



Assessment of Wild Edible Fruits Consumed through the Tribal People of Chittagong Hill Tracts (CHTs), Bangladesh

Asim Kumar Paul^{*1,+}, M Jahangir Alam² & AHM Jahangir Alam³

Forest Botany Division, Bangladesh Forest Research Institute, PO Box 273, Chittagong.4000, Bangladesh

E-mail: ⁺paulasim08@gmail.com

Received 15 October 2018; revised 13 July 2020

The present study was conducted with the ethno-botanical survey, documentation and future potentialities of the wild edible fruits used through the tribal people of Chittagong Hill Tracts (CHTs). The wild edible fruits play an important role in meeting the food and nutrition needs of the tribal people living in the CHTs. This paper deals with documentation of 49 types of wild edible fruits plant species belonging to 25 families used by the tribal people of CHTs. Their botanical names, families, local name, habit and fruit ripening time are discussed. Suggestions have been made to improve the quality (variety) of wild fruits through domestication, hybridization, grafting and also for their chemical analysis for improved food values and economic properties. Attempts should be taken to protect the wild edibles fruit species in the vanishing from natural forests. Also the general public should be encouraged to cultivate and use these wild fruits in addition to the conventional fruits by improving the varieties and nutritional value of the wild fruits through research.

Keywords: Chittagong hill tracts, Food value, Traditional knowledge, Wild edible fruits

IPC Code: Int. Cl.²⁰: A61K 36/00

The Chittagong Hill Tracts (CHTs) are located in the southeast part of Bangladesh. The total area of CHTs is about 13,184 sq. km. CHTs are one of the hilly areas of the country and have the highest number of forests in this area from other parts of the country. It's divided in to three hilly districts namely Rangamati, Khagrachhari and Bandarban districts. (Fig. 1) Due to the hilly terrain and the presence of many forest lands, the land area of this area differs from the plains. The way of life, culture and cultivation of the tribes are different from the plain land. There are a total of 27 tribal communities are live in Bangladesh, of which 13 tribal communities are live in CHTs. The ethnic communities remain living in CHTs for centuries^{3,19}. CHTs are very rich in biodiversity and rich number of flora of the country.

From ancient period our ancestors depended directly or indirectly on trees for food, shelter, clothing, medicine and education. Tribal people of different countries of the world traditionally collect various materials from the forest, required for their daily life such as: vegetables, fuel woods, medicinal goods etc.

Likes other tribes of the world, the tribes living in the CHTs have a rich traditional knowledge. Due to the poor economic condition of the tribal people, they use their traditional knowledge to collect various wild fruits from the forest. These fruits meet their daily nutritional needs. On the one hand, wild fruits can meet the daily nutritional needs, on the other hand, it is possible to earn money by marketing these fruits^{11,13,15}. Foods collected from the forest meet the daily needs of African tribes⁹. The Food and Agricultural Organization estimates that about one billion people worldwide consume wild foods to their daily nutritional needs. The results of various studies have shown that people have used 7,000 plant species as food since ancient period¹⁰. In south asian countries including Bangladesh more than hundreds of wild edible plants are still used as a food¹⁵. Wild edible plants play an important role in the human body's need for minerals and nutrients and provide energy to the body^{1,7}. In our country wild edible fruits play an important role in meeting the daily nutritional needs of the tribal people and the poor people of the plains.

Many research studies have shown that the nutritional value of these wild fruits (*Ziziphusoenoplia* (L.) Mill., *Ziziphusrugosa* Lamk.,

*Corresponding author

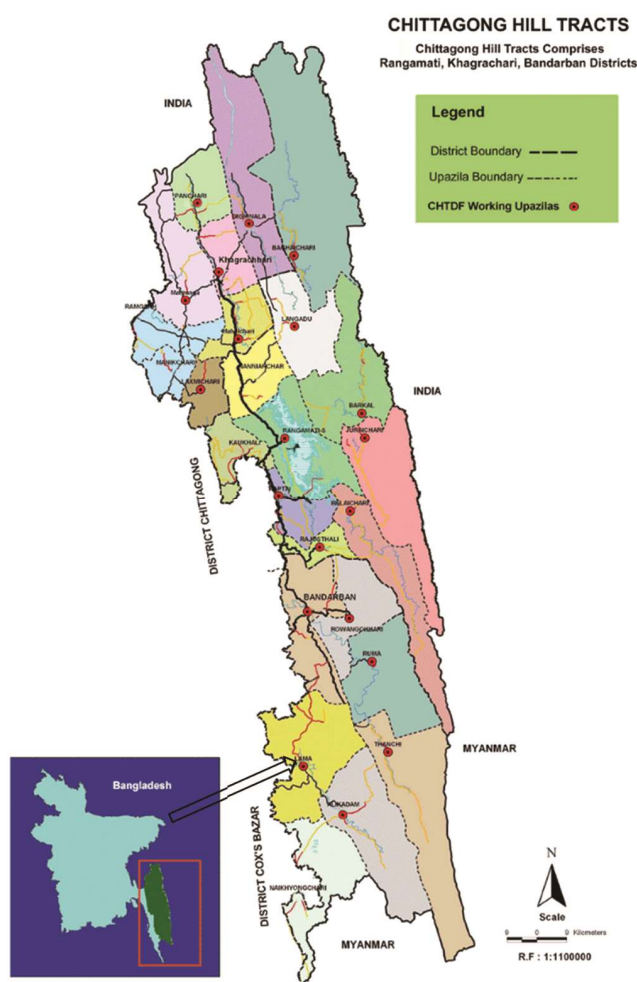


Fig. 1 — Location map of the study area

Phyllanthusacidus (L.) Skeels, *Brideliaretusa* (L.) A. Juss., *Phyllanthusemblica* L. etc.) is much higher than the conventional fruits available in the market^{8,14}. Wild fruits provide nutrition for the tribal communities. Mainly the poor tribal people of CHTs include wild edible fruits in their daily food list to meet their nutritional needs which collect from the forest. Especially the poor tribal people of CHTs survive by eating the wild edible plants collected from the forest as food supplements when they are in food crisis. Tribal people know through their traditional knowledge that wild edible fruits are rich in vitamins and nutrients (Nahar *et al.*, 1990). We need to conserve the genetic resources of native wild edible fruits species in an emergency basis. Wild fruits play an important role in meeting the food and nutrition needs of increased population of the country and for future generations. Wild edible fruits and plants help to survive when there is a food crisis during various natural calamities and famines due to the effects of

climate change. Due to lack of human awareness and aggression of foreign fruits, the fruits of native wild species are getting lost day by day. Many people from different tribal communities in the CHTs and other parts of the country now take wild fruits to meet their nutritional needs. The existence of native wild species of fruits is under threat today due to the increase in cultivation of foreign species of fruits and the importation of large quantities. The fruits of the native wild species are eaten in a variety of processes that are able to meet the human body's needs such as calories, carbohydrates, proteins, vitamins and minerals^{6,17,18,22}. It was the objective of the present study to document the wild edibles fruit in the CHTs. Due to excessive deforestation for development of roads and infrastructure, over population, lack of awareness among the young generation, these native fruits of the wild species are lost today. A list of wild fruits species should be prepared before they are lost from forest and necessary measure should be taken for proper conservation.

Methodology

The information was collected during July 2015 from December 2017 through repeatedly visits the research area, applied participatory rural appraisal (PRA) methods and questionnaire survey in Rangamati, Khagrachari and Bandarban districts of CHTs. Data were collected from group-based people of different ages and surveyed the local tribal markets in CHTs where wild fruits are available. We recorded the local name of the plant, habit and fruit ripen time of wild edible fruits through the field survey. During the survey period, plant samples were collected from the research area and brought to Bangladesh Forest Research Institute herbarium lab for identification. Collected plant specimens from the research area have been identified in matching with the conserve plant specimens at Bangladesh Forest Research Institute, herbarium Chittagong and use related books^{12,5,16,20,21,2}. The collected plant samples have been identified and presented in Table 1. Collected plant specimens are displayed alphabetically with Botanical names followed by family, local name, habit and fruit ripen time. Wild edible fruits photographs collected from study area (Fig. 2).

Result and Discussion

Through this research study prepared a list of wild edible fruits obtained from different forests area of CHTs has been compiled which wild fruits are taken

Table 1 — Wild edible fruits consumed through the tribal people of CHTs, Bangladesh

No.	Botanical Name	Family	Local Name	Habit	Fruit Ripen
1.	<i>Antidesma ghaesembilla</i> Gaertn.	Euphorbiaceae	Elena (B), Prejam (C)	Shrub	June- September
2.	<i>Artocarpus lacucha</i> Buch.-Ham.	Moraceae	Barta (B), Mialo (Mo)	Tree	May-July
3.	<i>Artocarpus chama</i> Buch.-Ham. ex Wall	Moraceae	Chapalish (B), Toponi (Mo)	Tree	May-June
4.	<i>Baccaurea ramiflora</i> Lour.	Euphorbiaceae	Lotkon (B), Kusumgulagach (C), Chichingbang (Ma)	Tree	May-June
5.	<i>Bouea oppositifolia</i> (Roxb.) Meissner.	Anacardiaceae	Bhallam, Mailam (B)	Tree	April-June
6.	<i>Bridelia retusa</i> (L.) A. Juss.	Euphorbiaceae	Kantaloshi (B), Fai-mong (Ma), Taipak (C)	Small tree	October-January
7.	<i>Buchanania lanza</i> Spreng.	Anacardiaceae	Piyal (B)	Tree	April-May
8.	<i>Calamus erectus</i> Roxb.	Arecaceae	Kring-bet (B), Bet gula (C)	Woody climber	May-June
9.	<i>Carallia brachiata</i> (Lour.) Merr.	Rhizophoraceae	Roskao, Lotkao (B), Kiabong (Mo)	Tree	April-May
10.	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Rubiaceae	Monkanta (B)	Small tree	January-February
11.	<i>Cleistocalyx nervosum</i> (DC.) Kosterm.	Myrtaceae	Dhepa-Jam (B)	Small tree	June-July
12.	<i>Cordia dichotoma</i> Forst. f.	Boraginaceae	Bohal (B), Chaine (Mo)	Tree	May-June
13.	<i>Daemonorops jenkinsiana</i> (Griff.) Mart.	Arecaceae	Gola bet (B), Bet gula (C)	Woody climber	April
14.	<i>Dillenia indica</i> L.	Dilleniaceae	Chalta (B), Ulugach (C), KraAning (Ma), Jhaipola (T)	Tree	January-February
15.	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Hargaza (B), Hara (C), Chambruin (Ma)	Tree	May
16.	<i>Diospyros malabarica</i> (Desr.) Kostel	Ebenaceae	Gab (B), Gabgola (C)	Small tree	July-August
17.	<i>Diospyros toposia</i> Buch.-Ham.	Ebenaceae	Katgula (B)	Tree	July-November
18.	<i>Elaeocarpus floribundus</i> Blume	Elaeocarpaceae	Jalphoi (B)	Tree	October-November
19.	<i>Ficus auriculata</i> Lour.	Moraceae	Bara-Dumur (B), Bojgona (Ma)	Small tree	November
20.	<i>Ficus hispida</i> L.f.	Moraceae	Khoksa, Kak-Dumur (B), Fah-shai-ba (Ma)	Shrub	May-July
21.	<i>Ficus racemosa</i> L.	Moraceae	Jagya-Dumur (B), Sanak (Ma)	Tree	April-July
22.	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Flacourtiaceae	Panyamala (B), Hadaannol (C)	Small tree	Apri-May
23.	<i>Flacourtia indica</i> (Burm.f.) Merr.	Flacourtiaceae	Boinchi (B)	Shrub	May
24.	<i>Garcinia cowa</i> Roxb. ex DC.	Clusiaceae	Kao-gola (B), Tahgalla (Ma)	Tree	May-June
25.	<i>Garcinia xanthochymus</i> Hook .f. ex T. Anders.	Clusiaceae	Dephal(B), Dem-gola (C)	Tree	November-December
26.	<i>Grewia tiliifolia</i> Vahl	Tiliaceae	Dheamin-Assar (B)	Tree	May-June
27.	<i>Grewia nervosa</i> (Lour.) Panigr.	Tiliaceae	Asar (B), Tarak (Mo), Tarani (Ma)	Small tree	October
28.	<i>Haematocarpus validus</i> (Miers) Bakh. f. ex Forman	Menispermaceae	Roshuku (B), Roktogola (C)	Woody Climber	April-May
29.	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	Sapindaceae	Bara-Harina (B)	Shrub	April-May
30.	<i>Mangifera sylvatica</i> Roxb.	Anacardiaceae	Uriam (B)	Tree	May-June
31.	<i>Melastoma malabathricum</i> L.	Melastomaceae	Phutki (B), Koyiing saw (Ma)	Shrub	November-December
32.	<i>Paramignya scandens</i> (Griff.) Craib.	Rutaceae	Bonjamir (B)	Shrub	November-January
33.	<i>Parkia timoriana</i> (DC.) Merr.	Mimosaceae	Kuki-tetoi (Ma)	Tree	March-April
34.	<i>Phyllanthus acidus</i> (L.) Skeels	Phyllanthaceae	Hobori (B), Sarbekko(C)	Small tree	April-May

(Contd.)

Table 1 — Wild edible fruits consumed through the tribal people of CHTs, Bangladesh

No.	Botanical Name	Family	Local Name	Habit	Fruit Ripen
35.	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Amloki (B), Soisha (Ma), Amloti (C)	Small tree	October- November
36.	<i>Protium serratum</i> (Wall. <i>ex</i> Coelbr.)	Burseraceae	Gutguttya (B)	Tree	July-August
37.	<i>Spondias pinnata</i> (L.f.) Kurz	Anacardiaceae	Piala (B), Thoura (Mo)	Tree	December- January
38.	<i>Sterculia foetida</i> L.	Sterculiaceae	Jangli-Badam (B)	Tree	October
39.	<i>Sterculia vilosa</i> Roxb. <i>ex</i> Smith	Sterculiaceae	Udal (B), Sambeing (Mo), Chambai (Ma)	Tree	May
40.	<i>Syzygium fruticosum</i> DC.	Myrtaceae	Puti-jam (B), Sabri (Ma)	Small tree	May-June
41.	<i>Syzygium claviflorum</i> (Roxb.) A.M. Cowan & J.M. Cowan	Myrtaceae	Nali jam	Tree	May-June
42.	<i>Syzygium megacarpum</i> (Craib) Rathakr. & N.C. Nair	Myrtaceae	Chalta-jam	Small tree	June-July
43.	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Bohera (B), Bora-gach (C), Sing Si (Ma)	Tree	March-April
44.	<i>Terminalia chebula</i> Retz.	Combretaceae	Haritaki (B), Hortall (C), Kaho (Mo)	Tree	December- March
45.	<i>Terminalia catappa</i> L.	Combretaceae	Kat-Badam (B)	Tree	May-October
46.	<i>Willoughbeia edulis</i> Roxb.	Apocynaceae	Lata-Am (B)	Woody Climber	December
47.	<i>Xeromorphis uliginosa</i> (Rtz.) Mahes.	Rubiaceae	Monkanta, Belong (B)	Small tree	November- January
48.	<i>Ziziphus oenoplia</i> (L.) Mill.	Rhamnaceae	Bon-Boroi (B), Kalamjiba (Ma)	Shrub	February-March
49.	<i>Ziziphus rugosa</i> Lamk.	Rhamnaceae	Bon-Boroi (B), Jiba (Ma)	Small tree	May-July

*Bangla (B), Chakma (C), Marma (Ma), Moagh (Mo), Tripura (T)



Fig. 2 — Photographs of collected wild edible fruits from the study area: (a), *Haematocaps thomsoni miers*; (b) *Phyllanthus acidus* (L). Skeels; (c) *Daemonorops jenkinsiana* (griff.) Mart.; (d) *Artocarpus chama* Buch.-Ham. *ex* Wall; (e) *Protium serratum* (Wall. *Ex* Coelbr.); (f) *Flacourtia jangomas* (Lour.) Raeusch.; (g) *Artocarpus lacucha* Buch.- Ham.; (h) *Baccaurea ramiflora* Lour.

by the tribal people to meet their daily nutritional needs. The wild fruits of 49 plant species obtained from the forest are used as food by the tribal people of CHTs. Of the 49 plant species of wild edible fruits were belonging to Moraceae (5 species) followed by Euphorbiaceae and Myrtaceae (4 species), Anacardiaceae and Combretaceae (3 species), Dilleniaceae, Ebenaceae, Sterculiaceae, Flacourtiaceae, Arecaceae, Clusiaceae, Tiliaceae, Rubiaceae and Rhamnaceae (2 species) and one species of plant was included under the rest of the families (Fig. 3). Among the 49 wild edible plants were documented, 51% are trees, 27% are small trees, 14% are shrubs and 8% are climber (Fig. 4).

A comparative analysis of wild edible fruits with common fruits in the market has shown that nutritional value of mangoes, apples, bananas and pomegranates is much higher than the common fruits available in the market. The amount of carbohydrate in wild edible fruit *Ziziphusoenoplia* (L.) Mill. (17.13%) is almost equal to the common fruits mango (17.00%) and pomegranate (17.17%). Like wise, the amount of sugarin *Ziziphusrugosa* Lamk. (20.70%) is comparatively much higher than the taste and

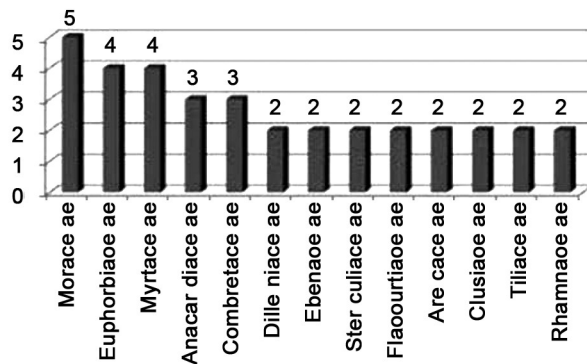


Fig. 3 — Family wise distribution of wild edible fruits

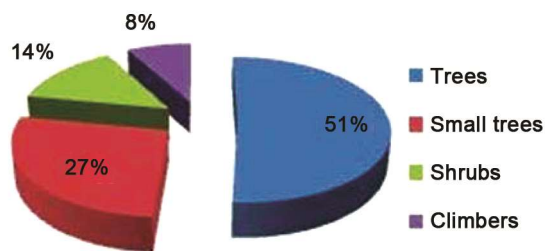


Fig. 4 — Life forms of wild edible fruits used by tribes

sugar content of common fruits in the market. *Phyllanthus acidus* (L.) Skeels and *Phyllanthus emblica* L. are richer in Vit-C comparable to cultivar fruits such as banana, apple, pomegranate and mango.

This document will be helpful in future research on the development of wild fruit varieties and in meeting the nutritional needs of the people of the country and protecting wild fruits from extinction. Many people in the country are suffering from malnutrition due to population growth and poverty. Low-cost wild fruits play an important role in meeting nutritional needs. To conserve the wild fruits and to protect their habitat from destruction, legislation has to be enacted for this purpose. Especially when tribal women and children go to the forest to meet the various needs of their household, that time they collect the wild edible fruits from the forest. Tribal women usually collect wild fruits from deep forest far away from their habitat. The habitat of wild fruits is rapidly being destroyed due to improper collection system of wild fruits. Nowadays, the new generation is more interested in the fruits available in the market than in collecting more nutritious wild fruits from the forest. Due to the indifference of the new generation, the traditional knowledge of the CHTs tribes about the collection and use of wild fruits is being lost day by day. If the new generation is not made aware of the nutritional knowledge and use of wild fruits, this knowledge of wild fruits collection

may be lost in the near future. It is likely that many more edible species occur in the forests which are yet to be explored. However, through domestication, hybridization, grafting etc. the variety and thereby the quality of many forest fruits can be improved. It is possible to develop new species and varieties of wild fruits using the genetic resources of wild fruits found in CHTs. Also the food value of different fruits can be determined by chemical analysis. In addition to eating wild fruits from the forest, many wild have medicinal and other economic values. Therefore domestication and proper cultivation of those species will bring more benefit to the nation. By cutting down of the natural forests many of the edible fruit species will be extinct in future. Therefore, conservation of the edible fruits species in different forest areas needs immediate attention. The marketing of forest edible fruit is also necessary.

Conclusion

People from different tribes living in CHTs have made a list of which species of wild fruits are taken as a source of nutrients and the nutritional value of the fruits has been studied. The nutritional value of the fruits collected from the forest is much higher than the amount of nutrients present in the conventional fruits available in the market such as: protein, carbohydrates and vitamins. The agro-forestry and afforestation programme will not only plant saplings of wood and conventional fruit trees but also the saplings of wild fruit trees and if they are included in the afforestation programme, the species of wild fruits will be protected from extinction. If we could develop wild fruit varieties and plant saplings, it would be possible to meet the daily nutritional needs of the people as well as the food needs of the forest birds. There are still many wild edible fruits in the deep forest whose names are unknown. Many unnamed wild edible fruits in our study area at CHTs are extinct. Lack of awareness among the general public about the nutritional value of wild fruits and uncontrolled deforestation are destroying wild edible fruit habitats. The species need to be collected and conserved urgently before the genetic resources of wild fruits are completely extinct. Due to the lack of awareness and reluctance of the new generation and the influence of foreign subcultures, important indigenous knowledge is being lost day by day. Important indigenous knowledge used by the tribes needs to be preserved urgently before it is lost. So that future generation can know and use the indigenous knowledge used by the

tribes. The new generation needs to be made aware of this indigenous knowledge and encourage planting more wild fruit seedlings in their home gardens and at VCFs. Fruits of any one of the wild fruits collected from the forest can open new horizons of nutrition. Therefore, it is necessary to take urgent steps to preserve the native knowledge about wild fruit tree, their habitat and management.

References

- 1 Afolayan A & Jimoh F, Nutritional quality of some wild leafy vegetables in South Africa, *Int. J. of Food Science and Nut.* 60(5) (2009) 424.
- 2 Ahmed ZU, Begum Z N, Hassan MA, Khondker M, Kabir SMH, Ahmed M, Ahmed A TA., Rahman AKT, Haque EU, *Encyclopedia of Flora and Fauna of Bangladesh*, Vol 6-12, (Asiatic Society of Bangladesh, Dhaka), 2008.
- 3 BBS (Bangladesh Bureau of Statistics), *Preliminary Report: Population Census 2001*. (Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of Bangladesh), (2001).
- 4 Brand-Miller JC, Holt HA, Australian Aboriginal plant foods: a consideration of their nutritional composition and health implications. *Nut. Res. Rev.* 11(1998) 5-23.
- 5 Cooke T, *The Flora of the Presidency of Bombay*, Vol1-3, (Botanical Survey of India), 1967.
- 6 Craig W, Beck L, Phyto-chemicals: health protective effects, *Can. J. Diet. Pract. Res.* 60(1999)78-84.
- 7 De Caluwe E, Halamova K, Van Damme P, Adansoniadigitata L, A review of traditional uses, Phyto-chemistry and pharmacology, *Afrika Focus* 23(2010)1.
- 8 Eromosele I C, Eromosele C O, Kuzhkzha D M, Evaluation of mineral elements and ascorbic acid contents in fruits of some wild plants. *Plant Food. Hum. Nut.* 41(1991) 151-154.
- 9 Getachew A, Kelbessa U, Dawit D, Ethno-botanical study of edible indigenous plants in some selected districts of Ethiopia. *Hum. Ecol.* 33(1) (2005) 83-118.
- 10 Grivetti L, Ogle B, Value of traditional foods in meeting macro and micronutrient needs: the wild plant connection, *Nutr. Res. Rev.*, 13(2000)3.
- 11 Guinand Y, Dechassa L, Indigenous Food Plants in Southern Ethiopia: Reflections on the Role of 'Famine Foods' at the Time of Drought. *United Nations Emergencies Unit for Ethiopia (UNEUE)*, Addis Ababa, (2000).
- 12 Hooker JD, *The Flora of British India*, Vol1-7 (L. Reeve & co., Kent England), 1872-1857.
- 13 Kebu B, Fassil K (2006). Ethnobotanical study of wild edible plants in Derashe and Kucha Districts. South Ethiopia, *J. Ethnobiol. Ethnomed.* 2 (2006) 53-64.
- 14 Maikhuri R K, Semwal R L, Singh A, Nautiyal M, (1994). Wild fruit as a contribution to sustainable rural development: A case study from the Garhwal Himalaya, *Inter. J. Sustain. Dev. World Ecol.* 1 (1994) 56-68.
- 15 Mazhar F, Buckles D, Satheesh PV, Akhter F, Food sovereignty and uncultivated biodiversity in South Asia, (Academic Foundation Report. New Delhi, India) 2007.
- 16 Naik V N, Marathwadyatil Samanya Vanaushhadhi. (Marathi) (Amrut Prakashan, Aurangabad), 1998.
- 17 Quebedeaux B, Bliss FA, *Horticulture and human health. Contributions of fruits and vegetables*, (Proc. 1st Intl. Symp. Hort. and Human Health. Prentice Hall, Englewood NJ), 1988.
- 18 Quebedeaux B, Eisa H M, *Horticulture and human health: Contributions of fruits and vegetables*, (Proc. 2nd Intl. symp. Hort. and Human Health. Hort. Science), 25(1990)1473-1532.
- 19 Roy D R, *Land and Forest Rights in the Chittagong Hill Tracts*, (International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal), (2002) 44.
- 20 Singh N P, Karthikeyan S, *Flora of Maharashtra State – Dicotyledones*, Vol 1, (Botanical Survey of India. Calcutta) 2000.
- 21 Singh N P, Lakshminarasimhan P, Karthikeyan S, Prasanna P V, *Flora of Maharashtra State – Dicotyledones*, Vol 2. (Botanical Survey of India, Calcutta), 2001.
- 22 Wargovich M J, Anticancer properties of fruits and vegetables. *Hort. Science*, 35 (2000)573- 575.