

AGRI-DIVERSITY IN NORTH-WESTERN HIMALAYAS

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The North-western (N-W) Himalayas has highly varied agro-ecological conditions and predominantly vegetarian people. The high dependence on plants as food source resulted into the growing consumption of about 180 plant species by the inhabitants. The highly diverse ecology of the N-W Himalayas hosts much varied vegetation. As a consequence, wild relatives of crop plants have also an impressive array of diversity. Among these, the significant species diversity is found for *Allium* (18), *Lactuca* (16), *Taraxacum* (14), *Agropyron* (11), *Vicia* (11), *Solanum* (brinjal) relatives (9), *Chenopodium* (8) and *Lathyrus* (8), besides, wild relatives of species like *Cicer microphyllum* and *Glycine max*.

Key words : North-western Himalaya, agri-diversity, food plants, wild relatives

The North-Western Himalayas include Jammu and Kashmir, Himachal Pradesh and north-western hills of Uttar Pradesh. The people of this zone have been growing and/or collecting large number of plants or plant products from wild habitats for consumption. Consumption of such a large array of plants have been the basis of good stamina and sound health for them since time immemorial. This combined with high agro-ecological diversity has made this region a very rich resources of food plants. The present paper is an attempt to reveal the rich agri-diversity resources of the N-W Himalayas.

Diversity of agro-ecological zones of N-W Himalayas: The region may conveniently be divided into five agro-climatic zones *viz.* (i) plain valleys with warm tropical conditions, (ii) foothills with mild subtropical climate, (iii) mid-hills with cool subtropical conditions, (iv) high hills with temperate climate, and (v) temperate arid zone with dry and sandy soil conditions.

Agri-diversity: The people inhabiting the western Himalayas derive their food from an array of cultivated as well as naturally growing wild plants. The number of plant species grown in the N-W Himalaya may be estimated to be about 10,000 to 12,000. Polunin and Stainton (1985) have also stated that the great variation in climate and habitat is the consequence of enormous variation in the western Himalayan flora even within quite a short distance (20 km). The diversity of human food resources in the western

Himalaya may conveniently be grouped as (a) cultivated food grains, (b) oilseed crops, (c) cultivated and wild vegetables, (d) spices and condiments, wild and cultivated fruits, (f) uncultivated food plants.

(a) **Cultivated food grains:** These constitute the main food items of the populace. They are comprised of large variety of grains such as (i) cereals, (ii) millets, (iii) pulses and (iv) pseudocereals. These are grown mainly in two crop seasons *Kharif* (May-June to Sept.-Oct.) and *Rabi* (Oct.-Nov. to Feb. March or April). The cereals grown are *Triticum aestivum* (wheat), *Hordeum vulgare* L. (barley), *Oryza sativa* L. (rice), *Zea mays* L. (maize). The millets and minor millets include *Eleusine coracana* Goertn. (mandava/mandal), *Setaria italica* Beauv. (kauni/kangani), *Panicum miliaceum* L. (Cheena), *Paspalum scrobiculatum* L. (kodo/kodra), *Echinochloa frumentacea* (mandiva/Jhangara), *Sorghum vulgare* Pers. (Jowar), job's tear (*Coix lachryma-jobi*), *Avena sativa* (Jai).

Pulses or legumes are the major sources of proteins. These are *Cicer arietinum* L. (gram, chana), *Vigna mungo* L. (black gram/mah/urd), *Vigna radiata* (L.) Wilezek. (green gram/moong), *Vigna unguiculata* Walp. (cowpea, lobia, rongi, ruansh), *Phaseolus vulgaris* L. (rajmash, french bean), *Macrotyloma uniflorum* L. (horse gram or kulthi), *Lens culinaris* Medik. (lentil, masur), *Glycine max.* (bhat), *Vigna umbellata* (rice bean), *Vicia faba* L. (bakala), *Pisum sativum* L. (pea/matar), *Vigna aconitifolia* Jacq. (moth/dew gram), *Lathyrus sativus* L. (chikling vetch/khesari dal), *Phaseolus coccineus* Lam. (scarlet bean), *Vigna trilobata* (L.) Verdc. (pillipsera), *Cajanus cajan* Mill. sp. (Red. gram/pigeon pea/arhar), *Phaseolus multiflorus* Willd. (scarlet runner). In the higher elevation of Himalayan mountains, except barley, no other cereals grow and therefore, the staple food constitutes of pseudocereals such as grain amaranth, (*Amaranthus hypochondriacus*, *A. caudatus* Moq., *A. biltum* L., *A. hybridus*), buckwheat (*Fagopyrum esculentum* Moench. 'Ogal' and *F. tataricum* Grerten, 'Phaphra').

(b) **Oilseed crops:** The people of western Himalayas generally rear milch cattle and consume butter and ghee. Besides, vegetable oils are also used in various culinary preparations. These include *Brassica campestris* L. var. toria, var. yellow sarson, var. brown sarson (toria, pili sarson, and kali sarson), *Brassica juncea* H.F.T. (rai), *Linum usitatissimum* L. (alsi or tulsii), *Sesamum indicum* L. (Til tel or Mitha tel), *Perilla frutescens* (Bhanjira), *Ricinus communis* L. (erendi tel), *Prunus armeniaca* L. (zardalu or apricot, or chuli tel), *P. communis* L. (huds or chuli tel), *Aesendra butyracea* Roxb. (chiura), *Bassia latifolia* Roxb., *Eruca sativa* Mill. (taramira).

(c) **Cultivated and wild vegetables:** People in hills grow and even collect naturally growing plants or plant products which are eaten cooked as vegetables. These may be grouped as (i) cultivated vegetables and (ii) uncultivated vegetables. The cultivated vegetable group constitutes *Luffa aegyptiaca* Mill. (ghiya tori, sponge gourd), *Luffa acutangula* Roxb. (kali tori or ridge gourd),

Lagenaria siceraria (lauki, tumra or bottle gourd), *Cucumis sativus* L. (kheera, kakari, or cucumber), *Trichosanthes anguina* L. (snake gourd), *Momordica charantia* L. (karela, bitter gourd), *M. dioica* Roxb. (bhat karela), *Coecirea indica* Naudin (kundru, kundri), *Cucurbita maxima* Duch. (kaddu, kurah), *C. pepo* DC. (chappan kadu). *Brassica rapa* L. (shalgam or turnip), *Raphanus sativus* L. (mooli, radish), *Lycopersicon esculentum* L. (tomato, tamatar), *Daucus carota* L. (carrot, gajar), *Abelmoschus esculentum* L. (bhindi, okra, lady's finger), *Capsicum annuum* L. (Shimla mirch), *Brassica oleracea* var. *capitata* (bandh gobi, cabbage), *B. oleracea* var. *botrytis* (phool gobi, cauli flower), *Solanum tuberosum* L. (alu, potato), *Beta vulgaris* L. (chukander), *B. vulgaris* var. *benghalensis* Roxb. (pahari palang), *Allium cepa* L. (piaj, onion), *A. sativa* (lahsun, garlic), *Lactuca sativa* DC. (salad, lettuce), *Colocasia antiquorum* Schoff. (ghuiya, arbi, kachalu, taro), *C. himalensis* Royle. (gaberi, ghandiali, dahseen), *Amorphophallus campanulatus* Blume, (zamikand, elephant foot yam), *Trigonella foenum graecum* L. (methi).

The uncultivated vegetables are numerous but a few which are consumed as cooked are: *Cucumis trigonus* Roxb. (bislombhai) *Trichosanthes cucumeriana* L. (jangli chachinda), *Bauhinia variegata* L. (karial, kachnar), *Ficus palmata* Forsk. (daghee, phagre, fig-unripe), *Lepidium sativum* L. (halon, halim, cress), *Salvia plebeia* R. Br., *Dioscorea sagittata* Royle. (tarur, tardi), *Momordica balsamina* (ban kokora), *Euphorbia royleana* Boiss. (chhuhn), *Aloe vera* (ghee kawar, kawar gandal, ghrit kumari), *Nasturtium officinale* R. Br. (chhuchha or water cress), *Boerhaavia diffusa* L. (itsit or utchhata), *Urtica dioica* L. (Bichhu buti), *Malva neglecta* Wall. (Sotsul), *Nelumbo nucifera* Gaertn. (Kamal kakari), *Malva parviflora*, *Phytolacca acinosa*, *Plantago lanceolata*, *Polygonum alpinum*, *Malva verticillata* (Sonchal), *Crambe cordifolia*, *Medicago sativa*, *Limnanthium nymphaeoides*, *Marsilea quadrifolia*, *Medicago sativa*, *Typha angusta*, *Nymphaea alba*, *Coriaria nepalensis*, *Orthosiphon rubicundus*, *Cousinia thomsonii*, *Polygonum bistorta*, *Oxyria digyna* (mountain sorrel), *Agave americana*, *Dioscorea belophylla* Voigt. (dregal), *Diplazium polypodioides* Blume. (lingri, lingru), *Ficus auriculata* Lour. (tiamala, timul), *Cordia dichotoma* Forst. (Lasura), *Selinum wallichianum* DC. (Thoa, celery), *Salvia lanata* Roxb. (Gunni), *Zehneria umbellata* Thw. (gwal kakri), *Amaranthus species* (chauli, Bathu), *Portulaca oleracea* L. (small purslain, Lunak), *Oxalis corniculata* L. (khati, chalmori), *Rumex vesicaria* L. (chuka palang), *Chaerophyllum villosoum* Wall. (wild carrot), *Berginia ciliata* (Haw) Sternb. (pahand, patharchatta).

(d) **Spices and the condiments:** A large number of plants or plant products are used as spices and condiments in different parts of the country. In north-western Himalayan region of the country, such plants are; *Carum carvi* L. (kala Jira), *Carum roxburghianum* Benth. (ajmud), *Murraya koenigii* Spreng. (Gandhla, Gandhela, Curry patta), *graveolens* Benth. (dill, soya), *Coriandrum sativum* L. (dhania, coriander), *Foeniculum vulgare* Gaertn. (fennel, sonf), *Capsicum frutescence* L. (red pepper, lal mirch), *Cinnamomum tamala* Nees. (tejpatta), *Amomum subulatum* Roxb. (cardamom, bari elachi), *Zingiber officinale* Ross

(Ginger, Adrak, Ada), *Curcuma longa* Roub. (Haldi, Turmeric), *Angelica glauca* Edgew. (Chora), *Perilla frutescens* (banjira), *Ocimum basilicum* L. (Bhabari), *Allium strachii*, *Rheum emodi*.

(e) **Wild and cultivated fruits:** The diverse agro-ecological conditions of the Himalayan valleys, hills and mountains are highly suitable for growing a range of fruit plants. The economy of hill people find vast potential in horticulture. This is also evident from the development of economy of Himachal Pradesh. A single fruit apple is responsible to transform the entire economy of people in H.P., but potential exists for the growing of a large number of fruits. The cultivated fruits constitute an impressive range and include *Prunus armeniaca* L. (apricot, khumani), *Prunus persica* (L.) Baesch Beyter. (peach, aru), *Malus buccata* (crab apple), *Prunus avium* L. (sweet cherry), *P. cerasus* L. (acid cherry), *P. communis* Huds. (alucha, alubukhara), *Fragaria vesca* L. (strawberry), *Cydonia vulgaris* Pers. (beehdana, quince), *Pyrus communis* L. (pear, naspati, nakh), *Juglans regia* L. (walnut akhrot), *Mangifera indica* L. (mango, aam), *Psidium guajava* L. (guava, amrood), *Punica granatum* L. (anar, pomegranate), *Prunus domestica* L. (plum), *Malus pumila* L. Mill. (seb, seu, apple), *Musa sapientum* L. (kela, banana), *Corylus jacquemontii* L. (bhotia badam, kapasi, hazel), *Citrus jambhiri* Lush. (jambhiri), *C. medica* L. (Bigaura, Ghora, Burunj citron), *C. medica forma lemon* (L.) Hoiroe. (lemon, galgal), *C. medica f. aurantifolia* (christen), Horoe (Lime, kagazi nimbu), *C. limetta* (risso) Lush. (sweet lime, mitha, amritphal), *C. aurantium* L. sub. f. *sinensis* (L.) Hiroe (sangtra, the tight skinned orange), *C. grandis* (L.) Osbeck (pumelo, shaddock, chakotra), *Prunus amygdalus* Baill (badam, almond), *Grewia asiatica* (phalsa).

Besides above, a large number of fruits are collected/harvested from the wild habitats or forests. Some of these, which need mention include *Aegle marmelos* (bel), *Zizyphus jujuba*, *Buchnanania latifolia*, *Spondias pinnata*, *Rubus ellipticus*, *Eugenia operculata*, *Cordia myxa*, *Hippophae rhamnoides*, *Morus indica*, *Ficus glomerata*, *Phyllanthus emblica*, *Ribes grossularia*, *Elaeagnus latifolia*, *Ribes glaciale* Wall. *R. nigrum* (black current), *R. rubrum*, *Pyrus lanata*, *P. vestita*, *Anona squamosa*, *Limonia acidissima*, *Viburnum stellulatum*, *Punica granatum*.

Genetic Erosion: There has been fast depletion of germplasm in many areas especially in areas where traditional crops are being replaced by the other high value ones. The examples are apple, replacing potato, amaranth, chenopod in Kinnaur and in Lahaul hops, potato and peas etc. have replaced buckwheat, barley etc. About 40-45 years back mandua (*Eleusine corocana*) was in cultivation in Bilaspur district which is not grown now. Similarly *Mucuna capitata* (bali) consumed as fresh pod vegetable is extinct now. *Trichosanthes anguina* is rarely seen in cultivation. Among others, a bold rice variety 'Rohru' cultivated among maize fields is no longer found. Grain chenopod is becoming scarce in hills because of the change in food habits of the people and low yield of the crop.

Diversity of wild relatives in N-W Himalayas: The N-W Himalaya is also reputed to contain some very important genetic resources of wild relatives. Considerable diversity of wild relatives occur for *Allium sp.*, *Lactuca sp.*, *Chenopodium sp.* and *Trigonella sp.* Besides, other important wild species that occur in N-W Himalayas included *Chaerophyllum villosum* Wall. (wild carrot), *Daucus carota* (a weed of cultivated fields), *Bunium persicum* (Boiss) Fedto, (kalajira, black cumin), *Glycine soja* (bhatta, wild Soybean), *Cicer microphyllum* Benth. (wild gram), *Cichorium intybus* L. (wild chicory), *Avena fatua* L., *A. aspera* Munroc var. *roylei* (wild oats), Wild strawberry (*Fragaria indica* Andr., *F. nubicola* Lindl ex Laciata, *F. vesca* L.), wild cucumber (*Cucumis hardwickii*), *C. momordica* Roxb., *C. callosus* (Rohb.) Cogn.), *Vigna capensis* Walp, *Vigna sublobata*, (wild marjoram) *Origanum vulgare* L. (wild thyme) *Thymus serpyllum* L. *Vitis lanata* (Wild grapes), (Wild parval) *Mamordica balsamina*, (wild chachinda) *Trichosanthes cucumerica* L.

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