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Collection and Documentation of Vegetables and Fruits in Kurseong Region of Darjelling District of West Bengal

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ABSTRACT

The study was carried out in five gram Panchayats of Kureseong block viz. Ghayabari, Tindharia, Singel, Mahanandi and Rongtong of Darjeeling district of West Bengal. A total 41 species of vegetables and 10 species of fruits utilized by local communities were documented as cultivated or planted in their homegardens of this surveyed region. These species are belonging to 31 genera and 19 families respectively. The most cultivated vegetable was found to be *Sechium edule* followed by *Brassica juncea*, *Colocassia esculenta, Utica parviflora*. The dominant genus was represented by *Brassica* followed by *Capsicum*. Rosaceae with five species was the dominant family among the utilized fruit species. Though not extensively but *Citrus grandis, Musa spp., Psidium guajava, Pyrus pyrifolia,* peaches and plums are grown here for the sustenance of the livelihood. The reported vegetables and fruit plants are very nutritious vitamins, proteins, polypeptides and flavonoids. Therefore, sustainable management of these resources for the wellbeing of the local communities as well as to conserve biodiversity is needed.

1. Introduction

The people of the Kurseong region are mostly dependent on the homestead gardens and tea estates or traditional farming. This area is endowed with unique physiographic and enormous plant genetic resources and diversity because of the wide variation in climate and ecological diversity. It is considered to be native of many leafy green vegetables and fruits which remain underutilized and even if unexplored. People of small land holdings and mainly cultivate *Sechium edule, Zea mays, Zingiber officinale and Brassica juncea.* Uses of edible plants and locally available vegetable have played an important role in human life since time immemorial particularly in this hilly region. These vegetables are grown in wild or semi-wild conditions and need less care and attention. In remote rural areas, local inhabitants depend on indigenous vegetable either grown in their kitchen gardens or collected from wild for enriching the diversity of food (Sundriyal and Sundriyal 2001: Mishra et al. 2008) than several known common vegetables.

These wild, green, leafy vegetables and fruits play a vital contribution to the diet in the life of rural people as they are a rich source of various nutritive macro and micro elements including pro-vitamin which can compensate for the dietary deficiencies of vitamins and minerals for human diet. Moreover, their consumption gives diversity to daily food intake, adding flavours to the diet (Asfaw 1997). The phyto-chemicals in vegetable also protect human beings from various ailments, as a result vegetable are considered as protective food (Rai et al. 2004).

Due to various natural and anthropogenic reasons natural resources of wild vegetables, fruits and their habitats are depleting rapidly (Bhogaonkar et al. 2010). Besides this, modern agricultural systems have succeeded in providing calories, but in the process, they have increased `hidden hunger' (micronutrient malnutrition) by displacing edible local plants (Ross and Graham 1997). So, cultivation of these vegetables and fruits will not only provide balanced nutrition, food security, health security but also helps to reduce poverty alleviation through the sale of the surplus of these vegetables and fruits

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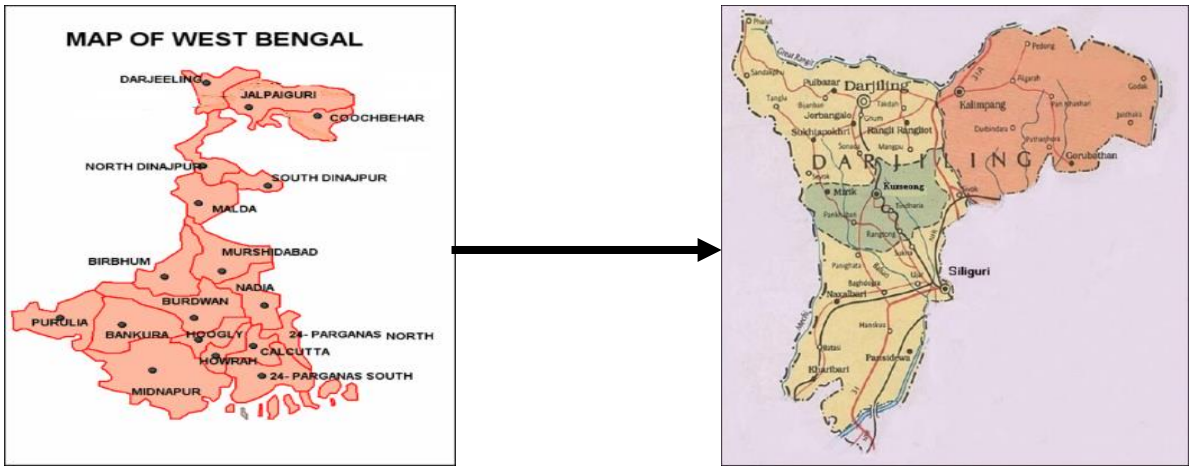
Which ultimately serves as an alternative to the usual agriculture crops. Due to the paucity of sufficient information of these vegetable and fruits, an attempt has been made to enlist the available vegetables and fruit plants mostly used by local communities to assess their potential in the nutritional security point of view in Kurseong subdivision of Darjeeling in the present study.

Figure 1. Location of Kurseong area in West Bengal



2. Materials and methods

The study was carried out in five gram panchayats namely Gayabari, Rongtong, Singhel, Mahanadi and Tindharia of Kurseong block of Darjeeling district of West Bengal (Figure 1). The study area lies in the lower hill of Himalaya with an elevation of 6,710 ft (2,045.2 m). The soil is chiefly composed of sandstone and conglomerate formations, which are the solidified and up heaved detritus of the great range of Himalaya. However, the soil is often poorly consolidated and is not considered suitable for agriculture. The study site has a temperature climate with wet summers caused by monsoon rains. The mean annual maximum and minimum temperatures are recorded as 16^0C and 9^0C, respectively. On an average, the average annual precipitation is 309.2 cm, with an average of 126 days of rain in a year (Malley 1999). The heavy and concentrated rainfall is experienced in the region, aggravated by deforestry and haphazard planning, often causes devastating landslides, leading to loss of life and property (Sarkar 1999). Data was collected through a combination of tools and technique of questionnaire, PRA techniques. The information thus gathered was compared with available literature sources as cited by Dey et al. (2007).

Questionnaire was prepared to collect the information regarding the vegetable and fruits used by local people. Discussions were held with the elders of the local regarding the use of the plant parts. The nutritive value of the plants was referred from secondary literature including different articles and websites. Identification of the plants was done with the help of the local people and the unidentified plants were identified from the local floras and experts from Department of Forestry, Uttar Banga Krishi Bhawan Viswavidalaya, Pundibari, Cooch Behar, West Bengal.

3. Results and Discussion

A total 41 species of vegetables utilized by local communities were documented from the surveyed region. These species are belonging to 31 genera and 19 families, are presented in Table 1. Mekonnen et al. (2014) also reported 69 species belonging to 40 families from homegardens of Ethiopia. The number of reported species is less as only vegetables and fruits into account. *Solanum betaccum* was only single tree species is less as only single tree species whose fruits were used by local communities as vegetables while rest of the species comprise of herbs and shrubs. The dominant genus was represented by *Brassica* followed by Capsicum, Solanaceae was the dominant family represented by six species followed by Cucurbitaceae with five species. Fruit (12 species) was the dominant plant part used as vegetable followed by leaves (10 species), shoots (7 species), and whereas least utilized plant part was held, fronds, inflorescence and corn of one species each. Ten species of fruits belonging to eight genera and six families available in the locality utilized by the communities were also documented (Table 3). Rosacea with five species was the dominant family among utilized fruit species. The plant species like *Zea mays* and *Prunus* species have been also reported in other homegarden studies (Larato 2012).

Table 1. Vegetables species found in the study area and their pattern of use

Scientific Name	Local Name	Family	Part Use
Amaranthus caudatus L.	Laal Saag	Amaranthacea	Leaves and shoot
Amatanthus tricolor L.	Laal Saag	Amaranthacea	Leaves
Bambusa tulda Roxb.	Tama Baas	Poacea	Tender shoot
Beta vulgaris L.	Beet	Chenopodiaceae	Root
Brassica campestris L.	Tori Saag	Brassicaceae	Leaves
Brassica junecea L.	Rayo Saag	Brassicaceae	Leaves
Brassica oleracea L.	Banda Gobi	Brassicaceae	Head
Brassica oleracia L.	Fulgobi	Brassicaceae	Curd
Brassica oleracia L. *var botrytis*	Brocauli	Brassicaceae	Curd
Capsicum frutescences L.	Khorsani	Solanaceae	Fruit
*Capsicum frutescens var. Conoides (*Mill.) L.H. Bailey	Jire Khorsani	Solanaceae	Fruit
Capsicum sp L.	Dalle Khorsani	Solanaceae	Fruit
*Colocasia esculenta (*L.) Schott	Karkalo	Araceae	Tuber, leaves, shoot
Coriandrum sativum L.	Dhaniya	Umbelliferae	Leaves and Shoots
Cusumis sativus L.	Kakro	Cucurbitaceae	Fruit, Leaves, tender
Cucurbita pepo L.	Pharsi	Cucurbitaceae	Fruit, leaves, tender shoot
Curcuma domestica Val.	Hardi	Zingiberaceae	Root
Daucus carota L. *var. sativa* DC.	Gajar	Umbelliferae	Root
Dioscorea alata L.	Ghar tarul	Dioscoreaceae	Root
Dioscorea spp L.	Bun tarul	Dioscoreaceae	Root
Diplazium esculentum (Reta.) Sw.	Niuro	Athyricaeae	Fronds
*Ipomoea batatus (*L.) Lamk.	Sakkar khanda	Convovulaceae	Root
Luffa cylindrical auct. Pl. Non M.J. Roem. (Syn. L. *aegyptiaca* Mill.)	Ghiraunla	Cucurbitaceae	Fruit
Lycopersicon esculentum (L.) Karst.	Tamatar	Solanaceae	Fruit
Manihot esculenta Crantz	Simal tarul	Euphorbiaceae	Root
Momordica charantia L.	Tite Karela	Cucurbitaceae	Fruit
Momordica cochinchinenesis Spreng.	Chatela	Cucurbitaceae	Fruit
Moringa oleifera Lamk.	Sajna	Moringaceae	Pods
Musa paradisiaca L.	Bunga	Musaceae	Inflorescence
Nasturtium officinale R. Br.	Simraya	Brassicaceae	Leaves and shoot
Phaselous vulgaris L.	Simi	Leguminosae	Pods and seeds
Pisum sativum L. var. *arvense* (L.) Poir.	Matar	Leguminosae	Pods and seeds
Raphanus sativus L.	Mula	Brassicaceae	Root
Sechium edule (Jacq.) Sw.	Ishkush	Cucurbitaceae	Fruit, leaves, tender shoot and root
Solanum betaceum Cav.	Rukh Tamatar	Solanaceae	Fruit
Solanum sp	Bee	Solanaceae	Fruit
Solanum tuberosum L.	Alu	Solanaceae	Root
Urtica ardens Link	Sisnu	Urticaceae	Leaves and shoot
Vigna sinensis L.	Bodi	Leguminosae	Pods and seeds
Zea mays L.	Makai	Poaceae	Corn
Zingiber officinale Rose.	Aduwa	Zingiberaceae	Root

Table 2. Vegetables species with their nutritive values

Scientific name	**Nutritional value**
Amaranthus caudatus L.	Rich in energy, proteins, vitamins and minerals
Amaranthus tricolour L.	Rich in Vitamin - A and minerals like iron and calcium.
Bambusa tulda Roxb.	Rcih in dietary fibres and Vitamin B- complex
Brassica campestris L.	Low in fats and cholesterol levels and rich in dietary fibres, vitamins, electrolytes and mineral.
Brassica junecea L.	Rich in protein, vitamins , dietary fibres and electrolytes
Brassica oleracea L.	Low in fat and calories, torehouse of phyto-chemicals like thiocyanates, indole-3-carbinol, lutein, zea – xanthin, sulforaphane, and isothiocyanates.
Brassica oleracia L.	Rich in phyto-nutrients such as vitamins, indole-3-carbinol, sulforaphane
Brassica oleracia L. *var botrytis*	Rich in dietary fiber, minerals , vitamins , and anti-oxidants
Capsicum frutescences L.	Rich in energy, vitamins specially Vitamin B9 and minerals
*Colocasia esculenta (*L.) Schott	Good source of energy, carbohydrates and vitamin –B6
Coriandrum sativum L.	Very good source of Vitamin A, C, E, K and folates.
Cusumis sativus L.	One of the very low calorie vegetables, good source of dietary fibre, potassium, and electrolyte
Cucurbita pepo L.	Good source of energy, carbohydrates ,fats, proteins, vitamins, electrolytes and minerals
Curcuma domestica Val.	Curcumin, a poly-phenolic compound present have anti – inflammatory, anti – tumour and antioxidant properties. It is also rich in Vitamins and Minerals.
Daucus carota L. *var. sativa* DC.	Rich in beta carotene, dietary fibres, electrolytes and Vitamin-A
Dioscorea spp L.	Good source of energy, carbohydrates, Vitamin –B complex, Minerals like calcium, iron and copper.
Diplazium esculentum (Reta.) Sw.	Fresh frond sare very high in antioxidant vitamin –A and carotenes.
*Ipomoea batatus (*L.) Lamk.	The tuber is an excellent source of flavonoid phenolic compounds such as beta-carotene and vitamin –A
Luffa cylindrical auct. Pl. Non M.J. Roem. (Syn. L. *aegyptiaca* Mill.)	Rich in amino acid and fatty acid
Lycopersicon esculentum (L.) Karst.	Have low fat and zero cholesterol levels and are excellent sources of antioxidants, dietary fibre, minerals, and vitamins.
Manihot esculenta Crantz	Good source of energy, carbohydrates, phosphorus, electrolytes, Vitamin-C and fatty acids.
Momordica charantia L.	Rich in polypeptide-P: a plant insulin known to lower blood sugar levels.
Momordica cochinchinenesis Spreng.	Rich in carotenoids especially beta- carotene and lycopene which is a cancer cell inhibitor.
Moringa oleifera Lamk.	Fresh pods and seeds are a good source of oleic acid, a health benefiting monounsaturated fat.
Musa paradisiaca L	Rich in energy, dietary fibres, potassium and Vitamin B-6
Nasturtium officinale R. Br.	Rich source of Vitamin –C , Vitamin-K and Calcium
Phaselous vulgaris L.	Low in calories contain no saturated fat, good source of vitamins, minerals, and plant derived micronutrients, dietary fibre vitamin A contain healthy amounts of minerals like iron, calcium, magnesium, manganese, and potassium.
Pisum sativum L. var. *arvense* (L.) Poir.	Rich source of protein, vitamins like thiamine and folate and iron.
Raphanus sativus L.	Contains *isothiocyanate* anti-oxidant compound called sulforaphane which helps in cancer-cell growth inhibition
Sechium edule (Jacq.) Sw.	Rich in Vitamin B9 (Folates), Vitamin- C and Vitamin-K , dietary fibres and electrolytes
Solanum betaceum Cav.	Rich in Vitamin –C, minerals specially magnesium and water content.
Solanum tuberosum L.	Good sources of starch, vitamins, minerals and sietary fiber.
Urtica ardens Link	Good source of energy, potassium, Vitamin-A and calcium
Vigna sinensis L.	Rich source of proteins and calories, as well as minerals and vitamins.
Zea mays L.	Good source of energy, carbohydrates, fats, proteins, vitamins, electrolytes and minerals
Zingiber officinale Rose.	Rich in electrolytes particularly potassium, Vitamin B-6 and magnesium.

Table 3. Documented fruit trees utilized and their values/uses

Scientific name	Local name	Family	Documented uses and other reported uses
Citrus grandis (L.) Osbeck	Bhogate	Rutaceae	It is a good source of energy and Vitamin – C
Emblica officinalis Gaertn.	Amala	Euphorbiaceae	It is highly nutritious and is an important dietary source of Vitamin - C, minerals and amino acids.
Musa paradisiaca L.	Kera	Musaceae	It is a high calorie fruit, it contains good amounts of health benefiting anti-oxidants, minerals, and vitamins specially Vitamin- B9
Passiflora edulis Sims.	Garandal	Passifloraceae	It is a rich source of antioxidants, minerals, vitamin A and C and fiber.
Prunus domestica L.	Alubhakara	Rosaceae	It is rich in many vital vitamins and minerals such as potassium, fluoride and iron.
Prunus persica (L) Batsch	Aru	Rosaceae	It is packed with numerous health promoting anti-oxidants, plant nutrients, minerals and vitamins.
Psidium guajava L.	Ambak	Myrtaceae	It is low in calories and fats but contain several vital vitamins, minerals, and antioxidant poly-phenolic and flavonoid compounds
Pyrus communis L.	Nashpati	Rosaceae	It is packed with health benefiting nutrients such as dietary fibre, anti-oxidants, minerals and vitamins.
Rubus ellipticus Smith	Ainselu	Rosaceae	It is rich in carbohydrates, proteins and minerals.
Rubus folilosus Hal csy	Kalo Ainselu	Rosaceae	It is rich in carbohydrates, proteins and minerals.

The reported vegetables and fruit plants are very nutrients having contents like vitamins, minerals, proteins, polypeptides, flavonoids as presented in Tables 2 and 3. Wild vegetables and fruits may be of great importance as they remain the cheapest source of protein, vitamins, minerals, essential amino acids, bioactive compounds and also as source of dietary supplements or functional foods of many people (Lyimo et al. 2003; Sanchez-Mata et al. 2011).

Over all, the people of Kurseong have rich Knowledge on use of edible plant species which provide seasonal, staple and nutraceutical foods. These plants are important alternative to the agriculturally cultivated crops. It shows that vegetable and fruit use is influenced by traditional knowledge, culture, and socio-economic conditions. Several vegetables and fruits can benefit local people not only as food, but also with their medicinal properties. These vegetables and fruits could also augment income generation, if managed sustainably. Government policies should be focussed on wild vegetables and fruits in rural areas for economic growth and food security. Therefore, sustainable management of these resources for the wellbeing of the local communities as well as to conservation biodiversity is needed as well as to preserve cultural value and to maintain eco fragile conditions of the hill region.

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