

## Promising Top Ten Underutilized Wild Edible Fruits of Nepal

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### Abstract

Nepal is home land for many types of wild edible fruits. The fruits are rich source of minerals, vitamins, protein, carbohydrate, fat and other important elements. The utilization of these plant species would also offer additional income to the local community. Some of the wild popular fruit plant species have been domesticated for commercial purpose. The conservation and utilization of genetic resources of these plants may be necessary for the genetic improvement of cultivated fruits. The promising wild edible fruits have been prioritized on the basis of their popularity in local community. The promising top ten underutilized wild edible fruits are: *Aegle marmelos* (L.) Correa (English: Bael Fruit; Nepali: Bael), *Berberis asiatica* Roxb. ex DC. (English: Barberry; Nepali: Chutro), *Choerospondis axillaris* (Roxb.) B. L. Burt & A.W. Hill. (English: Nepal Hog Plum; Nepali: Lapsi), *Diploknema butyracea* (Roxb.) H. J. Lam (English: Nepali Butter Tree; Nepali: Cheuri), *Elaeocarpus sphaericus* (Gaertn.) K. Schum. (English: The Blueberry beads; Nepali: Rudrakshya), *Hippophae salicifolia* D. Don (English: Seabuckthorn; Nepali: Daale chuk / Bhuin chuk), *Myrica esculenta* Buch.-Ham. ex D. Don (English: Box myrtle, Bay-berry; Nepali: Kafal), *Phyllanthus emblica* L. (English: Emblic Myrobolan; Nepali: Amala), *Rubus ellipticus* Smith (English: Himalayan Yellow Raspberry; Nepali: Aselu), *Zanthoxylum armatum* DC. (English: Nepal Pepper; Nepali: Timur).

**Keywords:** Biodiversity, Edible, Phyto-chemicals, Underutilized, Wild fruits

### Introduction

The fruit is the seed-bearing structure in flowering plant species developed from the ovary after flowering. It may be either fleshy or nut. The mature fruits with seeds are the heredity component of the natural plant species.

Fruits are generally are of two types; wild and cultivated. Some of the wild fruits plants were domesticated by our ancestor. The present day cultivated fruits are grown by farmers for economic benefits while wild fruits are growing only in their natural environment. These wild fruits plants are underexploited and their economic importance has still to be realized.

Nepal is located on the southern central part of Himalaya mountain range. It has diverse landscape, Tarai, Siwaliks, valleys, mountains and Himalayas. Nepal with its unique landscape and climatic conditions has different agro-climatic zones varying from tropical, sub-tropical, temperate to alpine zones. These ecological features led to the evolution of large plant biodiversity. A number of edible fruit plant species grow in wild forms in different ecological conditions. Many wild edible fruit plants are tasty and nutritionally rich which supplement the human diet with vitamins, essential amino acids / proteins, micronutrients, phyto-chemicals and antioxidants with specific medicinal value also. The fruits collected from their natural habitats are free from chemical pollutants, thus provide healthy organics. People are seeking new taste in their diet in modern days. These wild edible fruits may attract our new taste.

#### 1. *Aegle marmelos* (L.) Correa

Synonym	:	<i>Crateva marmelos</i> L.
English name	:	Bael Fruit, Bengal Quince, Golden Apple
Nepali name	:	Bael, Bel,
Newari name	:	Bya
Family	:	Rutaceae
Flowering Time	:	May-June

Fruiting Time	:	June- July (next year)
Distribution	:	600 to 1,100 m., WCE
Status	:	Wild and domesticated

*Aegle marmelos* is a medium sized tree. It grows in sub-tropical climate. It is deciduous in nature. The old leaves shed in April-May and new ones appear in May-June. The leaves are compound and trifoliate. The leaflets are lanceolate and about 8 cm long. The ripe fruits are round in shape, 5 to 10 cm in diameter with 3 mm thick woody rind. The edible pulp of the fruit is sweet and aromatic pulp.

**Ethnobotanical Use:** The ripe fruit is aromatic, astringent, cooling and laxative. Ripe fruit pulp is eaten fresh or mixed with water to prepare juice. Fruit is eaten to control digestive disorder. Marmelosin derived from the pulp is given as a laxative and diuretic. In large doses, it lowers the rate of respiration, depresses heart action and causes sleepiness.

Fruit pulp is used to prepare delicacies like puddings. Juice is made by grinding the seeded pulp together with milk and sugar. The juice is strained and sweetened to make a drink. Mature fruits are made into jam and jelly.

**Traditional Religious Value:** Newar community girls before completing ten years have first religious marriage with the fruit of this plant. The fruit is symbol of Lord Bishnu. So it is believed that Newar girls are never a widow. This function is called Bael Bibaha or EHI. Generally the function is performed in group or sometimes individually also.

**Conservation Status:** Nepal Government has prioritized it for Cultivation and Conservation.

## 2. *Berberis asiatica* Roxb.ex DC.

English name	:	Barberry
Nepali name	:	Chutro
Newari name	:	Marpyashi
Family	:	Berberidaceae
Flowering Time	:	February-May
Fruiting Time	:	March-July
Distribution	:	1,000 to 2,700 m., WC
Status	:	Wild

*Berberis asiatica* is an erect spiny deciduous shrub up to 4 meters tall. The spines are tri-fid, 4-13 mm. The young shoots are orange or yellow, mature shoots pale brown, glabrous. The leathery leaves are simple, thick, rigid, oblong elliptic or obovate 2-5 x 1.5-2 cm, prominent reticulate veins on both surfaces, elevated. The leaf texture is leathery coriaceous, margin with 1-4 spinose teeth on each side, rarely entire, light green above, glaucous and pilose beneath, reticulate venation, prominent on both sides. The flowers are yellow in shortly flexible in pedunculate racemes or in fascicles. The dark purple glaucous berries are ovoid or globose, 7-10 mm long. The fruits turn black on maturity.

**Ethnobotanical use:** Fully ripe fruits are juicy with pleasantly acidic flavor. The fruit is cooling and laxative. The fruits are dried used to make raisins.

**Distinguishing features:** *Berberis asiatica* is easily identified by its leathery leaves with distinct reticulate venation and glaucous berries.

## 3. *Choerospondias axillaris* (Roxb.) B.L. Burt & A.W. Hill.

English name	:	Nepali Hog plum
Nepali name	:	Lapsi
Newari name	:	Amali
Family	:	Anacardiaceae
Flowering time	:	April - May
Fruiting time	:	October – November
Distribution	:	1,200 to 1,500 m., CE
Status	:	Domesticated

*Choerospondias axillaris* is a deciduous and dioecious tall tree. Plants are domesticated for its edible fruits. The leaves are imparipinnately compound. Each leaf has 6 to 8 pairs of opposite leaflet and one terminal leaflet. The leaflet is oblanceolate in shape, about 10 cm long with serrate margin. It flowers only after 7 years of maturity. The male and female plants are morphologically similar. The male plant bears small green flowers. They are borne in panicles at the end of the branches. The female flower is solitary at the base of the leaf stalk. Each ovary has generally five stigmas (sometimes 4 or six) with short styles. The female flower has ten sterile stamens. The fruit is a drupe. It is oval in shape and 3 cm long and 2 cm broad. Each fruit has a stony seed. The seed has mostly five depressions (sometimes 4 or 6) at the distal end. When the seed is germinated one plant comes from each depression of the seed. It is one of the most popular fruit in Nepal.

**Ethnobotanical Use:** The mature fruit is yellow. The pulp (mesocarp) and pericarp of the fruit is edible. It is astringent in taste. The fruits are consumed fresh or pickled and processed for preparing varieties of sweet and sour, tasty food products that are sold locally and have potentials for exporting. The fruits are processed to make candies of various composition and taste. The whole fruit is boiled to remove fruit wall (pericarp) to make the Achar (pickle), which is very popular among pregnant women. The pulp is used to make a popular drink Paun (Syrup) for the Newari Bhoj. The pulp is sundried for future use. The pericarp is dried and powdered, which can be used to tart Pickle. Most of the Lapsi products are consumed within Nepal. However, the possibility for exporting the products could be improved with better management and hygienic processing practices. The main marketable products are: Mada, Candy, Titaura, Lyassipau, Lapsi powder, Lapsi squash etc.

#### 4. *Diploknema butyracea* (Roxb.) H. J. Lam

Synonym	: <i>Bassia butyracea</i> Roxb.
English name	: Nepali Butter Tree, Indian Butter Tree
Nepali name	: Chiuri,
Newari name	: Lhosi, Yoshi
Family	: Sapotaceae
Flowering time	: November - January
Fruiting time	: May - June
Distribution	: 300 to 1,500 m., CE
Status	: Wild and domesticated

*Diploknema butyracea* is a 20 meter tall tree. Its leaves are coriaceous, crowded near the end of the branches, ovate shaped with petiole. Flowers are pedicelled, crowded below the sub-terminal leaves, drooping and tomentose. The fruits are smooth ovoid berry. The mesocarp is sweet. The fruits contain one or two seeds. The cheuri butter is extracted from seeds.

**Ethnobotanical Use:** The fruit contains soft and thick edible pulp. It is eaten by the local people and also by many birds and wild animals. The fruit pulp is sweet and used for making gur (jaggary) by crushing and drying. The gur is tasty and sold in local market. The marks are used as animal feed by mixing it with fodder. The pulp juice keeps the body warm.

The main product of this tree is extracted from the seeds, which is known as *Cheuri ghee or butter*. It has a great nutritional and medicinal value. It is used as vegetable oil as well as for lightening the lamps. The oil is also used for making chocolate, soap and candles. The oil is also used by the local communities to cure many body disorders such as to relieve headache, rheumatic pains, ulcers, itching, hemorrhage, inflammation of tonsils etc. It is also applied on chapped hands and feet in winter. The oilcakes made out of the marc left after the extraction of ghee and is equally important. It is used as manure having pesticide properties and also as fish poison. The marc is used as leech repellent and the local people rub its paste on their legs in the rainy season. Cheuri ghee is applied for headache, rheumatism, boils and pimples. It is also used as emollient for chapped hands and feet in winter.

The Chepang community of Nepal gives the seedlings for plantation to their daughters in marriage ceremony.

#### 5. *Elaeocarpus sphaericus* (Gaertn.) K. Schum.

Synonym	: <i>Elaeocarpus ganitrus</i> Roxb. ex G. Don
English name	: The Blueberry beads, Ultrasum Bead Tree
Nepali name	: Rudrakshya

Family	: Elaeocarpaceae
Flowering time	: April-May
Fruiting time	: August-November
Distribution	: 600 to 1,500 m., E. mainly at Bhojpur, Khotang and Sankhuwasabha
Status	: Domesticated

*Elaeocarpus sphaericus* is medium sized evergreen tree up to 50 m tall with spreading branches. Petiolate leaves, 10-20 cm long, 2.5 to 6 cm broad, elliptic or lanceolate, with marked veins. Flowers are white, tubercled, hermaphrodite. Inflorescence, axillary racemes, 12 mm diameter. Fruit is a drupe, globose, 1.3-2 cm diameter, blue, soft epicarp and mesocarp but hard deeply grooved endocarp, generally 5 celled with 5 seeds. Single grooved (Ekmukhe) seed is the craze of the Hindus.

**Ethnobotanical use:** Fresh fruits, epicarp and mesocarp edible. It is used as appetizer, sedative, used to relieve cough, bronchitis. The fruits are used in Ayurveda for mental diseases, epilepsy, asthma, hypertension, arthritis and liver diseases.

The seeds are available from 1 Mukhi to 29 Mukhi (deep linings in the seed). The beads have several amazing powers due to their electromagnetic character, electrical properties and bio-electric circuit. The beads are used as garland.

#### 6. *Hippophae salicifolia* D. Don

Synonyms	: <i>Hippophae conferta</i> Wall., <i>Hippophae rhamnoides</i> subsp. <i>salicifolia</i> (D. Don) Servett.
English name	: Sea buckthorn
Nepali name	: Daale chuk / Bhuin chuk
Family	: Elaeagnaceae
Flowering Time	: May-June
Fruiting Time	: October- November
Distribution	: 2,700 to 3,700 m., WC
Status	: Wild

*Hippophae salicifolia* is found at open riverside terraces. It is a dioecious shrub or a small tree, up to 10 m high and 50 cm in diameter with a thick grey crown. The main trunk has a thick and rough bark. The branches are ending in spines with dense scales. The bark is brown or black in colour with a rough appearance. Leaves are alternate, narrow, lanceolate, 40-60 x 4-6 mm. The upper surface of leaf is bluish green with sparse stellate hairs, lower surface white with dense stellate hairs. Flowering occurs only after 3-4 years old plant. Male inflorescence has 4 to 6 apetalous flowers which release pollens at a temperature of about 6 degree C. The species is stress-tolerant which can survive a range of temperatures, high soil pH (about 8.0) and increased soil-salinity. In case of female inflorescence, there is only a single apetalous flower with one ovary and one ovule. Pollination via insects is impeded by the fact that both the male and female flowers lack nectarines which are needed for attracting insects. The pollination is wind dependent. The fruits (5.51 to 7.24 mm size) are generally round but may also be ovate in some cases. They are initially pale green in colour and turn golden-brown on ripening around October -November. The berries have a tough skin covering the juicy pulp and a small, hard, oval seed. Sea buckthorn develops an extensive root system rapidly. Therefore it is an ideal plant for soil erosion control, land reclamation because of its ability to fix nitrogen and conserve other essential nutrients. It is used for soil conservation in sub-alpine and alpine regions of Nepal.

#### 7. *Myrica esculenta* Buch.-Ham. ex D. Don

Synonyms	: <i>Myrica farquhariana</i> Wall., <i>Myrica integrifolia</i> Roxb., <i>Myrica sapida</i> Wall.
English name	: Box myrtle, Bay-berry
Nepali name	: Kaafal,
Newari name	: Kabasi
Family	: Myricaceae
Flowering Time	: February
Fruiting Time	: May
Distribution	: 1,200 to 2,300 m., WCE
Status	: Wild and domesticated

*Myrica esculenta* is an evergreen, dioecious tree up to 10 meters tall. Its leaves are 4-18 × 1.5-4.5 cm. Male inflorescences much branched, erect or pendulous at apex, 4-9 cm; individual spikelets 1 cm; peduncle densely pubescent; bracts overlapping, ciliate and usually golden glandular. Male flowers are without bracteoles, stamens 3-7; anthers red, ellipsoid. Female inflorescences erect, 1-3.5 cm, many flowered; flowers in short, axillary fascicles well spaced at maturity; rachis densely pubescent and golden glandular; bracts ciliate, golden glandular. Female flowers are with 2 bracteoles, ciliate and golden glandular. Ovary velutinous; stigmas 2, bright red. Fruit is a red globose, succulent drupe, with a hard endocarp; diameter 1.1 to 1.3 cm. It is one of the popular tasty wild fruits of Nepal.

**Ethnobotanical Use:** The fruit is a good natural antioxidant. In Ayurveda, it is described as a detoxifier, pain killer and healing herb. The seed oil is useful for massage in body-ache and used to treat ear discharge. An effective Ayurvedic preparation, **Kaas-Har Churnai** also prepared from this plant which is used in cough and cold. The fruits and stones are claimed to be beneficial in cardiac debility, edema and hemoptysis.

#### 8. *Phyllanthus emblica* L.

Synonyms	: <i>Phyllanthus taxifolius</i> D. Don, <i>Emblica officinalis</i> Gaertn.
English name	: Emblic myrobolan, Indian Gooseberry
Nepali name	: Amalaa
Newari name	: Anba
Family	: Euphorbiaceae
Flowering Time	: June
Fruiting Time	: October
Distribution	: 150 to 1,600 m., WCE
Status	: Wild and domesticated

*Phyllanthus emblica* is a medium sized deciduous tree. Leaves are simple with very short petiole, narrowly oblong in shape about 1cm long. They are arranged close together in two opposite rows. The flowers are very small and greenish-yellow. They are borne in dense branches in the axils of the new leaves. The fruit is green, round about 2 to 4 cm in diameter, with a hard seed inside it.

**Ethnobotanical Use:** The hard pulp is the edible part. It is eaten fresh or in dried form. When the fruit is chewed along with water it is sweet. It is one of the most popular wild fruit. The ripe fruits are generally used fresh but dried fruit are also used. Therapeutic uses as an energy refiller, aperient, antibacterial, antifungal, antiviral, in gonorrhoea, analgesic and skin fareness. Fruit is eaten fresh, pickled or preserved as murabba.

Dried fruit powder is one of the component of Ayurvedic formulation, Triphala i.e. consisting of dried and powdered fruits of three plants Viz., Amla, Barro and Harro, generally in equal proportions which is a traditional medicine in Charaka and Sushruta Samhita, the foundational text of Ayurveda. This is used to stimulate hair growth by nourishing the hair/scalp and preventing premature greying.

In Ayurveda, amla fruit is considered to be a potent rejuvenator and immuno-modulator effective in stopping degenerative processes/ senescence. It is used to promote longevity, enhance digestion, treat constipation, reduce fever and cough, alleviate asthma, strengthen the heart, benefit the eyes, stimulate hair growth, enliven the body, enhance intellect and suppresses cancerous cells.

Amla fruit is widely used in the Ayurvedic system of medicine as alone or in combination with other plants and is used to treat common cold and fever, as diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, antipyretic, hair tonic and to prevent ulcer and dyspepsia. It is also stated to have hepato, cardio, nephro and neuroprotective effects. It has antioxidant, antiinflammatory, analgesic, antipyretic and restorative properties.

It is the major component of Chayawanprash, an important ayurvedic health promoting formulation. Amla is virshya herb and has a positive effect on seven dhatus of human body including the digestive, excretory, circulatory, reproductive, respiratory and nervous system and supposed to be a divine herbal supplement to mankind.

**Conservation Status:** Nepal Government has prioritized it for Cultivation and Conservation.

#### 9. *Rubus ellipticus* Smith

Synonyms	: <i>Rubus flavus</i> Buch.-Ham. ex D. Don, <i>Rubus gowreephul</i> Roxb., <i>Rubus rotundifolius</i> Wall.
English name	: Himalayan Yellow Raspberry

Nepali name	: Ainselu
Newari name	: Esi
Family	: Rosaceae
Flowering Time	: March-April
Fruiting Time	: May-June
Distribution	: 1,700 to 2,300 m., WCE
Status	: Wild

*Rubus ellipticus* is a sub-erect prickly bush up to 2 meter tall. The leaves are compound and trifoliate. The leaflets are elliptic or ovate in shape. Inflorescence is terminal and axillary panicles. The flowers are white in colour. The fruit is yellow globose and succulent drupes and hollow underneath.

**Ethnobotanical Use:** Fruits are sweet in taste and are eaten raw. Nectar is derived from the blossom and it is a valuable honey plant. The plant is astringent and febrifuge. The fruit is a potential source of anti-fertility drugs. The fruit has counteracting effect to toxins, eliminates inflammation, relieves pain and stopping hemorrhage.

#### 10. *Zanthoxylum armatum* DC.

Synonym	: <i>Zanthoxylum hostile</i> Wall.
English name	: Nepal Pepper
Nepali name	: Timur
Newari name	: Tebu
Family	: Rutaceae
Flowering Time	: March -April
Fruiting Time	: May-June
Harvesting	: October-November
Distribution	: 1,000 to 2,500 m., WCE
Status	: Domesticated

*Zanthoxylum armatum* is a small prickly tree. The leaves are compound, usually consisting of 2 or 3 pairs of leaflets with one terminal leaflet. The leaflets are stalkless, lanceolate, 5 cm long and 2 cm wide with entire margin. The fruits are small, yellow and borne in loose bunches. The fruits are red with raised spots. The round fruits are 0.5 cm in diameter. On maturity the fruit split open into two halves and shed the black seed. The epicarp of the fruit is strong in taste.

**Ethnobotanical Use:** The fruits are used to relieve headache, toothache in Ayurvedic Medicinal System. It is also used as spice and pesticide. The aromatic oil extracted from fruit is used for cosmetic materials, food materials and medicinal purpose.

**Conservation Status:** Nepal Government has prioritized it for Cultivation and Conservation.

#### Conclusion

Wild edible fruits are very important for the well being of rural people not only as sources of supplemental food, nutritionally balanced diets, medicine but also for their income source. The rural people have their extra income source by selling these products. Among edible wild fruits in Nepal, promising top ten species following are extensively used by the rural people for consumption and selling in the local markets.

The wild edible fruit plant species thrive in their natural habitats and are exposed to various adverse conditions. They are expected to possess resistant genes against various biotic and abiotic stresses. Evaluation of these genetic resources for the identification of genes for fruit quality, hardiness, resistance against diseases and pests, soil factors etc. will serve as a database for future utilization.

The information on distribution of habitats of the wild edible fruit species may guide us to formulate policies for *in-situ* conservation of genetic diversity of these underexploited fruit plant species in botanical gardens, conservation areas and wild life reserves.

The information will be of great use to Nepalese as well as people interested in fruits plants to know our resources. We can utilize our waste or degraded lands for the plantation of wild fruit species in suitable locations and produce them on commercial scale. This information will also be of use to researchers, agro-industries, nutrition specialists,

social scientists and policy makers. It will serve as a source of reference for the general public to know the value of the wild edible fruit plants of Nepal.

### Declaration of conflict of interest:

I declare that I do not have any type of competing interest related to the manuscript.

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