# Cultural attributes of Plants of Darjeeling with potential use and threat through Environmental Degradation in Eastern Himalaya 

Debabrata Das<br>Microbiology and Ecology Laboratory, Under Graduate and Post Graduate Department of Botany, Darjeeling Govt. College, Darjeeling (India)<br>Email: dr.debabratadas@rediffmail.com;<br>Ph.: 9434232596/9851223359


#### Abstract

This short communication reflects 34 plant and their products under 33 species, belonging to 31 genera and 25 families. The products are much more important in Darjeeling Himalayan area with great ecological significance. The plants parts along with some relevant structures, availability, use value and conservation measures have been described in a crucial way. It broadcasts the importance of ecological kind which may be the intervention to people in near future to study more and more through different organisations to develop proper management in near future. Not only that it would generate the essence to broadcasts the query as a whole for future study to develop global market in a greater sense.


Key words: Darjeeling-Some plant products-use value-management-Conservation.

Darjeeling is a place of culture and conservation site for diversity. The beautiful landscape of and green valleys of the hills exude virgin fragrance of culture, religions which are not only beautiful but also captivating and charming. Thousands of visitors coming from different parts of the globe are simply overwhelmed by the serene beauty and nature of the mountains ${ }^{44}$. The assimilation of different culture, languages, usage tradition, beliefs, and religion and their close affinity with each other
for centuries have harmoniously blended into an inseparable unit of culture of the mountain. Although, each tribe, caste and community shows the own depth of identity, meaning of sequence and dimension thereby. They form one composite culture of the mountain as a whole. The prayer flags at the top of the mountain from time immemorial over are the temples, monasteries, churches; gurudwars are some of the symbols of unity in diversity. Darjeeling the queen of hills in the Eastern Himalayan
range situated between $26^{\circ} 53^{\prime}$ and $27^{\circ} 13^{\prime}$ north latitude and $87^{\circ} 59^{\prime}$ and $88^{\circ} 53^{\prime}$ east longitude. The area of the district is 3075 square kilometre. It is only the hill district of the state of West Bengal which is adjacent to Nepal in a side and on the other side Sikkim and Bhutan. So, culture of Nepal and Darjeeling Part of India is more or less similar though some abnormalities are there. The head quarter of Darjeeling District is Darjeeling Sadar which is about 6500 ft . high from MSL. The districts is divided in to two tracts namely the ridges and the deep valleys of the lower Himalayas, and the level country 'terai/tarai' at their base. Total administrative sub-divisions of the district are 4 where 3 are in hills. These are Darjeeling Sadar, Kalimpong, and Kurseong. The only one i.e. Siliguri is under the terai region. Hill subdivisions, occupy an area ca. 2417.3 sq. Kms. i.e about 79 percent geographical area of the district. The Population of Darjeeling Hills is extremely heterogenous ${ }^{22}$. Racially, the people of the Darjeeling hills are Mongoloid in origin. These are under different Nepalese castes. Not only are the Nepalese, other castes Lepchas, Bhotias, Tibetans, Limbu inhabited in the district. Together with these hill-men there are also the people from the plains. The plain people are mainly the Marwari and Bihari businessmen, Punjabi Traders, and Bengalis who have come over and living here due to employment reasons. According to Choudury ${ }^{9}$, after 1891 only Lepcha, Bhotia and Limbu were taken as distinct ethnic groups while all other groups mentioned above came to be recognised as different castes of Nepali Society. Ethnic groups available in the District Darjeeling are Gurung, Limbu, Murmi, Khambu, Rai, Kami, Brahman, Mangar, Chettri, Newar and Darzi. From the ethnic history of the hill
areas of Darjeeling we get to know that the Lepchas are the autochthonous people of the area and the Nepalese are the immigrant settlers. But, Nepalese comprises of not one homogenous group but a number of endogamous groups. Demographic and Socio Economic Profile of the Hill Areas of North-East India ${ }^{8}$ states that, "Among the Indigenous Schedule Tribes, the Bhutias/Bhotias and the Lepchas are most important. There are good number of tribe like constellations in the hills of Darjeeling district who have distinct cultural traditions and social organizations of their own. Among them mention is to be made Tamang, Gurung, Limbu and Rai etc ${ }^{32}$. It is noted that Tamangs have some affinity with the Bhutias, the most important Scheduled Tribe of the District. In fact, in Nepal, the Tamangs are called Bhutias". Subba ${ }^{40}$ states that besides the Lepchas and the Bhutias there are "over nineteen endogenous groups professing different religions, speaking different languages, and holding different positions in the social hierarchy" among the people corporately identified as 'Nepalis'. Here he discussed in details about the origin of these groups. Other castes available in the District Darjeeling are Khas or Chettri, Bahuns or Brahmans, Mangars, Gurungs, Newars, Yakhas, Sunuwar and Bhujel. The Khas belong to the proud military order of Nepal and adopted the title Chettri as a caste name. Newars are found in fair numbers in Darjeeling hills and who bear the title Pradhan. The Yakhas, an agricultural caste called themselves Dewan. In Nepali caste hierarchy the Kami, Dami/Damai, Sarki and Gharthi belong to the lower category and considered untouchables. Among the hill scheduled castes, the Kamis are numerically the strongest ${ }^{22}$. The pattern of use of plants in Darjeeling is versatile. It is
because the land is provided by a multidimensional race of people with different caste and creed. The so called reason divided the land mass in to different cultural attributes which boosts a large number of plant and plant products for their daily use. The most wanted are the in the form of presentation thereby which need every person that are essential kind. So, daily markets or hats (Weekly markets) are the points of origin and point of distribution for a large number of vegetables. These are coming from agricultural land or from forest or from waste land as wanted products. So, conservation and management of all the products their transport including habitats need immediate study. Conservation need on nonagriculture based products. As a whole, cultural attributes and the need based agricultural of forest or horticultural products need priority based conservation. In this ground good management is also needful. Here the demand of vegetable is high due to scarcity of actual agricultural vegetables which is available in plains as a good manner. So, these indigenous kinds of vegetables need good management for production as well as for sale. These vegetables may be used directly or with others but the theme is that these produce vitamins, minerals or promoting enhancer as medicinal one. Use value and product's diversity therefore need special study and need to develop intensity of intervention for further study to generate local and foreign exchange in near future.

Field study was conducted from Darjeeling District to Sikkim part since 2012. Different markets were taken for the study which having own characteristics. Seasonal study was conducted in different parts of the district i.e. Kalimpong, Kurseong, Sonada,

Ghoom, Singla Bazar, Chowrasta Market, Chowk Bazar, Singhmari Bazar, Mirik and Bijanbari, Sepaidhura, Darmdin (Sikkim), Jorethan (Sikkim), Vareng (Sikkim), area with the help of local Nepali students from Department of Botany, Darjeeling Govt. College, Darjeeling. Photographs were taken from these sites and identified with literature used as cross references. Not only that specimens and samples were studied with the help of literature and knowledge of the elder person thereby. Field visits were conducted with the help of Bishnu Prasad Sharma of Pandam village and in aid to the help made by local people. Some institutions and local seller of the markets were consulted. To study more specimens of some kinds were collected from market. Laboratory work done at Microbiology and Ecology Laboratory of Darjeeling Govt. College, Darjeeling. For other kind of studies, fruits, seeds and specimens were collected and prepared to deposit all as museum specimens. Literature study was made using different libraries in the districts following the publications made by Sharma ${ }^{35}$, Saha et al. ${ }^{33}$, Rai and Bhujel ${ }^{29}$, Rai ${ }^{28}$, Rai et al., ${ }^{26}$, Saha et al., ${ }^{34}$, Tamang et al., ${ }^{41}$, Rohin and D' souza ${ }^{30}$, Singh et al., ${ }^{38}$, Tiwari et al., ${ }^{43}$, Singh ${ }^{36}$, Menon, et al., ${ }^{21}$, Bhujel ${ }^{7}$, Tamang et al., ${ }^{42}$, Bhui et al., ${ }^{6}$. The books consulted for the study of ecological restoration were Greipson et al. ${ }^{15}$, Roy et al., ${ }^{32}$, Groom et al., ${ }^{16}$, Anonymous ${ }^{3}$, Stainton ${ }^{39}$, Polunin and Stainton ${ }^{24}$. For the identification and study of material, flora like Bengal Plants made by Prain ${ }^{25}$, Hooker's Flora of British India ${ }^{17}$, Flora of West Bengal, Vol.-I (1997) have been consulted. To study the Darjeeling District, O'Malley, ${ }^{23}$ Darjeeling: Bengal District Gazetteers, was taken into account. For check list of synonyms, name changes in flowering
plants of India and adjoining Regions by Bennet ${ }^{5}$ have been taken. Other books taken for consideration were authored by $\mathrm{Jain}^{18}$, Kirtikar and Basu ${ }^{19}$, Malhotra et al., ${ }^{20}$, Anonymous ${ }^{2}$, Dash and Dash ${ }^{13}$. Thesis consulted for NTFPs was made by Das ${ }^{10}$. Other study materials consulted were Anonymous ${ }^{4}$ and Dey ${ }^{14}$.

Vegetables and fruits including root eatables are the main source of food from agricultural field or from horticultural field or from forest or home gardens of Darjeeling areas. These are available round the year. But, during winter the quantity and diversity is more in comparison to the other seasons. In a report Rai ${ }^{27}$ published a statement which is related to vegetables of Eastern Himalayan region and the economy. Here, author wrote," winter is that time of the year when the local markets are flooded with an abundance of fruits and vegetables which are hard to come by during the wormer months. Being the humble mustard leaves or "raaya saag" which takes a rather handsome form in the cold with giant-sized, crispy green leaves, just asking to be stir-fried with pork chunks, nor the elusive squash roots or 'iskush ko jaraa' which is ready to be drug only when the temperatures shoot down. ...then there is the utterly delicious, 'laapchey kaulo' or the smaller avocados, which can be sighted at almost every corner of the town.

## Important marketed plants used in Darjeeling Himalaya:

1. Sisnu-Urtica dioica L. (Urticaceaea): The plant is native to Europe, Asia, Northern Africa and North America including California. It is perennial shrub. In English it is called common Nettle. Used in the
treatment of Arthritis and lower the blood pressure in Nepali community. Inflorescence marketed. Per stack available in market as INR (Indian Rupees) Rs. $20 /$-. The demand is high in Darjeeling Sadar, Kalimpomg, Kurseong, Mirik and neighbouring areas of Darjeeling and Town of Sikkim also. The plant near house is said to be Gharia sishnu. Leaves of Young kind used in the preparation of Chutney and served along with Chapatti. It is used as a source of fibre.
2. Koiralo-Phanera variegata (L.) Benth. Syn.Bauhinia variegata L. (Caesalpiniaceae): Twigs of young kind used as vegetable. The demand is moderate. Per pack is amounting Rs. 10/-. Available in Singla Bazar area and in Mirik area. It is native to South Asia and Southeast Asia.
3. Sim Sag-Nasturtium officinale W.T. Aiton. (Cruciferae/Brassicaceae): It is called watercress. It is native to Europe and Asia. Plant perennial. Whole plant is marketed. Grow near wet places. Available in all markets. High priced and high demand, available round the year. Price in INR 20/per pack.
4. Tama bans-Dendrocalamus hamiltonii Nees \& Arn. Ex Munro. (Poaceae): This is called giant Bans (Bamboo). The young or new shoot is used as vegetable and used to prepare pickles. Aged plant use in different purposes as it is giant type. Prepared vegetable found in all markets. Demand moderately high i.e Rs. 60-80 per kg (INR).
5. Kabro-Ficus infectoria (Miq.) Domin. (Moraceae): Buds used as vegetable and used widely to prepare pickles. Available in a small quantity in the markets. Good demand for making pickle.
6. Shiplican-Crataeva religiosa Forst. f. (Capparidaceae): The plant is called three
leaved caper or sacred garlic pear. The usable part is leaf bud but sometimes young flower buds are also used. The availability is low and market demand is high. Per 250 gm amounting Rs. 30/-
7. Bhyakur-Dioscorea deltoidea Wall. ex Griseb. (Dioscoreaceae): Roots used as vegetable. Availability is least or lesser. Market price is Rs. 100/- (INR).Availability is moderately low. Need conservation to get good yield.
8. Tanki-Bauhinia purpurea L . (Caesalpiniaceae): Young leaf and twigs are important. 25 twigs amounting Rs. 20/-
9. Neuro-Thelyopteris palustris Schoot. (Thelypteridaceae): The plant is a marshy fern. Available from here to North east area. It is native to North America. Tender leaves are eatable. Per pack amounting Rs. 20/-
10. Chuche karela/Chiste karela-Cyclanthera pedata (L.) Schrader (Cucurbitaceae): It is type of bitter gourd with a beak. The fruits having no bitterness. It is also called slipper gourd. The plant is cultivated type. Synonym of the plant is Momordica pedata L . The market price is Rs. 20/- per 250 gm (Paba i.e $1 / 4^{\text {th }} \mathrm{Kg}$.). Immature fruits are used as vegetable. The fruits of the plant contains peptins, galacturonic acid, resins, lipoprptein etc. Need good quality seedless variety to generate high demand.
11. Bee Brinjal-Solanum anguivi Lam. (Solanaceae): The plant is perennial herbs. The fruits borne in a branch as single clusters. Fruits bitter in taste. Market price Rs. 20/- per 250 gm . The market value is moderately low. It is also called Bitter-Ball Eggplant. Sometimes referred as African Eggplant. It is a traditional ethno-medicinal plant.
12. Bee Brinjal-Big-Solanum macrocarpum L. (Solanaceae): The big fruits coverd $3 / 4$ th by big sepals. Colour white to pale white with pink tinge. Demand medium. Price Rs. 20/- per 250 gm. Good market in Kalimpong. Cultivated areas are Kalimpomg and Kurseong. Conservation of seeds is essential because the local kind having low seed germination yield less number of seedlings.
13. Ban-karela-Momordica balsamina L. (Cucurbitaceae): It is wild and a vailable in the roadside area of Kurseong and Kalimpong. In Duars the plant is common. It is native to Africa but introduced in Asia, Australia, Central America and India. Good medicinal plant. Leaves used as vegetable. In market the product is not available. In a small scale people used the plants directly from field.
14. Cranberry bean-Phaseolus vulgaris L. (Fabaceae): It is also called Catarino bean or Borlotti Bean. Cultivated in gardens of Darjeeling area. High priced i.e. Rs. 20/per Kg. Available in almost all markets. It is sometimes called garden bean, or haricot bean. A coloured one is called Ghie bean. 15.Culantro-Eryngium foetidum L. (Apiaceae): It is called Nepali Dhone, but commonly called Mexican Coriander. The plant is native to Mexico and South America. Good spice used in home gardens of India. Per pack is Rs. 20/-
15. Dunduko sag-Allium tuberosum Rottler $e x$ Spreng. (Amaryllidaceae): It is called garlic chives, Kuchay or Dunduko sag in Nepali. It is a strong culinary agent.
17.Japanese Onion/Chinise Onion-Allium chinense G. Don. (Amaryllidaceae): Its activity as culinary agent including stomachic one. Per pack is amounting Rs. 20/-
16. Celary-Apium graveolens var. Dulce (Mill.)

Schubl. \& G. Martens. (Apiaceae): In soups crisp petiole (Leaf stalk) used widely and the seeds are used as spice. Price is Rs. 20/per pack of celary.
19.Dolle Khursani/Akbari Khorsani-Capsicum chinense Jacq. (Solanaceae): It is a rare variety of Chilli in Darjeeling and Sikkim. It is also known as Dalle khursani. It is a kind of Chilli closely related to the "Habanero" widely used in traditional cuisine in Bhat in Nepal and Indian Himalaya. Price in Darjeeling is $400-1200 /$ - per Kg. (Seasonally). It gives us unique flavour and hot taste. Shresta and Rai (2012) Surveyed on the same vegetables available in Dharan, Eastern Nepal.
20.Bet fruit-Calamus erectus Roxb. (Arecaceae): Fruits are edible like beetle nut. Price is not confined. It is called Phyakray. Per kg. Rs. 60-100/-
21.Avocado-Persea americana Mill. (Lauraceae): The fruits are economically important. It is native to Mexico and Central America. The fruit is also called alligator pear. Fruits contain monounsaturated fatty substances. The pulp is used as culinary agent.
22.Eskush-Sechium edule (Jacq.) Sw. (Cucurbitaceae): The plant is a twining vine. In the market the demand of Sechium edule (Jacq.) Sw., is high because, it is used as pumpkin with high potential for its ecological and medicinal significance. In Nepal, it is available nearly round the year. At Dharan, Nepal, thirty vegetables were found both in winter and summer season but not throughout the year in which one important marketed species is Sechium edule. In almost all parts of Darjeeling District and Sikkim it is marketed and broadly used by the people. The leafy part used as
vegetable and underground root is used as vegetable. The price of the fruit is Rs. 30$40 /$ - per Kg . One bunch green vegetable amounting Rs. 20/-(Das) ${ }^{11,12}$.
23.Kush-ko-jara-Sechium edule (Jacq.) Sw. (Cucurbitaceae): The tuberous root is a source of starch. It is nearly similar to Yam. The demand in the market is high as the product available only during winter even the late summer. The price is near about Rs. $40-100$ per Kg . It is used as substitute of Potato, and when used need to peel the skin. One plant can produce $3 \mathrm{~kg}-4 \mathrm{~kg}$ of tuberous root. The production of green squash root is slightly lower than white or pale green type.
24.Boke Timbur-Zanthoxylum acanthopodium DC. (Rutaceae): A large shrub with spreading branches. It is called Boke Timbur. Important medicinal plant. Fruit paste used in chutney preparation. The price is $800 /-$ to $1200 /-$ per kg.
25.Totala-Oroxylum indicum Vent. (Bignoniaceae): The flower is important because in market the demand is high. The price is near about Rs. 20/- per 6 pieces of flower. The vegetable drug is tasty and used for various menus. The leaves are in dried form used as medicine to cure stomach problem and in liver troubles and is called sonapata. Bark is also important. The seeds used in local culture in Darjeeling and Kalimpong which is called totala seed.
26.Thotne-Polygonum molle D. Don. (Polygonaceae): It is called Thotney. A scandant shrub producing young twigs which are used in the preparation of pickles. Roots of bulbous kind used to prepare pickles. It is also used as medicinal one for women diseases.
27.Gurus-Rhododendron arboreum Sm .
(Ericaceae): Red to pink red coloured flowers in trees during mid January to late March in Hilly tracts of Darjeeling and Sikkim Himalaya attracts people. The flowers producing Guras juice and wine in Gorkey and Sandakhphu areas in Darjeeling by ethnic community and more famous as a plant in the local community. So many songs and folklore have been found in Nepali culture with Gurus plant and flowers. The natural beauty attracts others with the glamour of hills in Eastern Himalaya. Dried flowers are used to relief the fish bones from throat of people. A large number of species of Rhododendron are available in Hills but the common one i.e. R. arboreum which is famous in the hills as Gurus. Guras liquor amounting Rs. $70 /-$ per 250 gms .
28. Rai ko Sag-Brassica rapa L. (Brassicaceae). The plant is growing in hilly slopes round the year. It is used largely in the district. Leafy part is eatable. Price per pack is Rs. 20/-
29.Tarul-Manihot esculenta Crantz (Euphorbiaceae) This is native to South America. The plant is woody shrub, and called Cassava. Only the element from the family Euphorbiaceae which is used as food. Cassava is the third largest source of food carbohydrates in the tropics after rice and maize. The market price is Rs. $100 /-$ per Kg .
30.Sakarkand-Ipomoea batatas (L.) Lam. (Convolvulaceae) The plant is perennial herbaceous vine. In English it is called sweet potato. Flowers white and purple. Tuberous roots are eaten which contains huge amount of carbohydrates, Vit.-A, calcium and phosphorous. Recent report revealed that the white skinned sweet potato having antidiabetic compounds. The sweet variety in market demand amounting Rs. 80/- kg.
31.Rukhtomato-Cyphomandra betacea (Cav.) Sentner (Solanaceae). It is called Rukh Tomato in Nepali. The trade name is Tamarillo. The plant is small tree or shrub. It is native to Argentina, Bolivia, Peru. In India the plant is exotic. Plant is being affected by Tamarillo mosaic virus, Potyvirusthe leaf mosaic virus. Mildew and leaf spot also occurred which get down the production after flowering. Anthracnose is also reported in the plants at middle age. Powdery mildew affected by Oidium spp., and verticillium wilt due to infected by soil borne fungi. Almost all plants are affected by pathogens so production is moderately low or least. A medium sized tree can produce $6-7 \mathrm{~kg}$ of fruits in hills. The fruit is used to prepare chutney and can be used as pickles. The demand in Darjeeling is high and sale rate per Kg . is ca. Rs. 60/-.
32. Sanu Puei- Talinum paniculatum (Jacq.) Gaertn. (Portulacaceae). The plant is a succulent herb in the purslane family which is found in Western Hemisphere. It is also called flame flower, Jewels of-open Pine baby's breath. The plant is said to be a reproductive tonic. It is used as antiinflammatory agent. Use of one leaf a day keeps anaemia away. The vitamin-C contents of the fresh green leaves of this plant growing on the ground of the U.S. Citrus Products Station was found to be 160 mg per 100 gram, hence this plant is an excellent source of this vitamin (Al. Curl; Chemist). Regarding Curl's analysis Dr. Heid adds in his letter the following significant remarks: -"The Talinum shows a phenomenally high content of Vit-C comparing with guavas and sweet peppers. It also probably has a considerable content of carotenoids pigments". 33.Xeringo-Phytolacca acinosa Roxb.
(Phytolaccaceae). It is annual herb. The plant is used as vegetable and a god remedy for rheumatic arthritis. Phytolaccatoxin and Phytolaccigenin poison to mammals if not cooked properly. It is also called pokebush or poke berry. In Sub-tropical South America one species available which is Phytolacca dioica L. grow there as tree in Pampas.
34. Khursani-Capsicum annuum L. (Common chilli): Common Chillies are used along with special type i.e. Capsicum chinense Jacq. (Solanaceae) and C. frutescens L. (Short). Dalle Khorsani or Dallay Khorsani is the common name of round or semi round famous type. It is a type of Habanero Chilli which performs unique flavour and hot taste. Sometimes is said to be Akbari Khorsani. All the chillies are used as mixed one in chutney along with tamarillo. The round one is individually used and widely accepted in Darjeeling while used in traditional cuisine in Bhat in Nepal. A somehow default variety is available in Sikkim which is rare variety in Darjeeling District also. The demand is high.

The study revealed that Darjeeling Himalaya is Cultural site which boosts a large number of ethnic people. Among the people Lepcha and Nepali are more dominating group in the district. The use pattern and other attributes are different due to diversity of races. The people use Chiste karela-Cyclanthera pedata (L.) Schrader, along with potato tuber. The demand is largely high during monsoon in almost all parts of hills when it is young in stage. It is an agricultural species. But, for its seeding character this not popular. Among the leafy vegetables, Brassica rapa L. is common one which is available round the year and the demand in high. Dolley Khursani i.e. Capsicum
chinense Jacq., is an important chutney making chilly available in all parts of the district even in Sikkim and Nepal also. This chilly is famous because almost all dishes are served along with this hot chilli or chutney made by this species. Root of Sechium edule (Jacq.) Sw., is available during post monsoon. Fruits of Sechium edule (Jacq.) Sw., are varied shape and sizes. The fruits may be green, white or dark green. Green type of Sechium edule (Jacq.) Sw., is popular due to its own characteristics. White type is available as less or lesser quality fruit. AvocadoPersea americana Mill., is available during October to late November, as fat rich fruit and used as culinary. Tarul-Manihot esculenta Crantz is used in most of the sites which having potential importance. Darjeeling OrangeCitrus sp. are available from late October to January each year as it is a good source of Vitamin-C. Calamus erectus Roxb., is called Bet-ko-Phal which is an important medicinal fruit. Nasturtium officinale W.T. Aiton., is called sim-ko-sag available round the year. Plume-Prunus sp., is available during late September. Xeringo-Phytolacca acinosa Roxb., is used as vegetable in rheumatic pain, but raw form can create toxic effect. Squash sag-Sechium edule (Jacq.) Sw., is regarded as vegetable drug. Sanu Puei-Talinum paniculatum (Jacq.) Gaertn., is rich in vitamin C. Guras i.e Rhododendron arboreum Sm . is a fantastic flowering plant bringing nature more dramatic to be a pestle. Gorkhey and sandakphu area wine and guras juice available which is used by local people. Tama bans-Dendrocalamus hamiltonii Nees \& Arn. ex Munro., is used by the people for its food value. Markets near Darjeeling Rail Station and Chowrasta bazaar at Darjeeling are always busy to sell the vegetable from which are coming from all parts of Darjeeling. Winter squash with small Tite

Photo Plate (Figure 1 to 28)



Figure: 1-28: Different local plant products in Darjeeling Himalaya to develop market economy

## Legend of Figures 1-28:

(Upper Left to upper right in direction) Fig. 1: Chiste karela-Cyclanthera pedata (L.) Schrader; 2: Brassica rapa L.; 3-4: Capsicum chinense Jacq.; 5: Root of Sechium edule (Jacq.) Sw.; 6: Fruit of Sechium edule (Jacq.) Sw. green; 7: Sechium edule (Jacq.) Sw. white; 8: Persea americana Mill.; 9: Tarul-Manihot esculenta Crantz; 10: Darjeeling Orange-Citrus sp. (Splitted fruits); 11: Calamus erectus Roxb.; 12: Nasturtium officinale W.T. Aiton.; 13: Plume-Prunus sp.; 14: Xeringo-Phytolacca acinosa Roxb.; 15: Squash sag-Sechium edule (Jacq.) Sw.; 16: Sanu Puei-Talinum paniculatum (Jacq.) Gaertn.; 17-18: Guras-Rhododendron arboreum Sm.; 19: Tama bans-Dendrocalamus hamiltonii Nees \& Arn. ex Munro.; 20: Market near Rail Station at Darjeeling; 21: Winter squash with small Tite begun (Bee); 22: Dunduko sagAllium tuberosum Rottler ex Spreng.; 23: Alocasia sp. (Taro); 24: Cranberry bean-Phaseolus vulgaris L.; 25: Bee Brinjal-Big-Solanum macrocarpum L.; 26: Rukhtomato-Cyphomandra betacea (Cav.) Sentner; 27: Sishnu- Urtica dioica L.; 28: Kanchendzongha view attracts tourists.
begun (Bee) is available round the year and the demand is moderately low. Dunduko sagAllium tuberosum Rottler ex Spreng., is available in market and used as a coolant broadly used by Tamang and Gurung. TaroAlocasia sp., is famous because whole plant and corm are used widely. Cranberry beanPhaseolus vulgaris L., is available round the year. A colourful one is called Ghi bean used but the production is lee or least. Bee Brinjal-Big-Solanum macrocarpum L., is cultivated widely in Kalimpong area which is marketed widely. Rukhtomato-Cyphomandra betacea (Cav.) Sentner, is called Tamarillo in market. It is used to prepare chutney. Sishnu- Urtica dioica L., is used to cure blood pressure and against rheumatism. Last but not least the panoramic view of Kanchendzongha round the year attracts people so tourists come to Darjeeling and enjoy its beauty and amazing attractive value. Side by side out comers enjoy the diversity and ethnicity of plants as well as the diversity of Darjeeling people who have their own feelings to run the holy place with glamour and happiness. Come stay and feel the cultural ethnicity in Darjeeling, which is available in remote of Darjeeling villages, not in the town which is now losing its impishness due to developing city centricity. These perhaps need restoration of markets and conservation of farmers to make concrete chain for market development. Government should take care to conserve the people and vegetables to be a bigger way for smooth functioning of source and sink to generate economy and ecology in near future through rigorous research and development.

Author acknowledges the Darjeeling and Sikkim People for their cordial help during data collection. Students of PG and UG classes
of Darjeeling Govt. College, UG students of St. Joseph's, and Kalimpong Colleges are well acknowledged. I owe to the officers of different Institutes who had supplied data to generate the work better. My previous head, of Darjeeling Govt. College is well acknowledged. Prof. Yonzone, Ex-Professor of Botany of our Govt. College is well acknowledged who helped me in various ways. Students of other parts of the Darjeeling are well acknowledged because they helped me during field survey as and when required.

## References :

1. Anonymous (1997). Flora of West Bengal, Vol.-I, Flora of India, Series-2, BSI, Kolkata.
2. Anonymous (2002). Effectiveness Monitoring guidelines for Ecosystem Restoration, Final Report, submitted toHabitat Branch, Ministry of Water, Land and Air Protection, Stn. Prov. Govt., Jutland Road, Victoria, prepared by-Marine Machmer and Christoph Steager, Pandian Ecological Research Ltd., 705-Stanley, Nelson.
3. Anonymous (2010). Handbook of Ecological Indicators for Assessment of Ecosystem Healthy, Second Edition, edited by Sven E. Jorgensen, Fu-Liu Xu and Robert Costana, CRC Press, Taylor and Francis Group, pp. 484.
4. Anonymous. (2012). Information Booklet, GTA Election, pp. 103.
5. Bennet, S.S.R. (1987). Name Changes in Flowering Plants of India and adjoining Regions, Triseas Publishers, Dehra Dun.
6. Bhui, U. (2008-09). Gorkhaland Movement and ethnic conflicts in Dooars: Some Observations and Opinions, The Himalayan Miscellany, Vol. 19 \& 20: Centre for the

Himalayan Studies, North Bengal University, Raja Rammohunpur, Siliguri, Darjeeling, pp.-19-30.
7. Bhujel, R. B. (1996). Studies on the Dicotyledonous Flora of Darjeeling District, Ph. D. Thesis, North Bengal University, Siliguri, Darjeeling.
8. Census of India (1961). Demographic and Socio-Economic Profiles of the Hill Areas of North-East India
9. Choudhury, N. (1999). Darjeeling-Sikkim Himalayan Region: An Anthropogenic Overview, In: Glimpses of the Eastern Himalayan Culture, Centre for Communication and Cultural action, J N Printers, 36, S N Roy Road, Calcutta. Pp.21-40.
10. Das, D. (2007). Vegetation Ecology of Forests of South West Bengal with special reference to Non-Timber Forest Produce (NTFPs) Productivity, Ph. D Thesis awarded from Vidyasagar University, 2007, West Bengal (Work from CNH, Botanical Survey of India, Shibpore, Howrah, West Bengal).
11. Das, D. (2014a). IOSR-PHR, 4(4):53-79.
12. Das, D. (2014b). International Journal of Integrated Research and Development, 1: 58-62.
13. Dash, M.C. and S. P. Dash (2010). Fundamentals of Ecology, Third Edition, The McGraw-Hill Companies, 7 West Patel Nagar, New Delhi, Chapter-5, pp-222.
14. Dey, N. (2013). Ecological study of some herbaceous medicinal Plants of Darjeeling Himalaya with special reference to Vasicular Mycorrhizal infection, Dissertation Work for M.Sc. Degree in Botany, from Darjeeling Govt. College, under North Bengal University, West Bengal (Supervisor, Dr. Debabrata Das, Asst. Prof. of Botany, Angiospermic Taxonmy and Ecology Laboratory,

Darjeeling Govt. College, Darjeeling), 2013, pp-1-40. (Un-Published, Un-uploaded).
15. Greipsson, S. (2011). Restoration Ecology, Jones and Bartlett Learning, USA, 2011, pp-387.
16. Groom, M. J., G. K. Meffe, C. R. Carroll, and Contributors (2006). Principles of Conservation Biology, Third, Sinauer Associates, Inc. Publishers, U S A., pp.793.
17. Hooker, J.D. (1892-1897). Flora of British India, Vol.-1-7, BSI, Kolkata.
18. Jain, S. K. and R. R. A. Rao (1997). Hand Book of Field Herbarium Methods, Oxford IBH Publishing Company, New Delhi.
19. Kirtikar, K.R. and B.D. Basu (1918). Indian Medicinal Plants, I-IV, International Book Distributors, 1918, Dehra Dun.
20. Malhotra, K.C., D. Deb, N. Dutta, T.S. Vasulu, G Yadav and M. Adhikari (1991). Role of Non-Timber Forest Produce in Village Economy: A Household survey in Jamboni Range, Midnapore District, West Bengal, IBRAD, Calcutta.
21. Menon, S., M.L. Khan, A. Paul and A. T. Peterson (2012). Rhododendron species in the Indian Eastern Himalaya: New approach to understanding Rare Pant species distribution, Journal of American Rhododendron Society, Spring, pp.78-84.
22. Mukhopadhyay, R.S. (1999). Social Contour of Darjeeling Hills, In: Glimpses of the Eastern Himalayan Culture, Centre for Communication and Cultural action, J N Printers, 36, S N Roy Road, Calcutta. Pp. 8-15.
23. O'Malley, L.S.S. (1907). Darjeeling: Bengal District Gazetteers, New Delhi, Logos Press.
24. Polunin, O. andA. Stainton (2012). Flowers
of the Himalaya. Oxford University Press, Twelfth Impression, New Delhi, India.
25. Prain, D. Bengal Plants (Vol.-I/II), Bishen Singh and Mahendra Pal Singh, 1963 (Revised Edn.), Dehradun, India.
26. Rai. A., S. Rai and R. Yonzone (2013). Universal Journal of Pharmacy, 2(1): 122-134.
27. Rai, R. (2006). Winter foods-those bright delights for cold day, Now, 5(247): Gangtok, dt.29/11/2006.
28. Rai, S. 2001. Improved Management of Ginger Diseases, Project report, Published by S. Rai, Principal Investigator, Uttar Banga Krishi Viswavidhyalaya, Kalimpong.
29. Rai, S. K. and R.B. Bhujel (1999). J. Hill Research, 12: 160-163.
30. Rohin, D'souza (2009). Rural Development through rural tourism thinking away from mass tourism, Salesian Journal, Salesian College, Sonada, pp.-1-6.
31. Roy, Burman B. K. (1961). Demographic and Socio-Economic Profiles of the Hill Areas of North-East India, Census of India, 1961.
32. Roy, S.B., D. Mukhopadhyaya and S. Das (2001). Strengthening Institutions in Joint Forest Management Systemic approach to Forest Conservation, Social Science, New Delhi.
33. Saha, J., P.K. Sarkar and S. Chattopadhyay (2011). Indian Natural Products and Radiance, 2(4): 479-492.
34. Saha, S. K., T. Bag, A. K. De, S. Basak, S. C. Biswas and S.C. Ghosh Roy (2006).
J. Obstecol India, 56(4): 329-332.
35. Sharma, B. C. (2013). Indian Jour. Of Fundamental and Appl. Life Sc., 3(3): 299-303.
36. Shresta, S and S.K. Rai (2012). Nepalese Journal of Bioscience, 2: 134-147.
37. Singh, K. K. (2009). Turkish Jour. of Botany, 33(4): 305-310.
38. Singh, K.K., S. Kumar, L. K. Rai and A.P. Krishna (2003). Current Science, 85(5): 602-606.
39. Stainton, A. (2011). Flowers of the Himalaya, A Supplement, Oxford University Press, Eighth Impression, New Delhi, India.
40. Subba, T. B. (1992). Ethnicity, State and Development: ACase study of the Gorkhaland Movement in Darjeeling, Vikas Publishing House Pvt. Ltd., New Delhi.
41. Tamang, D. K., S. Gurung, N. P. Sharma and D. G. Shrestha (2013). International Journal of Scientific and Research Publications, 3(2): 1-6.
42. Tamang, K. K. and G. S. Yonzone (2004). Dictionary of Flowering Plants of DarjeelingSikkim Himalaya (along with their corresponding Nepali and English names), Mani Printing House, Darjeeling, West Bengal, India, pp: 1-70.
43. Tiwari, O.N. and U.K. Chauhan (2006). Current Science, 90(4): 532-541.
44. Wangdi, D. (1999). Songs and Dances of the Mountain, In: Glimpses of the Eastern Himalayan Culture, Centre for Communication and Cultural action, J N Printers, 36, S N Roy Road, Calcutta., Pp.48-52.

