

Wild and lesser-known fruit germplasm in JNTBGRI: An approach for ex-situ conservation

Wild edible fruits are the 'grapes and apples' of the rural and tribal communities, supplementing essential nutrients for their better health and survival. The forests of Kerala are a treasure trove of such lesser-known and under exploited wild fruit resources. With the help of the Department of Planning and Economic Affairs, Government of Kerala, Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) has taken up an in-depth study on the wild edible fruits of the State which has resulted in conservation 648 live accessions belonging to 184 species in 43 families, of which 141 species yields raw fruits, 12 species produces vegetable fruits, and 22 species provide consumable seeds/ grains/ kernels and 9 species supplies spices/ condiments. A total of 47 species are endemic either to the State or to the Western Ghats region, among which *Aporosa bourdillonii*, *Eugenia discifera*, *Meteoromyrtus wyanaadensis*, *Garcinia imbertii*, *Ixora johnsonii*, *Syzygium bourdillonii* and *S. travancoricum* are critically endangered while *Salacia malabarica* is endangered which and *Garcinia wightii* along with *Eugenia rottleriana* are vulnerable. *Salacia beddomei* finds mention in the Red Data Book of Indian Plants.

EVER since the human history, wild fruits form an important source of food for mankind and the situation continues, as it acts as the staple food for at least the marginalized rural and tribal folks throughout the world. The fruits we cultivate today were once grown wild in their natural habitats and the collection and conservation of such wild fruits is considered as one of the oldest occupation in the history of human civilization. Thus germplasm of wild edibles formed an important and key resources to which the entire world and its generations owe for existence. The improved types of fruits we see today are actually the resultant products of continuous selection and hybridization of the once widely grown wild fruits. Out of 265,000 species of angiosperms identified world over, some 30,000 species are edible and about 7,000 species are cultivated for human consumption. Even though there were efforts to collect and conserve useful germplasm since prehistoric time, large-scale collection of plant germplasm took shape only after 16th century with the development of gardens and orchards, which were largely responsible for the collection and movement of vast amount of germplasm around the world. It is with the establishment of FAO, CGIAR and International Board for Plant Genetic Resources (IBPGR) that the co-ordinated efforts of germplasm collection began on national and international level. Presently, International Plant Genetic Resources Institute (IPGRI), an independent successor to IBPGR, in close collaboration with other



Baccaurea courtallensis



Karinga



Kattu munthiri



Kattu seemanelli

international agencies and botanic gardens continue to be actively involved in plant germplasm collection and conservation in developing countries. About 800 botanic gardens are presently engaged in such activities around the globe and it is interesting to note that those who are engaged in germplasm collection exercises most of their efforts in collecting crop plants and their wild relatives rather than bringing truly wild plants whose unknown potential represents astonishingly never-ending biological prospects.

Many of the wild fruits of unknown potential including those having food value still remain locked-up in the impenetrable areas of our wild habitats and such fruits are continuously being reported from all over the world. India, with its 17,000 species of angiosperms, more than 1,000 species fall in the category of wild edibles, in the form of fruits, tubers, vegetables etc. JNTBGRI establishes a vast germplasm of wild fruits which serves as a genetic stock for selection and improvement. A total of 648 live accessions of wild edible fruits belonging to 184 species were collected through extensive field surveys all over the wild habitats in Kerala and the species were conserved *ex-situ* in the wild fruits conservatory in JNTBGRI, the largest of its kind in the State of Kerala.

Venue for *ex-situ* conservation

JNTBGRI is the pioneer Botanic Garden in Kerala established with the sole objective of collecting and conserving the vast amount of plant germplasm of the State. Persistently since the date of inception, the institute broke all frontiers in collecting of all types of potential plant resources including wild edible fruits seizing high merits of conservation potential as such resources are more prone to get depleted due to randomly occurring bio-physical pressures. It is hoped that the new initiative of *ex-situ* conservation of lesser-known wild fruit germplasm will provide a double safety for their existence, at least under captive environments.

Location details

Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram, Kerala, located between 8° 45' and 8° 47' north latitude and 77° 1' and 77° 4' east longitude covers an area of 121 hectares of forest land with an altitudinal range between 100-125 m MSL in the lap of the Western Ghats. The climate is tropical, the average annual precipitation is 300 cm and the temperature varies from 19°-34° C. The area is in fact continuous with the natural forests whose predominant vegetation being a mix of evergreen and moist deciduous types. The institute now acts as a repository of lesser-known plants of various utility classes including edible, medicinal, and ornamental plants, the fruit plants conservatory alone is of 10 acres of land within the site.



Kudappunna

Methodology

The wild fruit plants whose edibility has been proved beyond doubt by repeated enquiries through Rapid Appraisal Method among the traditional village folks and the tribal communities all over the State were collected for nutritional analysis and the live accessions for field planting. Representative specimens were also collected for making permanent herbarium vouchers which are duly identified and deposited in

TBGT for future reference. The planting materials were raised either through seed trials or by recruiting seedlings directly from the original habitat. Saplings thus raised were subsequently established in the field following the 'contour method' of planting.

Accessions

Since the value of a gene bank is determined by the extent of its documentation system and its accessibility, each accession has been assigned a unique accession codes followed by accompanying information such as current botanical name, family, local name *etc.* Each accession code contains 2 parts, the first part is the abbreviation of



Ponkorandi



Shade house for fruit plants

its generic and specific epithets while the second part is a number ranging from 1 to many. The duplicate accessions essentially represent the extent of intra-specific variability within each accession.

Field planting

Species were planted intermixed in the field with appropriate interspaces, considering their mode of growth, adaptability etc. The species recruitment was principally based on their habitat requirements as the site selected for planting possess highly varied topography with distinct landscape undulations. Trees with superior traits based on yield, palatability etc, as evident from the field experience were identified and such plants were used for raising saplings, also for collecting scions for the purpose

of making grafting operations. Field planting was done by planting in $1.5 \times 1.5 \times 1.5$ feet pits filled with a mixture of sand, soil and farm yard manure in the 1: 1: 1 ratio. The interspace between each plant was given 8 – 15 m distance considering the canopy diameter, growth pattern and the height reachable at maturity with regard to individual species.

Discussion

The evaluation and sustainable utilization of genetic diversity among plants is increasingly recognized worldwide for the benefit of the whole humanity and therefore, every step to strengthen and preserve our biodiversity is of immense importance. A total of 648 live accessions of 184 species of wild plants having edible fruit

value were collected and conserved *ex-situ* at JNTBGRI. These species belongs to 43 families and, based on their mode of use, wild fruits are categorized into: (1) raw fruits, (2) fruits cooked as vegetables, (3) kernels, seeds and grains cooked or roasted and (4) spicy and condiment fruits. The raw fruits include 141 species with a total of 509 accessions, the fruits which are consumed cooked or roasted contain 12 species, with 28 accessions and those having edible seeds, kernels and grains include 22 species, with 74 accessions; the 'spicy' and 'condiment fruits' contains 9 species, with 37 accessions (Tables 1 and Table 3[A] – 3[D]).

Two gymnosperms viz. *Cycas circinalis* (Cycadaceae) and *Gnetum ula* (Gnetaceae) whose starchy seeds have great



Views from fruit plants conservatory in JNTBGRI

acceptance among the tribal or village communities as a staple food item, but remains under-utilized and relatively lesser known to the outside world are also conserved along with wild fruits. Similarly, there are some other species viz. *Phyllanthus emblica*, *Mangifera indica*, *Syzygium cumini*, *Garcinia gummi-gutta*, *Baccaurea courtallensis* etc whose fruits play significant roles in the formal as well as informal trade among forest dwellers, to meet their livelihood. *Garcinia wightii* is considered as a keystone species which afford food and shelter for a wide range of birds, bats and primates. Likewise, the seeds and flowers of *Cullenia exarillata*, an endemic tree of Western Ghats forms the principal food for the Lion tailed macaques, Bonnet macaques and Malabar giant squirrels.

The present investigation mainly concentrates on the edible aspects of the species rather than their rarity or endangerment. This does not mean that the rare or endangered species are not given priority. For instance, *Salacia beddomei*, a species that has 'qualified' to enter into the Red Data Book of Indian Plants due to severe habitat destruction has been given adequate attention and 20 accessions of the species are conserved. On account of their

edible as well as ornamental potential, more than thousand saplings of *S. beddomei* has been raised and distributed to the public for planting around their homesteads. Some rare endemics such as *Buchanania axillaris*, *B. lanceolata* etc. deserving immediate conservation measures are also well-maintained in the conservatory. Species listed in Table 2 are endemics restricted to the Western Ghats region. Since most of the wild fruit species recruited for conservation are tropical in their adaptability, they grow and acclimatize well in the *ex-situ* conservatory of wild fruits in JNTBGRI.

Though the primary objectives of the study were to collect the wild fruits germplasm, the authors could also collect some significant intra-specific variability among *Phyllanthus emblica*, *Baccaurea courtallensis*, *Elaeocarpus serratus*, *Garcinia gummi-gutta*, *Mangifera indica*, *Syzygium cumini* etc, some of which have great potential for selection and improvement. The present attempt is a prelude towards a great leap to be followed in this direction, and an added expansion of the wild fruit germplasm - cum-field gene bank is anticipated with a view to acquire more accessions from the backwoods of South India.

Table 1. Family-wise representation of lesser-known edible fruits conserved in JNTBGRI

Family	No. of species	No. of accessions	Family	No. of species	No. of accessions
Anacardiaceae	6	84	Moraceae	6	13
Annonaceae	1	1	Musaceae	2	3
Apocynaceae	2	16	Myrtaceae	37	91
Arecaceae	2	7	Nelumbonaceae	1	2
Berberidaceae	1	1	Nymphaeaceae	1	1
Boraginaceae	2	2	Passifloraceae	1	3
Cactaceae	4	9	Pedaliaceae	1	4
Cannabaceae	2	2	Phyllanthaceae	16	137
Celastraceae	8	53	Piperaceae	4	7
Clusiaceae	13	35	Poaceae	3	5
Combretaceae	2	7	Primulaceae	1	1
Cornaceae	2	6	Rhamnaceae	4	6
Cucurbitaceae	5	16	Rosaceae	6	6
Dilleniaceae	2	3	Rubiaceae	6	15
Dioscoreaceae	1	2	Rutaceae	10	16
Elaeagnaceae	3	8	Salicaceae	3	22
Elaeocarpaceae	2	20	Sapindaceae	3	6
Lamiaceae	1	1	Sapotaceae	5	10
Leguminosae	2	7	Solanaceae	3	6
Lythraceae	1	1	Urticaceae	1	1
Malvaceae	7	6	Zingiberaceae	1	2
Melastomataceae	1	5	Total	184	648

Table 2. Endemic species among lesser-known wild edible fruit germplasm conserved ex-situ in JNTBGRI

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Alphonsea sclerocarpa</i> Thw.	Annonaceae	-	AS	01
<i>Aporosa acuminata</i> Thw.	Phyllanthaceae	Cheruvetti	AAC	02
<i>Aporosa bourdillonii</i> Stalpf.	Phyllanthaceae		AB	01
<i>Aporosa indoacuminata</i> Chakrab. & Balakr.	Phyllanthaceae	Cheruvetti	AI	01
<i>Artocarpus hirsutus</i> Lamk.	Moraceae	Anjili	AHi	08
<i>Baccaurea courtallensis</i> (Wt.) Muell.-Arg.	Phyllanthaceae	Moottipuli	BC	32
<i>Buchanania lanceolata</i> Wt.	Anacardiaceae	Kulamavu	BL	18
<i>Clausena austroindica</i> Stone & K.N. Nair	Rutaceae	Kattukariveppila	CA	01
<i>Cullenia exarillata</i> A. Robyns.	Malvaceae	Vedipilavu	CE	01
<i>Elaeagnus indica</i> Servettaz	Elaeagnaceae	Kurangurudraksham	EI	02
<i>Elaeocarpus munronii</i> (Wt.) Mast.	Elaeocarpaceae	Kattukara	EM	08
<i>Ensete superbum</i> (Roxb.) Cheesm.	Musaceae	Kalluvazha	ESu	02
<i>Entada rheedii</i> Spreng.	Leguminosae	Paranda	ERh	04
<i>Eugenia discifera</i> Gamble	Myrtaceae	Senelli	ED	01
<i>Eugenia rottleriana</i> Wight & Arn.	Myrtaceae	-	ER	01
<i>Eugenia terpnophylla</i> var. <i>keralensis</i> Shareef et al.	Myrtaceae	-	ETk	01
<i>Flacourtia montana</i> Graham	Salicaceae	Kattuseemanelli	FM	18
<i>Garcinia wightii</i> T. And.	Clusiaceae	Attupuli	GW	02
<i>Garcinia gummi-gutta</i> (L.) Robson	Clusiaceae	Kodampuli	GG	25
<i>Garcinia imbertii</i> Bourd.	Clusiaceae	Manjakkanji	GI	01
<i>Garcinia indica</i> (Thour.) Choisy	Clusiaceae	Kokum	GI	01
<i>Garcinia wightii</i> T. Anders.	Clusiaceae	Pulimaranga	GW	01
<i>Ixora brachiata</i> Roxb. ex DC.	Rubiaceae	Marathetti	IB	01
<i>Ixora johnsonii</i> Hook.f	Rubiaceae	Malamthetti	IJ	01
<i>Meteoromyrtus wynaadensis</i> (Bedd.) Gamble	Myrtaceae	-	MW	01
<i>Palaquium ellipticum</i> (Dalz.) Baill.	Sapotaceae	Pali	PE	01
<i>Phyllanthus indofischeri</i> Bennet	Phyllanthaceae	Malanelli	PI	01
<i>Piper galeatum</i> (Miq.) CDC.	Piperaceae	Kattu kurumulaku	PGa	01
<i>Salacia fruticosa</i> Heyne ex Lawson	Celastraceae	Ponkorandi	SF	15
<i>Salacia macrosperma</i> Wt.	Celastraceae	Anakorandi	SM	02
<i>Salacia beddomei</i> Gamble	Celastraceae	Korandi	SB	20
<i>Salacia brunoniana</i> Wight & Arn.	Celastraceae	-	SBr	01
<i>Salacia gambleana</i> Whiting & Kaul	Celastraceae	Korandi	SG	01
<i>Salacia malabarica</i> Gamble	Celastraceae	"	SM	01
<i>Spondias indica</i> (Wight & Arn.) Airy Shaw & Forman	Anacardiaceae	Kaattambazham	SI	01
<i>Syzygium bourdillonii</i> (Gamble) Radhakr. & Nair	Myrtaceae	-	SBo	01
<i>Syzygium chemungianum</i> S.M. Shareef, E.S.S. Kumar et Roy	Myrtaceae	-	SC	01
<i>Syzygium densiflorum</i> Wall. ex Wight & Arn.	Myrtaceae	Vellanjava	SD	01
<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi	Myrtaceae	Kollinjava	SL	01
<i>Syzygium mundagam</i> (Bourd.) Chithra	Myrtaceae	Kattuchamba	SMu	01
<i>Syzygium munnarensense</i> Shareef et al.	Myrtaceae	-	SMun	01
<i>Syzygium occidentale</i> (Bourd.) Gandhi	Myrtaceae	Attusamba	SO	01
<i>Syzygium palodensis</i> S.M. Shareef, E.S.S. Kumar et T. Shaju	Myrtaceae	-	SP	01
<i>Syzygium ramavarmae</i> (Bourd.) Gandhi	Myrtaceae	-	SR	01
<i>Syzygium salicifolium</i> (Wight) Grah.	Myrtaceae	Vellamanchi	SS	01

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Syzygium stocksii</i> (Duthie) Gamble	Myrtaceae	Njaval	SSt	01
<i>Syzygium travancoricum</i> Gamble	Myrtaceae	Vathamkollimaram	ST	01
47 species	17 families		191 accessions	

AC: Accession code; NA: Number of accessions. ⁺Species treatment follows alphabetic order; ⁺⁺Naming of families follows APG system; ^xMalayalam.

Table 3[A]. Lesser-known wild edible fruit germplasm conserved ex-situ in JNTBGRI (Raw fruits)

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Aegle marmelos</i> (L.) Corr.	Rutaceae	Koovalam	AM	01
<i>Alangium salviifolium</i> (L.f.) Wangerin	Cornaceae	Ankolam	ASa	01
<i>Alangium salviifolium</i> subsp. <i>sundanum</i> (Miq.) Bloem.	Cornaceae	Kilikothippazham	ASs	05
<i>Alphonsea sclerocarpa</i> Thw.*	Annonaceae	-	AS	01
<i>Antidesma bunius</i> (L.) Spreng.	Phyllanthaceae	Mayilkombii	AB	02
<i>Antidesma acidum</i> Retz.	Phyllanthaceae	Kattupulinchi	AAc	08
<i>Antidesma alexiteria</i> L.	Phyllanthaceae	Thathalamaram	AAI	01
<i>Antidesma ghaesembilla</i> Gaert.	Phyllanthaceae	Kattupulinchi	AG	12
<i>Antidesma montanum</i> Blume	Phyllanthaceae	Nilamveetti	AMo	02
<i>Aporosa acuminata</i> Thw.*	Phyllanthaceae	Cheruvetti	AAc	02
<i>Aporosa bourdillonii</i> Stalpf.*	Phyllanthaceae	-	AB	01
<i>Aporosa cardiosperma</i> (Gaertn.) Merr.	Phyllanthaceae	Ponvetti	AL	16
<i>Aporosa indoacuminata</i> Chakrab. & Balakr.*	Phyllanthaceae	Cheruvetti	AI	01
<i>Artocarpus hirsutus</i> Lamk.*	Moraceae	Anjili	AHi	08
<i>Artocarpus heterophyllus</i> Lamk.	Moraceae	Kattupilavu	AH	02
<i>Artocarpus lacucha</i> Buch.-Ham.	Moraceae	Kurangupilavu	ALa	02
<i>Atalantia racemosa</i> Wight & Arn.	Rutaceae	Malanaragam	AR	01
<i>Atalantia monophylla</i> DC.	Rutaceae	Kattunarenga	AM	01
<i>Baccaurea courtallensis</i> (Wt.) Muell.-Arg.*	Phyllanthaceae	Moottipuli	BC	32
<i>Bridelia retusa</i> (L.) Spreng.	Phyllanthaceae	Mulluvenga	BR	01
<i>Bridelia stipularis</i> (L.) Blume	Phyllanthaceae	Kanjikottam	BS	01
<i>Carissa carandas</i> L.	Apocynaceae	Karimulli	CC	09
<i>Carissa spinarum</i> L.	Apocynaceae	Cherumulli	CS	07
<i>Carmona retusa</i> (Wall.) Masamune	Boraginaceae	Kurangu vettilla	CR	01
<i>Celtis timorensis</i> Span.	Cannabaceae	Poochakkurumaram	CT	01
<i>Cereus pterogonus</i> Lamaire	Cactaceae	Chathurakkalli	CP	01
<i>Chrysophyllum roxburghii</i> G. Don	Sapotaceae	Noolambazham	CRo	01
<i>Clausena austroindica</i> Stone & K.N. Nair*	Rutaceae	Kattukariveppila	CA	01
<i>Clausena dentata</i> (Willd.) M. Roem.	Rutaceae		CD	01
<i>Clausena indica</i> (Dalz.) Oliver	Rutaceae	Gorakotta	CI	01
<i>Cordia dichotoma</i> G. Foster	Boraginaceae	Naruviri	CDi	01
<i>Debregeasia longifolia</i> (Burm.f.) Wedd.	Urticaceae	Neerinch	DL	01
<i>Dimocarpus longan</i> Lour.	Sapindaceae	Poripunna	DLo	01
<i>Elaeagnus kologa</i> D.F.K. Schlecht	Elaeagnaceae	Kurangupazham	EK	02
<i>Elaeagnus conferta</i> Roxb.	Elaeagnaceae	Kattumunthiri	EC	04
<i>Elaeagnus indica</i> Servettaz*	Elaeagnaceae	Kurangurudraksham	EI	02
<i>Elaeocarpus serratus</i> L.	Elaeocarpaceae	Kara	ES	12
<i>Elaeocarpus munronii</i> (Wt.) Mast.*	Elaeocarpaceae	Kattukara	EM	08

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Eugenia discifera</i> Gamble*	Myrtaceae	Senelli	ED	01
<i>Eugenia mooniana</i> Wight	Myrtaceae	Kunjunnippazham	EMo	01
<i>Eugenia rothii</i> Panigrahi	Myrtaceae		ER	03
<i>Eugenia rottleriana</i> Wight & Arn.*	Myrtaceae	-	ERo	01
<i>Eugenia roxburghii</i> DC.	Myrtaceae	Kaya	ERox	01
<i>Eugenia terpnophylla</i> var. <i>keralensis</i> Shareef et al.*	Myrtaceae	-	ETk	01
<i>Flacourtia indica</i> (Burm.f.) Merr.	Salicaceae	Chaliru	FI	03
<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Salicaceae	Kanji	FJ	01
<i>Flacourtia montana</i> Graham*	Salicaceae	Kattuseemanelli	FM	18
<i>Garcinia cowa</i> Roxb ex DC.	Clusiaceae	Cowa	GC	01
<i>Garcinia indica</i> (Thour.) Choisy*	Clusiaceae	Kokum	GI	01
<i>Garcinia spicata</i> (Wt. & Arn.) Hook.f.	Clusiaceae	Pandurmanga	GS	01
<i>Garcinia wightii</i> T. And.*	Clusiaceae	Attupuli	GW	02
<i>Garcinia xanthochymus</i> Hook.f. ex T. Anders.	Clusiaceae	Rajapuli	GX	01
<i>Geophila repens</i> (L.) I.M. Johnston	Rubiaceae	Karimkodangal	GR	02
<i>Glycosmis mauritiana</i> (Lam.) Tanaka	Rutaceae	Karumpanal	GM	01
<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Panal	GP	03
<i>Gmelina arborea</i> Roxb.	Lamiaceae	Kumizh	GA	01
<i>Grewia damine</i> Gaertn.	Malvaceae	Manjali unnam	GD	01
<i>Grewia nervosa</i> (Lour.) G. Panigrahi	Malvaceae	Kottangapazham	GN	01
<i>Grewia tiliifolia</i> Vahl.	Malvaceae	Unnam	GT	01
<i>Grewia villosa</i> Willd.	Malvaceae	Thottukulla	GV	01
<i>Ixora brachiata</i> Roxb. ex DC.*	Rubiaceae	Marathetti	IB	01
<i>Ixora coccinea</i> L.	Rubiaceae	Kattuthechi	IC	04
<i>Ixora johnsonii</i> Hook.f.*	Rubiaceae	Malamthetti	IJ	01
<i>Limonia acidissima</i> L.	Rutaceae	Vlanka	LA	01
<i>Madhuca longifolia</i> (J. Koenig ex L.) J.F. Macbr.	Sapotaceae	Illippa	ML	01
<i>Maesa indica</i> (Roxb.) A. DC.	Primulaceae	Kaarithi	MI	01
<i>Mahonia leschenaultia</i> (Wall. ex Wight & Arn.) Takeda ex Gamble	Berberidaceae	Mullumanjanathi	MLe	01
<i>Mangifera indica</i> L.	Anacardiaceae	Kattumavu	MIn	42
<i>Manilkara hexandra</i> (Roxb.) Dubard	Sapotaceae	Pazhamunnipala	MH	01
<i>Melastoma malabathricum</i> L.	Melastomataceae	Kalampotti	MM	05
<i>Meteoromyrtus wynaadensis</i> (Bedd.) Gamble*	Myrtaceae	-	MW	01
<i>Mimusops elengi</i> L.	Sapotaceae	Elengi	ME	01
<i>Morinda citrifolia</i> L.	Rubiaceae	Noni	MC	01
<i>Opuntia elatior</i> Mill.	Cactaceae	Pattanathumkalli	OE	01
<i>Opuntia ficus-indica</i> (L.) Miller	Cactaceae	Ilakkalli	OF	01
<i>Opuntia striata</i> var. <i>dillenii</i> (Ker-Gawler) Haw.	Cactaceae	Pathikalli	OSd	01
<i>Palaquium ellipticum</i> (Dalz.) Baill. *	Sapotaceae	Pali	PE	01
<i>Passiflora foetida</i> L.	Passifloraceae	Bonjikkai	PF	03
<i>Phoenix loureiroi</i> Kunth	Arecaceae	kaatteentha	PL	01
<i>Phoenix pusilla</i> Gaertn.	Arecaceae	Chitteenthal	PP	06
<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Nelli	PEm	49
<i>Phyllanthus indofischeri</i> Bennet*	Phyllanthaceae	Malanelli	PI	01
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Leguminosae	Korukkappuli	PD	03
<i>Psidium guineense</i> Sw.	Myrtaceae	Kattupera	PG	08

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Rhodomyrtus tomentosa</i> (Ait.) Hassk.	Myrtaceae	Kattukoyya	RT	01
<i>Rubus niveus</i> Thunb.	Rosaceae	Mulli	RN	01
<i>Rubus ellipticus</i> Smith.	Rosaceae	Manjamulli	RE	01
<i>Rubus glomeratus</i> Blume	Rosaceae	Mulluvettilla	RG	01
<i>Rubus micropetalus</i> Gaertn.	Rosaceae	Chuvanna muli	RM	01
<i>Rubus moluccanus</i> var. <i>glomeratus</i> (Blume) Backer	Rosaceae	Chuvannamulli	RMg	01
<i>Rubus racemosus</i> Roxb.	Rosaceae	Chambamulli	RR	01
<i>Salacia chinensis</i> L.	Celastraceae	Cherukorandi	SC	12
<i>Salacia beddomei</i> Gamble*	Celastraceae	Korandi	SB	20
<i>Salacia brunoniana</i> Wight & Arn.*	Celastraceae	-	SBr	01
<i>Salacia fruticosa</i> Heyne ex Lawson*	Celastraceae	Ponkorandi	SF	15
<i>Salacia gambleana</i> Whiting & Kaul*	Celastraceae	Korandi	SG	01
<i>Salacia macrosperma</i> Wt.*	Celastraceae	Anakorandi	SM	02
<i>Salacia malabarica</i> Gamble*	Celastraceae	"	SMa	01
<i>Salacia oblonga</i> Wall.	Celastraceae	Ponkorandi	SO	01
<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Poovanam	SOI	02
<i>Spondias indica</i> (Wight & Arn.) Airy Shaw & Forman*	Anacardiaceae	Kaattambazham	SI	01
<i>Spondias pinnata</i> (L. f.) Kurz.	Anacardiaceae	Ambazham	SP	19
<i>Streblus asper</i> Lour.	Moraceae	Paruva	SA	01
<i>Streblus taxoides</i> (Roth.) Kurz.	Moraceae	Kozhimullu	ST	03
<i>Syzygium gardneri</i> Thw.	Myrtaceae	Karinjaval	SGa	01
<i>Syzygium travancoricum</i> Gamble*	Myrtaceae	Vathamkollimaram	STr	01
<i>Syzygium zeylanicum</i> (L.) DC.	Myrtaceae	Poochappazham	SZ	23
<i>Syzygium arnottianum</i> Walp.	Myrtaceae	Navva	SAr	01
<i>Syzygium benthamianum</i> (Wight ex Duthie) Gamble	Myrtaceae	Njaval	SBe	01
<i>Syzygium bourdillonii</i> (Gamble) Radhakr. & Nair*	Myrtaceae	-	SBo	01
<i>Syzygium calophyllifolium</i> Walp.	Myrtaceae		SCa	01
<i>Syzygium caryophyllatum</i> (L.) Alston.	Myrtaceae	Karinga	SCr	04
<i>Syzygium chemungianum</i> S.M. Shareef, E.S.S. Kumar et Roy*	Myrtaceae	-	SCh	01
<i>Syzygium claviflorum</i> (Roxb.) Wall. ex A.M. Cowan & Cowan	Myrtaceae	-	SCI	01
<i>Syzygium cuminii</i> (L.) Skeels	Myrtaceae	Njaval	SCu	20
<i>Syzygium densiflorum</i> Wall. ex Wight & Arn.*	Myrtaceae	Vellanjaval	SD	01
<i>Syzygium fruticosum</i> (Roxb.) DC.	Myrtaceae	-	SFr	01
<i>Syzygium hemisphericum</i> (Wt.) Alston	Myrtaceae	Vellanjaval, Venjara	SH	01
<i>Syzygium jambos</i> L.	Myrtaceae	Jamba	SJ	01
<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi*	Myrtaceae	Kollinjaval	SL	01
<i>Syzygium lanceolatum</i> (Lamk.) Wt. & Arn.	Myrtaceae	Njara	SLa	02
<i>Syzygium lineare</i> (Duthie) Wall. ex Gamble	Myrtaceae	-	SLi	01
<i>Syzygium malabaricum</i> (Bedd.) Gamb.	Myrtaceae		SMal	01
<i>Syzygium mundagam</i> (Bourd.) Chithra*	Myrtaceae	Kattuchamba	SMu	01
<i>Syzygium munnarensis</i> Shareef et al.*	Myrtaceae	-	SMun	01
<i>Syzygium munronii</i> (Wight) Chandr.	Myrtaceae	Njaral	SMunr	01
<i>Syzygium myhendrae</i> (Bedd. ex Brandis) Gamble	Myrtaceae	-	SMy	01
<i>Syzygium neesianum</i> Arn.	Myrtaceae	-	SN	01
<i>Syzygium occidentale</i> (Bourd.) Gandhi*	Myrtaceae	Attusamba	SOc	01
<i>Syzygium palodensis</i> S.M. Shareef, E.S.S. Kumar et T. Shaju*	Myrtaceae	-	SPa	01
<i>Syzygium ramavarmae</i> (Bourd.) Gandhi*	Myrtaceae	-	SR	01

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Syzygium salicifolium</i> (Wight) Grah.*	Myrtaceae	Vellamanchi	SS	01
<i>Syzygium stocksii</i> (Duthie) Gamble*	Myrtaceae	Njaval	SS†	01
<i>Toddalia asiatica</i> (L.) Lam.	Rtaceae	Kakkathodali	TA	01
<i>Trema orientalis</i> (L.) Blume	Cannabaceae	Malamthodali	TO	01
<i>Trichopus zeylanicus</i> subsp. <i>travancoricus</i> Burkill ex Narayanan	Dioscoreaceae	Karivachi	TZ†	02
<i>Triphasia trifolia</i> (Burm.f.) P. Wilson	Rutaceae	Chonanaragam	TT	01
<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Elentha	ZM	01
<i>Ziziphus oenoplia</i> (L.) Mill	Rhamnaceae	Thodali	ZO	02
<i>Ziziphus rugosa</i> Lamk.	Rhamnaceae	Julippazham	ZR	02
<i>Ziziphus xylopyrus</i> (Retz.) Willd.	Rhamnaceae	Kottamullu	ZX	01
141 species	31 families		509 accessions	

AC: Accession code; NA: Number of accessions; *Species treatment follows alphabetic order; ++Naming of families follows APG system; ^xMalayalam.

Table 3[B]. Lesser-known wild edible fruit germplasm conserved *ex-situ* in JNTBGRI (Vegetables fruits)

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Koval	CG	05
<i>Cucumella ritchiei</i> (Chakr.) Jeffrey	Cucurbitaceae	Kattuvellari	CRi	01
<i>Dillenia indica</i> L.	Dilleniaceae	Chalitha	DI	01
<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Kudappunna	DP	02
<i>Ensete superbum</i> (Roxb.) Cheesm.*	Musaceae	Kalluvazha	ESu	02
<i>Ficus hispida</i> L.f.	Moraceae	Erumanakku	FH	03
<i>Ficus racemosa</i> L.	Moraceae	Athi	FR	02
<i>Memordica dioica</i> Roxb. ex Willd.	Cucurbitaceae	Kattupaval	MD	02
<i>Mukia maderaspatana</i> (L.) M. Roem.	Cucurbitaceae	Kattuvellari	MM	03
<i>Musa acuminata</i> Colla	Musaceae	Navazha	MA	01
<i>Solena amplexicaulis</i> (Lamk.) Gandhi	Cucurbitaceae	Karuvi	SAm	05
<i>Tamilnadia uliginosa</i> (Retz.) Tirvengadam & Sastre	Rubiaceae	Pindichakka	TU	01
12 species	5 families		28 accessions	

AC: Accession code; NA: Number of accessions; *Species treatment follows alphabetic order; ++Naming of families follows APG system; ^xMalayalam.

Table 3[C]. Lesser-known wild edible fruit germplasm conserved *ex-situ* in JNTBGRI (Edible kernels, seeds and grains)

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Bambusa bambos</i> (L.) Voss.	Poaceae	Mullumula	BB	02
<i>Buchanania axillaris</i> (Desr.) Ramam.	Anacardiaceae	Malamavu	BA	03
<i>Buchanania ngulate</i> Wt. *	Anacardiaceae	Kulamavu	BL	18
<i>Buchanania lanzan</i> Spreng.	Anacardiaceae	Mungappezhu	BLz	10
<i>Cardiospermum helicacabum</i> L.	Sapindaceae	Uzhinja	CH	03
<i>Cullenia exarillata</i> A. Robyns. *	Malvaceae	Vedipilavu	CE	01
<i>Cycas circinalis</i> L.	Cycadaceae	Kalanga	Cci	04
<i>Eleusine coracana</i> (L.) Gaertn.	Poaceae	Kaepa	EC	01
<i>Entada rheedii</i> Spreng. *	Leguminosae	Paranda	Erh	04
<i>Gnetum ula</i> Brongn.	Gnetaceae	Odal	GU	03
<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	Thamara	NN	01
<i>Nymphaea nouchali</i> Burm.f.	Nymphaeaceae	Ambal	Nno	02

Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
<i>Oryza meyeriana</i> subsp. <i>granulata</i> (Nees & Arn. Ex Watt.) Tateoka	Poaceae	Kattunellu	OM	02
<i>Physalis angulata</i> L.	Solanaceae	Njodi-njotta	PA	01
<i>Sesamum orientale</i> L.	Pedaliaceae	Ellu	Sor	04
<i>Solanum nigrum</i> L.	Solanaceae	Manithakkali	SN	02
<i>Solanum torvum</i> Swartz	"	Chunda	Sto	03
<i>Sterculia foetida</i> L.	Malvaceae	Keethondi	Sfo	01
<i>Sterculia guttata</i> Roxb. Ex DC.	"	Thondi	SG	01
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Tanni	TB	03
<i>Terminalia chebula</i> Retz.	"	Kadukka	TC	04
<i>Trapa natans</i> L.	Lythraceae	Karimpolam	TN	01
22 species	13 families		74 accessions	

*Endemic; AC, Accession code; NA, Number of accessions.

⁺Species treatment follows alphabetic order; ⁺⁺Naming of families follows APG system; ^xMalayalam.

Table 3[D]. Lesser-known wild edible fruit germplasm conserved *ex-situ* in JNTBGRI Spicy and condiment fruits

SN	Species ⁺	Family ⁺⁺	Local name ^x	AC	NA
1	<i>Elettaria cardamomum</i> (L.) Maton	Zingiberaceae	Elam	ECa	02
2	<i>Garcinia gummi-gutta</i> (L.) Robson*	Clusiaceae	Kodampuli	GG	25
3	<i>Garcinia imbertii</i> Bourd.*	Clusiaceae	Manjakkanni	GI	01
4	<i>Garcinia talbottii</i> Raiz. ex Santapau	Clusiaceae	Malampongu	GT	01
5	<i>Garcinia wightii</i> T. Anders.*	Clusiaceae	Pulimaranga	GW	01
6	<i>Piper attenuatum</i> Buch.-Ham. ex Miq.	Piperaceae	Kattukurumulaku	PA	02
7	<i>Piper galeatum</i> (Miq.) C.DC. *	Piperaceae	Kattu kurumulaku	PGa	01
8	<i>Piper longum</i> L.	Piperaceae	Thippali	PL	02
9	<i>Piper nigrum</i> L.	Piperaceae	Kattukurumulaku	PN	02
Total	9 species	3 families		37 accessions	

AC, Accession Code; NA, Number of Accessions.

⁺Species treatment follows alphabetic order; ⁺⁺Naming of families follows APG system; ^xMalayalam.

SUMMARY

The conservation activities of wild fruits are in fact a safety measure to protect the lesser-known and under-exploited native fruit germplasm from all kinds of depletion. JNTBGRI is the pioneer institute in Kerala to come up with such a prolific scheme to protect the vast reservoir of wild fruits germplasm bounded in its wilderness. A total of 648 live accessions belonging to 184 species are maintained in the Institute's conservatory. Within the next few years, more wild fruit plants will be brought out for conservation and popularization as an alternative unconventional resource, adding substantially

to the fruit basket of the State. In the coming years, novel strategies will be established for bringing such unconventional fruit germplasm into the limelight of active research so as to catch up the attention of plant breeders, agriculturists, industrialists, etc.

For further interaction, please write to:

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Identification of Pro Vitamin A (PVA) rich banana accessions

Two dessert hybrids plantain (NOP 45–102 µg/g of Dw pulp) and Pisang Awak (Progeny No. 434- 90 µg/g pulp dry weight) back grounds and one selection (ITC 2390/2) having more provitamin-A (82 µg/g of pulp dry weight) were identified.

Source: ICAR Annual Report 2021-22

