TRADITIONAL KNOWLEDGE AND USE OF INDIGENOUS TROPICAL FRUITS BY RURAL HOUSEHOLDS IN THE UTTARA KANNADA DISTRICT OF KARNATAKA, INDIA

Rajeshwari, N.*[1] and Manjunatha, G.O.[2]

[1] Dept. of Natural Resources Management, College of Forestry Sirsi, UAS Dharwad, Karnataka
[2] Dept. of Forest Products and Utilization, College of Forestry Sirsi, UAS Dharwad, Karnataka

Received-05.03.2015, Revised-24.03.2015

Abstract: The Uttara Kannada forests are rich in biological diversity both with respect to flora and fauna. The rural households in this district possess traditional knowledge about the use of indigenous fruits which are season specific. To gather traditional knowledge on fruit and their use , A study was conducted on consumption of these fruits by the Farm households of different geographic zones across the Uttara Kannada district. An attempt was also made for documentation of recipes prepared indigenously by farm women of different regions. The results revealed that different fruit parts used in the reported recipes were unripe fruits and ripe fruit pulp, seed and fruit rind though the list is not exhaustive. Upghat region represented highest recipes (33) and coastal region was on par with the upghat region (31). Eastern plains recorded lowest number of recipes (5). Famous jackfruit dosa was reported from coastal region. The recipe for mango appe huli was not reported in eastern plains, it was however recorded from coastal and upghat region. The study concludes that coastal and upghat zones have more number of recipes compared to eastern plains, therefore these zones may called centers of traditional knowledge on indigenous fruit trees. We also suggest that further studies are required for socio-economic and cultural linkage analysis in this region.

Keywords: Uttara Kannada, Fruit trees, Recipes, Indigenous knowledge

INTRODUCTION

Several fruit species grown in the homestead gardens are used for culinary purpose in Uttara Kannada district. Mainly mango, garcinia and jack form the niche crops. These crops have deep cultural and livelihood connotations to local farmers. It is estimated that there are more than 300 varieties of wild pickle mango (appe midi), a dozen varieties of garcinia and about 50 varieties of jack in Uttara Kannada district alone. These species are vital for the livelihood and sustenance of the people. Although there are wide uses of these crops, very little is known about their nutritional, medicinal and culinary uses. Some isolated research on documentation of tree species has been done in the Western Ghats. Sarala and Krishnamurty[1]documented detailed morphological characteristics for monkey jack.Anithaet al[2]reported tree species diversity and community composition in human dominated tropical forest of Western Ghats. Manohar et al[3]documented only two important tropical fruits viz., wild mango and garcinia for conservation and sustainable use of cultivated and wild tropical fruit diversity for promoting sustainable livelihoods, food security and ecosystem services. But our study has stressed on other aspects like traditional knowledge and fruit consumption pattern. However, this study also seeks to integrate niche species into agroforestry farming systems of the hilly tracts of Western Ghats such that value-added products from farmlands which could generate cash income to the resource poor and peri-urbon households. Indigenous tree species not only have nutritional importance but also cultural significance. The cultural value is attached to every product that is prepared. However these fruit trees culturally linked directly or indirectly. We found that, about 15 fruits were consumed by farmers based on seasonal availability. However, most of the fruits had multiple benefits and cultural significance.

Significance of fruit trees

About 15 fruits form the component of food on a daily basis. The nutritional value of these fruits is no less. Kokum has multiple health and medicinal benefits. These fruits are an excellent source of anti-oxidants[4]. Miguelet al[5] reported that kokum is used in case of piles, constipation, heart stroke, pain, tumor etc.The fruit rind and extracts of kokum species are used in many traditional recipes especially for fish curries[6]. The health benefits of consuming mango include a decreased risk of molecular degeneration and colon cancer[7]. The genus artocarpus is receiving increasing importance for agroforestry, plantation forestry and afforestration programmes due to wide range of utilities like fruits and timbers, ayurvedic, culinary uses[8]. It also have immense medicinal value and is considered a rich source of carbohydrates, minerals, carboxylic acids, dietary fiber and vitamins[9]. Likewise innumerable indigenous fruits are used for medicinal and culinary purposes. After understanding the nutrition and health benefits of niche crops a study was undertaken under Rashtriya Krishi Vikas Yojana (RKVY) project “Investigations on the agroforestry based value chain systems in rural areas of Uttara Kannada district”. With this backdrop the fruit species consumed by the farmers across the Uttara Kannada

*Corresponding Author

district was documented. An attempt was also made to list the fruit recipes prepared indigenously for household consumption and commercial purpose.

MATERIAL AND METHOD

Data on distribution of native plant species and traditional foods of Uttara Kannda district were collected from primary sources with the help of structured as well as un-structured interview schedule. Thirty three sample households were randomly selected from each zones in 7 villages namely, Murur, Kharwa, Halkar from coastal region, Manigar, Kadakeri and Benagaon from upghat region, Bengle from eastern plain for documentation and interview (Table 1 and Fig. 1). Representing all distinct agro-ecological niches and socio-economic groups. Lot system was adopted for randomization. During the survey of the study area a non-participant observation method was also applied while recording the information.

Under RKVY information was obtained on the crops grown in the villages and various recipes prepared from them. Apart from cultivated plant species, the wild edible plant species consumed as fruits and fruit production were documented. The respondent households were also asked to fill up a questionnaire for extracting information on crops under cultivation and wild edible plant species. After collection of information on cultivated and wild edible plant species and their recipes, the information was classified into various groups as described in the results.

RESULT

Fruit tree diversity

The data shows that 15 species belonging to 11 genera and 8 families (Table 2) were used for culinary purpose. The major genus were Garcinia, Mangifera and Artocarpus followed by Emblica, Carica and Tamarindus. The major families include Clusiaceae and Anacardiaceae followed by Moraceae and Euphorbiaceae. All the fruit trees were randomly found across the geographical zones of Uttara Kannada district.

Traditional recipes from fruit trees

The different plant parts used in the reported recipes were unripe and ripe fruit pulp,seed and fruit rind (Table 3). Unripe fruits of mango, jack, papaya, tamarind, etc. were used in the preparation of tambuli, appehuli, chutney, papad, chips, salad, rotti, fruit payasa, dosa, jam, papad etc. Ripened fruit parts of Kokum, mango, jack, amla, pomello, breadfruit, etc were used for culinary purpose. From the seeds of kokum, ghee was extracted, jackfruit seeds were used to prepare holige or poli , payasa or kheer and gamboge ghee was used to top the sweet dishes (Table 3). From the fruit rinds of kokum, huli and pickle were prepared. However, total of 25 recipes from the ripe fruit, 11 from unripe fruit, 4 from seed and 2 from fruit rind was prepared. Of the 42 recipes 19 (45.23%) were prepared from kokum, mango and jack. Kokum and mango recorded 4 and 6 recipes, respectively from coastal zone while 5 and 8 recipes, respectively were recorded from upghat (Table 4). Surprisingly only 5 recipes of kokum was documented from eastern plains. Mango in the upghat recorded highest recipes (8) compared to other fruit recipes.Jackfruit and amla reported 2 recipes in coastal and comparatively more in upghat region (6). However, 3 recipes each from coastal and upghat were testified.

Tamarind is only fruit reported 3 recipes from coastal zone and remaining regions it was nil. There was only one recipes of monkey jack, lemon, belfruit and starfruit in the coastal region. The other fruit recipes of pomello, breadfruit, Indian hogplum, gamboge and jamun were also found varyingly across the region. All the recipes were used for household consumption as well as for commercial purpose.Upghat region represented highest number of recipes (33) followed by coastal region (31). Eastern plain represents lowest number of recipes (5). Conversely, ripe fruit forms the ingredient of 25 recipes and un-ripe fruit 11recipes. The seed was a component of 4 recipes and 2 recipes from fruit rind(Table 3). The kokum tambuli and sambar were reported from both coastal and upghat regions, while kokum juice were found from all the regions (Table 5). Surprisingly kokum ghee and jam were only recorded from eastern plains. Mango rotti, tamarind kata-mircha-gudna, pomello sasme, breadfruit papad, bonda, Indian hogplum tambuli, kayirasa, papad, monkey jack powder, lemon appe, gamboge ghee, bael juice and starfruit pickle were belonged to coastal region. Famous jackfruit dosa was only reported from coastal region. The recipe mango appe huli was not reported in eastern plain, it was however recorded from coastal and upghat region. The jam is very famous in Western Ghats, though kokum jam was recorded in eastern plains while amla jam found only in upghat region. Highest number of recipes were recorded from kokum fruit (7) followed by 6 recipes each from mango and jackfruit (Fig. 2).

Table 1. The geographic location of the villages in the study area

Village	Latitude	Longitude	Altitude (m)	Bioclimatic zone
Murur	$14^0$26’54.02’’N	$74^0$28’47.3’’E	25 MSL	Coastal zone

Kharwa	$14^0$16’40.4’’N	$74^0$30’49.2’’E	29 MSL	
Halkar	$14^0$26’52.7’’N	$74^0$25’2.8’’E	14 MSL	
Manigar	$14^0$29’44.2’’N	$74^0$44’9.06’’E	486 MSL	Up-ghat zone
Kadakeri	$14^0$18’80.2’’N	$74^0$59’57.2’’E	597 MSL	
Benagaon	$14^0$35’5.7’’N	$74^0$36’10.2’’E	458 MSL	
Bengle	$14^0$34’45.7’’N	$74^0$58’26’’E	584 MSL	Eastern plain

Table 2. Botanical name, common name and the family of tropical fruits consumed by farmers of Uttara Kannada district

Serial No.	Botanical name	Common name	Family
1	*Garcinia indica*	Kokum	Clusiaceae
2	*Garcinia gummi-gutta*	Ganboge	Cluciaceae
3	Mangifera indicaL.	Mango	Anacardiaceae
4	*Artocarpusheterophyllus*Lam.	Jackfruit	Moraceae
5	*Phyllanthusemblica*L.	Amla	Euphorbiaceae
6	*Carica papaya*L.	Papaya	Euphorbiaceae
7	*Tamarindusindicus*L.	Tamerind	Papilionaceae
8	*Citrus maxima* Merr.	Pomello	Rutaceae
9	*Artocarpusaltilis* (Parkinson) Fosberg	Breadfruit	Moraceae
10	*Artocarpuslacucha*Buch.-Ham.	Monkey jack	Moraceae
11	*Spondiasmangifera*Wild.	Indian hogplum	Anacardiaceae
12	*Syzygiumcumini L.*	Jamun	Myrtaceae
13	*Citrus limon*(L.) Burm. f.	Lemon	Rutaceae
14	*Limoneaelephantum*L.	Baelfruit	Rutaceae
15	*Averrhoacarambola*L.	Starfruit	Oxalidaceae

Table 3. Different tropical fruits parts used in the recipes of Uttara Kannda district

Serial No	Fruit pulp		Seed	Fruit rind
	Unripe	Ripe		
1	Tambuli from raw mango	Kokum tambuli	Kokum ghee	Kokum huli
2	Appe huli from raw mango	Kokum sambar	Jackfruit seed holige	Kokum pickle
3	Mango chetney	Kokum juice	Jackfruit seed payasa	
4	Jackfruit papad	Kokum jam	Gamboge ghee	
5	Jackfruit chips	Mango rotti		
6	Papaya salad	Mango fruit rasayana		
7	Papaya palya	Mango fruit payasa		
8	Papaya sambhar	Jackfruit dosa		
9	Tamarind-Katta-Mircha-Gudna	Jackfruit Kadabu		
10	Tamarind tambuli	Amla jam		
11	Tamarind	Amla juice		
12		Amla chetney		
13		Pomello tambuli		
14		Pomello sasme		
15		Breadfruit papad		
16		Breadfruit bonda		
17		Indian hogplum Tambuli		
18		Indian hogplum Kayirasa		
19		Gamboge huli		
20		Jamun juice		
21		Jamun chakke juice		
22		Monkey jack powder		
23		Lemon appe huli		

24		Baelfruit juice		
25		Starfruit pickle		
Total	**11**	**25**	**4**	**2**

Table 4. Number of recipes of tropical fruits from different zones of Uttara Kannada district

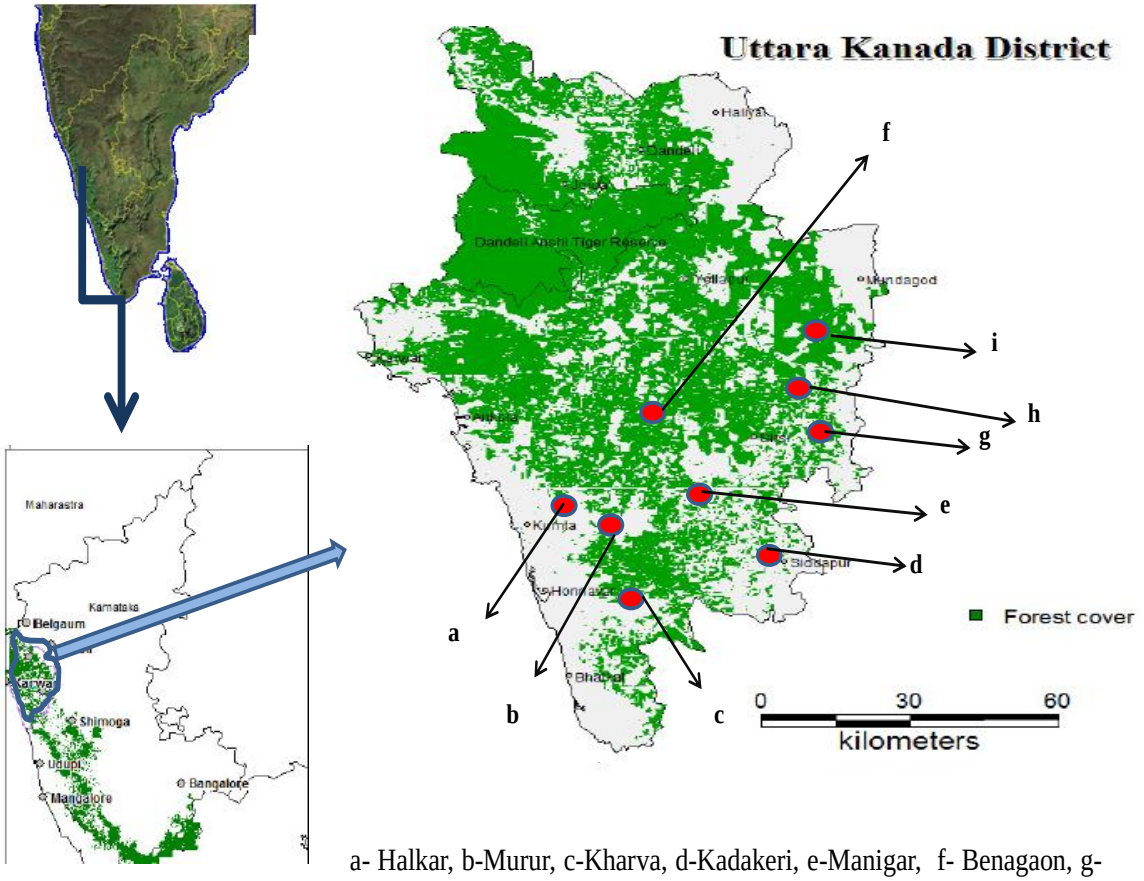
Serial No.	Fruit species	No. of recipes		
		Coastal	Upghat	Eastern plains
1	Kokum	4	5	5
2	Mango	6	8	0
3	Jackfruit	2	6	0
4	Amla	2	6	0
5	Papaya	3	3	0
6	Tamarind	3	0	0
7	Pomello	2	1	0
8	Breadfruit	2	0	0
9	Indian hogplum	2	0	0
10	Gamboge	1	1	0
11	Jamun	0	2	0
12	Monkey jack	1	1	0
13	Lemon	1	0	0
14	Baelfruit	1	0	0
15	Starfruit	1	0	0
	Total	**31**	**33**	**5**

Table 5. Different recipes reported from the different zones of Uttara Kannada District

		Regions					Regions		
Fruit name	**Recipe name**	**Coastal**	**Upghat**	**Eastern Plain**	**Fruit name**	**Recipe name**	**Coastal**	**Upghat**	**Eastern Plain**
Kokum	tambuli	1*	1	0#	Amla	jam	0	1	0
	sambara	1	1	0		juice	0	1	0
	juice	1	1	1		chetney	0	1	0
	huli	0	1	0	Papaya	salad	1	1	0
	jam	0	0	1		palya	1	1	0
	ghee	0	0	1		sambara	1	1	0
	pickle	0	0	1	Tamarind	katta-mirch-gudna	1	0	0
Mango	rotti	1	0	0		tambuli	1	0	0
	tambuli	1	1	0		huli	1	0	0
	appe huli	1	1	0	Pomello	tambuli	1	1	0
	chetney	1	1	0		samse	1	0	0
	rasayana	1	1	0	breadfruit	papad	1	0	0
	payasa	1	1	0		bonda	1	0	0
Jackfruit	dosa	1	0	0	Indian hogplum	tambuli	1	0	0
	seed holige	1	1	0		kayirasa	1	0	0
	papad	1	0	0	Gamboge	ghee	1	0	0
	kadabu	0	1	0		huli	0	1	0
	chips	0	1	0	Jamun	juice	0	1	0
	seed payasa	0	1	0		chakke juice	0	1	0

Monkey jack	powder	1	1	0	Bael	juice	1	0	0
Lemon	appe huli	1	0	0	Starfruit	pickle	1	0	0

Note:1* Indicate the recipe recorded in the particular zone.
0#Indicate the recipe not recorded in the particular zone.



a- Halkar, b-Murur, c-Kharva, d-Kadakeri, e-Manigar, f- Benagaon, g-Bengle, h-Dasankoppa, i-Pala

Fig. 1. Map showing study site in the Uttara Kannada District, Karnataka

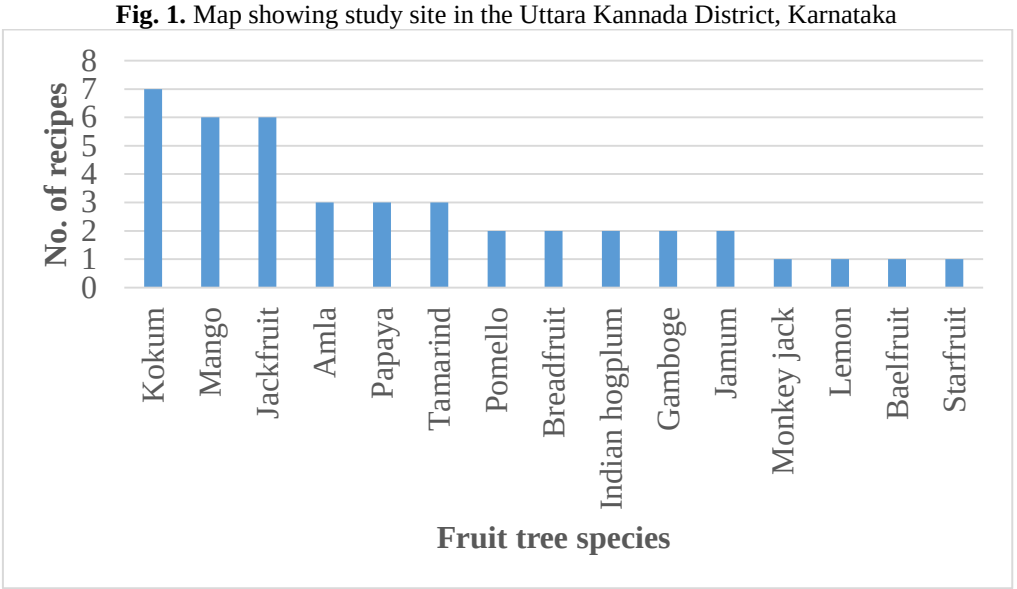


Fig. 2. Number of recipes of wild tropical fruits of Uttara Kannada district regions

DISCUSSION

The indigenous edible fruits in Western Ghats are well distributed across the zones.Empirical studies revealed that upghat zones had highest species diversity as compared to coastal zone[10]. Vasugi et al[11] determined aroma compounds from appe midi viz., Anantha Bhatta Appe, Isagoor Appe, Adderi Jeerige and Kana Appe from the same study regions. However, the indigenous fruits are increasingly significant due to many culinary and medicinal uses. In the present study we reported 15 tropical fruits which form the component of diet. However the higher number of recipes from coastal and upghat regions probably due to fruit tree diversity. Migual et al[5] reported that fruit trees grown in all categories of forests and in private lands of coastal and upghats. They also noted that people protect and promote regeneration of fruit trees in their surroundings. Conversely, insufficient recipes from eastern plain attributed due to lesser number of tree in homesteads and/or farmers were not aware about diverse recipe preparation. However, kokum forms the major fruit of this reason. Farmers of all the zones reported that kokum might provide employment opportunities and increase the household income. Another reason for greater number of recipes in coastal and upghat might be that vegetation changes across latitude gradient in Uttara Kannada district. The same also stated by Rao et al[12]. They reported that the eastern plains had relatively low number of species because of the teak dominated deciduous forests and predominance of agricultural lands in the rain-shadow region. The more number of recipes in upghat and coastal region presumably due to *soppinabetta lands*: unique privileged usufruct forestlands in these regions[3].

The farmers preferred to use fruits both unripen and ripens. Preferably for making fruit pulp from ripened fruits than unripen because of variation in taste and flavour. However, kokum reported to be used only for making recipes from fruit rind viz., kokum huli and kokum pickle. Seeds were also used from different fruits namely kokum ghee, jackfruit seed holige or poli, seed payasaor kheer and gamboge ghee. The similar recipes were also reported by Hegde[13] where jackfruit, mango, gooseberry and garcinia found the important species. However, use of unripe fruit recipe are more than seeds and fruit rind, probably due to farmer's cultural linkage. The synchrony of fruit production and farmer's need may replicates the selection of unripened fruits over seeds. However, the other purpose might be that generally once fruiting starts the persons mind may set to eat the available fruits and go for maximum use of present resources rather than further wait. However, Grivetti and Britta[14] noted that wild edible plants not only food quantity but also make significant contribution to the population's nutrition throughout the year.

The upghat region recorded highest recipes (33). The fruits also recorded from this region includes jackfruit, mango, papaya form the major components. Empirical evidences reported that nutritive value of these fruits is high[15,16,17,18]. The culinary use of these fruits imparts value addition to the diet. Greater use of fruit in coastal and upghat zones presumably agro forestry practices like home garden and boundary planting the same also reported by Varadaranganatha and Madiwalar[10]. Thus farmers domesticate these fruits in their homesteads. The fruits like mango, jackfruit breadfruit and papaya may replace the rice in the diet. The seed powder of jackfruit could replace wheat floor and thus become a major component of food. However, greater fruit diversity in the Uttara Kannada district possibly due to availability in the homesteads. Therefore, these seasonal fruit are eaten throughout the year as one or the other fruit is available. Sometimes farmers may also plant trees as a religious importance. Shah and Patel[19] reported that the persons born during constellation of trees like jamun, mango and bael are considered as a sacred for worship and grown in their surroundings.

CONCLUSION

Uttara Kannada, one of the forest-rich districts of Karnataka, is well known for its biological diversity, rich cultural heritage and a high level of awareness among people. However, the traditional knowledge of the indigenous people not only comprises the information about ecosystem, but also they have vast knowledge about the use of specific plants or fruit parts forconsumption. Informal discussions during the Participatory Rural Appraisal (PRA) indicated that people place considerable importance on fruit trees and are willing to have them in their fields.The geographic setting has significant influence recipe preparation and consumption. As the latitudinal gradient altered and forest cover decreased the traditional recipes from the villages also changed. The coastal and upghat zones have large number of recipes, therefor these zones may called center of indigenous recipes. Further, detailed research are necessary on building a pro-conservational understanding among the local communities in Uttara Kannada.

AKNOWLEDGEMENT

This report has been prepared under the RKVY Innovative project entitled*Investigations on the Agro-forestry based Value Chain Systems in Rural Areas of Uttara Kannada District*. Farmers from Murur, Kharwa, Halkar, Manigar, Kadakeri, Benagaon and Bengle from the Uttara Kannada district are highly aknowledged.

REFERENCES

Anitha K, Shijo J, Robert JC, Ramasamy EV, Narendra PS, (2010). Tree species diversity and community composition in a human-dominated tropical forest of Western Ghats biodiversity hotspot, India, *Ecol Complexity*, 7 (2) 217-224.

Chukwuka KS, Iwuagwu M & Uka UN, (2013). Evaluation of nutritional components of *Carica papaya* at different stages of ripening, *J Pharm Biol Sci*, 6 (4) 13-16.

Elevitch CR & Manner HI, (2006). Species profiles for pacific island agroforestry: *Artocarpus heterophyllus*, Accessed at http://www.agroforestry.net/tti/A.heterophyllus-jackfruit.pdf(on Dec. 2014).

Grivetti LE & Britta MO, (2000). Value of traditional foods in meeting macro- micronutrient needs: the wild plant connection, *Natl Res Rev*, 13, 31- 46.

Hegde V, (2014). Documenting diversity to develop community biodiversity register (CBR) for tropical fruit tree (TFT) genetic resources in Central Western Ghats, M. Sc thesis, University of Agricultural Sciences Dharwad, 156 p.

Kittur BH, Manjunatha GO and Rajeshwari N, (2015). Poor man's fruit: A comprehensive review on jack, *J Plant Dev Sci*, 7 (1) 7-12.

Lewis YS, Neelakantan S & Murthy C, (1964). Acids in *Garcinia cambogia*, *Curr Sci*, 33, 82-83.

Lin CN, Lu CM & Huang PL, (2000). Flavonoids from *Artocarpusheterophyllus. Phytochem*, 39 (6) 1447–1451.

Manohar S, Vasudeva R, Narasimha H & Bhuwon S, (2010). Community biodiversity management in central Western Ghats, India: a GEF and UNEP multi-country project "Conservation and sustainable use of cultivated and wild tropical fruit diversity: Promoting sustainable livelihoods, food security and ecosystem services" Department of Forest Biology, College of Forestry Sirsi, Karnataka India, 18-19.

Miguel B, Ajit SD, Jayarama B and Krishnan S, (2012). Resource Book on Kokum, Western Ghats Kokum Foundation, Panaji, Goa, India, 37-38.

Mudoi T, Deka DC & Devi R, (2012). In vitro antioxidant activity of *Garcinia pedunculata*, an indigenous fruit of North Eastern (NE) region of India, *Int J Pharm Tech Research*, 4 (1) 334-342.

Nwofia GE, Ojimelukwe P & Eji O, (2012). Chemical composition of leaves, fruit pulp and seeds in some *Carica papaya* morphotypes, *Int J Med Aroma Plants*, 2 (1) 200-206.

Perkin G & Cope F, (1995). The constituents of *Artocarpus integrifolia*, *J Chem Soc*, 67, 937–44.

Rao GR, Krishnakumar G, Sumesh N, Dudani MD, Subash C et al., (2013). Vegetation changes along altitudinal gradients in human disturbed forests of Uttara Kannada, central Western Ghats, *J Biodiversity*, 4 (2) 61-68.

Rui HL, (2004). Potential Synergy of Phytochemicals in Cancer Prevention: Mechanism of Action, *Am SocNutrSci*,134 (12) 3479-3485.

Sarala P and Krishnamurthy SR, (2014). Monkey jack: underutilized edible medicinal plant, nutritional attributes and traditional foods of Western Ghats, Karnataka, India, *Indian J Tradit Know*, 13 (3) 208-518.

Shah RR & Patel RS, (2014). Study of various plant species useful in each Nakshatra for human society, *Int J Sci Res*, 4(1) 1-10.

Varadaranganatha GH & Madiwalar SL, (2010). Studies on species richness, diversity and density of tree/shrub species in agroforestry systems, *Karnataka J Agri Sci*, 23 (3) 452-456.

Vasugi C, Dinesh MR, Sekar K, Shivashankara KS, Padmakar B. et al., (2012). Genetic diversity in unique indigenous mango accessions (Appemidi) of the Western Ghats for certain fruit characteristics, *Curr Sci*, 103 (2) 199-207.