae) verified by amplified fragment length polymorphism. *Molecular Ecology* 11(8): 1465-1469.
- Thomson, L.A.J. and R.R. Thaman (2005) "Pometia pinnata (tava), ver. 1.1", in C.R. Elevitch (ed.) *Species Profiles for Pacific Island Agroforestry. Permanent Agriculture Resources, Hōlualoa, Hawai'i*. <<http://www.traditionaltree.org>>.
- Tirtawinata, M.R., Y. Othman, W. Veevers-Carter and A. Sidharta (1995) *Fruit of Indonesia*. Taman Buah Mekarsari, Jakarta.
- Utsunomiya, N. et al. (1998) Diospyros species in Thailand: their distribution, fruit morphology and uses. *Economic Botany* 52(4): 343-351.
- Van Lingen, T.G. (1992) "*Syzygium jambos* (L.). Alston", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp.296-298.
- Verheij, E.W.M. (1992) "*Muntingia calabura* L.", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp.223-225.
- Verheij, E.W.M. and R.E. Coronel (eds.) (1992) *Plant Resources of South-East Asia 2. Edible fruits and nuts*. PROSEA, Bogor.
- Vidal, J. (1962) *Noms vernaculaires de plantes (Lao, Mèo, Kha) en usage au Laos*. EFEO, Paris.
- Walter, A.E. and C. Sam (1999) *Fruits d'Océanie*. Paris: IRD. Also (2002) *Fruits of Oceania*. [trans. P. Ferrar] ACIAR, Paris / IRD, Canberra.
- Wang Zichun (1987) *Sericulture in Ancient China's Technology and Science*. Compiled by the Institute of the History of Natural Sciences Chinese Academy of Sciences. Foreign Language Press, Beijing.
- Whistler, W.A. and C.R. Elevitch (2005) "Syzygium malaccense (Malay apple), ver. 1.1", in C.R. Elevitch (ed.) *Species Profiles for Pacific Island Agroforestry*. Permanent Agriculture Resources, Hōlualoa, Hawai'i. <<http://www.traditionaltree.org>>.
- Williams, R.O. (1949) *The useful and ornamental plants in Zanzibar and Pemba*. Zanzibar [no publisher given].
- Wong, K. C. and K. Saichol (1992) "Dimocarpus longan Lour", in E.W.M. Verheij and R.E. Coronel (eds.) *Plant Resources of South-East Asia 2. Edible Fruits and Nuts*. PROSEA, Pudoc, Wageningen. pp. 146-151.
- Yamdagni, R. (1985) "Ber [Indian jujube]", in T.K. Bose (ed.) *Fruits of India: tropical and subtropical*. Naya Prokash, Calcutta. pp.520-536.
- Yen, D.E. (1977) "Hoabinhian horticulture: the evidence and the questions from northwest Thailand", in J. Allen, J. Golsen and R. Jones (eds.) *Sunda and Sabul: Prehistoric Studies in Southeast Asia, Melanesia and Australia*. Academic Press, Sydney. pp.567-600.
- Yonemori, K. et al. (1998) Phylogenetic relationship of *Diospyros kaki* (persimmon) to *Diospyros* spp. (Ebenaceae) of Thailand and four temperate zone *Diospyros* spp. from an analysis of RFLP variation in amplified cpDNA. *Genome/Génome* 41(2): 173-182.
- Zide, A.R.K. and N.H. Zide (1976) "Proto-Munda cultural vocabulary: evidence for early agriculture", in P.N. Jenner, L.C. Thompson and S. Starosta (eds.) *Austro-Asiatic Studies, Part II*. University of Hawai'i, Honolulu. pp.1295-1334.
- Zizumbo-Villareal, Daniel and Hermilo J. Quero (1998) Re-evaluation of early observations on coconut in the New World. *Economic Botany* 52(1): 68-77.

Appendix: Vernacular names of cultivated fruits of mainland Southeast Asia

The transcriptions in Table 1 are taken from existing published and online sources with the exception of some Khmer and Thai names transcribed directly in Siem Reap. Common Chinese names are taken from existing online dictionaries; more specialised botanical nomenclature from the online eFlora of China¹¹. These sources have highly inconsistent transcriptions and I have attempted to regularise them but many problems remain. I have occasionally included transcriptions the relevant script, but many dictionaries do not include or accurately define minor tree species.

Table 1. Vernacular names of cultivated fruits of mainland SE Asia

No.	Binomial	Family	English	Burmese	Khmer	Thai	Lao	VN	Malay	C	Notes
1	<i>Aegle marmelos</i>	Rutaceae	Bael	opeshet	phñeu	matum ma pin	mak tum	trái mām	bilak, bel	D	
2	<i>Anacardium occidentale</i>	Anacardiaceae	Cashew	thayet si	sva:y chantii	má mǎaŋ hím paan มะม่วงหิมพานต์	má mǎaŋ hím paan	đào lòn hòt danh từ	jambu monyet	F	Chinese <i>yào jiāo</i> 腰果
3	<i>Ananas comosus</i>	Annonaceae	Pineapple	na naq thi နာနာထီး	mnöhs'	sàp parót (ส้มประรด) lòok rá-bert meu (ลูกระเบิดมีโอ)	mak khiep, khiep thet	mang cáu xiém	nanas	F	Chinese <i>fēng lí</i> 鳳梨
4	<i>Annona muricata</i>	Annonaceae	Soursop	duyin awza	tiap barang	thu rian thet thuriankhak	khan tha lot khiép thét khan tha lot		durian belanda	F	Chinese <i>cí guāo fān lì zǐ</i> 刺 果番荔枝
5	<i>Annona reticulata</i>	Annonaceae	Bullock heart	awza	baba:t mak' ba:t tiap ba:y	nǒy nǒng	mak khiep, khiep thet	mang cáu ta	lonang	F	Chinese <i>nǐu xīn fān lì zǐ</i> 牛心番荔枝
6	<i>Annona squamosa</i>	Annonaceae	Sweetsop, sugar apple	awza	tiap ba:y	nǒy na:	mak khiep, khiep thet	mang cáu ta	nona sri kaya	F	Chinese <i>fān lì zǐ</i> 番荔枝
7	<i>Antidesma bunius</i>	Euphorbiaceae	Chinese laurel, Bignay, Salamander tree		sla	ma mao luang	kho lien tu	choi moi	buni, berunai	A	Chinese <i>wú yuè chá</i> 五月茶
8	<i>Archidendron jiringa</i>	Mimosaceae		tanyeng-pen		niang nok cha niang maak mia (ໄໝ)			jering	A	
9	<i>Areca catechu</i>	Palmae	Betel palm	kunthi-pin kun	sla		'mak	cao	pinang	A	Chinese <i>bīn líng</i> 槟榔
10	<i>Artocarpus altilis</i>	Moraceae	Breadfruit	paung thi	sakéé khnaór sám lá khnaór	khà nǒon sampalor		saké	kelur (seeded) sukun (seedless) nangka	C	
11	<i>Artocarpus heterophyllus</i>	Moraceae	Jackfruit	peignai		khà nǒon (ໄໝ)	mak mii	mit		D	Chinese <i>mù bō láo</i> 木菠萝
12	<i>Artocarpus integer</i>	Moraceae	Chempedak	sonekadat		mak mi (NE)		mit tò nù	cepedak	A	
13	<i>Averrhoa bilimbi</i>	Oxalidaceae	Bilimbi, cucumber tree	tayok zaungya	tróling ting	champada		khe tau	belimbing	A	
14	<i>Averrhoa carambola</i>	Oxalidaceae	Carambola, star- fruit		spit	ma-fianj	fuaŋ	khe tau	belimbing	A	Chinese <i>yáng táo</i> 阳桃

No.	Binomial	Family	English	Burmese	Khmer	Thai	Lao	VN	Malay	C	Notes
15	<i>Baccaurea molleyana</i>	Euphorbiaceae	Rambai			mafaifarang			rambai	A	
16	<i>Baccaurea ramiflora</i>	Euphorbiaceae	Burmese grape	kanazo	p ^h ɲw	mafai som fai, hamkang taan (๓๓๘)	ma:khev	giâu gia dât, giâu tiên, džâu miên	pupor tampoi	A	pre-Angkorian Khmer <i>pɲau</i>
17	<i>Borassus flabellifer</i>	Palmae	Palmyra palm, sugar palm, sea- apple	han taw	thnô'	tan	tan	thót lôt	lontar	A	Chinese <i>táng sōng</i> 糖棕
18	<i>Bouea macrophylla</i>	Anacardiaceae	Gandaria		mak prang	ma praang			kundang setar	B	
19	<i>Carica papaya</i>	Caricaceae	Papaya	thin baw	ihong	malako	houng	đu dũ	betek ketala	F	Chinese <i>fān mù guā</i> 番木瓜
20	<i>Chrysophyllum camito</i>	Sapotaceae	Star apple	hnin thagya	tũk dáh kóó	sataa appoen		vú sùc	kameto	F	Chinese <i>xīng píng guǒ</i> 星苹果
21	<i>Citrus generic</i>	Rutaceae	Lime	shouk	kro:c kro:c c ^h ma:	som ma naw	na:w	chanh ta	limaw asam, limaw nipis	A	
22	<i>Citrus aurantifolia</i>	Rutaceae	Leech-lime	shouk-nu, shouk-waing	kro:c saac	ma krù:t ມະກຸດ som'fo:	mà:k kù:t	trúc	limaw purut	A	Chinese <i>suān gān</i> 酸柑
23	<i>Citrus hystrix</i>	Rutaceae	Shaddock, pomelo	shouk ton oh kywegaw	kro:c k ^h lɔŋ		kiên saj photuk sôm ô sôm hôt	bi'oi	limaw betawi	A	
24	<i>Citrus maxima</i>	Rutaceae	Tangerine, mandarin orange	lein maw	kro:c kvic	som men		cam sành cay quit cam	limaw langkat, kupas	A	Chinese <i>gān qiān</i> 甘茜
25	<i>Citrus reticulata</i>	Rutaceae	Sweet orange	thung chin thi	kro:c po:sát	lũuk sô hm (ລູກສົມ)	liou kiên	hoàng bi, g'òr	limau manis	E	Chinese <i>gān jú</i> 柑桔 Korean 오렌지
26	<i>Citrus sinensis</i>	Rutaceae	Wampee		kan trop	som mafai	som mafai		wampi	E	Chinese <i>huáng pí</i> 黄皮
27	<i>Clausea lansium</i>	Rutaceae	Water banyan			wa kao			jambon	A	Chinese <i>shíu wéng</i> 水翁
28	<i>Cleistocalyx operculatus</i> var. <i>paniala</i>	Myrtaceae	Coconut		do:ŋ	má phrá:w ต้นมะพร้าว	phao	đua	kelapa, nytur len'ken	B	Chinese <i>yē zǐ</i> 椰子
29	<i>Cocos nucifera</i>	Palmae	Longan	mak un	mien lamyay	ma bo lo	lám nhai	nhan	buah mantega	E	Chinese <i>lóng yán</i> 龙眼
30	<i>Dimocarpus longan</i> ²⁾	Sapindaceae	Butterfruit	ngá-bauk		phrachao-ha-phra-ong-ka- kho, sang-kuan			sengkuan, sepul	G	
31	<i>Diospyros blancoi</i>	Ebenaceae	Durian	thuren	thuren	thú rian (ทุเรียน)	thurièn	sàu r'èng	durian	E	Chinese <i>lú lián</i> 榴蓮
32	<i>Dracontomelon dao</i>	Anacardiaceae	Indian plum	kántuét préi		makhampom kantot (Chanthaburi)	mak-kham-pom	bong-ngot, chu-me	asam melaka, melaka	A	
33	<i>Durio zibethinus</i>	Bombacaceae	gooseberry			khropdong	ken	mung guan r'ung	rukam gajah	G	Chinese <i>dà yè dǐ lǐ mù</i> 大叶刺篱木
34	<i>Embllica officinalis</i> ³⁾	Euphorbiaceae	Mundu, Gourka, Rata			ma phuut			mundu	B	

No.	Binomial	Family	English	Burmese	Khmer	Thai	Lao	VN	Malay	C	Notes
37	<i>Garcinia mangostana</i>	Clusiaceae	Mangosteen	mīngut မိၼ်ဂုတ် ဝဲး	məŋkòt	məŋ khót (มังกรห่อ)	mankhud	cay, quá máng cút	mangis	B	Chinese máng jí shí 莽吉柿
38	<i>Hylocereus undatus</i>	Cactaceae	dragon-fruit, pitaya	langsat duku	ska: nea? ⁴⁾ prátiel puéhs langsa:t	klèt maŋkò:n langsa:t duku		bónbon	langsat duku	F	? all from Malay?
39	<i>Lansium domesticum</i>	Meliaceae	Langsat, Duku	lin chi kyet mouk	langsa:t kule:n	langsa:t linci: ลินชี	ngèè	cay vai tu hú	kelengkang	A	
40	<i>Litchi chinensis</i>	Sapindaceae	Litchi	thayeq poh	ma nut	ma nut		xoài hoi	bachang	E	Chinese lí zhi 荔枝
41	<i>Mangifera foetida</i>	Anacardiaceae	Horse mango	thayeq dhi သရဲဂ်း	sva:y sa:	ma nut		xoài		A	
42	<i>Mangifera indica</i>	Anacardiaceae	Mango	thayeq dhi သရဲဂ်း	sva:y	má mīaŋ (มะม่วง)	mwàng	xoài	mangga mempelam	D	Chinese máng guǒ 芒果
43	<i>Mangifera odorata</i>	Anacardiaceae	Kiwini, huani		ləmut	má mīaŋ pa lamut faraj	lamud	xáboche tam luc	kumi	G	
44	<i>Manilkara zapota</i>	Sapotaceae	Sapodilla	posa	p ^h ɲɔ nhó srók mò:n thom	phon yɔ: mon	ma:k ɲɔ: nho	nhaul lon, nhaul nui dau tam màu dau chin	ciku	F	Chinese rén xīn guǒ 人心果
45	<i>Morinda citrifolia</i>	Rubiaceae	Indian mulberry, noni, cheesefruit						menkudu	G	Chinese lái jī tiān 人心果
46	<i>Morus alba</i>	Moraceae	mulberry						tut	E	Chinese rén jī, shén jī fruit; sāng 桑 mulberry tree
47	<i>Muntingia calabura</i>	Flacourtiaceae	Jamaica cherry	haget thaŋya	krakhób barang saw maw	takhop farang ๑๖๓ (๑๖๓)	khoom sóm	trúng ca mat sam	kerukup siam	F	
48	<i>Nephelium lappaceum</i>	Sapindaceae	Rambutan	hraw bat	kan tət am'pəl tək	๑๖๓ (๑๖๓)		chòm chóm vai thièu bo'	rambutan	B	Chinese hóng máo dān 红毛丹
49	<i>Peara americana</i>	Lauraceae	Avocado		'avókaa	aa wɔ khaa do (๑๖๓๑๖๓)		lê dau	apukado	F	
50	<i>Phyllanthus acidus</i>	Euphorbiaceae	Star gooseberry	thin bozih pyoo kway tanyeng	saen ta lom	ma yom ma kham thet ma kham thong		chùm ruət me keo keo tay	chermai asam kranji, asam belanda, cina	G	Chinese fān lóng yǎn 番龙眼
51	<i>Pithecell-obium dulce</i>	Leguminosae	Guayamochil							F	
52	<i>Pometia pinnata</i>	Sapindaceae	Taun tree, Fiji longan	yingan	rəkām ləmpia? slāf	saen ta lom			kasai asam kuang	G	Chinese fān lóng yǎn 番龙眼
53	<i>Psidium guajava</i>	Myrtaceae	Guava	thitro	totum	thap thim fā rang (มะขาม)	philaa sida	lu'u ôi	delima	D	Chinese fān shí líu 番石榴
54	<i>Punica granatum</i>	Punicaceae	Pomegranate	gway	trapæk sruk	saen ta lom			jambu biji, kampuchia	F	Chinese shí liú 石榴
55	<i>Salacca zalacca</i>	Palmae	Snakefruit		salà?	salà?			salak	A	< Malay into Thai, Khmer
56	<i>Sandoricum koetjape</i>	Meliaceae	Santol		sat'ɔ:n	sat'ɔ:n	roj ²	sáu	séntul kecapi	A	
57	<i>Spondias dulcis</i>	Anacardiaceae	Hog-plum, Ambarella		mak'əŋ mak'əŋ	mak'əŋ farang	maák k'òk	cây cóc	kedongdong	C	
58	<i>Syzygium aqueum</i> & <i>S. samarangense</i>	Myrtaceae	Water apple, Curacao apple		kánlán réhs chomphu pa	chomphu pa		man roi	jambu mawar	A	

No.	Binomial	Family	English	Burmese	Khmer	Thai	Lao	VN	Malay	C	Notes
59	<i>Syzygium cumini</i>	Myrtaceae	Java plum, Jambolan	thabyang hpyoo	pring bai	wa hakhpuae	va	vôi rung trâm móc	jambulan	D	Sanskrit <i>jambu</i> (जम्बू), Zanzibar Swahili <i>mzambaru</i>
60	<i>Syzygium jambos</i>	Myrtaceae	Rose apple, Malabar plum	thabyu thabye	châmpuu, sâ	chom phu nam dok mai	kiêng	bô dào roi	jambu kelampok	A	Chinese <i>pú táo</i> 蒲桃
61	<i>Syzygium malaccense</i>	Myrtaceae	Malay apple	thabyo thabyang	krá há:m	chom phu	—	cay dao diêu dò	jambu merah	A	
62	<i>Tamarindus indica</i>	Leguminosae	Tamarind	maje (မာ့ခေ)	mpil khwa me GMBil	ma khá:m ખજીરા	ma:k khâm	me	asam jawa	D	Chinese <i>sián dòu</i> 酸豆 pre-Angkorian Khmer <i>amuil</i>
63	<i>Terminalia catappa</i>	Combretaceae	Indian almond, sea almond	badan		hu kwang		bàng bièn	ketapang	G	
64	<i>Ziziphus mauritiana</i>	Rhamnaceae	Indian jujube, Ber	zizidaw zee pen	tària	phutsa:	than	tao nhuc	bidara epal siam	D	? < Sanskrit <i>vadana</i>

Sources: Jensen (2001), Vidal (1962); Smitinand (2001); Dy Phon (2000); Som & Gerard Diffloth (p.c.)

Notes for the appendix

- 1) URL: http://www.efloras.org/flora_page.aspx?flora_id=3
- 2) In some sources as *Euphoria longan*
- 3) Formerly *Phyllanthus emblica*
- 4) 'scales of the naga'

