
Chapter 18

State of Documentation and Collection of Crop Land Races and Wild Relatives in the Indian Himalayas

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Introduction

The diversity in agricultural crops, land races, and their wild relatives in the Indian Himalayas has been maintained by local inhabitants and tribal groups since ancient times. In India, the endemic species inhabit two areas for the most part; approximately 4,200 species being in the Himalayas and 2,600 species in the peninsular region. In the Indian Himalayas, crop diversity is related to eight groups of crops and 71 species. As a result of the selection pressure exercised within the species by locals over the unrecorded millennium, enormous diversity has evolved in the form of local land races. Two types of agricultural system are followed by local people and tribal groups in the Indian Himalayas: mixed cropping in mountainous regions and intensive cropping patterns in valley areas. In higher altitudinal zones in the western Himalayas, pseudocereals, such as amaranth, buckwheat, and chenopods, and cereals such as barley (hulled and hullless) are the main staple crops. The main crops in the mid-hills in the entire Himalayan zone are minor millet (barnyard millet, proso, foxtail, and finger millet); cereals (paddy, maize, wheat and hulled barley); pulse crops (French beans, soybean, lentils, black gram, peas, and horse gram); and oilseed crops (sesame and mustard). In the eastern Himalayas and northeastern region, Job's tears (*Coix-lacryma jobi*) and *Perilla frutescens* are also grown in addition to the above-mentioned crops. Thus an enormous diversity exists at special genetic levels (Table 18.1).

Paddy (*Oryza sativa*): Paddy is a staple food all over the Himalayan region and has tremendous diversity in both upland and lowland areas in the western

Table 18.1: Diversity of Crop Land Races (number) in the Western and Eastern Himalayas

Crop	No of species	Crop	No. of Land Races		
			Western Himalayas	Eastern Himalayas	Total
Cereals	4	Paddy	1330	1474	2804
		Maize	1185	1114	2299
		Wheat+barley	1043	488	1531
Pseudocereals	6	Amaranth	-	-	-
		Buckwheat	-	-	-
		Chenopods	-	-	-
		Coix	-	-	-
Minor millets	6	All	3080	44	3124
		Barnyard	-	-	-
		Proso	-	-	-
		Foxtail	-	-	-
		Finger	-	-	-
Pulses	17	All	1308	87	1395
		Ricebeans	-	-	-
		Lentils	-	-	-
		Soyabeans	-	-	-
		Cowpeas	-	-	-
		All	2097	789	2886
Oilseeds	9	All	1002	511	1513
Forage legumes and grasses	22	All	502	-	502
Fibre plants	7	All	0	98	98
Total	71		11553	4605	16158

Himalayas as well as in *jhum*¹ agriculture areas in the eastern Himalayas. In the Uttar Pradesh (UP) hill region, old land races are maintained by tribal communities such as the *Jaunsari*, *Marcha(s)*, *Tolcha(s)*, *Nitwal(s)*, *Jad(s)*, *Johari(s)*, *Darmi(s)*, *Raji(s)*, *Bhotiya(s)*, and *Gangwal(s)* (Pant and Negi 1996).

Maize (*Zea mays*): There is a wide diversity of maize in the western Himalayan region in Jammu and Kashmir, Himachal Pradesh, and in small pockets of the Jaunsar and Babar region in the Uttarkashi and Dehradun Districts of the UP hills. Enormous diversity among old land races has been observed in the eastern Himalayas. Variations in plant height, cob size, kernel cob, and seed size, shape, and colour are common. Bhag Singh (1977, 1991) grouped northeastern maize collections into 15 land race groups on the basis of detailed agro-morphological characterisation.

Pseudo-cereals: The amaranth species, *A. hypochondriacus*, *A. cruentus*, and *A. caudatus* are mainly grain type species. Amaranth is grown in large areas at

1 The system of long-term shifting (slash and burn) agriculture.

higher altitudes between 1,800 and 2,700m, but surprisingly only two types are grown: *A. hypochondriacus* and *A. caudatus*. In the mid-hills to low hills all three grain type species, including *A. cruentus*, can be observed in sparse stands. The grains are rich in protein, fat, and carbohydrate and are comparable to wheat, rice, and oats. A wide range of variation is observed in the number of days to flower, the days to maturity, plant height, inflorescence length, spikelet number, 1,000 seed weight, and grain yield. Following multilocation trials, one land race (accession I.C. 42258-1) was selected and released as Annapura (Joshi 1985). This variety can produce 20-25 t/ha seed yield with 15 per cent protein and has drought tolerance and wider adaptability.

Buckwheat (*Fagopyrum* spp): There are two cultivated species of buckwheat: *F. esculentum* and *F. tataricum*. The latter is mainly confined to higher altitudes. These species can withstand the poor, infertile, and acidic soils prevalent in hilly areas. The NBPGR Regional Station (Shimla) selected a better performing land race and named it *Himpriya*.

Chenopods (*Chenopodium album*): Chenopods are distributed widely but sporadically in the western and eastern Himalayas at altitudes between 1,500 and 3,600m. In the eastern Himalayas, cultivation is limited to Arunachal, Manipur, Darjeeling, and the Khasi hills. Annual production in the Himalayan region is nearly 400 tonnes (Partap 1990). Ninety-nine accessions collected from the Himalayas are being maintained at the NBPGR Regional Station, Shimla. Multi-locational trials conducted at four locations in the Uttar Pradesh (UP) and Himachal Pradesh (HP) hills showed that indigenous collections performed better (1.2 t/ha grain yield) than exotics (0.6 t/ha maximum yield).

Minor millets (*Pseudocereals*): Minor millets are important for the food security of the Himalayan region. Minor millets are cold resistant and drought hardy. They include *madua* (coarse millet), finger millet (*Eleusine coracana*); white, brown, and purplish/reddish varieties of *kauni*, foxtail millet (*Setaria italica*); *cheena*, proso millet (*Panicum milaceum*); *sawan*, barnyard millet (*Eleusine coracana*); and *kodo* (*Paspalum scrobiculatum*), an extremely drought resistant coarse grain millet. Not much Genetic Diversity exists within these species. But they can thrive under extreme conditions and do not require special inputs. In the northeastern Himalayas, *Job's tears* (*Coix lachryma jobi*) exhibit good variation in leafiness, tiller number, panicle length, compactness, shell thickness, colour (black, creamy, striated or smooth), and kernel size. Another small millet, *raishan* (*Digitaria cruciata* var. *Esculenta*), an endemic species in the Shillong region, is tall with long fingers, has edible grains and good tillering, and has a good fodder value.

Pulses: Many land races of black gram (*Vigna mungo*), (*Vigna unguiculata*), peas (*Pisum sativum* var. *arvensis*), french beans (*Phaseolus vulgaris*), *gahat/kulthi*,

horse gram (*Macrotyloma uniflorus*), *gurans*, and rice beans (*Vigna umbellata*) found in the northeastern region in the Garo and Khasi hills of Meghalaya, Manipur, Mizoram, and the western Himalayas. Lentils (*Lens culinaris*) are a crop in Himachal, whereas broad beans (*Vicia faba*) are grown in the eastern Himalayas and *bhatmas*, a black seeded soybean (*Glycine hispida*), is a traditional crop in the western Himalayas.

Oil seed crops: *Brassica campestris* var. brown sarson, *B. campestris* var. yellow sarson, sesame (*Sesamum indicum*), and linseed (*Linum usitatissimum*) are widely cultivated as oilseed crops in the Himalayas. In some regions, other wild and semi-domesticated plants are also used to provide edible oils. One example is the *Cheuri* or Indian butter tree (*Aesandra butyracea*) which is found in the western Himalayas in Pithoragarh (Negi and Pant 1988), in Almora district, and occasionally in Nainital district in warmer valley areas. Trees can grow under rainfed conditions, but thrive best and fruit in high humidity areas near rivulets. *Perilla frutescense* is an underexploited oil seed crop with wide variations found in the eastern Himalayas.

Documented Diversity of Land Races of Rice, Wheat and Maize

Rice

Central Himalayas (UP) (100m – 1,500m)

Andi, Anandi, Anjana, Bagari, Bagadia, Bagani, Bamkua, Bankuli, Barik Bagadia, Bhadari, Binduli, Bura, Chamba, Chani, Chaunia, Chinmuri, Chotiya, Dafauti, Dalbadal, Dandunauli, Dangya, Dhania, Dudh, Gadala, Garru, Gyasu, Geemi, Gorakhpuri, Gurdi, Hansi, Hansraj, Jamali, Jauli, Jaulia, Jhumri, Kaladhan, Kalimalali, Kalthuniya, Katuria, Khaja, Khajia, Lal Dhan, Lamadi, Paktauli, Pingla, Rajmati, Ramjawan, Sal, Simanjari, Suriya, Thapachini, Tilakchandan, Lalchandan.

Central Himalayas (UP) (1500m - 2000m)

Anchan, Baguabanapsa, Chawar, Dhur Basmati, Duhia, Garudya, Char Dhan, Ghysu, Lekmal, Chawariya, Jhelda, Kajuri, Roti, Rotinga, Sawa, Shakhulshukhila, Ukhad, Tolia, Chwatu, Almunji, Jhalla-Highly cold resistant.

Western Himalayas (Jammu Kashmir and Himachal)

Baber, Lonazen, Budiji, Mushka Budiji, Niver, Roda, Anri, Bathal, Matali, Sundaru, Mandhole, Kalikalori, Chowartu, Dewal, Seyartu, Peladhan, Ramjawan, Hansraj, Phul Pattas, Lal Nakanda, Dundar, Desi Basmati.

Eastern Himalayas, Assam

Dhumai, Prasad Bhog, Boro I to IV, BAU.

Manipur

Changlei, Phongak, Dumai, Moringphou, Phourel, Karchangphouo, Phouretmbi.

Mizoram

Burma, Buban, Mangbuh, Fazai, Fazu, Farel, Vaibuh, Lalruma, Zongan, Phulbuh, Luangbuh, Liankhuma - grown under Jhum cultivation. Pawnbuh, Vuitawia - grown under wetland conditions.

Meghalaya

Minel, Minelmakhre, Sapha, Bhög, Mima, Bora, Sarang, Misiken, Miphisa, Kalajira, Mukhidep, Mithanbung, Megachak, Sphang, Jhum cultivation. Mibisa, - upland Manoharsali, Manohar, Joha, Champali, Mulukanä, Balam, Kalajoha, Moyanagiri.

Darjeeling and Sikkim Areas

Dudhey, Attey, Phudunge, Zarey, Chiragey, Jowari, Kelomarsi, Chungthangi, Tapre Tulsı, Chapre - cold tolerant types grown up to 1,900m (Anon 1992).

Nagaland

Uraba, Touzmo, Lakokolak, Nguva, Naguvano, Copia, Nkomemei, Hepet, Kera, Azinme, Hapakaima, Phat, Pakaime, Kemenya, Tevurli, Kezikiwamey, Meide.

Tripura

Dharial, Katakatarä, Dhumai, Kamansali, Sonamukhi, Latisalt, Gheegaj, Nizersali, Thakurbhog.

Wheat (Triticum aestivum)

Himachal Pradesh

Sheriun, Lalpuri, Tarmosi, Dharmori, Daru, Bhangaru, Chhiti Kanak, Mundal, Mandalu, Badakanak.

UP Hills

Kathi, suitable for hailstorm prone areas; *Misri*, highly cold resistant; *Rigaliya*, tall, thrives amidst weeds in valleys and mid-hills; *Gazariya*, can withstand stormy winds.

Maize (Zea mays)

Eastern Himalayas

Poorvi Botapa, *Tirapnag-Sahypung*, *Arun Tepi*, *Alok Sapa*, *Manipuri Chujak*, *Mayong Saah*, *Asht Samsung*, *Shyam Nahom*, *Cachar Gomdhan*, *Maidani Makka*, *Teesta Mendi*, *Silken Tipang Khasi Riewhadem*, *Mikir Merakku*, *Nilip Mekop*.

Western Himalayas

Tenta, *Tedi*

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