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Short Communication

COLLECTION AND CONSERVATION OF INDIGENOUS TEMPERATE FRUITS DIVERSITY IN HIMALAYA

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The Indian Himalaya occupies 4,18900 sq km. climatically the area offers a diversity of gradients, cool moist Arunachal Pradesh to cold desert ladakh and cold dry Tibetan plateu to subtropical Indo-gangetic plains. The Himalaya acts as barrier against monsoon winds of south and cool siberian winds of north, the rainfall pattern varies and decreases from east to west. Different floristic records on the Himalayan context are available (Pei 1992, Jain 1987). Occurrence of 9000 plant species (Myers, 1988) in Eastern Himalaya reflects the relatives richness compared to West Himalayan domain with 3054 species (Dhar and Kachroo, 1983). Wild relatives of crop plants in the region reveal the occurrence of 132 species in the north east, 82 in the east and 128 in the west (Arora and Nayer, 1984). This include the species of *Pyrus, Prunus, Malus, Citrus, Rubus, Ribes, Sorbus, Myrica, Corylus, Ficus, Cydonia, Docynia, Cotoneaster, Actinidia, Rosa, Cornus, Crataegus, Punica, Castenia, Viburnum, Vitis, Pinus and Juglans* etc. among temperate fruit plants. This rich diversity in temperate fruits and their wild relatives is eroding fast in the recent past due to increasing population pressure, various developmental activities like construction of roads, hydroelectric projects, industry and deforestation by local inhabitants for their livelihood.

The collection sites were deep forest, farmers orchards, marginal lands and the areas bordering the cultivated lands. The exploration route were followed according to the distribution, species richness and maturity of the crops. Local people were also contacted to know the exact location and their uses. The passport data were recorded at the site of collection. The material was collected in the form of scion wood (20), fruits (10), seeds and cuttings (20) and two suckers each from mother plant where it was available.

A total of 330 collections of temperate fruits was made (Table 1) from Uttar Pradesh (60), Himachal Pradesh (190), Sikkim (55), Meghalaya (15) and Arunachal Pradesh (10). Of these collections, only 170 could survive and established in the field genebank which include *Malus baccata, M. baccata var, himaliana, M. sikkimensis and M. dirangensis; Prunus prostata, P. wallichi, P. nepulensis, P. persica, P. cornuta, P. tomentosa, P. armeniaca, P. cerasoides and P. spp (Behmi); Pyrus jacumontiana, P. polycarpa, P. pyrifolia, P. pashia, P. pashia var. kumaoni, P. communis,* and *P. khasiana; Sorbus lanata, S. verrucosa, S. cuspidata; Cotoneaster frigida, C. accuminata, C. numularia; Cynodia oblonga, Docynia hookeriana, Crataegus crenulata, C. oxycantha; Vibernum cotnifolium, V. lanata, Rubus ellipticus, R. biflorus, Myrica nagi; Persea edulis, Corylus avellana, C. colurna; Cornus capitata; Actinidia callosa* and *A. strigosa, Elaegnus latifolia, Juglans regia* and two species of *Rosa* having edible hips. Elite material in walnut was collected from Chakarata area of Dehradun district having thin celled, bigger fruit size and very good percentage of kernel/nut ratio. Wild *Rosa spp.* and *Pinus gerardiana* collected from Spiti valley and Kinnaur could not survive. It appears that they have specific ecological requirements for conservation, therefore, *in situ* conservation for these species will be most appropriate approach. Rich diversity of temperate fruits and their wild relatives such as; *Prunus prostrata, Prunus tomentosa* are restricted to the Kinnaur district, *Prunus cornuta* occurs in the higher altitude of Shimla district (Narkanda, Khadrala). *Malus baccata* was also found in kinnaur and Rohru area of Himachla Pradesh, locally known as dhak which is commercially used as rootstocks for apple cv. Royal in Kinnaur. While *Malus sikkimensis* occurs in Lachun and Lachung area of North Sikkim. *Pyrus communis* occurs largely in Kashmir, *P. kumaoni* is localized in U.P. hills, *Pyrus jacumontiana* is confined to Shimla and Kinnaur (Kochli, Powari) whereas *P. pyrifolia, Pyrus khasiana* and *Pyrus thomsoni* are confined to NEH regions. The species of *Rubus* also exhibited special distribution pattern; *R. fruitcosus* is confined to Western Himalaya; *R moluccans, R. niveus and R. reticulatus* showed wide spread distribution in the Himalayas. *Rubus ellipticus* and *R. lasiocarpus* extends south to penninsular hills. In Ribes; *R. nigrus* occurs in Western Himalaya and *R. gracilis* and *R. accuminatum* in the eastern Himalaya. In *Corylus* very good variability and distribution was observed in Pangi valley, satlundi (Chamba) in Himachal Pradesh and Baragaon and Oli-peak in U.P. Hills. *Pinus grardiana* was confined to Kinnaur and Pangi valley only. Very good variability and distribution of *Actinidia* was observed in the forests and was confined to Bomdila In Arunachal Pradesh and Hilley in South Sikkim. Very good variability and distribution in *Persea edulis* was restricted in North Sikkim and Darjeeling district of West Bengal.

Table 1. Areas surveyed and diversity collected in indigenous temperate fruit germplasm

S.No.	Collection period (Month/year)	Diversity collected	Details of Diversity	States/districts surveyed
1.	March-April, 1993	49	Apricot(6), Walnut(15), Apple(2), Pear(7), Peach(6), Chestnut(2), Almond(1), Hazelnut(1), Bamora(2) Pomegranate(1), Miscellaneous(6)	Shimla and Kullu districts of H.P. and hill districts of UP.
2.	June-July, 1993	65	Apple(1), Sorbus(2), Hazelnut(2), Filbert(1), Walnut(34), Pear(10), Apricot(3), *Prunus* sp.(2), Roses (6), Elaegnus(1), Hipppohae(1), Cotoneaster(1), Chilgoza(1)	Sirmaur, Solan ditricts of Himachal Pradesh and Chamoli, Pithoragarh, Almora, Nainital, Uttarkashi district of U.P.Hills
3.	August-Sept, 1993	30	Walnut(12), Apricot(7), *Prunus* sp.(3), *Malus* sp.(1), Sorbus(1), Hazelnut(3), Elaegnus(1), Hippophae(1), Blackberry(1)	Chamba (Pangi Valley), Lahaul & Spiti, and Kinnaur district of H.P.
4.	December, 1993	30	Almond(8), Walnut(11), Plum(2), Apricot(3), *Prunus sp.*(3), *Malus sp.*(3)	Kinnaur district of H.P.
5.	January-Feb, 1994	81	*Malus sp.*(9)Sorbus (8), Pear(15), *Pyrus sp.*(8), *Prunus sp*(9), Walnut(3), Peach(7), Hazelnut(03), Filbert(2), Kivifruit(3), Elaegnus(3), Persea(2), Other fruits(7)	Sikkim, Meghalaya, Part of Assam and Arunachal Pradesh
6.	October, 1994	32	Walnut(9), Sorbus(3), Rubus (5), Peach(2), Apricot(2), Almond(1), *Viburnum*(1), Filbert(1), Hazelnut(1), *Prunus*(1), Plum(1), Pear(3), Apple(1)	Bharmaur, Hadsar, Satlundi, Tissa areas of Chamba district of H.P.
7.	August, 1994	50	Pomegrante (50)	Solan, Sirmaur, part of Bilaspur and Shimla districts of H.P.
8.	September, 1995	40	Pomegranate (40)	Kullu and Mandi districts of H.P.
9.	December, 1995	10	Walnut (10)	Chakrata area of Dehradun district of U.P. hills.

Some of the species like *Prunus rufa* is confined to Tonglu and Sandakpu in Darjeeling and not in N-W Himalaya. Like wise *Prunus prostrata, P. tomentosa, P. spp.* (Behmi) and *Prunus jacumontiana* are in Kinnaur and Ladakh. In case of *Sorbus* species; *Sorbus microphylla, S. ursina, S. insignis and S. foliolosa* are confined to Darjeeling hills whereas *S. acuparia* is confined to Koksar and *S. lanata* in Khadrala, Pangi valley and Munshiyari area of Pithoragarh in U.P. (Joshi and Rana, 1994). *Sorbus verrucosa and S. granulosa* and confined to Cherrapunji hills of Meghalaya.

The fast depletion of temperate fruit diversity in the Himalaya including their wild relatives in the forest need to be collected and conserved on priority basis. These resources will provide drought resistance, cold and frost resistance, and hailstorms resistance types with good adaptability genes for breeding programme or as rootstocks. The species with distribution in each genus available in temperate fruits and other wild minor fruits in the Himalayas are on the verge of extinction and need urgent collection priorities. These species rarely exist in the forest and have not been collected or did not establish at Shimla. These species do not have any patronage for protection by forest department and hence urgent action is required for the collection and conservation. Some of them need *in situ* conservation because of their specific ecological requirements (*Pinus gerardiana*). The other wild fruit species e.g. *Prunus prostrata, P. jacumontiana, P. wallichi, Pyrus pyryfolia, P. jaccumontii, Hippophae, Myrica, Corylus, Malus baccata* var. *himaliana, Holbelia latifolia, Sorbus microphylla, S. ursina, S. insignis, S. foliolosa, Persea edulis, Elaegnus spp. and Ascendra butrecia* need urgent attention for their conservation.

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