

Marketing of Indigenous Fruits: A Source of Income among Khasi Women of Meghalaya, North East India

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ABSTRACT The present research attempted to document the usage of important marketable indigenous fruits of Meghalaya, India and evaluated their role in addressing livelihood and food needs of the people of the state. Information on common marketable indigenous fruits were collected through informal interviews and market surveys conducted for a period of one year. Ten indigenous fruits were found to be widely sold in Iewduh, one of the largest open markets in the state. These fruits are available during different seasons of the year. Women are mostly involved in marketing and selling of these fruits, enabling them to generate additional cash income. The status of 5 out of 10 indigenous fruit trees were found to be wild, 3 semi-domesticated and 2 domesticated. Five fruits were found to have value addition, which is a way out to reduce the perishability rate of fruits. The study contributed towards knowledge based on indigenous plant resources and recommends measures for conservation and livelihood enhancement through value addition of this hitherto less researched bioresource of north-east India.

INTRODUCTION

Indigenous fruits are known to play a significant role in meeting food and livelihood needs of people in the developing nations (Mwema et al. 2012; Mabaya et al. 2014). These fruits provide an alternative source of nutrition and generate cash income in times of hardship (Muok et al. 2001). Studies by Ndoye et al. (2004), Shackleton and Shackleton (2005), and Schreckenberg et al. (2006) revealed the important contribution that indigenous fruit trees make towards poverty reduction. In India, the indigenous fruits collected from the wild, play an important role in meeting the food and cash income requirement of the rural poor and the tribals (Deshmukh and Shinde 2010; Mahapatra and Panda 2012). They are good substitutes for exotic fruits which are not easily accessible to a majority of the poor population. Some wild fruits are known to have better nutritional value than the cultivated fruits (Eromosele et al. 1991; Maikhuri et al. 1994). Lately, the use of wild fruits as food has decreased due to improvement and hybridization in com-

mercially-cultivated fruit plants. Increase in urbanization and commercial exploitation of forests and waste lands have also brought about a real threat to the existence of these resources.

Meghalaya, one of the eight states of north-east India, is endowed with abundant floral and faunal wealth. The indigenous people of the state comprises of the Khasis, the Garos and the Jaintias who have their respective dialects, distinct ways of life, beliefs, traditions and cultural heritage. These tribes possessed rich plant-lore. One important feature of Meghalaya is that it is a matrilineal society and women play an important role in the society both socially and economically. A number of studies have been carried out in the state on diversity and uses of plant resources in general (Kharkongor and Joseph 1981; Ahmed and Borthakur 2005; Hyniewta and Kumar 2007) giving little attention to indigenous fruits. However, studies analyzing marketing status and economic contributions of indigenous fruits to cash incomes and food security in the state are rare.

Objectives

The present research was conducted with the aim to study important marketable indigenous fruits of Meghalaya and investigate their role in addressing livelihood and food needs of the people. The present study also attempts to

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evaluate their usage so that they can be popularized and exploited for value addition.

MATERIAL AND METHODS

Study Area

The market study was conducted at Iewduh market in Shillong, the capital of Meghalaya. It is the largest open market in the state and probably in the whole of northeast India. This market is under the control and jurisdiction of the syiem (chieftain) of Hima Myllem (Myllem state). This market is also a major source of revenue for the Hima (state) as tax is being collected from all the traders and shopkeepers including the vendors. In this market all range of products are sold which include eatables, clothes, foot-wears, handicrafts, tools and equipments, construction materials, etc. Sale of indigenous leafy vegetables, wild edible mushrooms, tubers, corms and indigenous fruits is very common in this market. These items are sold in the market according to the season. Leafy vegetables and wild mushrooms are common during summer season, tubers and corms during winter; whereas a variety of fruits are available almost throughout the year.

Methods

The methods employed in the present study were so designed as to collect information on the indigenous fruits sold at Iewduh market. Secondary data were collected from published literature and field data was collected for a period of one year from January 2013 to December 2013. The Iewduh Market was surveyed twice a month to check the availability of these fruits and extensive interviews of women vendors were taken as they are the ones who are actively involved in selling these fruits. A minimum of 10 vendors were interviewed during each survey regarding the vernacular name of the fruits, place from where they are brought, their source, price, uses and processing. They were identified crudely as common or rare as per their availability and encounter rates in the market. Voucher specimens were collected during field survey and preserved as bottled specimens in 5% formalin which were then deposited at the Botany department herbarium, Lady Keane College Shillong. Identification was done with the help of specialist and standard books such as Forest

Flora of Meghalaya (Haridasan and Rao 1985-1987) and Flora of Assam (Kanjilal et al. 1934-1940). Photographs were also taken during the survey.

RESULTS AND DISCUSSION

Indigenous fruits are among the most common items sold at Iewduh market. The consumers of these fruits are mainly the local tribal people who buy them for consumption as fresh fruits and also use for making pickles. These fruits are popular among urbanites too and are an added attraction to the tourists visiting Shillong.

Diversity of Marketable Indigenous Fruits

During the study, ten indigenous fruits were recorded to be commonly sold at Iewduh market (Fig. 1). These fruits belong to nine genera and eight families and the growth-form of seven out of ten fruits is tree and the remaining three is shrub (Table 1). In Africa the availability of a wide range of marketable and non-marketable indigenous fruit trees in many areas enabled farmers to meet their varied household needs for food, nutrition and medicines (Mwema et al. 2012; Kalaba et al. 2014). The indigenous fruits are available throughout the year. Fruits like *Myrica esculenta*, *Myrica nagi*, *Baccaurea sapida*, *Prunus nepaulensis*, *Eleagnus latifolia* and *Calamus erectus* are available during the wet summer months (April- August), while *Viburnum foetidum*, *Castanopsis indica*, *Gynocardia odorata* and *Docynia indica* are available during the dry winter months (October-February). The ripening of fruits at different times of the year can be targeted to meet the food needs of rural people (Akinifesi et al. 2004). These fruits grow in tropical and sub-tropical evergreen forests in the wild as well as in the home gardens. Fruits of *B. sapida*, *G. odorata*, *C. erectus* and *V. foetidum* are exclusively collected from the wild. Others like *Myrica* spp. and *Docynia indica* are semi-domesticated, while *Eleagnus latifolia* and *Prunus nepaulensis* are mostly domesticated on a small scale in the home gardens of villages near Shillong. Domesticating and management of semi-domesticated indigenous fruits trees is considered appropriate for nutrition and livelihood security (Esipisu 2014; Iroko et al. 2014). Domestication is also viewed as a way to reduce over-exploitation and extinction of the already

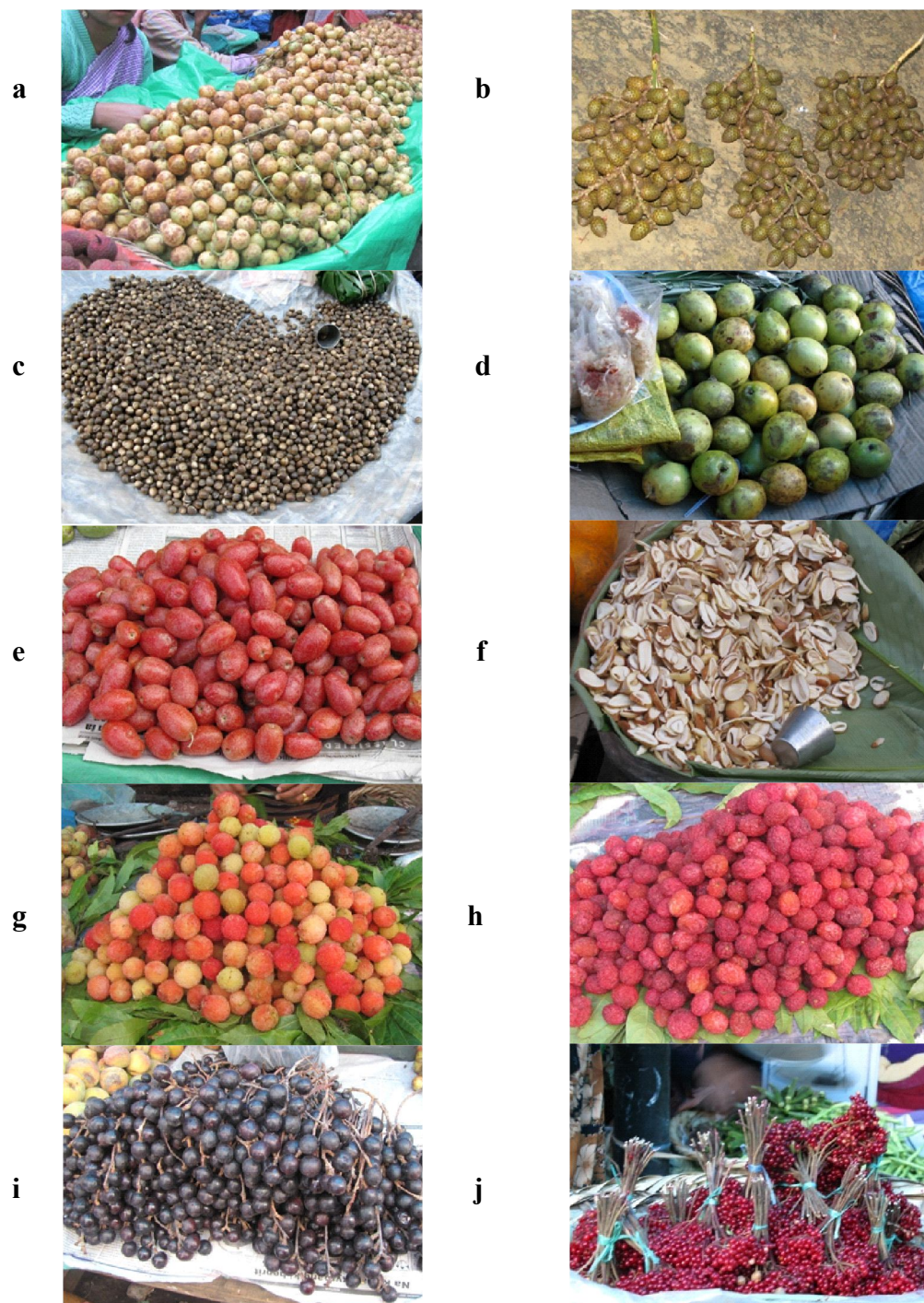


Fig. 1. Indigenous fruits sold at Iewduh, Shillong. (a). *Baccaurea sapida* (Roxb) Muell. Arg. (b). *Calamus erectus* Roxb. (c). *Castanopsis indica* A.DC. (d). *Docynia indica* (Wall.) Decne (e). *Eleagnus latifolia* Linn. (f). *Gynocardia odorata* R. Br. (g). *Myrica esculenta* Buch. Ham. ex D. Don, (h). *Myrica nagi* Hk. f. (i). *Prunus nepaulensis* (Ser.) Steud (j). *Viburnum foetidum* Wall.

Table 1: Important characteristics of ten indigenous fruits commonly sold in Iewduh market

S. No.	Botanical name	Family	*Vernacular name	Habit	Flowering/ fruiting	Habitat	Status
1	<i>Baccaurea sapida</i> (Roxb) Muell. Arg.	Euphorbiaceae	Soh myndong/ Soh ramdieng	Tree	Apr-Aug	Evergreen forest at lower elevation	Wild
2	<i>Calamus erectus</i> Roxb.	Arecaceae	Soh thri	Shrub	Oct-May	Tropical forest	Wild
3	<i>Castanopsis indica</i> A.DC.	Fagaceae	Soh ot rit	Tree	Feb-Dec	Evergreen forest	Wild
4	<i>Docynia indica</i> (Wall.) Decne	Rosaceae	Sohphoh khasi	Tree	Feb-Dec	Home gardens	Semi-domesticated
5	<i>Eleagnus latifolia</i> Linn.	Eleagnaceae	Soh shang	Shrub	Nov-May	Home gardens	Domesticated
6	<i>Gynocardia</i> <i>odorata</i> R. Br.	Flacourtiaceae	Soh liang	Tree	Mar-Jan	Evergreen forest at lower elevation	Wild
7	<i>Myrica esculenta</i> Buch. Ham.	Myricaceae	Soh phi bah	Tree	Oct-Jul	Sub-tropical evergreen forests at higher elevation	Semi-domesticated
8	<i>Myrica nagi</i> Hk. f.	Myricaceae	Soh phi nam	Tree	Oct-Jun	Sub-tropical evergreen forests at higher elevation	Semi-domesticated
9	<i>Prunus nepaulensis</i> (Ser.) Steud.	Rosaceae	Soh iong	Tree	Nov- Aug	Home gardens	Domesticated
10	<i>Viburnum foetidum</i> Wall.	Caprifoliaceae	Sohlang Sohlang	Shrub Shrub	Jun- Nov Jun- Nov	Evergreen forest and forest margins	Wild

*Vernacular name is given in Khasi language

low population of wild fruit trees and also minimize supply shortages (Simons and Leakey 2004; Kruse et al. 2006).

Marketing Status

The unit of measurement of these fruits is in weight and volume of kilogram, per cup or per bundle. Availability of fruits in the market was highest during the peak fruiting months. *C. erectus* and *V. foetidum* were less common and sold in small quantities whereas the rest were more common and were available in large or medium quantities in the market (Table 2). The average quantities of fruits sold was a minimum for *V. foetidum* (10-15 bundles) whereas for other fruits it ranged between 10-25 kg per day. The retail price for fruits like *G. odorata* (Rs. 320/kg) and *Castanopsis indica* (Rs. 120/kg) was comparatively the highest. The fruits sold at Iewduh come from nearby districts viz., East Khasi Hills, West Khasi Hills and Ri Bhoi. Since, most of the fruits are perishable in nature; therefore, long distance transportation is often avoided. Many studies in Africa and Asia also highlighted the difficulty in trade of fresh indigenous fruits as most of them have a very short shelf life (Awono et al. 2002; Kalaba et al. 2014) and local marketing of indigenous fruit products if available also are limited and poorly developed (Ramadhani 2002; Hughes and Haq 2003).

Processing and Value Addition

All fruits are sold in fresh form except *G. odorata* which needs processing before it is mar-

keted. The fruits of *G. odorata* are collected from the wild; they are then peeled to extract the seeds. The seeds are then boiled in water, washed thoroughly and cut into thin slices and sold in the market. Processing and value addition of fresh fruits is necessary, as the fruits' perishability rate is very high, due to lack of cold storage facilities in the rural areas (Kalaba et al. 2014). Out of the ten fruits commonly sold in Iewduh market, five were found to have value addition (Table 3). *E. latifolia* and *D. indica* are used only for pickling where as *M. esculenta* is used mostly used for the preparation of juices and pickles. *B. sapida* is used for preparation of juice and wine, while *P. nepalensis* is used for preparation of juice, jam and wine. Promoting simple, low-cost food processing techniques would reduce postharvest losses, increase utilisation and cultivation of these fruits and enhance the development of small-scale food processing enterprises which contributes enormously to the economy (Aworh 2008, 2014; Adesulu and Awojobi 2014).

Indigenous Fruits and Income Generation to Women

In fact, most of the sellers of indigenous fruits at Iewduh market are women vendors (Fig. 2). Studies by Gumbo et al. (1991) and Mwema et al. (2013) also reported that marketing of wild fruits is the domain of women and children. These women vendors may be the producers or collectors themselves, or the intermediaries. They start selling every day from 900 hr. up to 1800 hr. Due to the lack of space and overcrowd-

Table 2: Marketing and quantity of ten indigenous fruits sold at Iewduh market, Shillong

S. No.	Botanical name	Availability	Frequency	Quantity	Price (Rs.)	*Source
1	<i>Baccaurea sapida</i> (Roxb) Muell. Arg.	May-Aug	Common	Large	80/kg	EKH
2	<i>Calamus erectus</i> Roxb.	Apr-May	Rare	Small	80/kg	EKH
3	<i>Castanopsis indica</i> A.DC.	Oct-Jan	Common	Large	120/kg or 10/cup	EKH, RB, WKH
4	<i>Docynia indica</i> (Wall.) Decne	Oct-Jan	Common	Medium	80/kg	EKH, WKH
5	<i>Eleagnus latifolia</i> Hk. f.	Feb-May	Common	Large	80/kg	EKH, RB
6	<i>Gynocardia odorata</i> R. Br.	Nov-Feb	Common	Large	320/kg or 10/cup	EKH, WKH
7	<i>Myrica esculenta</i> Buch Ham. ex D. Don	Apr-Jul	Common	Large	80/kg	EKH, WKH.
8	<i>Myrica nagi</i> Hk. f	Apr-Jun	Common	Medium	160/kg	EKH, WKH
9	<i>Prunus nepaulensis</i> (Ser.) Steud.	Jul-Aug	Common	Large	120/kg	EKH, WKH
10	<i>Viburnum foetidum</i> Wall.	Oct-Nov	Rare	Small	10/bundle	EKH, WKH

*From where the fruits comes

Table 3: Processing and value addition of some important indigenous fruits of Meghalaya

S. No.	Botanical name	Parts used	Processing	Value addition
1	<i>Baccaurea sapida</i> (Roxb) Muell. Arg.	Pulp	Sold fresh	Preparation of juice and wine
2	<i>Calamus erectus</i> Roxb.	Aril	Sold fresh	-
3	<i>Castanopsis indica</i> A.DC.	Nut	Sold fresh	-
4	<i>Docynia indica</i> (Wall.) Decne	Pulp	Sold fresh or pulp Cut into small pieces added with salts and powdered chilli	Preparation of pickle
5	<i>Eleagnus latifolia</i> Hk. f.	Pulp	Sold fresh or pulp cut into small pieces, added with salts and powdered chilli	Preparation of pickle
6	<i>Gynocardia odorata</i> R. Br.	Placenta	Seeds boiled in water, cut into small pieces and sold with salts	-
7	<i>Myrica esculenta</i> Buch. Ham. ex D. Don	Pulp	Sold fresh or pulp cut into small pieces, added with salts and powdered chilli	Preparation of juice and pickle
8	<i>Myrica nagi</i> Hk. f	Pulp	Sold fresh	-
9	<i>Prunus nepaulensis</i> (Ser.) Steud.	Pulp	Sold fresh	Preparation of juice, wine and jam
10	<i>Viburnum foetidum</i> Wall.	Pulp	Sold fresh	-

ing inside the market new women vendors sometimes do not get a permanent place so they sell their items on the road-sides, thus they keep pushing the periphery of the market. At times permanent vendors too shift their sale to the peripheral road side to avoid jostling with fellow shoppers at the crowded central part of the market, especially with their shopping bags fully laden.

On an average, a woman vendor can earn a profit of Rs. 300 – Rs. 500 per day by selling these fruits. Many petty women vendors selling ready-to-eat betel nuts on the road side also engage themselves in selling various indigenous fruits during different seasons of the year. These women usually buy a variety of fruits from the whole-sellers and sell them at various points outside Iewduh main market and in the Shillong city by carrying them in baskets. These fruits are sold fresh or are chopped into small pieces seasoned with chilli peppers and salts and packed in polythene bags. Selling of these fruits helps generate extra cash income to these women (Mithofer et al. 2006).

CONCLUSION

Indigenous fruits in the state are in great demand locally and are widely sold in the mar-

ket. Fruits' year-round availability in the market is viewed as a good opportunity in reducing the local demand for exotic fruits, which are often expensive, to supplement food requirement. Collection and selling of indigenous fruits also play an important role in improving the livelihood of the weaker section of society like women. There is an obvious lack of processing of fruits on a larger scale to convert them into commercially viable superior quality products for the national and international markets. Thus, initiatives need to be taken to create enterprises for value addition on a large scale so as to generate employment among women vendors and improve their livelihood. The high rate of deforestation in the state has caused a reduction in the availability of indigenous fruits which can be addressed through prioritization and promotion of large scale cultivation of these fruit trees.

RECOMMENDATIONS

The following recommendations are drawn from this study:

- (i) Only few indigenous fruit trees have been domesticated in the state. Hence, the reproductive biology and ecology of non-domesticated indigenous fruit trees must

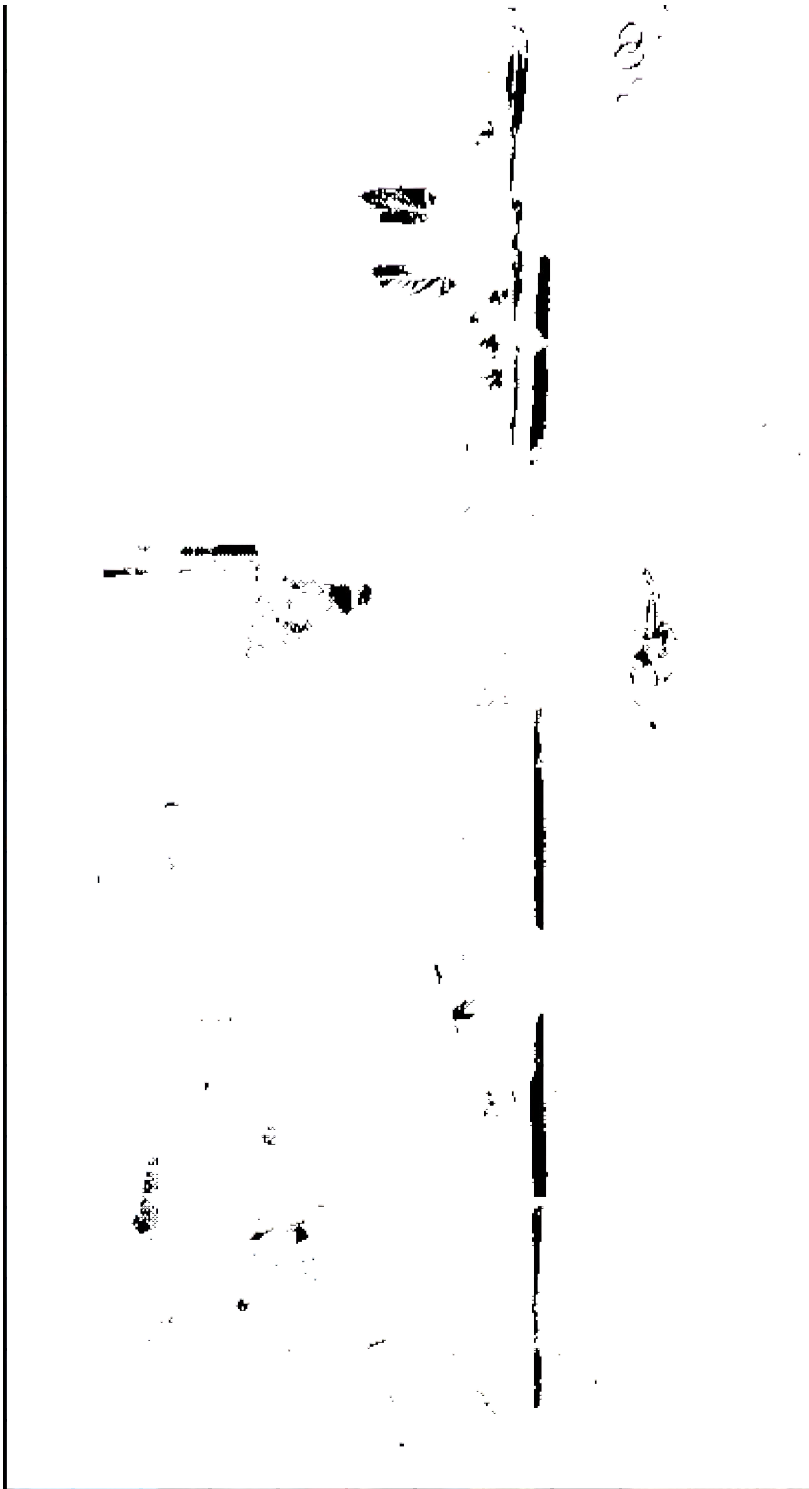


Fig. 2. Women vendors selling indigenous fruits

- be investigated for initiating their domestication and cultivation.
- (ii) Encourage innovative research and development efforts to help bring about improvements in cultivation and scaling up of important domesticated indigenous fruit trees.
 - (iii) Collector/harvesters and sellers of these fruits must be provided with information on harvesting, uses as well as regular marketing information on the potential fruit markets to ensure their sustainability and to obtain maximum benefit from them.
 - (iv) Promotion of value addition activities at the local and regional level, improvement in marketing channels, exploration of regional and national markets and development of small-scale enterprises need to be taken up to reduce the fruit's perishability rate and to enhance income.
 - (v) Nurseries should be developed by the state government for growing saplings of these indigenous fruits so that seedlings of these fruit trees can be distributed to village communities, NGOs, schools, colleges, etc. for plantation, as these plants are well adapted to the local conditions.

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REFERENCES

- Adesulu AT, Awoiobi KO 2014. Enhancing sustainable development through indigenous fermented food products in Nigeria. *Afr J Microbiol Res*, 8(12): 1338-1343.
- Ahmed AA, Borthakur SK 2005. *Ethanobotanical Wisdom of Khasis (Hynniew Treps) of Meghalaya*. Dehradun: Bishan Singh Mahendra Pal Singh.
- Akinnifesi FK, Kvesiga FR, Mhango J, Mkonda A, Chilanga T, Swai R 2004. Domesticating priority miombo indigenous fruit trees as a promising livelihood option for smallholder farmers in southern Africa. *Acta Hort*, 632: 15-30.
- Awono A, Ndoye O, Schreckenberger K, Tabuna H, Isseri F 2002. Production and marketing of safou (*Dacryodes edulis*) in Cameroon and internationally: Market development issues. *Forests, Trees and Livelihoods*, 12: 125-147.
- Aworh OC 2008. The role of traditional food processing technologies in national development: The West African Experience. In: GL Robertson, JR Lupien (Eds.): *Using Food Science and Technology to Improve Nutrition and Promote National Development*. International Union of Food Science and Technology, pp. 1-18.
- Aworh OC 2014. Promoting Food Security and Enhancing Small Farmers' Income through Value-added Processing of Lesser-known and Under-utilized Indigenous Fruits. *Paper presented at the 17th International Union of Food Science and Technology (IUFoST) World Congress* in Montreal, Canada, 17-21 August 2014.
- Deshmukh BS, Shinde V 2010. Fruits in the wilderness: A potential of local food resource. *Int J Pharm Bio Sci*, 1(2): 1-5.
- Eromosele IC, Eromosele CO, Kuzhkhza DM 1991. Evaluation of mineral elements and ascorbic acid contents in fruits of some wild plants. *Plant Food Hum Nutr*, 41: 151-154.
- Esipisu I 2014. Domesticating Fruit Trees for Nutrition and Livelihood. *World Congress on Agroforestry*. From <<http://www.wca2014.org/>> (Retrieved on 22 October 2014).
- Gumbo DJ, Mkamuri BB, Muzondo MI, Scoones IC 1991. Indigenous and exotic fruit trees: Why do people want to grow them? In: RT Prinsley (Ed.): *Agroforestry for Sustainable Production: Economic Implications*. London: Commonwealth Secretariat Publications.
- Haridasan K, Rao RR 1985-1987. *Forest Flora of Meghalaya*. 2 Volumes. Dehradun: Bishan Singh and Mahandrapal Singh.
- Hughes A, Haq N 2003. Promotion of indigenous fruit trees through improved processing and marketing in Asia. *Int Forest Rev*, 5(2): 176-181.
- Hynniewta SR, Kumar Y 2008. Herbal remedies among the Khasi traditional healers and village folks in Meghalaya. *Indian J Tradit Know*, 7(4): 581-586.
- Iroko OA, Bolanle-Ojo OT, Williams OA 2014. Participatory domestication of indigenous fruit trees: contribution to sustainable livelihood in West Africa. In: MO Adedire, JC Onyekwelu, DO Oke, VAJ Adekunle, OA Jayeola, AO Oladoye (Eds.): *Forests and Forest Products: Key To Sustainable Livelihood. Proceedings of the 4th Biennial National Conference of the Forest and Forest Products Society (FFPS)*, 23-25th April 2014, pp. 475-480.
- Kalaba FK, Chirwa PW, Prozesky H 2014. The contribution of indigenous fruit trees in sustaining rural livelihoods and conservation of natural resources. *Int J Fruit Veg Sci*, 1(1): 1-6.
- Kanjilal UN, Kanjilal PC, Das A, De RN 1934-1940. *Flora of Assam*. 4 Volumes. Shillong: Govt. Press.
- Kharkongor P, Joseph J 1981. Folklore medico botany of rural Khasi and Jaintia tribes in Meghalaya. In: SK Jain (Ed.): *Glimpses of Indian Ethnobotany*. New Delhi: Oxford and IBH Publishing Co, pp. 124-136.
- Kruse T, Waibel H, Akinnifesi FK, Mithofer D 2006. Economics of *in-situ* Conservation of Indigenous Trees by Smallholder Farmers in Central Malawi. *Paper presented at Tropentag 2006: Prosperity and Poverty in a Globalized World—Challenges for Agricultural Research* in University of Bonn, Bonn, Germany, 11-13 October 2006.

- Mabaya E, Jackson J, Ruethling G, Carter CM, Castle J 2014. Wild fruits of Africa: Commercializing natural products to improve rural livelihoods in southern Africa. *Int Food Agribus Man*, 17: 69-74.
- Mahapatra AK, Panda PC 2012. Wild edible fruit diversity and its significance in the livelihood of indigenous tribals: Evidence from eastern India. *Food Security*, 4(2): 219-234.
- Maikhuri RK, Semwal RL, Singh A, Nautiyal MC 1994. Wild fruits as a contribution to sustainable rural development: A case study from the Garhwal Himalaya. *Inter J Sustain Dev World Ecol*, 1: 56-68.
- Mithofer D, Waibel H, Akinnifesi FK 2006. The Role of Food from Natural Resources in Reducing Vulnerability to Poverty: A Case Study from Zimbabwe. *Paper presented in 26th Conference of the International Association of Agricultural Economists (IAAE)* in Queensland, Australia, 12-18 August 2006.
- Mwema CM, Mutai BK, Lagat JK, Kibet LK, Maina MC 2012. Contribution of selected indigenous fruits on household income and food security in Mwingi, Kenya. *Curr Res J Soc Sci*, 4(6): 425-430.
- Mwema CM, Lagat JK, Mutai BK 2013. Economics of Harvesting and Marketing Selected Indigenous Fruits in Mwingi District, Kenya. *Paper presented at the 4th International Conference of the African Association of Agricultural Economists* in Hammamet, Tunisia, 22-25 September 2013.
- Muok BO, Owuor B, Dawson I, Were J 2001. The potential of indigenous fruit trees: Result of a study in Kitui District, Kenya. *Agro Today* 12: 13-15.
- Ndoye O, Awono A, Schreckenberg K, Leakey R 2004. *Commercialising Indigenous Fruits for Poverty Alleviation, Policy Briefing for Governments in the African Humid Tropics*. London: ODI.
- Ramadhani T 2002. Marketing of Indigenous Fruits in Zimbabwe. *Socio-economic Studies on Rural Development*. 129, Germany: Wissenschaftsverlag Vauk Kiel.
- Schreckenberg K, Awono A, Degrande A, Mbooso C, Ndoye O, Tchoundjeu Z 2006. Domesticating indigenous fruit trees as a contribution to poverty reduction. *Forests, Trees and Livelihoods*, 16: 35-52.
- Shackleton SE, Shackleton CM 2005. The contribution of marula (*Sclerocarya birrea*) fruit and fruit products to rural livelihoods in the Bushbuckridge district, South Africa: balancing domestic needs and commercialisation. *Forests, Trees and Livelihoods*, 15: 3-24.
- Simons AJ, Leakey RRB 2004. Tree domestication in tropical agroforestry. *Agrofor Syst*, 61: 167-181.
- Styger E, Rakotoarimanana JEM, Rabvohitra R, Fernandes ECM 1999. Indigenous fruit trees of Madagascar: Potential components agroforestry system to improve human nutrition and restore biological diversity. *Agrofor Sys*, 46: 289-310.