Indian J. Pl. Genet. Resources 9(2): 247-254, 1996

SOME MINOR FRUITS OF ROSACEAE: DISTRIBUTION, DIVERSITY AND USE IN INDIAN HIMALAYAS

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The Himalayan region is endowed with rich genetic diversity in temperate fruits. Several species of family Rosaceae are available locally. Many of them are also cultivated or found as semi-domesticated types in the areas of their distribution. In some genera like *Prunus*, *Pyrus*, *Rubus*, *Fragaria* and *Malus* a large number of wild species have not only contributed towards food but also are a rich wild gene pool for important traits. With drastic increase in the world population, there is a great need to explore newer sources of food and in this context, the diversity available in minor/lesser known fruits of the family Rosaceae, available in this region along with a brief description of chief types among them has been discussed. A check-list of species with botanical names, popular names/common names is included as Appendix. This information will be useful in screening for newer sources of food in this region both for present and future needs.

Key words : Rosaceae, minor fruits, *Prunus*, *Pyrus*, *Rubus*, *Fragaria*, distribution, diversity, uses

Minor fruits have their importance mainly in the areas of their occurrence. Due to diverse climatic and physiographic diversity, the Himalayan region has tremendous wealth in terms of wild fruits and less known edible plants. In the temperate region, economically more important families, yielding edible fruits from the wild and cultivated species are - the Rosaceae, Saxifragaceae, Caprifoliaceae, Cornaceae and Berberidaceae. In Rosaceae, apart from cultivated fruits, enormous diversity occurs in semi-domesticated and wild types in local pockets and such types have been selected locally by native people as part of their routine food requirements. Several examples of vitamin C rich fruits include wild apples, roses, *Crataegus*, *Cydonia*, *Rubus*, etc. Many important wild fruits such as *Prunus*, *Pyrus*, *Sorbus*, *Docynia*, *Rubus* are locally consumed. Native types in *Malus*, *Prunus*, *Pyrus*, *Rubus*, *Fragaria*, *Duchesnea* are edible as a part of their regular diet also. Consumption is usually in the ripe form of fruits, raw or in pulp form or sliced, sun dried or made into drinks and other beverages. The kernels of selected wild types such as *Prunus armeniaca* and *Prunus persica* are sweet, highly nutritious and form an important supplement in day to day food/calories requirements. As such no special attention has

been laid on specific breeding or cultivation/evaluation programmes for these types. The wild gene pool possesses important traits and may be exploited both by direct selections or breeding, besides being useful as root-stock.

DISTRIBUTION AND DIVERSITY

A large number of rosaceous species form a part of the Himalayan flora extending from the sub-temperate to alpine zone. Of a total of 278 representative species in Rosaceae in India about 67 species belonging to 37 genera are cultivated. 211 species occur wild and many of them are valued as wild economic fruits. 28 species in 9 genera are cultivated for fruits of which 23 species are in cultivation on a major scale. Among fruit yielding genera, tribe Pomeae consists of large number of species, followed by the tribe Pruneae. Less known/wild edible rosaceous fruits are represented mainly by 16 genera (see Appendix). Of these *Prunus, Pyrus, Malus, Docynia, Eriobotrya, Rubus, Sorbus, Rosa* and *Stranvaesia* show narrow distribution restricted to Indian region from north western and north eastern region mainly. Species such as *Prunus nepaulensis, P. jenkinsii, P. rufa, P. undulata, Pyrus kumaoni, Malus baccata* var. *himalaica, M. sikkimensis, Fragaria daltoniana, Rubus ellipticus, R. lineatus, R. mollucanus, Docynia hookeriana* and *D. indica, Pyracantha crenulata, Rosa webbiana, Pourthiaea arguta* are also available in the central Himalayas and adjoining areas of Nepal, Sikkim and Bhutan. Several species such as *Prunus undulata, P. jacquemontiana, Malus baccata, Fragaria vesca, Rubus saxatilis, Photinia integrifolia, Rubus rosaefolius, Sorbus aucuparia, Rosa foetida, R. brunonii* are distributed beyond Himalayas upto south east Asia in east and Afghanistan and further westwards. Species endemic to this region include *Pyrus pashia, P. kumaoni* and *P. jacquemontiana, Eriobotrya dubia, Malus baccata* var. *himalaica, M. sikkimensis, Sorbus cuspidata, S. lanata, Rosa gigantea* and *Stranvaesia nussia*. Tremendous variability is prevalent in wild types in branching pattern, maturity of fruits, fruit bearing; shape and size, colour and quality of fruits.

IMPORTANT MINOR FRUITS

Prunus spp.

Most of the Indian species inhabit hilly and cold climate areas but some species are naturalised and found usually between altitude ranging 760-3600 m. Of the 35 species in this genus in India, about 8 are wild economic types utilised as fruits. Some of them are cultivated on small/local scale. The acidic fruits/drupes of *P. nepaulensis* and *P. jenkinsii* are edible. In *P. cornuta* the drupes are red and with thick stone, var. *cornuta* is distributed throughout the Himalayas and Tamil Nadu whereas var. *vilosa*, with small drupes, is less commonly available.

P. cerasoides, the Himalayan Wild Cherry, is a common tree in north western Himalayas. The drupes are 4-5 mm, ovoid, var. *majestica* possessing large drupes (12-15 mm), with a bitter pulp. *P. undulata*, with 2 mm long hypanthia (persistant in fruit) has edible drupes. The fruits are 20 × 10 m, with pointed apex, glabrous and purplish black. *P. rufa* drupes are ellipsoid, glossy, red, bitter in taste. Types are known with hypanthia and petals glabrous or hairy in lower half or at base. *P. prostrata* has drupes (8-6 mm), ellipsoid, red on ripening. Although the pulp is scanty, yet the fruits are consumed. *P. jacquemontii*, with serrated stipules and red, subglobose, fleshy drupes is edible.

Wild forms of *P. armeniaca* (wild apricot, *chuli*) and *P. persica* (wild peaches) are also gathered and used for edible purpose in the Himalayan region in dried or raw form particularly the former species. Besides, *P. carmesina*, *P. undulata*, *P. tomentosa*, and *P. venosa* are also exploited for edible fruits.

Pyrus spp.

The genus is represented by 22 species of which 6 occur in India between 700-3000 m altitude. Of the three wild/lesser known species, the most favourite is *P. pashia* which occurs wild and also as semi-domesticated/cultivated species in the western, northern and eastern region is also reported from Nilgiris. The poor quality fruits are gritty, dark brown and pyriform (20-40 mm) with white raised dots; it is used as root stock for cultivated pear. The apple shaped, hard, bitter fruits are edible when half-rotten. Other two species *P. kumaoni* and *P. jacquemontiana* (very similar to *P. pashia*) possess fruits with smooth skin. These species are related to *P. pashia*. Of all the wild edible *Pyrus* and *Prunus* species, fruits of *P.kumaoni* are the tastiest. It is frequently used as root-stock on pear.

Malus spp.

Of the 35 species, 5 occur in the Himalayan region between 1650-3300 m. *M.baccata*, the Siberian Crab Apple (*Jangli Seb*) a tree found in western Himalayas, occasionally cultivated in the valleys of north-western and eastern hills is small round headed tree, with sub-globose (10-30 mm), red, scarlet, yellowish/creamish fruits. It shows wider distribution in its wild and naturalised forms in north-eastern region with variability in fruit size, branching and resistance to diseases, insects/pests, cold hardiness, etc. It is often raised as an ornamental, or used in breeding of cultivated apple. The fruits astringent before cooking or are made into preserves.

An Indian wild crab apple, *M. baccata* var. *himalaica*, the Himalayan Crab Apple, with smaller, edible fruits, distributed from north-western to central Himalayan region is used as stock for commercial apple in low rainfall areas

for imparting resistance against diseases and pests. In Lahaul areas its true apple flavoured fruits are edible. Another endemic crab apple, *M. sikkimensis*, is an apomictic species which occurs at high altitudes of central to north-eastern region. It is locally used as an edible fruit and for root stock of *M.baccata*. The fruits are more woody and much larger than former species. It is good as steamed food.

Table 1. Nutritional values of some minor Rosaceous fruits of India*

Species	Moisture	Protein	Fats	Minerals	Fibres	Carbohydrates	Vitamine(%)	Others
Prunus armeniaca	19.4	1.6	0.7	2.8	2.1	73.4	-	Vit A
Cydonia oblonga	85.7	0.3	0.1	0.3	1.7	11.9	1	-
Crataegus oxyacantha	-	-	0.76	-	-	35.0	0.15	-
Pyrus pashia	-	1.8	-	-	-	3.3	0.32	-
Fragaria vesca	87.5	-	14.3	-	-	3.75	-	-
Rubus fruticosus	87.2	1.3	0.5	0.5	3.8	6.7	0.9	Vit A Calcium, Phosphorus, Iron
Rosa foetida	-	-	-	-	-	20	3.3	-
R.macrophylla	-	-	-	-	-	-	78.7	
R.webbiana							8.0	
Sorbus aucuparia	-	-	-	-	-	-	0.56	

*Data compiled from WIth India (1948-1972) and Gopalan *et al.*, 1987

Sorbus spp.

It is represented by 100 species of which 13 are available in India with maximum concentration of diversity in north-western and eastern region. *S.aucuparia* and *S. cuspidata* are distributed in the temperate Himalayas at high altitudes. *S. aucuparia*, a small moderate sized tree from western temperate Himalayas from Kashmir to Kumaon (3500-4000 m) shows variants/forms in fruits and flowers characters. The fruits are round to globose (10 mm), bright red (sometimes white in European types) and are used for extracts, syrups, juices, brandies, marmalades, also as scarcity fruits. Candied fruits are good source of vitamins (see table). The fruit concentrates have vitamins as high as 240 mg/100 gm as compared to candied types (30-40 mg/100 gm). It is used as an ornamental species also in Indian gardens.

S. lanata, a moderate sized deciduous tree, is distributed between 2300-3000 m altitude in the temperate Himalayas. It yields globose, red, pyriform (10-30

mm) fruits. The leaves are used as fodder in temperate Himalayas. *S.cuspidata,* a deciduous tree at 2700-3000 m altitude yields fruits which are globose (15-20 mm), reddish-brown with spotted skin. They are much relished in eastern region in same way as that of the *S.aucuparia* and *S.lanata* in the north-western region. It is also cultivated as an ornamental species.

Docynia spp.

Of 6 species, two occur in India. *D. indica,* an indigenous species is also cultivated in the temperate region of eastern Himalayas. The yellow green, pyriform-ellipsoidal, pomaceous (25-50 mm) fruits are acidic and eaten raw/cooked. The fully ripe fruits have quince-like flavour. Its wild related species *D. hookeriana* occurs in Khasia region of eastern Himalayas with high variability in habit and flower colour. It is exploited for edible fruits and wood used for tool handles.

Eriobotrya spp.

Of 30 species, 9 occur in India. *E. angustissima* and *E. dubia* are used for wild edible fruits. These two endemic species are available from central to eastern Himalayas. *E. angustissima,* an evergreen shrub, grows gregariously on banks of streams in Khasia, Jaintia and Garo Hills in the eastern parts (1700 mm). It yields pyriform, speckled berries which turn yellow on ripening and are edible. The second species *E.dubia,* a small tree from central and eastern Himalayas (1700-2100 m), also yields edible fruits. The fruits of *E. bengalensis* are insipid and not much relished.

Crataegus oxyacantha

The distribution of *C. oxyacantha* extends from north-western temperate Himalayan region upto 2000-3900 m and westwards beyond Europe. The liquor extracts from scarlet coloured fruits is used in cure of the heart diseases. Several forms differing in foliage, flesh and fruit characters are available in this region. The Indian Himalayan types yield better fruits than those of the European types. Hawthorn marmalade is prepared from the fruits which is a high vitamin C source (1.5 mg/gm). The fruit flesh contains citric acid, tartaric acid and crataegus acid, pectin and fatty acids. They are made into preserves.

Other types

Diversity is well represented in other wild economic taxa such as *Rubus* and *Fragaria.* In *Rubus,* the Yellow Himalayan Raspberry, *R. ellipticus,* widely occurring in the Himalayas and Western Ghats yields one of the best wild fruits of India and is used in breeding for fruit size, disease and heat, drought

resistance. The fruits of *R. mollucanus* a species occurring in the eastern and peninsular region has better quality but smaller cherry sized fruits. *R. niveus* from Himalayas and peninsular region has black, sweet, juicy fruits and is consumed directly or in processed form. The species is grown commercially. *R. rosaefolius*, primarily an ornamental species is also exploited for its beautiful red/orange red, large, succulent fruits. In *Fragaria, F. vesca* and related species *F. nubicola* from temperate Himalayas; *F. nilgerrensis* from Khasi and Nilgiris also yield deliceous edible fruits.

Besides the above mentioned species, several other taxa such as *Photinia integrifolia, Potentilla anserina, Pyracantha crenulata, Pourthiaea arguta, Stranvaesia nussia, Sanguisorba minor, Duchesnea indica* are exploited for edible fruits. Hips of several species of wild roses such as *Rosa foetida, R. microphylla, R. webbiana, R. sericea, R. gigantea* and *R. foetida* and *R. webbiana* are rich source of vitamin C. *R. gigantea*, an endemic rose from Manipur is a source of commercial rose hip from the wild population. *R. sericea* and *R.microphylla* fruits are eaten raw when over-ripe and also processed into sauce.

ETHNOBOTANICAL USES

Wild plants of economic value have played an important role in the lives of tribal people. Several local plants, perennial trees/bushes are regular part of their diet supplement. They are either collected directly from the wild or cultivated/protected as backyard cultigens by the native people which include species of *Rubus, Prunus, Sorbus, Malus, Pyrus, Rosa, Docynia hookeriana, D. indica, Eriobotrya angustissima, Fragaria* spp., *Prunus jenkinsii, P. nepaulensis, Rubus* spp., *Sorbus* spp., which commonly occur in areas surrounding local habitation particularly in the north western and eastern Himalayas.

There are several forms in which fruits of these species are consumed, viz. as raw/ripened in *Crataegus, Docynia, Duchesnea, Eriobotrya, Fragaria, Malus, Pourthiea, Prunus, Rubus, Rosa*; over-ripened/half - rotten in *Pyrus kumaoni, P.pashia, Rosa microphylla, Sorbus aucuparia, S. lanata*; processed as beverage, sauces, jams/jellies or for brewing in *Prunus armeniaca, P. cornuta, Rosa sericea, Rubus ellipticus, R. niveus, Docynia hookeriana*. Several species are also exploited to the level of commercial exploitation and are marketed from wild/semi - domesticated source, viz. *Docynia indica, Prunus nepaulensis, Rubus niveus, R. ellipticus, Rosa gigantea, R. webbiana, R. foetida* and *Malus baccata*.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge, with thanks the help extended by Dr. P.N. Gupta, Shri Umesh Srivastava and Dr. Anuradha Agrawal for giving their valuable comments and suggestions while preparing this manuscript.

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APPENDIX

Wild Edible Fruits of Rosaceae in India : A Check-List

**Crataegus oxyacantha* Linn. English Hawthorn

Docynia hookeriana Decne.; **D. indica* (Wall.) Decne. Indian Crab Apple.

Duchesnea indica (Andr.) Focke syn. *Fragaria indica* Andr. Indian Strawberry, *Bhiu-Kaphal, Kiphaliya.*

Eriobotrya angustissima Hk. ; *E. bengalensis* Hk. f.; *E. dubia* Decne.

Fragaria nubicola Lindl. *ex* Lacaita *syn. F. vesca* L. var. *nubicola* Lindl. Alpine Strawberry; *E. vesca* Linn. Perpetual Strawberry, Alpine Strawberry; *F.nilgerrensis* Schlecht. Nilgiri Strawberry; **F. daltoniana* Gay.

**Malus baccata* (L.) Borkh. Siberian Crab Apple; **Malus baccata* var. *himalaica* (Maxim.) Schneid. Himalayan Crab Apple; **M. sikkimensis* (Hk. f.) Koehne.

Pourthiaea arguta Decne.

Photinia integrifolia Lindl; **Prunus armeniaca* Linn. Wild Apricot, *chuli; P. carmesina* Hara syn. *P.cerasoides* var. *rubea* C. Ingram. Carmine Cherry; **P. cerasoides* D. Don *syn. P. puddum* Roxb. *ex* Brandis *non* Miq. Himalayan Wild Cherry, *Paddam, Phuya; P. cornuta* Steud. *syn. P. padus* Hk. f. *non* Linn. Himalayan Bird Cherry; **P.jacquemontii* Hk. f. *Kursang, Targui; P. jenkinsii* Hk. f.; **P. nepaulensis* (ser.) Steudel; **P persica* (L.) Batsch. *Aru,* Wild Peach; **P. prostrata* Labill.; *P. rufa* Steud. *ex* Hk. f.; *P. tomentosa* Thun, *P.venosa* Koehne. *Gadh-ara, Aria ; P. undulata* Buch.-Ham. *ex* D.Don. *Mauli, Lali, Lik-kung.*

Pyracantha crenulata (D. Don) Roem. *syn Crataegus crenulata* Roxb. *Ghingaru.*

Pyrus kumaoni Decne; **P. pashia* Buch. -Ham. *ex* D. Don. *Mehal. Mol,* Melu; *P.jacquemontiana* Decne.

Rosa brunonii Lindle. Himalayan Musk Rose, *Kujji, Karer.; R. gigantea* Collett. Manipur Wild Tea Rose.; **R. foetida* Herrm. Austrian Briar.; *R. macrophylla* Lindl.; *R. sericea* Lindl. *Chapala, durkunja;* **R. Webbiana* Royle.

Rubus assamensis Focke.;**R. barbatus* Edgew. *syn. R. nutans* Wall. exes Eddgew. *Sinjang; R. biflorus* Buch. -Ham. ex Sm. Himalayan Yellow Cherry.; **R. ellipticus* Sm. Himalayan Yellow Raspberry.; *R. fruticosus* Linn. var. *discolor syn. R. discolor* Weihe & Nees. The Blackberry or Bramble, Alish.; *R. lanatus* Wall. *Hisalu; R. leucens* Focke;**R. lineatus* Reinw.; *R. macilentus* Camb. *Anchu, Insula Rajalu.;* **R. moluccanus* Linn. The Black Cherry, *Katsoi;* **R. niveus* Thunb. syn. *R. lasiocarpus* Hook. f. Ceylon Raspberry, Mysore Raspberry, Mahabaleshwar Raspberry, *Kala hisalu, Kala anchu.; R. pedunculosus* D. Don. *syn. R. niveus* Wall. *Pila Hisalu.; R. paniculatus* Sm. *Kala hisalu.; R. rosaefolius* Sm.; *R. rugosus* Sm. *syn. R. moluccanus* Sm.; *R glandulifer Balak; R. gracilis* Roxb.; R. *nepalensis* Kuntz.; *R. pentagonus* Wall.; *R. calycinus* Wall., *R. insignis* Hk. f.; *R. panculatus* Sm.; *R. treutleri* Hk. f.

**Sorbus aucuparia* Linn. *syn. Pyrus aucuparia* Gaertn. Mountain Ash, Baltal; *S. lanata* (D. Don) S. Schauer *syn. Pyrus lanata* D. Don *Galion, Mauli, Pahi.;* **S. cuspidata* (Spech.) Hedlund *syn. Pyrus vestita* Wall. *ex* Hk. f. *Mauli,* Himalayan White Beam.

Stranvaesia nussia (D. Don) Decne. *Gadhmela, Garhmehal.*

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*Most popular edible species