

# **Cultural Significance of Medicinally Important Wild Edible Fruits in North Kashmir with Reference to District Bandipora**

**Rayees Afzal Mir, Syed Aasif Hussain Andrabi,  
Gousiya Majeed, Bilques Aashiq**

Department of Agriculture, Glocal University, Saharanpur 247121 Uttar Pradesh, India

E-mail: [gousiyamajeed@gmail.com](mailto:gousiyamajeed@gmail.com)

## **ABSTRACT**

A number of wild edible fruits, used by rural and tribal populations and contributing significantly to their livelihood. Fruit is a ripened ovary, it may be either nut or fleshy and these may be cultivated and as well as from wild categories. Wild edible fruits are universally distributed and mostly present in the part of the earth where there is no human activity the use of wild edible fruit species for food and medicine has been known for a long time. North Kashmir is one of the these which is acceptable for wild edible fruiting plants because of their hard geography and climatic conditions and good taste of fruits which will attract other people as a rich source of their nutrition. Wild edible fruits are very important for the wellbeing of rural population in the region, not only for the source of supplement of food nutritional, balanced diet, medicines, and cultural purpose but also for their income. The aim of this paper is to throw light on cultural significance of medicinally wild edible fruits of Bandipora district of north Kashmir.

**Keywords:** Wild edible fruit; Medicine; Culture; Forest food, Nutrition; Bandipora

## **Introduction**

Plant diversity constitutes an essential natural resource which supplies and supports the world's food, fuel, clothing, medicine, and the like of total 297,000-510,000 plant species found worldwide (Schippmann et al. 2002) about 75,000 are believed to be edible (Walter and Hamilton 1993) with over 2,500 species of ethno botanical use known in India alone (Jain 1991).

Consuming wild edibles is a part of the food habit of people in many societies and naturally connected to virtually all aspects of their socio-cultural, religious life and health it also plays a major role in meeting the nutritional requirement of the tribal population in remote parts of the country throughout year wild edible food play a very important role in the livelihood of rural communities. India is one of the second largest human population in this planet 75% of the population is living in the rural areas. Most rural communities depend on the wild resources including wild edible plants to meet their food needs in period of food emergency, as well as for additional food supplements it is estimated that in India about 800 species are consumed as food

plants, predominantly by the tribal inhabitants wild plants have since ancient times , played a very important role in human life in search for wild edible food plants many of which are likely beneficial for human being has been identified to maintain a balance between population growth and agriculture productivity, particularly in the developing countries.

Gathering of wild plants play an important role for maintenance and primary health care of millions of people ,especially in developing countries (Hamilton 2003 ) .Additionally with a growing conformation that edible wild plants are often higher-ranking in comparison to food processed foods (Somnasang and Moreni- black 2000 ) provide sustainable nutritional and dietary benefits to tribal population of remote area (Sundriyal and Sundriyal 2001 ) and can be used to prevent chronic and under nutrition disease (Green 1993) ,ethno botany studies are becoming increasingly important (Bhattarai and Chaudhary 2009; Singh and Arora 1978 ; Sundriyal and Sundriyal 2000 ,2004). With over 2000 species of flowering plants (Stewart 1972 ;Dar ,Naqshi, and Ara 1995 ) , Kashmir Himalaya constitutes one of the 28 hotspots of endemic plant diversity in india.

Wild plants provide food ,medicine and custom values for tribal population ,and they may be more nutritious than their cultivated counterparts historically humans may have utilized more than 7000 WEPs so far .WEPs have,by tradition , occupied an important position in the ,cultural religious ,and health sector of rural and cultural lives of Indians .In India , the presence of diverse climatic zone and ecological diversity creates a basis for rich Phytodiversity and this fact is strongly supported by various studies carried out on WEPs by various researchers throughout India Arora and Anjula have given a detailed account of WEP species.WEPs are among the most commonly used NTFPs (Non- timber forest products) and some may also possess medicinal properties,and are therefore used in treatment of disease. WEPs are used for range of other purpose. In the nutrition and pharmaceutical Literature, WEPs have been widely studied and recommended as rich sources of antioxidants,minerals and vitamins.

Fruits are generally cultivated as well as wild, cultivated fruits are grown by farmers for economical benefits while wild fruits are occurring only in their natural environment. As population increases the areas of plantation and forest used for human welfare, number of plants decreases so wild plants lost their identity and decrease in their number. Wild fruiting plants are major in numbers in that place which are not affected by human intraction due to their difficult geography and climatic conditions which is not suitable for human survival

Some wild plants and edible fruits are important constituents of biodiversity and their utilization has become a valuable livelihood strategy and fall back option for rural household during periods of nutritional stress (Bell 1995 ). As Mojeremane and Tshwenyane (2004) noted,when arable agriculture fails in poor rainfall years, indigenous fruits help to reduce the deficit of food availability to rural households

North Kashmir is one of these places which is suitable for wild edible fruiting plants because of their difficult geography and climatic conditions and awesome taste of fruits which is attracted by their people as a rich source of their nutrition. North Kashmir Himalayan region is rich in diversity of wild edible plant species. Consumption of wild edible fruits meets the protein, carbohydrates, fats, vitamin and mineral requirement of poor rural populace in the region. Wild edible plants are very important for the well being of rural populations in the region, not only as sources of supplemental food, nutritionally balanced diets, medicines, fodder and fuel, but also for their income.

## **Material and Methods**

### **Study area**

Bandipore district or (also spelt Bandipora) is one of the 22 districts in the Indian union territory of Jammu and Kashmir. Bandipora town is the administrative headquarters of the district. Bandipora, a township with peculiar scenic beauty is located in the foothills of snow-clad peaks of Harmukh overlooking the shores of Wular Lake has produced hundreds of scholars and intellectuals. Before 1947, this town was a big trade and literary center of Kashmir. Bandipore, the birthplace of the great historian, Hassan Khoehami. This district was carved out from the erstwhile Baramulla district in 2007. The district is bounded by Kupwar district in the west, Baramulla district in south and Kargil district in Ladakh Srinagar and Ganderbal district in the east this district occupies an area of 398 Km<sup>2</sup> [2]. The district has population of 392,232 as per 2011 census.

Urban 49.6km<sup>2</sup>(19.2 sq mi)

Rural 295.4km<sup>2</sup>(114.1 sq mi)

Density 1,100/km<sup>2</sup>(2,900/sq mi)

Climate is temperate with four usual seasons a year and heavy precipitation (snow) during winters which keeps the valley snow bound and cut off from the outside world for almost six months. A typical mountainous land represents by lofty hills and peaks dotted by long flat grasslands which during the snow free summer months are used by the migratory people to graze their livestock is an important feature of this valley. These people are intermingle of three distinct ethnic tribes viz. Bakerwals, Gujjars and Puhloo (professional Kashmiri herdsmen) and constitute an important component of Kashmir population. Though these communities depend mostly on the livestock rearing for their livelihood yet they differ in their life style. Bakerwals live a true nomadic life and practice seasonal migration from foothills and plains of Jammu to the upper reaches of the northwestern Himalayas with a primary aim to get pastures for their flocks. Gujjars are semi nomadic which inhabit mostly the mountain fringes and hilly areas while and Puhloo are (semi) sedentary which usually live in low lying plains, with many being agro pastoralists.

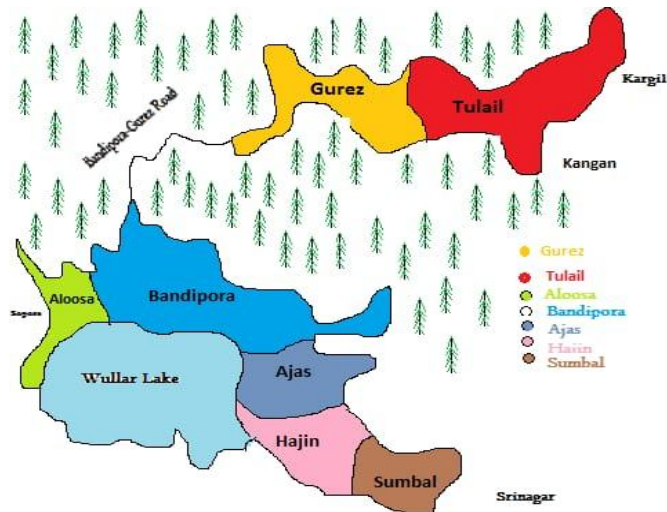


Fig:3. Map of Bandipora District

## Methodology

The data were collected During the survey, informants were selected randomly and information were collect by conducting interviews and group discussions with the informers in their local language on the native use of wild flora as food .A total of 220 informants (150 females 70 males ) between the age group 40-100 years were interviewed with a questionnaire . The information were collected from the local Residents. The elder persons, farmers, stockmen, shepherds, and housewiveswere contacted to collect data on uses of fruits. Local names, plant part used and the methods of implementation were collect from them.

The information and data related to the traditional uses of these wild edibles was explain by a combination of both direct observations of the people in the Forest area a survey conducted among the family elders Because our primary objective was to document the huge prosperity of the traditional knowledge associated with these wild edible fruits , we did not set any selection criteria and instead depend also on our field observations (first author lived with these people during both the growing seasons). The authenticity of the collected data was also cross checked within the members of the community. To further understanding on the local name, collection method, traditional use, part used and frequency of use we conducted unstructured casual interviews with other family members and group discussions besides sometimes go along with these people while they collected these fruits Because all the three ethnic community tribes visit these forests it helped us to get a relative account of their utilization of fruits. The sources of information were tribal people, medicinal plant practitioners, local and old persons of the understudy area. The collection of information was done by group discussions and interviewing all the persons in their local languages (kashmiri, pahari, gojri etc).

## DATA ANALYSIS

Descriptive statistics that are percentage and frequency were used to analyze the ethnobotanical data of the reported wild edible plants and their associated indigenous knowledge. Preference ranking was computed to assess the degree of preference of wild edible fruit based on taste, edibility quality, and importance of species at different seasons. Priority ranking was employed to determine threats of wild edible fruits based on their level of destructive effects. To recognize threats of wild edible fruit species, values from 1–9 were given: 8 are the least destructive threat and 1 is the most destructive threat. Use diversity ranking was carried out to identify the multipurpose use of wild edible fruits which were commonly reported by the key informants.

The wild edible plants were classified into nine categories based upon the local Usage (Table 1). The Fruit usage was subcategorized as raw (FrR) and processed (FrP). Due to less number of fruit species, both cooked and preserved subcategories were merged as processed. Other categories included spices (Sp), and medicinal fruits (Med). The field information collect through questionnaire and interviews was analyzed quantitatively using two ethnobotanical indices described as follows.

### Factor informant consensus (Fic):

To test the homogeneity of knowledge about the medicinal plants, the factor informant consensus (Fic) was used. The Fic was calculated as:

$$\text{Fic} = \frac{nur - nt}{nur - 1}$$

where nur refers to the number of use-reports for a particular use category and nt refers to the number of taxa used for a particular use category by all the informants. Fic values are low (near 0) if plants are chosen randomly or if there is no exchange of information about their use among informants, and approach one when there is a well-defined selection criterion in the community or if information is exchanged between informants

### Cultural importance index (CI):

The cultural importance index (CI) is defined by the following formula

$$\text{CI} = \frac{\sum_{u=1}^{u=NC} \sum_{i=1}^{i=N} uR \quad ui}{N}$$

CI index can also be seen as the sum of the proportion of informers that mention each species use. This additive index takes into account not only the spread of the use (number of informers) for each species but also its adaptability, i.e., the diversity of its uses. The theoretical maximum value of the index is the total number of different use-categories (NC), reached in the unlikely case that all the informers would mention the use of the species in all the use-categories

considered in a survey. In the case of species with only one use, this index would be equal to RFC.

## **Results and discussion**

### **Harvesting of wild fruit, their uses and tribal knowledge**

The study shows that, People of Bandipora possess a very good knowledge on the wild edible fruits around the forest areas. A total of 9 wild edible fruit species belonging to 8 genera and 7 families have been recorded as wild edible fruits in the study area. They were harvested from natural stands and their habit, local names, parts used and mode of consumption are presented in Table 2. Among the seven families, the most utilized species belong to Roseaceae (3) and Grossulariaceae (2) and the remaining families were represented by only one species each. In present study about 9 wild edible fruits have been listed, among them 4 are herbs, 4 are shrubs 1 are from trees.

These wild edible fruits are being used by the tribal people of the hilly state from very ancient times and almost all the fruits have one or more ethno-medicinal uses. The tribal settlements are generally in the remote areas of forest and there is popularity of common diseases like indigestion problem, fever, injury, etc. The popularity of diseases can be allocate to unhygienic conditions, poor quality of food, lack of clean drinking water etc. In addition, tribal people do not get in time and proper treatment even for common diseases. Therefore, for getting relief from these problems, they mostly rely on easily available traditional herbal medicines. It was also observed that, the most popular medicinal preparation are infusion, decoction, paste, juice and dry powder and it is based on approximation, not standardized. Since, these indigenous system of treatments based on wild edible fruits with medicinal value is still an important part in Mizo social life and culture in village areas but this traditional knowledge of the local people has been transferred orally from generation to generation without proper documentation. Therefore, the claimed therapeutic values of the reported species are to be critically studied to establish their safety and effectiveness and to preserve these high valued wild edible fruits, which may otherwise loss due to deforestation.

During the last few years, some initiatives have been taken by the government for sustainable management of medicinal plants and their resources. Despite the implementation of various activities for the conservation and documentation of the species, there is still gap in policy, plan and implementation of programmes. Though some initiatives have already been taken for conservation and sustainable utilization of useful species of wild edible fruits, less priority is given to conserve these useful resources in an integrated manner. Therefore, appropriate national policy, action plan and programme related to conservation and sustainable utilization of these valuable plants should be formulated. Many parts of the biogeographical areas of the country still remained unexplored. Hence, it is strongly recommended that major thrust should be given for intensive inventory and documentation of useful species, their chemical constituents, habitats

and potential utilization as raw materials. Emphasis should also be given to implement some pilot programmes for plantation, domestication and cultivation of useful species. This will help in gaining some additional income to the local people. Moreover, top priority should be given for in situ conservation of the species. Such steps will not only contribute to protect the habitats but also help to maintain the ecological processes. Emphasis should also be given to conserve the habitats and useful species in ex situ conservation.

S.No.	Botanical Name. (Vernacular Name.)	Family	Habitat
1.	<i>Fragaria nubicola</i> . (JangliGonch)	Rosaceae	Herb
2.	<i>Morus alba</i> L. (Tul)	Moraceae	Tree
3.	<i>Podophyllum hexandrum</i> Royle. (Wanwagun)	Berberidaceae	Herb
4.	<i>Viburnum grandiflorum</i> Decene. (Kalmach)	Caprifoliaceae	Shrub
5.	<i>Solanum nigrum</i> . (Makoi/Cambe-tamtar)	Solanaceae	Herb
6.	<i>Rosa webbiana</i> Wall.ex Royle (saih)	Rosaceae	shrub
7.	<i>Fragaria vesca</i> L (Budmewa/jungle strawberry)	Rosaceae	Herb
8.	<i>Ribes alpestre</i> Wall .ex Decne (Shatoo)	Grossulariaceae	Shrub
9.	<i>Ribes orientale</i> (Askut)	Grossulariaceae	Shrub

**Table:1.** Wild edible fruits and their family and habitat

**Table:2** Edible usages and culture index of wild edible fruit species of Bandipora district

S.no	Botanical Name. (Vernacular Name.)	Parts Used	Uses	CI
1.	<i>Fragaria nubicola</i> . (JangliGonch)	FR	The fruits are edible. Used to relieve constipation berries are of great benefit for rheumatic gouts. sunburn could be relieved by rubbing a cut strawberry over a fleshed washed face	0.25

2.	<i>Morus alba L.</i> (Tul)	FR	Fruits are eaten .Used for the treatment of dizziness, insomnia, premature aging also have a protective effect against liver and kidney disorder, and inflammation	0.56
3.	<i>PodophyllumhexandrumRoyle.</i> (Wanwagun)	FR	Fruit is edible Red Berry. Used against fever in traditional system and is also used for gastric problem	0.41
4.	<i>Viburnum grandiflorum</i> <i>Decene.</i> (Kalmach)	FR	Fruits are delicious and edible. Used traditionally in the treatment of typhoid and whooping cough	0.23
5.	<i>Solanum nigrum.</i> (Makoi/Cambe-tamtar)	FR	Fruits are eaten. Used for the treatment of stomach ache , tonsillitis ,wing worm ,pain , inflammation and fever.	0.20
6.	<i>Rosa webbianaWall.exRoyle(saih)</i>	FR	Fruits are eaten raw. Rich source of vitamins and minerals ,especially in vitamins A,C and E, Falavanoids and other bio-active compounds.	0.05
7.	<i>Fragaria vesca L</i> (Budmewa/jungle strawberry)	FR	Ripe fruits eaten raw used in the treatment of gastrointestinal disorder.	0.26
8.	<i>Ribes alpestre Wall .ex Decne</i> (Shatoo)	FR	Ripe fruit are eaten raw used for the treatment of jaundice	0.51
9.	<i>Ribes orientale(Askut)</i>	FR	Ripe fruit are eaten berries are purgative	0.43



**Table:2** Edible usages and culture index of wild edible fruit species of Bandipora district

S.no	Botanical Name. (Vernacular Name.)	Parts Used	Uses	CI
1.	<i>Fragaria nubicola.</i> ( <i>Jangli Gonch</i> )	FR	The fruits are edible. Used to relieve constipation berries are of great benefit for rheumatic gout. sunburn could be relieved by rubbing a cut strawberry over a fleshed washed face	0.25
2.	<i>Morus alba L.</i> ( <i>Tul</i> )	FR	Fruits are eaten .Used for the treatment of dizziness, insomnia, premature aging also have a protective effect against liver and kidney disorder, and inflammation	0.56
3.	<i>Podophyllum hexandrum Royle.</i> ( <i>Wanwagun</i> )	FR	Fruit is edible Red Berry. Used against fever in traditional system and is also used for gastric problem	0.41
4.	<i>Viburnum grandiflorum</i> <i>Decene.</i> ( <i>Kalmach</i> )	FR	Fruits are delicious and edible. Used traditionally in the treatment of typhoid and whooping cough	0.23
5.	<i>Solanum nigrum.</i> ( <i>Makoi/Cambe-tamtar</i> )	FR	Fruits are eaten. Used for the treatment of stomach ache , tonsillitis ,wing worm ,pain , inflammation and fever.	0.20
6.	<i>Rosa webbiana Wall.ex Royle(saih)</i>	FR	Fruits are eaten raw. Rich source of vitamins and minerals, especially in vitamins A,C and E, Flavonoids and other bio-active compounds.	0.05
7.	<i>Fragaria vesca L</i> ( <i>Budmewa/jungle strawberry</i> )	FR	Ripe fruits eaten raw used in the treatment of gastrointestinal disorder.	0.26
8.	<i>Ribes alpestre Wall .ex Decne</i> ( <i>Shatoo</i> )	FR	Ripe fruit are eaten raw used for the treatment of jaundice	0.51

9.	<i>Ribes orientale</i> (Askut)	FR	Ripe fruit are eaten berries are purgative	0.43
----	--------------------------------	----	--------------------------------------------	------

Botanical name	CI
<i>Fragarianubicola</i> . (JangliGonch)	0.25

**Table:3**Represents the CI value of *fragarianubicola*.

Botanical name	CI
<i>Morus alba L.</i> (Tul)	0.94

**Table:4**Represents the CI value of *Morus alba L*

Botanical name	CI
<i>PodophyllumhexandrumRoyle.</i> (Wanwagun)	0.41

**Table:5**Represents the CI value of *PodophyllumhexandrumRoyle.*

Botanical name	CI
<i>Solanum nigrum.</i> (Makoi/Cambe-tamtar)	0.20

**Table:6**Represents the CI value of *Solanum nigrum*

Botanical name	CI
<i>Viburnum grandiflorum Decene.</i>	0.23

**Table:7**Represents the CI value of *Viburnum grandiflorum*

Botanical name	CI
<i>Rosa webbianaWall.exRoyle(saih)</i>	0.05

**Table:8.** Represents the CI value of *Rosa webbiana Wall*

Botanical name	CI
<i>Fragaria vesca</i> L ( <i>Budmewa/jungle strawberry</i> )	0.26

**Table :9.** Represents the CI value of *Fragaria vesca* L

Botanical name	CI
<i>Ribes alpestre</i> Wall .ex Decne ( <i>Shatoo</i> )	0.51

**Table:10.** Represents the CI value of *Ribes alpestre* Wall

Botanical name	CI
<i>Ribes orientale</i> ( <i>Askut</i> )	0.43

**Table:11.** Represents the CI value of *Ribes orientale*.

**Table: 12.** species richness and cultural importance of various use categories and sub categories of wild edible fruits

Use of categories/subcategories	Number of species	Use-reports(UR)	MeansUR	CI	Fic
Fruits	9	220	24.4	3.28	0.94
Fruit(processed)	2	50	25	0.68	0.43
Fruit(raw)	7	215	30.7	2.6	0.94

Informant consensus index (Fic) (Table 2). Wild fruits eaten raw and chutney preparations also recorded high values (0.94) These findings point towards the fact that despite huge variation in communities, climatic conditions, and forests, informants have good knowledge of wild edible fruits which is being shared to a great extent among the inhabitants and also wild Phytofoods are presently in use among the local populace. The present study site is having a rich diversity of wild edible fruits (table 2) the maximum wild edible species are those which we used as raw

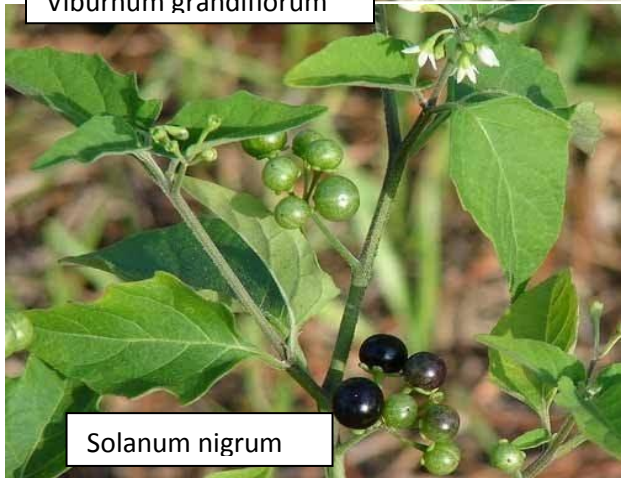
The cultural index value for wild edible fruits is( 3.28%) of the total CI. Culturally (on the basis of CI) the most important wild edible fruit species were *Morus alba* L (CI, 0.94)*Ribes alpestre*(CI, 0.51) *Ribes orientale* (CI, 0.43) *Podophyllum hexandrum*Royle(CI,0.41)



Viburnum grandiflorum



Ribes orientale



Solanum nigrum



Podophyllum hexandrum



Fragaria vesca



Rosa webbiana





Ribes alpestre

The wild edible fruits have played an important role as a natural Source for human beings since ages. The wild edible fruits used the tribal people especially at the time of scarcity. Documentation of wild edible fruits from ethno botanical approach is important for enhancing the understanding of indigenous knowledge systems. The wild consumption and availability of wild edible fruits attest their value, and are especially visible among indigenous cultures. But in recent times, the old traditional in many tribal communities are at risk and gradually decline, hence there is urgent need to study such knowledge systems and find innovative ways of tapping their potential for the welfare of mankind.

Based on the indigenous knowledge collected during the study, it can be seen that the area is a valuable source of medicinal flora with different medicinal properties. Most of the wild edible fruits used for different medicinal purposes are regarded as very important and are used extensively. Due to extensive usage they are over harvested. The wild edible Fruit like *Podophyllum hexandrum* are endangered and need immediate attention towards preservation on high priority basis. In recent times serious threats of bio-piracy and intellectual property rights (IPR's) with huge economy at stake have necessitated the early bio prospecting of the potential medicinal plants used in the folklore .

## Conclusion

From this ethno botanical study we have catalogued 9 wild edible fruit species collected from the district Bandipora. Hunger is one of the most important concerns of this generation, can be supplemented, to a great extent, by the inclusion of wild edible fruits in diet. Medicinal wild edible Fruits are now emerging as an important bio-resource. The Present study concludes that different parts of the wild edible fruits were used as food and medicine .if properly maintained and harvested, wild edible fruits of this region could be the source of additional income for local people. Wild fruit plantation not only improves food base for humans but also helps in sustaining

wild animals particularly herbivore and bird population. It was also found that many endemic edible fruits are still unknown which are exploited in the study area. Yet, due to growing population, over exploitation and depletion of biodiversity by natural and artificial hazards, there is a need to collect and conserve those species before the threat of extinction.

## REFERENCE

- 1) Arora RK, Anjula P. Wild edible plants of india: diversity conseration and use.india: ICAR New Delhi; 1996.
- 2) Bell, J. (1995). The Hidden Harvest. In Seedling, the quarterly newsletter of Genetic Resources Action International (GRAIN). www. grain.org. Accessed 9 October 2007.
- 3) Bhattarai, S., and R. P. Chaudhary. 2009. Wild edible plants used by the people of Manang District, Central Nepal. *Ecology of Food and Nutrition* 48:1–20
- 4) Green, C. 1993. An overview of production and supply trends in the U.S. specialty vegetable market. *Acta Horticulturae* 318:41–45
- 5) Hamilton, A. C. 2003. Medicinal plants and conservation: Issues and approaches. Surrey, UK: WWF-UK International Plants Conservation Unit
- 6) Jain, S. K. 1991. Dictionary of Indian folk medicine and ethnobotany. New Delhi, India: Deep Publication.
- 7) Mojeremane, W., &Tshwenyane, S. O. (2004). Azanzagarckean: A valuable edible indigenous fruit tree of Botswana. *Pakistan Journal of Nutrition*, 3(5), 264–267.
- 8) Somnasang, P., and G. Moreno-Black. 2000. Knowing, gathering and eating: Knowledge and attitudes about wild food in an Isan Village in north-eastern Thailand. *Journal of Ethnobiology* 20 (2): 197–216
- 9) Sundriyal, M. and Sundriyal, R.C. (2001). Wild edible plants of the Sikkim Himalaya: Nutritive values of selected species. *Economic Botany*, 55: 377-390
- 10) Sundriyal, M., and R. C. Sundriyal. 2004. Wild edible plants of the Sikkim Himalaya: Marketing, value addition and implications for management. *Economic Botany* 58 (2): 300–315
- 11) Stewart, R. R. 1972. An annotated catalogue of the vascular plants of W. Pakistan and Kashmir. In *Flora of West Pakistan*, ed. E. Nasir and S. I. Ali, 1–1028. Karachi: Fakhri Press
- 12) Schippmann, U., D. J. Leaman, and A. B. Cunningham, 2002. Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues. Rome: Food and Agricultural Organization
- 13) Walters, M., and A. Hamilton. 1993. The vital wealth of plants. Gland, Switzerland: WWF-World Wide Fund for Nature.