# Chapter 23

# The Diversity of (Minor) Fruit Crops and Wild Relatives in the Mountain Areas of Pakistan

Z. Ahmad

The Hindu-Kush Himalayan region of Pakistan is very rich in fruit and nut biodiversity as a result of the wide range in climate. The area lies between the two major centres of diversity in temperate fruit species, the Caucasus Mountains and China. Ancient trade routes from China to Western Asia passed through this region and many fruit species were bought into Pakistan as a result.

The major fruit species cultivated include apples, apricots, peaches, plums, and walnuts. Besides these, there are a number of other minor or neglected species and wild relatives of many fruit species. Some species may have less significance in the present economy of the region, but genetically could be very important for future breeding programmes. This paper focusses on the diversity of minor and wild fruit species in Pakistan.

## Pome Fruit Diversity

The minor pome fruit species growing in the region are listed in Table 23.1. They include *Pyrus pashia, Malus domestica, Cydonia oblonga, Sorbus lanata, S. tianshanica, Crotaegus songarica, C. affinis, C. intergerrima, Cotoneaster lindlegi, and C. nummularia. Pyrus pashia* (wild pear) occurs at elevations between 750 and 2,500m together with *Pistacia chinesis and Diospyros lotus*. The fruits of wild pear are one to two cm long and brown with conspicuous white raised *lenticels*. After harvesting, the fruit is stored and allowed to soften and turn dark brown to make it edible. The domestic apple (*Malus domestica)* is planted widely and produces small to medium-sized early maturing fruits. *Cydonia oblonga* (quince) is not distributed widely in the region and the type of fruit found in the area is

| Table 23.1: **Minor Fruit Crop Resources of the Pakistan Mountains** | | |
|---|---|---|
| **Latin Name** | **English Name** | **Local Names** |
| **Pome fruits** | | |
| *Pyrus pashia* | Wild pear | *Batanji, tanchi khapa* |
| *Malus domestica* | Domestic apple | *Chotta, shird* |
| *Cydonia oblonga* | Quince | *Behi, chator, charoll* |
| *Sorbus lanata* | Sorbus | *Tameez* |
| *Sorbus tianshanica* | Sorbus | - |
| *Cartaegus songarica* | Cartaegus | *Chochina sinjay* |
| *Cotoneaster affinis* | Cotoneaster | *Bedour, kabeshoo* |
| *Cotoneaster integerrima* | Cotoneaster | - |
| *Cotoneaster nummularia* | Cotoneaster | - |
| **Stone fruits** | | |
| *Prunus cerasioides* | Wild cherry, Carmine cherry | - |
| *Prunus jacquemontii* | - | *Jikhn, mabheen* |
| *Prunus prostrata* | - | - |
| *Prunus cornuta* | Himalayan bird cherry | *Burris, parrt* |
| *Prunus cerasus* | Pie cherry, tart or sour cherry | - |
| *Prunus mahaleb* | St. Luice cherry, Mahaleb cherry | - |
| *Prunus tomentosa* | Manchu downy, Korean cherry | *Shogun, shugun* |
| *Prunus cerasifera* | Myrobalan plum, cherry plum | *Alucha* |
| **Other fruit tree species** | | |
| *Diospyros lotus* | Date plum | *Amlok* |
| *Ficus carica* | Fig | *Anjir* |
| *Ficus palmata* | Wild fig | *Jangli anjir* |
| *Morus alba* | White mulberry | *Toot* |
| *Morus nigra* | Black mulberry | *Shahtoot* |
| *Morus serrata* | - | *Toot* |
| *Olea ferruginea* | Indian olive | *Kao* |
| *Zizyphus spp* | Jujube | *Ber, anab, markhanay, singli* |
| **Tree nuts** | | |
| *Corylus jacquemontii* | Hazelnut | *Mazeer, jangli badam* |
| *Pistacia atlantica* | Wild pistachio | *Toke* |
| *Pistacia chinesis* | Wild pistachio | *Shinala, kangar* |
| *Pistacia khingjuk* | Wild pistachio | *Saveer, khakaon* |
| *Prunus bucharica* | Wild almond | *Jangli badam* |
| *Prunus kuramica* | Wild almond | *Jangli badam* |
| Small fruits | | |
| *Duchesnea indica* | Indian strawberry | - |
| *Frageria nubicola* | Wild strawberry | *Magaroos* |
| *Ribes alpestre* | Asian gooseberry | - |
| *Ribes orientale* | Wild currant | - |
| *Rubus anatolicus* | Wild blackberry | *Kanachi, karwara* |
| *Rubus ellipticus* | Golden raspberry | *Guracha* |
| *Rubus hoffmeisterianus* | Wild raspberry | *Rumu* |
| *Rubus irritons* | Wild red raspberry | *Rutuch* |
| *Rubus macilentus* | Wild yellow raspberry | - |
| *Rubus niveus* | Black raspberry, Mysore raspberry | *Buganray, bukaran* |

| Table 23.1: Minor Fruit Crop Resources of the Pakistan Mountains (cont'd) | | |
|---|---|---|
| **Latin Name** | **English Name** | **Local Names** |
| **Grapes and related species** | | |
| *Ampelopsis vitifolia* | Crow's grape | *Kawali yatch, grabuch* |
| *Vitis jacquemontii* | Wild grape | *Gidar kwar (jackal grape)* |
| *Vitis parvifolia* | - | *Kali dhak* |
| *Vitis vinifere* | Wine grape | *Angoor* |
| Source: Bhatti and Anwar 1990; Ishaq and Khatal (1960) Thompson et al. (1988) | | |

bitter. People use the fruit cooked, boiled and preserved in sugar, and for medicinal purposes. Sorbus (*Sorbus lanata*) occurs at elevations of from 2,000-3,600m. The associated species include *Abies pindrow, Picea smithiana, Cedrus deodara, Pinus wallichii,* and *Juglans regia*. The fruit is round, two to four cm in diameter, and orange with a heavy red blush flesh. The soft fruit is edible and sweet. The fruit can be kept for one month after harvesting. *Cartaegus (Cartaegus songarica)* is known locally as *Cochina* in Kohistan, *Shinjuli* in Kaghan, *Gooni* in Chital, and *Singjary* in Pushtoo. It is common in cultivated areas of Balochistan, the Kurram Valley, Chitral, Swat, Astore, Gilgit, Hazara, the Murree hills, and Kashmir at elevations of from 925-2,800m. Trees are propagated by seeds or suckers. The mature fruit hangs on the tree for several months. As well as being grown for its fruit, *Cartaegus songarica* is also used as root stock for quince and apple. Local knowledge suggests that the root stock is resistant to root rot. The *Cotoneaster* genus is represented in the region by *C. affinis, C. Integerrima, C. lindleyi,* and *C. nummularia*. *C. affinis* is found associated with *Pinus gerardiana, Cedrus deodara, Ulmus,* and *Pyrus pashia* at altitudes of from 1,100-3,000m, whereas *C. integerrima* is found at altitudes of from 2,200-4,000m. All four *Cotoneaster* species have ornamental value and the fruits are edible.

## Stone Fruit Diversity

Stone fruits in the Pakistan mountains are represented by 12 species, excluding almonds (Table 23.1). These include four wild and naturally occurring species of cherry (*Prunus cerasioides, P. jacquemontii, P. prostrata, and P. cornuta*). Seven species of *Prunus* apart from sweet cherry (*Prunus avium*), which is a recent introduction, have been introduced into this area at different times in human history. *Prunus cerasioides* is very rare because the region lies at its western limit of distribution. Its distribution (up to 800m) indicates that it has low chilling requirements and is resistant to stone fruit diseases. It produces small, acid fruits and may be useful as a rootstock. *Prunus jacquemontii* is distributed widely from Balochistan to Chitral, Gilgit, and Kaghan at elevations of between 1,250 and 3,700m. Although this species is exposed to heavy grazing, it is still quite common in the wild. It produces juicy, tart edible fruits. Besides having ornamental value, it could usefully be explored as a dwarfing root stock for cherries. *Prunus prostrata*

is a spreading shrub and subjected to heavy grazing. The fruits are very small and inedible. It is found on open, rocky, dry, and sunny slopes. It may be a valuable ornamental because of its flowers and the nature of its occurrence. The Himalayan bird cherry (*P. cornuta*) is common in moist, temperate regions at elevations of from 2,100-3,700m associated with *Pinus, Alies, Juglans,* and *Quercus* species. Although frequently lopped, it is found in the Kaghan Valley because there the fruits are edible. It has good compatibility as a root stock for sweet cherry. *Prunus cerasus* (pie cherry) and *P. mahaleb* (Mahaleb cherry) are introductions in this area, most probably brought in by the British as a root stock for sweet cherry or as ornamentals. Both these species are rare. *Prunus tomentosa* (Korean cherry) is cultivated for both ornamentation and for its edible fruits. *Prunus cerasifera* (*myrobalan mirabello* plum) is distributed widely throughout northern Pakistan at altitudes of from 500-2,300m. It is called *alucha* everywhere. The fruits are edible, 2-2.5 cm in diameter, and available in the market from May to mid-July. Other species of stone fruit such as *Prunus salicina* (Japanese plum), *Prunus persica* (peach), and *Prunus armeniaca* (apricot) are considered as the major fruit trees in this area.

### Tree Nuts

Walnuts and almonds (*Prunus dulcis*) are cultivated tree nuts of economic importance to local communities. In addition to these, three species of *Pistacia*, two species of wild almond, and the hazelnut *Corylus jacquemontii* all grow in this area. Three wild species of *Pistacia* (*P. atlantic, P. chinesis,* and *P. khinjuk*) grow on dry rocks, in rock clefts, and in places inaccessible to people. *Pistacia chinesis* is mostly found in graveyards together with wild olives. The two species of wild almond are *Prunus bucharica* and *P. kurminica*. (almond). *Prunus bucharica* is very rare, *P. kuramica* grows in the Kurram Valley and in Chitral on dry slopes. Because these species have small trees and are found in areas where there is extreme drought, they may be valuable as root stock for cultivated almonds. Filberts or hazelnuts (*Corylus jacquemontii*) are found in the moist forests of the Kalam Valley, but trees are rare. The nuts are collected by local people and sometimes sold in the local market.

### Diversity and Importance of Other Fruit Tree Species

Other minor fruit species occurring in the northern mountain area of Pakistan are listed in Table 23.1. These species have significant economic importance to local people, either for income or as food. Two species of mulberry (*Morus*) are found widely distributed in the area and both fresh and dried fruits are consumed by the local people. *Diospyros lotus* (date plum) is cultivated widely by villagers in the hills at altitudes of between 750 to 2,100m. Small fruits are dried and sold in the market and seedlings are also used as root stock for *D. kaki* cultivars. The wild

fig, *Ficus palmata*, is also common in hilly areas. These trees produce small fruits that are edible. This species also has good attributes as a root stock for commercial figs.

Among the small fruits, there are two wild species of strawberry, three species of gooseberry, one species of blackberry, and five species of raspberry native to the area. However, the diversity of these species is threatened by overgrazing of their habitats.

### Diversity of Grapes and Their Wild Relatives

There are three wild grape species in the area: *Ampelopsis vitifolia, Vitis jacquemontii,* and *Vitis parvifolia*. *Ampelopsis vitifolia* is found in Chitral, Swat, Kohistan, Hazara, and Muzaffarabad at elevations of from 900 to 2,400m growing either in moist gullies or in regions with substantial rainfall. *Vitis jacquemontii* is found in Swat, Hazara, and Azad Kashmir at elevations of between 600 and 2,400m. The vines are vigorous and climb up trees or hang over river banks. The fruits are black and juicy with tough skins and two to three seeds per berry. The fruits are edible and available in the local markets. *Vitis parvifolia* is found growing in gullies in Swat, Hazara, and Azad Kashmir. The fruits are not edible but the vines are used as fodder.

### Management Concerns

Genetic vulnerability in minor fruit species and their wild relatives is pronounced in the Pakistan mountains because of population pressure and the cultivation of commercial cultivars of major fruit species. Woody species are diminishing because they are cut for timber and fuel. Small shrubs and climbers are being grazed. Species with inedible fruit are under threat of extinction. Horticultural Development Programmes by various public sector organizations and NGOs are also causing genetic erosion by introducing exotic cultivars. Some of the indigenous species such as *Sorbus lanata, Cydonia oblonga, Prunus prostrata, Prunus mahaleb, and* Cors are much more common in areas with rainfed farming than in areas where there is irrigation. On average only four crops are grown under irrigated conditions, but 20-30 crops are grown where there is no irrigation. Some crops that are grown under both irrigated and rainfed conditions, such as *Oryza sativa* and *Panicum miliacium*, have different cultivars adapted to the two types of situation. Others, such as *Setaria italica* have a single cultivar used for both conditions. Agroecosystem diversity along an altitudinal gradient is determined by the climatic constraints and farmers' needs. Food security can be achieved by growing a uniform mixture of crops over all the available land, or by growing pure crops in small plots. The coexistence of these alternatives in settled farming in the central Himalayas adds to the agroecocystem biodiversity and complexity. The factors

that determine farmers' knowledge and decisions on the choice of mixed or monocropping, and the rationale behind the choice of crops and their proportions in a mixture, need to be thoroughly investigated.