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Prospective wild edible fruit plants from part of northern Western Ghats (NWG), Mulshi (MS), India

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Abstract

A survey was carried out to document traditional religious information of prospective wild edible fruits consumed by tribal and non tribal communities in Mulshi, a part of Northern Western Ghats (NWG). Forests represent an integral part of the social life of tribal groups and are home to the people who are completely or partly dependent on forests for their livelihood. The communities in Mulshi include "Marathas", "Katkari" "Mahadeo koli" and "Dhangars". The study area is rich in genetic and species diversity including rare, endemic, endangered and threatened (RET) category species. The wild edible fruits plays fundamental role in human diet and are enriched with macronutrients, microelements, secondary metabolites and have high nutritional value. The fruits are eaten either as a raw in ripe or unripe condition. The total of 109 wild edible fruit plant species belonging to 85 genera and 57 families has been investigated in present research work. The potentialities of these fruits could be explored and utilized for pharmaceutical industry or as an additional fruit crop source in agriculture with high food value and with exceptional medicinal properties.

Keywords: Ethno-botany, Wild edible fruits, NWG, Mulshi.

1. Introduction

Utilization of the natural resources is the very ancient religious knowledge from Vedic periods [3]. Western Ghats represents exceedingly diversified area and having great ethno-botanic wealth [1]. Term ethno-botany states that the use of natural resources and products in human domestic life. Western Ghats zone is varied in climatic and edaphic factors which affects fruit plants distribution at the fluctuated altitude elevation. The tribal peoples acquired the knowledge of wild edible plant species based on trials in the fields and knowledge of wild edible fruit plants can be used to solve food insecurity and malnutrition problems [6, 13].

Since prehistoric time, edible wild fruits have played a vital role in supplementing the diet of the people. The dependence on these fruits has steadily declining as more exotic fruits have been introduced. But many people in tribal areas still use them as a supplement of their basic need of food. Some of them are preserved for use in dry period or sold in local market. But the popularity of these wild forms has recently decreased. Apart from their traditional use of food, potentially they have many advantages [4]. They are edible and having fortified nutritional food value, which provides the minerals like sodium, potassium, magnesium, iron, calcium, phosphorus as well as vitamins, proteins and carbohydrates and microelements. These are richest source of secondary metabolites with highest antioxidant properties. They are immune to many diseases and often used in different formulation of 'Ayurveda' in Indian Folk-medicine and traditional medicines. Documentation of wild edible fruits plays significant role to enhance the natural food resources which had been used with the help of religious knowledge [7]. Wild edible fruits today are needs to be recommended for cultivation due to this, they can serve as food material for ever increasing population [14].

The wild edible fruit are not only food but also contributes the beneficial natural nutrition source as food, diet, nutrition and nutrients to ever increasing population and in food scarcity [9]. The wild edible fruits play an important role in sustainable livelihood of tribal communities residing in forest areas [5]. Increased use of these wild edible fruits may rise as promising solutions on problems of malnutrition [8]. In order to medicate, a wider and sustained acceptance of wild fruits as important dietary components must be encouraged.

Area under study

Mulshi (18°28.651' - 18°25.796'N to 073°24.508'- 073°36.513' E) is located almost centrally in Northern Western Ghats (NWG), about 70 km west of Pune district of Maharashtra state, at an altitude of 931 to 2680 feet. It forms the crest line of Western Ghats, and gently sloping part bordering the Deccan Plateau and has an area of about 250 sq. km (Figure-1). The average annual rainfall of area is 145 cm and highest up to 165 cm. The vegetation is moist deciduous with evergreen, semi- evergreen, dry deciduous and grassy patches. Several forest patches are still conserved due to Deo-Rahati (Sacred grove) "deities house" is an ancient religious concept.

This area provides a good habitat to diverse forms of plants and animals with rich biodiversity. The most prominent feature of this area is centrally located Mulshi Lake which is developed by a dam constructed on Mula River by a Tata Electric company, during 1921 to 1924. This privately owned lake is 37 km² is in semi-circular manner in Mulshi basin. It includes Temghar and Varsgaon water reservoirs on eastern side of Mulshi near Lavasa a privately developed hill city. Mulshi also includes Tamhini wild life sanctuary with 49.62 sq.km area having rich biodiversity. The average temperature ranges between 5 °C – 30 °C in winter to summer season.

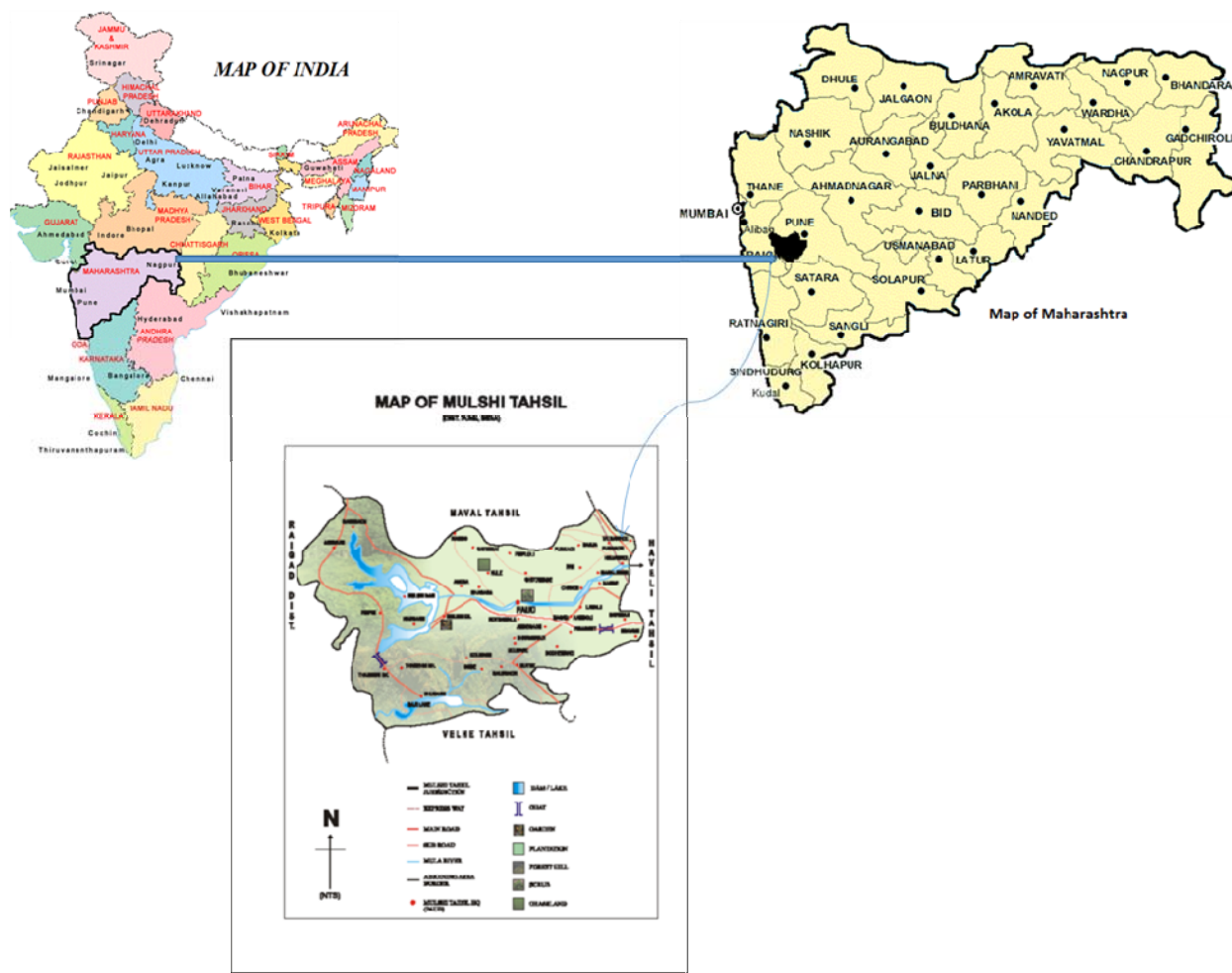


Fig 1: Map represents Area under study

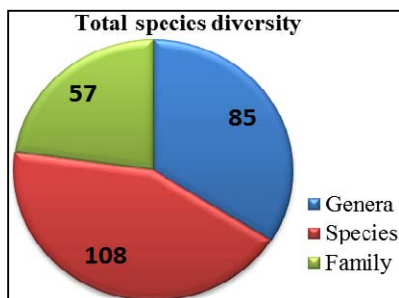
2. Methodology

The study was undertaken to document the potential wild edible fruit resources from Mulshi a part of NWG. The tribal communities reside in several villages and forest patches in Mulshi. People, mostly tribal and non-tribal communities which includes 'Marathas', 'Mhadeo-Koli', 'Katkari', 'Dhangars' inhabits the area. The frequent field tours were organized to procure the information regarding wild edible fruits from both communities including several sacred groves (Deorai's). Plants materials were collected in their flowering and fruiting period and identified by referring several floras such as Flora of Maharashtra Vol. I-III [10-12], Flora of Baramati [2]. These were processed as per standard procedure in triplicates and deposited in herbarium of department of Botany, Anantrao Pawar College, Pirangut in Mulshi. Present study was carried out for period 2013 to 2015.

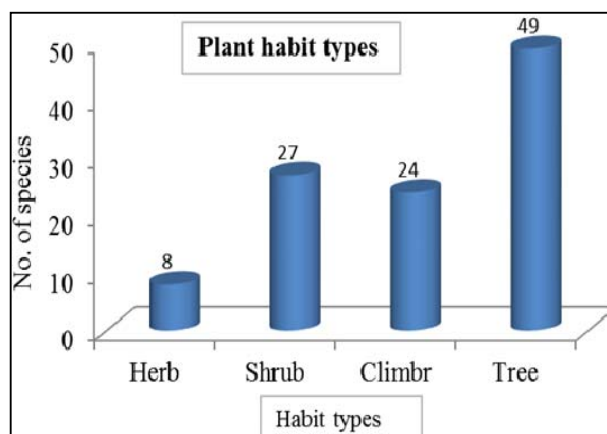
3. Results and Discussion

Wild edible fruits are easily accessible to cost effective natural resources to enhance the dietary habit and nutritional values for the healthy growth of related communities and local peoples. Present work reveals that, the use of traditional knowledge of wild edible fruits by 'Marathas', 'Katkari', 'Mahadeo Koli' and 'Dhangars' in their daily food. The total number of 108 wild edible fruit plants species belonging to 85 genera from 57 families has been documented in area under study (Graph 1). The majority of these fruits belong to tree habit i.e. 49, followed by shrub 27, climber 24 and 8 species from herb category (Graph 2). The purpose of this study is documentation, identification and recommendation of wild edible fruits used by tribes and local peoples in NWG of Mulshi. Future research is required to analyze the quality and quantity of nutrition and to investigate the role of edible fruits

to maintain nutrition of our body. Further it needs to understand the action of secondary metabolites to cure the diseases and as a source of nutrition.



Graph 1: Total species diversity of wild edible fruits from Mulshi region



Graph 2: Plant habit diversity of wild edible fruits in Mulshi region

Table 1: Enumeration of prospective wild edible fruits from NWG, Mulshi

Scientific Name	Common Name	Family	Flowering and Fruiting	Utilization
<i>Acacia nilotica</i> (L.) Willd. ex. Del	Babhul	Mimosaceae	Aug-Feb	Mature ripe or unripe legumes are used to treat the toothache and also eaten as raw
<i>Aegle marmelos</i> (L.) Corr.	Bel	Rutaceae	Apr- Sept	Fruits aromatic pulp eaten with sugar
<i>Allophylus cobbe</i> (L.) Raeusch.	Tipani	Sapindaceae	May-Nov	Ripe and unripe fruits eaten as raw due to their sweet taste
<i>Annona reticulata</i> L.	Ramphal	Annonaceae	Mar- July	Ripe fruits are eaten as raw
<i>Annona squamosa</i> L.	Sitaphal	Annonaceae	May-Aug	Ripe fruits eaten as raw
<i>Argyrea nervosa</i> (L. f.) Sweet.	Samudrashok	Convolvulaceae	Sept-Mar	Ripe fruits pulp are eaten as raw
<i>Artocarpus heterophyllus</i> Lam.	Phanas	Moraceae	Feb-May	Ripe fruits eaten as raw and also used as making pickles, jams and chips
<i>Atlantia monophylla</i> (L.) Corr.	Makad-limbu	Rutaceae	Dec-June	Fruits are pickled and also fruit juice used as anti-thimet property
<i>Azadirachta indica</i> A. Juss	Kadu-nimb	Meliaceae	Feb-May	Raw and fully ripe fruits are edible
<i>Balanites aegyptiaca</i> (L.) Del.	Hingan	Solanaceae	Nov-Apr	Ripe fruits pulp eaten as raw and also used to treat the stomach problems, fever and jaundice
<i>Bauhinia racemosa</i> Lam.	Kanchan	Caesalpiniaceae	Mar-Aug	Legumes used as vegetables
<i>Bridelia retusa</i> (L.) Spreng.	Asana	Euphorbiaceae	Aug-Jan	Ripe fruits eaten as raw
<i>Buchanania cochinchinensis</i> (Lour.) Almeida	Charoli	Anacardiaceae	Jan-May	Ripe fruits eaten as raw
<i>Cajanus lineatus</i> (Wight & Arn.) van der Maesen	Ran-Tur	Papilionaceae	Aug-Jan	Mature legumes are eaten as raw
<i>Calophyllum inophyllum</i> L.	Karmal	Clusiaceae	Jan-May	Ripe fruits eaten as raw
<i>Cassia rheedii</i> Gmel.	Akas-Nimb	Opiliaceae	Nov-Apr	Fruit pulp eaten as raw
<i>Casearia tomentosa</i> Roxb.	Chilla, Karei	Flacourtiaceae		Fruit pulp medicinal
<i>Canthium dicocum</i> (Gaertn.) Merr.	Tupa, Arsul	Rubiaceae	Nov-Feb	Fruit pulp eaten as raw
<i>Canavalia ensiformis</i> (L.) DC.	Abai	Papilionaceae	Aug.-Nov.	Unripe legumes used as vegetable
<i>Canavalia gladiata</i> (Jacq.) DC.	Patad sheng, Abeyvel	Papilionaceae	Oct-Mar	Unripe legumes used as vegetable
<i>Capparis zeylanica</i> L.	Waghata	Capparidaceae	Dec-May	Mature unripe fruits used as vegetable and ripe pulpy berries eaten as raw
<i>Carissa congesta</i> L.	Karvand	Apocynaceae	Feb – July	Mature unripe fruits used as vegetables and made to Pickles. Ripe fruits are eaten as raw and used to prepare juice
<i>Cassia fistula</i> L.	Bahava	Caesalpiniaceae	Mar-Oct	Juvenile fruits (Legumes) are used as vegetables and mature fruits pulp eaten as raw
<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Gela	Rubiaceae	Feb-May	Ripe fruits eaten as raw
<i>Celastrus paniculatus</i> Willd.	Malkanguni, Jyotishmati	Celastraceae	June-Dec.	Seed oil from fruits used for medicinal purpose
<i>Citrus aurantifolia</i> (Christm. & Panz.) Swingle	Limbu	Rutaceae	Throughout year	Used in vegetables and making sarbat, pickles and jams
<i>Citrullus colocynthis</i> (L.) Schrad.	Kadu-Indrayan	Cucurbitaceae	July-Oct.	Fruits used for medicinal purpose
<i>Coccinia grandis</i> (L.) Viogt	Tondli	Cucurbitaceae	Mar-Dec	Ripe or unripe fruits eaten as raw and used as vegetable
<i>Corallocarpus epigaeus</i> (Rottl.) C.B.Cl.	Karmugli	Cucurbitaceae	Aug.-Oct.	Fruits medicinal
<i>Cordia dichotoma</i> L.	Bhokar	Boraginaceae	Mar - Aug	Semi-ripe fruits are pickled and ripe fruits are eaten as raw
<i>Cordia macleodii</i> Hook.	Bhokar	Boraginaceae	Mar-May	Ripe fruits are eaten as raw

<i>Cucumis setosus</i> Cogn.	Mehaki	Cucurbitaceae	Sept.-Oct.	Ripe fruits eaten as raw and also as vegetables.
<i>Dillenia pentagyna</i> Roxb.	Karmal	Dilleniaceae	Sept – Feb	Fruits eaten as raw or cooked
<i>Diospyros montana</i> Roxb.	Tendu	Ebenaceae	Dec-Mar	Fruits are edible and pulp eaten as raw
<i>Diospyros peregrina</i> Roxb.	Tendu	Ebenaceae	Mar-May	Ripe fruits eaten as raw
<i>Ehretia laevis</i> Roxb.	Ajaanvruksha, Datrang	Boraginaceae	Mar-July	Ripe fruits eaten as raw
<i>Elaeagnus latifolia</i> L.	Ambgul	Elaeagnaceae	Nov-May	Ripe fruits are eaten as raw
<i>Emblica officinalis</i> Gaertn.	Avla	Euphorbiaceae	Sept-Mar	Mature fruits are eaten as raw and also used made to Pickles and Murabba
<i>Ensetes superba</i> (Roxb) Cheesman.	Jangli kel	Musaceae	Aug-Feb	Ripe fruits are eaten as raw
<i>Ficus hispida</i> L.f.	Kala Umbar	Moraceae	Jan-July	Unripe fruits are eaten in curries
<i>Ficus racemosa</i> L.	Umbar	Moraceae	Jan-June	Mature unripe fruits are used as vegetables and ripe fruits are eaten as raw
<i>Flacourtia indica</i> (Burm.f.) Merr.	Atak, Tambat	Flacourtiaceae	Dec-May	Ripe fruits are eaten as raw and also used to made juice
<i>Flacourtia montana</i> Grah.	Ataki	Flacourtiaceae	Nov-Mar	Ripe fruits eaten as raw
<i>Galactia tenuiflora</i> (Klein ex Willd.) Wight & Arn. var. <i>tenuiflora</i> .	-	Papilionaceae	Sept.-Oct.	Unripe legumes used as vegetable
<i>Garcinia indica</i> (Thou.) Chois.	Amsul, Ratamba	Clusiaceae	Nov-Aug	Ripe fruits are eaten as raw and also used in sarbat. Fruits covering is highly edible used in curry
<i>Garcinia talbotii</i> Raiz. ex Sant.	Fansada, Limboti	Clusiaceae	Feb-July	Ripe fruits eaten as raw, preserved fruits covering used in curry
<i>Garuga pinnata</i> Roxb.	Kakkad	Burseraceae	Feb.-May	Fruits eaten for medicinal use
<i>Glycosmis pentaphylla</i> (Retz.) DC.	Maenaki, Kirmira	Rutaceae	Oct-May	Ripe fresh berries eaten as raw
<i>Gmelina arborea</i> Roxb	Shivan	Lamiaceae	Feb-May	Fruits are edible
<i>Grewia hirsuta</i> Vahl	Kirmid	Tiliaceae	Sep-Jan	Ripe fruits eaten as raw
<i>Grewia tiliifolia</i> Vahl	Dhaman	Tiliaceae	May-Aug	Ripe fruits are eaten as raw
<i>Grewia abutilifolia</i> Vent. ex A. Juss.	Kharmati, Kirmith	Tiliaceae	Feb.-Nov.	Ripe fruits eaten as raw
<i>Helicteres isora</i> L.	Murud sheng	Sterculiaceae	Dec-May	Mature fruits are used for children's
<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Waval	Ulmaceae	Jan.-June	Fruits edible
<i>Lantana camera</i> L. var. <i>aculeata</i> (L.) Moldenke	Ghaneri, Tantani	Verbenaceae	Throughout	Mature fruits edible
<i>Leea indica</i> (Burm. f.) Merr.	Karkani	Leeaceae	Aug-Mar	Fleshy fruits with scanty edible pulp
<i>Leucaena leucocephala</i> L.	Subabhul, Shevri	Mimosaceae	Nov-Apr	Legumes used as vegetables, also used in salads
<i>Limonia acidissima</i> L.	Kavath	Rutaceae	Mar-Sep	Pulp of ripe and unripe fruit eaten as raw, also with sugar or salt
<i>Luffa acutangula</i> (L.) Roxb.	Jangli Dodka	Cucurbitaceae	Aug-Dec	Fruits are used as vegetables and also used in Pakoda
<i>Madhuca indica</i> Gmel. Syst.	Moha	Sapotaceae	Nov-Mar	Ripe fruits eaten as raw and also cooked
<i>Maesa indica</i> (Roxb.) DC.	Krumighna Phal	Myrsinaceae	Throughout	Ripe fruits eaten as raw
<i>Mangifera indica</i> L.	Amba	Anacardiaceae	Jan – July	Fruits eaten as raw or by preparing Juice, Jams and Pickles
<i>Meyna laxiflora</i> Robyns.	Alu	Rubiaceae	Mar-May	Fruits are fleshy, ripe fruits are eaten as raw
<i>Morus alba</i> L.	Tuti	Moraceae	Throughout year	Ripe berries are eaten as raw
<i>Mukia maderaspatana</i> (L.) Roem	Kamuni	Cucurbitaceae	Sep-Dec	Mature unripe fruits are eaten as raw
<i>Mukia leiosperma</i> (Wight & Arn.) Wight	-	Cucurbitaceae	July-Sept.	Ripe fruits edible
<i>Muntingia calabura</i> L.	Singapore cherry	Rosaceae	Jan-May	Ripe fruits are eaten as raw
<i>Olea dioica</i> Roxb.	Parjamb	Oleaceae	Mar-June	Ripe fruits are eaten by birds
<i>Opuntia elatior</i> Mill.	Nivdung	Cactaceae	Jan-Dec	Ripe fruits eaten as raw
<i>Passiflora foetida</i> L.	Krishna Kamal	Passifloraceae	July-Dec	Ripe berries eaten as raw
<i>Pavetta indica</i> L.	Papat	Rubiaceae	Mar-June	Fruits are pickled and ripe berries eaten as raw
<i>Phoenix robusta</i> (Becc.) Hook. f.	Sindhi	Arecaceae	Jan-Mar	Ripe fruits are eaten as raw also made preserves
<i>Phoenix sylvestris</i> (L.) Roxb.	Sindhi	Arecaceae	Feb- May	Ripe fruits are eaten as raw also made into jams and jellies
<i>Phyllanthus reticulatus</i> Poir.	Poolan	Euphorbiaceae	June-Oct	Ripe fruits eaten as raw
<i>Physalis minima</i> L.	Ran Popati	Solanaceae	Oct-Mar	Fruits eaten as vegetable
<i>Piper longum</i> L.	Pimpli	Piperaceae	Oct-Dec	Used as spices and condiments
<i>Piper nigrum</i> L.	Meeri	Piperaceae	Nov-Jan	Ripe dry fruits are used in spices
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Vilayti Chinch	Mimosaceae	Jan-June	Mature fruits are eaten as raw
<i>Prosopis juliflora</i> (Swartz) DC.	Vedi-Babhul	Mimosaceae	Throughout year	Fruits edible
<i>Rhus mysorensis</i> G. Don	Amani	Anacardiaceae	Aug.-Dec.	Ripe fruits eaten as raw
<i>Sclleichera oleosa</i> (Lour.) Oken	Kusum	Sapindaceae	Mar.-May	Fruits are edible; seeds are used against skin diseases
<i>Scurrula stocksii</i> (Hook. f.) Danser	-	Loranthaceae	Aug.-June	Mature fruits edible
<i>Semecarpus anacardium</i> L.f.	Bibba	Anacardiaceae	Nov-Apr	Ripe or dry fruits are eaten as raw and also used as oil source
<i>Solena amplexicaulis</i> (Lam.)	Gomati, Gometta	Cucurbitaceae	July-Jan.	Fruits eaten as raw

Gandhi				
<i>Solanum anguivi</i> Lam.	Dorli, Mothi Ringni	Solanaceae	Aug-Dec	Ripe fruits eaten as raw and also unripe fruits eaten as vegetable
<i>Solanum nigrum</i> L.	Kanguni	Solanaceae	Aug-Jan	Ripe fruits eaten as raw
<i>Solanum torvum</i> Sw.	Marang	Solanaceae	Jan-Apr	Fruits are eaten as raw or cooked
<i>Sterculia guttata</i> Roxb.	Kukur	Sterculiaceae	Sep-May	Seeds eaten as roasted
<i>Syzygium cumini</i> (L.) Skeels	Jambhul	Myrtaceae	Mar-July	Ripe fruits are eaten as raw
<i>Syzygium heyneanum</i> (Duthie) Wall. ex Gamble	Par-Jambhal	Myrtaceae	Mar-July	Ripe fruits are eaten as raw
<i>Syzygium rubicundum</i> Wight & Arn.	Lend-Jambhal	Myrtaceae	April-July	Ripe fruits are eaten as raw
<i>Tamarindus indica</i> L.	Chinch	Papilionaceae	Oct – May	Ripe and unripe fruits are eaten as raw
<i>Tamilnadia uliginosa</i> (Retz.) Tirveng.	Bhutala, Pendari	Rubiaceae	Apr-June	Unripe fruits eaten after roasting
<i>Teramnus labialis</i> (L. f.) Spreng.	Ran-Udid	Papilionaceae	Aug.-Nov.	Legumes eaten as raw
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Behda	Combretaceae	Feb-June	Mature fruits are used to making Churna
<i>Terminalia chebula</i> Retz.	Hirda	Combretaceae	Feb-May	Used as making pickles and jams, churna
<i>Trema orientalis</i> (L.) Blume	Khargol, Ghol	Ulmaceae	Jan-June	Ripe fruits pulp eaten as raw
<i>Trichosanthes dioica</i> Roxb.	Padval	Cucurbitaceae	July-Sep	Cooked as vegetables and also eaten as raw
<i>Tribulus terrestris</i> L.	Gokhru, Sarata	Zygophyllaceae	Through the year	Matured fruits used for medicinal purpose
<i>Ventilago madraspatana</i> Gaertn.	Toran	Rhamnaceae	Nov- May	Ripe fruits eaten as raw
<i>Vigna khandalensis</i> (Sant.) Raghavan & Wadhwa	Ran Mug, Badamung	Papilionaceae	Aug.-Oct.	Unripe seeds from legumes cooked as vegetable and eaten as raw
<i>Vigna vexillata</i> (L.) A. Rich.	Halunda	Papilionaceae	Aug.-Dec.	Unripe seeds from legumes cooked as vegetable and eaten as raw
<i>Wrightia tinctoria</i> (Roxb.) R. Br.	Indrajao	Apocynaceae	Mar-July	Fruits eaten as vegetable
<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	Tirphal, Tisal	Rutaceae	June-Mar.	Matured fruits used for flavoring purpose
<i>Ziziphus caracatta</i> Roxb.	Ghat Bor	Rhamnaceae	Sep-Feb	Fruits juice used to treat the stomachache of pet animals also eaten as raw
<i>Ziziphus jujuba</i> (L.) Gaertn.	Bor	Rhamnaceae	Sep-Jan	Ripe fruits eaten as raw
<i>Ziziphus mauritiana</i> Lam.	Bor	Rhamnaceae	Sep-Jan	Ripe fruits are eaten as raw
<i>Ziziphus oenoplia</i> (L.) Mill.	Burgi, Yeruni	Rhamnaceae	Aug.-Sept.	Ripe fruits are eaten as raw
<i>Ziziphus rugosa</i> Lam.	Bor	Rhamnaceae	Dec-Feb	Ripe fruits eaten as raw

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