International Journal of Agricultural Sciences
Volume **10** | Issue 1| January, 2014 | 459-462

A CASE STUDY

Potential and biodiversity conservation strategies of underutilized or indigenous vegetables in Himahal Pradesh

DHARMINDER KUMAR*, S.V. DWIVEDI[1], SANDEEP KUMAR, FAIZAN AHMED[2], R.K. BHARDWAJ, K.S. THAKUR AND PRABAL THAKUR
Department of Vegetable Science, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, SOLAN (H.P.) INDIA (Email : dharmruder@gmail.com)

Key Words : Potential and biodiversity conservation, Indigenous vegetables, Geographical

View Point Article : Kumar, Dharminder, Dwivedi, S.V., Kumar, Sandeep, Ahmed, Faizan, Bhardwaj, R.K., Thakur, K.S. and Thakur, Prabal (2014). Potential and biodiversity conservation strategies of underutilized or indigenous vegetables in Himahal Pradesh. *Internat. J. agric. Sci.*, **10** (1): 459-462.

Article History : Received : 12.08.2013**; Accepted :** 15.12.2013

INTRODUCTION

The use of the term underutilized refers to "categories of wild and cultivated plants, whose potential has not been yet fully realized". It includes those non-commodity crops, which are the part of a larger biodiversity portfolio, once more popular and today neglected by users by agronomic, genetic, economic, social and cultural factors." (Padulosi and Hoeschle-Zeledon, 2004). These crops have under-exploited potential for contribution to food security, health (nutritional medicinal), income generation, and environmental services (Jaenicke and Hoeschle-Zeledon, 2006).

Farmers cultivate them less than in the past because these species are no longer competitive with the crops that have come to dominate the world food supply and that are supported by seed supply systems, production and post-harvest technologies and extension services. In addition, their markets are well established and consumers are accustomed to using them. Lack of competitiveness is one of the important factors for underutilization but, in itself, this tells us little about the geographical, social and economic reasons associated with the decline of local crops. Underutilized crops are often presented as 'new crops', not because they are 'new' but because they have been taken up by commercial companies and researchers for a new market. In reality, local communities have used these species for generations but the current loss of local knowledge means that their traditional uses are being forgotten.

Himachal Pradesh, being a hilly state, has diverse agro-climatic conditions ranging from sub-humid tropical (Elevation 350-1000 m) in the southern low tracts, warm and temperate (Elevation 1001-1500 m), cool and temperate (Elevation 1,501-2,500 m), and cold alpine and glacial (Elevation 2,501- 6,975 m) in the northern and eastern mountain ranges and are conducive for growing diverse types of crops throughout the year. State, is a treasure house of traditional, locally adapted indigenous vegetables, which are mostly underexploited. There are several lesser-known plant species, which have tremendous potential to be used as vegetables and they do not require high input technology and can thrive well on marginal and sub marginal lands and therefore, could be exploited for meeting the protein requirement of the predominantly vegetarian population of the country.

Increased use of these greens of high nutritive value could be great significance towards solving the problem of

*** Author for correspondence**
[1]Krishi Vigyan Kendra, Sonebhadra, MIRJAPUR (U.P.) INDIA
[2]Krishi Vigyan Kendra, Kargil, KASHMIR (J&K INDIA

malnutrition, to some extent. Since indigenous vegetables could help to undercut the food insecurity at the household level, therefore, there is need to promote their conservation, production, processing and utilization (Kalia *et al.*, 2007). In Himachal Pradesh, different locally adapted niche based indigenous vegetables are consumed traditionally as special dishes based on age-old indigenous wisdom of their nutritive and medicinal value in different areas. There are number of indigenous potential plants species, which support life in more extreme environment situation as species of emergency utility, the information on these little known plant species used as vegetables in Himachal Pradesh is given below (Table 1).

An ethno botanical survey of upper hilly region of Shimla was carried out in 2008 by Sharma *et al.* (2009) to enumerate some of the important plants used as supplementary food among the people of this area. The investigations indicated the significance of wild plants as supplementary food and these supplementary food plants play an important role in future for insuring food security of people.

Some of these species are highly commercialized, while others are semi-cultivated or still growing wild (Table 2). Indigenous vegetables particularly from perennial plants are widely used as sources of food and condiments and sources of income for many poor communities in India. Many of these plants are rich in nutritional value particularly proteins, vitamins and minerals and compounds of medicinal importance which enable them to be utilized in different Indian systems of medicine to cure ailments (Chadha and Patel, 2007).

Table 1 : Summarized detail of underutilized vegetables in Himachal Pradesh

Common name	Botanical name	Economic importance
Zimmu	*Allium tuberosum*	– Dried leaves/plants are mixed in curries – Shoots are boiled as soup or chopped into small pieces and consumed as salad and are also cooked as vegetable
Jungle chulai	*Amaranthus viridis*	– Plants are consumed after boiling as soups or leafy vegetables – Rich in iron content
Buckwheat/ phapru	*Fagopyrum esculentum* Monech	– The leaves and young shoots are boiled and eaten as spinach – It contains rutin which is important to keep the arteries fragile, and reduce the chance of blockade of arteries and thereby heart attack
Khatta Palak	*Rumex* species	– It is mainly consumed as raw – Leaves are rich in calcium, carotene and Vitamin C
Curry leaf	*Murraya koenigii*	– Fresh leaves are valued primarily for seasoning and flavoring the vegetable dishes – Curry leaf highly contain amount of vitamin A (12,600 IU/100g), protein (6.1%), and fat (1.0%)
Arbi/kachalu/dasheen	*Colocasia esculenta*	– The tubers are eaten after boiling and or fried as vegetable – The younger leaves and stalks are eaten as spinach or made into fried preparations with powered Bengal gram flour.
Basokand/Tardi/Air Yam	*Dioscorea bulbifera*	– Contains the steroid diosgenin, which is the principal material used in the manufacture of birth-control pills
Kachnar	*Bauhinia varigata* Linn	– The buds and flower are traditionally eaten as vegetable. Flower buds are boiled, mixed with curd and spices – The protein in kachnar is 46.5 and oil s 17.3g/100g of fruit – The bud has high phenolic content and provides dietary antioxidant. Flavonol glycoside has anti-inflammatory activity. – Dried buds are used in treatment of dysentery, piles and worms.
Lasora/Indian cherry	*Cordia dichotoma*	– It is eaten raw when ripe and semi-ripe fruits are pickled – Fruits are useful in leprosy, skin diseases, arthritis and ring worms – It is rich in vitamin C and its paste act as a curative against skin disorders – Lasora contain 1.8 g protein, 30 g P and 2112 mg Ca
Chayote	*Sechium edule*	– Fruit is mainly used for human consumption as vegetable and snack – The fruit and particularly the seeds are rich in amino acid. – Chayote infusion of the leaves are used to dissolve kidney stones and to assist in the treatment of arteriosclerosis and hypertension, infusion of the fruit are used to alleviate urine retention
Broad bean	*Vicia faba*	– Young pods and seeds are cooked into a vegetable. – It has relatively high protein content (25%)
Lungru	*Diplazium esculentum*	– Used in curry in various forms, as cooked vegetable and pickle – It is rich in micronutrients, especially iron (8.40 mg/ 100g), manganese (5.60mg/ 100 g) and zinc (5.30mg/ 100g)

Table 2 : Supplementary food plants and wild edible macro-fungi used by the people of upper hilly region of district Shimla, Himachal Pradesh

Botanical name	Local name	Family
Spiraea canescens Don.	Chakuli	Rosaceae
Allium humile Kunth.	Duna	Amaryllidaceae
Alpine onion		
Chenopodium album Linn.	Bathu	Chenopodiaceae
Fagospyrum tataricum(L.)Garten.	Phapata	Polygonaceae
Girardinia hererophylla Decne	karli	Utricaceae
Nasturtium officinale R.	Chala	Cruciferae
Phytolacca acinosa Roxb.	Jalga	Phytolaccaceae
Utrica dioica Linn.	Kimshi	Utricaceae
Colocasia esculenta (L.) Schott	Silly aalu/Gaaguli	Araceae
Cucurbita pepo Linn.	Petha	Cucurbitaceae
Diplazium esculentum Retz.	Lingra	Dryopteridaceae
Helvella compressa (Synder) N.S. Weber	Kanchantu	Helvellaceae
Lactarius delicious (L. ex Fr.) S.F. Gray	Chhatri	Russulaceae
Lycoperdon sp. Pers.	Buthu	Lycoperdaceae
Morchella conica Pers. ex. Fr.	Guchhi	Morchellaceae
Morchella deliciosa Fries		
Morchella esculenta (L.) Pers		
Morchella semilebra DC	Guchhi	
Rhizopogon rubescens (Tal. & C. Tal.)	Zhanda	Rhizopogonaceae

General features of underutilized vegetables:

– Ensure the food security for millions of people worldwide.

– Underutilized vegetables are highly adapted to agro-ecological niches and marginal areas.

– They have comparative advantages over commodity crops, because they have been selected to withstand stressful conditions and can be cultivated using low input and biological techniques.

– Possess high nutritional and/or medicinal value.

– Require only limited external inputs for production.

– Suitable for organic production.

– Suitable for cultivation on marginal land having poor soil fertility etc.

– Suitable for stabilization of fragile ecosystems.

– Fit into small-scale farming systems.

– Possess traditional, local or regional importance.

– Easy to store and process by resource-poor communities.

– Helps in maintaining biodiversity and sustaining the environment.

– Maintaining the social structure and poverty alleviation.

– Local market opportunities are available.

– They have immense post harvest potential and are used in preparation of various value- added products-nutritious, high in fibre and antioxidants.

Reasons for negligence of underutilized vegetables:

– Priority is given to high value commercial high yielding varieties so they are being replaced by few cultivated species.

– People have no idea of the use of underutilized vegetables as food especially their health promoting properties.

– Lack of available germplasm for widespread use.

– Lack of information on use and importance.

– Lack of information about their performance and input requirements and lack of information on how they can fit into production systems.

– Shift from eating more vegetable greens to eating more meat and cereal products.

– The loss of knowledge resulting in non-utilization is eventually causing the loss of the germplasm.

– The indigenous knowledge associated with the cultivation, utilization, and conservation of underutilized vegetables is also endangered.

– Natural habitat of many underutilized vegetables is disappearing. "Weeds" which were gathered as supplementary food are rouged out.

– Vigorous marketing of modern cultivars representing only a few species by seed companies is resulting in the rapid disappearance of old local varieties and indigenous species which may carry valuable characteristics and contribute to the country's biodiversity.

Research potential of underutilized vegetables:

Research on underutilized crops holds promise to attain sustainability, profitability and diversification in agriculture and to restore the balance of trade, reduce India's dependence on imports and to make us more competitive in agricultural exports. Several international agencies, such as the Overseas Development Agency (ODA), International Plant Genetic Resources Institute (IPGRI), United States Agency for

International Development (USAID), and International Centre for Underutilized Crops (ICUC), also encouraged research on these underused species in order to broaden the range of plant species under cultivation. The collection is being regenerated, characterized and evaluated for their potential to improve nutrition and contributor to farm productivity (Engle and Faustino, 2007). This has helped to raise concern and awareness for safe conservation and sustainable use of genetic resources of underutilized plant species.

Challenges in marketing of underutilized vegetables:

– High transaction costs.

– Problem to meet food safety standards particularly in international markets.

– No existing product grades that facilitate long distance trade.

– Poorly-defined markets and weak demand for value-added products, because their products are not very well known.

– Unstable market.

– Lack of credit facilities.

– Inaccessibility of markets.

Future strategies:

There are several strategic factors that needs to be taken into account if we are to successfully promote underutilized species and at the same time, ensure that benefits are equally shared among community members. These include:

– Focusing on local values, indigenous knowledge and uses. Such an approach will strengthen the link between diversity and sustainable uses and is important in considering marketability.

– Recognizing underutilized species as a public good to ensure the continued availability and accessibility of plant genetic material to present and future generations.

– Focus on groups of species as models through case-study approaches to make the best use of limited resources and facilitate for scaling-up and mainstreaming results.

– Promote co-operation among stakeholder groups and create national, regional and international synergies: this is not an option but a necessity, isolated efforts and success stories need to be linked and disseminated.

– Analyze and enhance demand using market-oriented strategies: such an approach will create sustainable markets and reduce the risk of over-estimating economic potential.

– Empower rural poor and strengthen their capacity to negotiate with the private sector and government: such interventions will ensure that the poor and underprivileged receive their rightful share of the benefits resulting from our promotion process.

– Mainstream gender-sensitive approaches in management and use: these will allow groups like women - who are too often marginalized - to enhance their capacity to manage, conserve and use underutilized species in a sustainable way and - in doing so - strengthen their economic status.

– Inter-disciplinary work: such an approach is critical if the opportunities of underutilized species - including nutritional, economic and social aspects - are to be tapped at all levels.

Conclusion:

Indigenous/underutilized vegetables are being ignored by policy makers and excluded from research and development agendas. Cultivation and use can be enhanced by using farmer-based knowledge and by introducing innovative cultivation practices. Special efforts are needed to improve the cultivation, management, harvesting and post-harvesting of underutilized species and studies are needed on issues such as marketability, nutritional status and policies and legal frameworks to regulate their use. Efforts are also needed to provide planting material to farmers in order to make the cultivation of underutilized species more feasible and sustainable over time.

REFERENCES

Chadha, K.L. and Patel,V.B. (2007). Prospect of indigenous perennial plants as source of vegetable. Division of Fruits and Horticulture Technology, Indian Agriculture Research Institute. *Acta Hort*., **752** :49-54.

Engle, Liwayway M. and Faustino, Flordeliza C. (2007). Conserving the indigenous vegetable germplasm of Southeast Asia. *Acta Hort*., **752**: 55-59.

Jaenicke, H. and Hoschle-Zeledon, I. (eds.). (2006). Strategic framework for research and development of underutilized plant species with special reference to Asia, the Pecific And Sub- Saharan Africa. International Centre for Underutilized Crops (ICUC), Colombo, Sri Lanka and Global Facilitation Unit for Underutilized Species (GFU), Rome, Italy.

Kalia, Pritam, Sharma, Akhilesh, Singh, Sharda and Singh, Yudhvir (2007). Locally adapted indigenous vegetables of Himachal Pradesh and their role in alleviating poverty, hunger and malnutrition. *Acta Hort.,* **752**: 239-242.

Padulosi, S. and Hoeschle-Zeledon, I. (2004). Underutilized Plant Species: What are they? *Leisa,* **20** :5-6.

Sharma, Sushil, Gautam, Ajay K. and Bhadauria Rekha (2009). Some important supplementary food plants and wild edible fungi of Upper Hilly Region of District Shimla (Himachal Pradesh), India. School of Studies in Botany, Jiwaji University, Gwalior (M.P.) INDIA.