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Contribution of Underutilized Plants in Food and Livelihood Security in Tinsukia District

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Abstract

Underutilized plants though have a great potential towards contribution of improvement of livelihood income and nutritional security, they are not properly explored. A study was carried out in Tinsukia District with the help of a questioner and focus group discussion with the objective to identify the importance of underutilized crops at farmer's level. Data was collected from 120 families and the study showed that there are many minor underutilized crops mainly fruits (40%), leafy vegetables (54.5%), and herbals (29%) which are not only subsidizing to the food requirement and nourishment of the family but also generating an extra income at household level and also are being used to treat the minor disorders at local level.

Keywords: Food security, medicinal values, underutilized crops

1. Introduction

Underutilized plants are species with under-exploited potential for contribution to food security, health, income generation and environmental services. The advantages of these crops are humongous as these crops not only help to address the issues of food and nutrition security but also improve the household livelihood and adds to the sustainable environment. But despite of these benefits, the role of the underutilized crops is often overlooked or under estimated. So far, out of the estimated 75,000 species of edible plants (Gautam and Singh, 1998), only about 150 species have been widely used ninety percent of the world's total food is provided by only 30 species of these widely used plants only.

Underutilized crops are those crops which though are consumable to the human beings but are relatively less appetizing/appealing than other conventional fruits. They also have lesser demand in the market and are grown to a restricted degree and are not usually cultivated in organized plantations with application of inputs. Underutilized crops are generally characterized by the fact that (i) they are locally abundant, but restricted in their geographical dispersion with a high use value, (ii) they are widely adaptable to agro-ecological niches/marginal areas, (iii) it lacks scientific knowledge about them, and (iv) their current use is limited relative to their economic potential. Minor fruit species act as life support species in extreme environmental conditions and threatened habitats and have tolerance to survive under harsh climate conditions. If minor food crops are properly utilized, they may help to contribute in food security, nutrition, health, income generation and environmental services (Kunkel, 1984). The underutilized or unexploited crops are not only good in taste but also nutritive and a regular component of local diet. These crops are rich source of vitamins, minerals, fibre and polyphenols which provide health benefits (Nurzery et al., 2013). Moreover, these crops are playing a vital role in nutrition and livelihood of rural and tribal masses for employment and income generation. In India, about 27% of the fruit production consists of a number of minor fruits and there are nearly 150 of consumable species of minor fruits in India (Majumder, 2004). But the cultivation of these fruits on a commercial scale is not yet attempted and hence can be a major reason that their trade remains restricted. However, many are of considerable economic importance in their respective regional markets (Anang and Chang, 1999).

2. Materials and Methods

The study was carried out in three randomly selected blocks of Tinsukia district namely Guijan, Hajjam and Kakopathar. Out of these blocks, ten villages were randomly selected namely Na Matapung, DighalSaku, Jaigokhuwa, Matiakhana, MautgaonPanitola, Baruahula, Dirak, Kakopathar and Kathalguri. From each village, twenty farm families are

selected for the study. The age group of the respondents varied from 28 years to 60 years. A questioner was prepared to conduct the study. Focus group discussion, semi structured interviews were also conducted to gather the in-depth information on relevant aspects of underutilized crops. During the survey, farmers were interviewed about the local names of edible wild plants, palatable parts, cooking and eating methods, use of these crops on health problems, seasonal availability of the crops and the approximate prices for retail at the market.

The interview was followed by field observations of available specimens and samples were collected for proper identification. Frequency and percentage are the tools used for statistical analysis.

3. Results and Discussion

Various underutilized edible crops are found in Tinsukia district. Among fruit crops, *amora*, *sikikha*, *jolphai*, *amkhali*, *rohdoi* were most commonly found. Among vegetables, *laisak*, *baborisak*, *sukasak*, *dhekia*, *kochuu*, *kolmou*, *jilmilsak*, *khutura* were most prevalent and consumed regularly. In case of medicinal plants, the utilization of some plants like *nephaphu*, *manimuni*, *bramhi*, *dulbon*, *bhadailota*, *sukloti* were very much widespread in daily life (Table 1).

Sl. No.	Scientific name	Local Name of underutilized crops	Parts used	Seasonal availability	Average market rate
1.	*Alocasia indica* (lour.) Koch	Mankochu	Tender leaves cook as vegetables	Jan-June	Rs. 10 bundle^{-1}
2.	*Alocasia cucullata* (lour.) Schott.	Bogakochu	Tender leaves cook as vegetables	Jan-March	Rs. 10 bundle^{-1}
3.	*Alternentherasessilis* L.	Matikanduri	Cook as vegetables against Gastritis, gastro-intestinal disease	Jan-Dec	Rs. 10 bundle^{-1}
4.	*Amaranthus viridis*	Khutura	Leaves and shoots use as vegetables	Dec-Feb	Rs. 10 bundle^{-1}
5.	*Averrhoa bilimbi* L.	Kordoi	Fruits are use in curry preparation especially with fish. Fruits are also use in pickle preparation, squash, RTS etc	Jan-April	Rs. 30 kg^{-1}
6.	*Artocarpus lachcha* Buch. -Ham.	Bohot	Fruit juice given in Joundice	April-Aug	Rs. 30 kg^{-1}
7.	*Averrhoa carambola* L.	Rohdoi	Fruits in Curry preparation. Also, as pickle, chutney etc.	Jan-March	Rs. 30 kg^{-1}
8.	*Artocarpus heterophyllus* Lamk	Kothal	Raw fruits use as vegetables and pickle. Ripe fruits in table purpose. Seeds are dried and used in curry.	Jan-July	Rs. 40 piece^{-1}
9.	*Baccaurear amiflora* Lour.	Leteku	Fruits as table purpose	June-July	Rs. 50 kg^{-1}
10.	*Brassica juncea*	Lai sak	Leaves, shoots use as vegetables	Dec-Jan	Rs. 10 bundle^{-1}
11.	*Bessela alba* L. var. *alba*	Bogapuroi	Leaves use as vegetables	Dec-Jan	Rs. 10 bundle^{-1}
12.	*Bessela alba* L. var. *rubra* (L.) Stewart	Rongapuroi	Leaves use as vegetables	Dec-Jan	Rs. 10 bundle^{-1}
13.	*Carissa carandas* L.	Korjatenga	Fruits as squash, RTS pickle	April-May	Rs. 5 fruit^{-1}
14.	*Centella asiatica* (L.) Urb.	DangorMani-muni	Leaves use against stomach problems	April-Sep	Rs. 10 bundle^{-1}
15.	*Celtis tetrandra* Roxb.	Sukuta	Leaves cooked as boiled. Use against stomatic problems and fever	Jan-Aug	Rs. 10 bundle^{-1}
16.	*Chrysanthemum coronarium*	Baborisaak	As vegetables	Jan-Feb	Rs. 10 bundle^{-1}
17.	*Chenopodium album*	Jilmilisak	As vegetables	Dec-Feb	Rs. 10 bundle^{-1}
18.	*Citrus maxima*	RobabTenga	Fruits use as RTS	Dec-Jan	Rs. 15 fruit^{-1}

Sl. No.	Scientific name	Local Name of underutilized crops	Parts used	Seasonal availability	Average market rate
19.	*Citrus aurantifolia* (Christm.)	SokolaTenga	Fruits use as juice	Dec-Jan	Rs. 5 fruit^{-1}
20.	*Clerodendrum colebrookianum*	Nephaphu	Leaves use as medicine against high blood pressure and blood purifier	Aug-Nov	Rs. 10 bundle^{-1}
21.	*Corchorus olitorius*	Titamora	As vegetables	Jan-March	Rs. 10 bundle^{-1}
22.	*Colocasia esculenta* (L.) Schott	Kola kochu	Tender shoots cook as vegetables	Nov-April	Rs. 10 bundle^{-1}
23.	*Dillenia indica* L.	Outenga	Fruits are used in making curry	Jun-Dec	Rs. 5 fruit^{-1}
24.	*Diplazium esculentum* (Retz.) Sw.	Dhekia	As vegetables	Oct-April	Rs. 10 bundle^{-1}
25.	*Donella roxburghii* (Syn: -*Chrysophyllum roxburghii*)	Bonpitha	Fruits use as table purpose	Oct-April	Rs. 30 kg^{-1}
26.	*Elaeagnus caudate* Schlt-dl. ex Momiy	Mirikatenga	Fruits are used in making curry. Also use in pickle	July-Aug	Rs. 50 kg^{-1}
27.	*Eryngium foetidum* L.	Man dhonia	Leaves Use as taste enhancer in dishes	April-July	Rs. 10 bundle^{-1}
28.	*Elaeoearpus floribundus*	Jolphai	Fruits are use in curry preparation. Also use in pickle, chetny	Dec-Jan	Rs. 40 kg^{-1}
29.	*Flacourtia jangomos*	Poniol	Fruits as table purpose	Jan-Feb	Rs. 70 kg^{-1}
30.	*Hydrocotyle sibthorpioides*	Sarumanimuni	Leaves use in stomach upset	Dec-Feb	Rs. 10 bundle^{-1}
31.	*Garcinia pedunculata*	Borthekera	Fruits use for pickle and for stomach problem	Feb-Jan	Rs. 15 fruit^{-1}
32.	*Garcinia lanceifolia* Roxb.	RupohiThekera	Fruits are used in making curry. Also use in pickle. The water of dried fruit slices uses in dysentery and also as cooling substance in summer heat	April-Oct	Rs. 100 kg^{-1}
33.	*Garcinia acuminita Plachon* and *Triana*	KujiThekera	Fruits are used in making curry	March-May	Rs. 50 kg^{-1}
34.	*Garcinia xanthochymus*	Teportenga	Fruits use in curry and stomach problems	April-May	Rs. 30 kg^{-1}
35.	*Hibiscus sabdarifa* L.	Tengamora	Leaves and fruits are used in making curry. Fruits also use in maing jam	Dec-Feb	Rs. 30 kg^{-1} fruits or Rs. 10 bundle^{-1} leaves
36.	*Houttuynia cordata* Thunb	Moshundori	Leaves use against dysentery, diarrhea, stomachic	Jun-Aug	Rs. 10 bundle^{-1}
37.	*Ipomea aquatic*	Kolmou	As vegetables	May-Aug	Rs. 10 bundle^{-1}
38.	*Kalanchoe pinnata* (Lam.) Pers.	Duportenga	Leaves use against kidney stone	Jan-Dec	Rs. 10 bundle^{-1}
39.	*Lasia spinosa* (L.) Thwaites	Chengmora	As vegetables	Dec-Feb	Rs. 10 bundle^{-1}
40.	*Leucas plukenetii* (Roth) Spreng.	Dulbon	Leaves cook to use against	Jan-Dec	Rs. 10 bundle^{-1}
41.	*Morus alba* L.	Nuni	Fruits in table purpose	May-Jun	Rs. 30 kg^{-1}
42.	*Malva verticillata* L.	Lofasak	As vegetables	Dec-Jan	Rs. 10 bundle^{-1}

Sl. No.	Scientific name	Local Name of underutilized crops	Parts used	Seasonal availability	Average market rate
43.	*Musa sapientum* L.	Kaskol	Fruits as vegetables	May-Oct	Rs. 30 bunch^{-1}
44.	*Myrica esculenta* Buch-Ham.	Naga Tenga	Fruits as pickle	May-July	Rs. 50 kg^{-1}
45.	*Nyctanthes arbortristis* L.	Sewaliphul	Flowers fried with bason as fillers use against Hypertension, worm and de-toxification	Oct-Nov	Rs. 20 bundle^{-1}
46.	*Oxalis corniculata* L.	SaruTengeshi	Leaves use as vegetables	Dec-Feb	Rs. 10 bundle^{-1}
47.	*Oxalis debilis*	Bortengeshi	Leaves use as vegetables	Dec-Feb	Rs. 10 bundle^{-1}
48.	*Phyllanthus acidus* (L.) Skeels	Puraamlakhi	Fruits use as raw. use in rheumatism, bronchitis, asthma	Jan-March	Rs. 30 kg^{-1}
49.	*Portulaca oleracea*	Common parsele	Leaves as vegetables	Jan-Feb	Rs. 10 bundle^{-1}
50.	*Passiflora edulis* Sims	LataBel	Fruits as table purpose	May-Jun	Rs. 30 kg^{-1}
51.	*Paederia foetida*	Bhedailota	Leaves cook as curry and believe to cure Anemia, stomachic proble arthritis, pile and use in post maternity treatment.	Jan-Dec	Rs. 10 bundle^{-1}
52.	*Phlogocanthus thyrsi* florus	Titaphul	Flowers and leaves boiled to use against Stomachic problems, gastritis, detoxfication, anemia and worm problem	Nov-Jan	Rs. 10 bundle^{-1}
53.	*Pogostemon benghalensis* (Burm.) Kuntze	Suk loti	Leaves cook as curry to treat maternity healing	Sep-Jan	Rs. 10 bundle^{-1}
54.	*Polygonum chinense* L.	Madhusoleng	Tender leaves cook as vegetables and use to treat against Dysentery	Sep-March	Rs. 10 bundle^{-1}
55.	*Portulaca oleraceae* L.	Malbhugsak	Tender leaves use as vegetables and use against dysentery	May-Sep	Rs. 10 bundle^{-1}
56.	*Rumex acetosa*	Cukasaak	As vegetables	Jan-Feb	Rs. 10 bundle^{-1}
57.	*Solanum indicum* L.	TitaBhekuri	Fruits are cooked, boiled fried	May-Oct	Rs. 10 bundle^{-1}
58.	*Solanum torvum* Sw.	HatiBhekuri	Fruits use as vegetables	May-Oct	Rs. 10 bundle^{-1}
59.	*Spondius pinnata* (L.f.) Kurz	Amora	Fruits use in curry preparation and pickle	March-Dec	Rs. 30 kg^{-1}
60.	*Syzygium jambos*	Bogajamu	Fruits for table purpose	June-July	Rs. 30 kg^{-1}
61.	*Talinum portulacifolium* (Forssk.)	Piralipalang	Leaves and shoots as vegetables	Sep-Oct	Rs. 10 bundle^{-1}
62.	*Terminalia chebula*	Silikha	Fruits use for cough, fever, and tonsil. Dried Fruits use as mouth freshener.	Nov-Mar	Rs. 35 kg^{-1}
63.	*Tetrastigma thomsonianum* Planch. Ex Balakr.	Noltenga	Leaves and shoots as vegetables	June-Aug	Rs. 10 bundle^{-1}
64.	*Musa balbisiana* Colla	Koldil	The male flower bud cooks as vegetables	Jan-Dec	Rs. 10 fruit^{-1}
65.	*Zanthoxyllium oxyphyllum*	Mezenga	Leaves use as vegetables	March-June	Rs. 10 bundle^{-1}

It was observed from the study that out of the total 65 species of plants which are available in the study area, the leaves and tender shoots of 55% plant species are used by the respondents in their daily food habit. Fruits of 26 species (40%) are and flowers of 3 species are use as food by the respondents. 19 species are used to treat small health disorders. As per the study, three major significances of the underutilized crops to the farmers were identified. They were:

3.1. Contribution of underutilized crops to the nutritional security to the family

The role of minor crops in the nutritional security of the family is large. Generally, out of the three meals per day, at least one meal is prepared of underutilized crops. Underutilized crops contribution to the food requirement of a family was measured by calculating the number of whole meals prepared by the family with underutilized crops in a given fortnight. Generally, the total no of meals per fortnight is 45 considering 3 number of meals per day and there are 15 days in a fortnight The highest number of families (39.16%) has consumed 10-18 numbers of meals, produced from the underutilized crops (31% of the food requirement) per fortnight. The highest number of meals produced using underutilized crop was 28-36 per week and such number of meals are consumed by 18.33% families of the area which contribute 60% of the food requirement per fortnightly (Table 2).

Table 2: Contribution of underutilized crops to the food requirement of the family (n=120)

Number of meals produced Using UC (per fortnightly)	Frequency	Percentage of families using UUF for food (%)	Share of UUC the total food requirement (per fortnightly)
1-9	16	14	11%
10-18	47	39	31%
19-27	35	29	51.11%
28-36	22	18	71.11%

These findings point out that a substantial level of food requirement of the family is contributed by the underutilized crops at the house hold level. Highest share of underutilized crops in food requirement is 71% which cover about 28-36 number of meals.

3.2. Contribution as the extra income for the family

Apart from supporting the food requirement of a family, these underutilized crops also contribute to the total income of the family. Out of all the families interviewed, 60.83% of the families sell the minor crops in local markets apart from consumption at house hold level which contributes towards an extra income to the families. 19.71% of the families earn an extra income within the range of Rs. 501 to 1000 in a month. The percentage of households which earn more than 1500 by selling the minor crops at market is 8.05 (Table 3).

Table 3: Contribution of minor crops to the income of the family

Amount of income per week	Frequency	Percentage (%)
<500/-	14	10.22
501-1000/	27	19.71
1001-1500/-	21	15.33
>1500/-	11	8.05

3.3. Use of underutilized crops as herbals for simple health disorders

There are many crops which apart from being used as food also has medicinal properties. Many simple health problems are treated by these locally available plants. In this study, it is found that majority of the people (53%) use underutilized crops 1 to 3 times per fortnight. From the study it can be observed that the utilization of underutilized crops as source of medicine is very much prevalent (Table 4).

Table 4: Use of herbals for simple health disorders

Number of times per fortnight	Frequency	Percentage
1-3 times	63	53
4- 6	41	34
7-9	11	9
>9	5	4

4. Conclusion

It was apparent from the present study that the contribution of the underutilized crops both in terms of nutritional security and economic security is enormous. Again, they also contribute to the medicinal benefits. But the development of the crops at farmers level is still very limited. Motivation of the farmers to go for commercial cultivation of these underutilized plants is the cry of the time. For that, supplying of inputs required is the first priority. Provision of marketing facilities, storage and processing facilities are also required for the proper establishment of the underutilized crops. As the research and development programmes are limited in underutilized crops, initiation of proper research programs to improve these crops is also necessary along with operative policy frameworks to popularize these crops among city dwellers.

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