Original Research Article

Traditional Use of Chinar (*Platanus orientalis* L.) Leaf Litter for Charcoal Making in Kashmir Himalaya

ABSTRACT

The exploration and documentation of indigenous traditional knowledge (ITKs) are crucial to preserve the intellectual property, maintain its practical utility and plan projects for people's socioeconomic development by mobilizing these untapped resources. This study was sought to investigate and provide comprehensive ITKs pertaining to utilization of Chinar (*Platanus orientalis* L.) leaf litter for charcoal making in Manasbal range of the Sindh Forest Division of Jammu and Kashmir UT. Multi-stage random sampling technique was employed to select the villages and households for the field survey. The ITKs on collection of leaf litter, packing and transportation, charcoal making, drying and storage of charcoal, seasonality calendar, livelihood mainstay and gender dimension of Chinar charcoal making were collected through structured interviews and non-participant observations. This study concludes that the local denizens have in-depth ITKs in sustainable use and management of Chinar leaf litter for charcoal making to meet bio-fuel needs in *kangri* burning for body warming during harsh winter. From the livelihood perspective, the ITKs documented on Chinar charcoal making will be a base for rural income and employment diversification through entrepreneurship development in the intervention for energy security and socioeconomic improvement.

Keywords: ITKs, charcoal making, Chinar, *Platanus orientalis* L., women, *kangri*, Kashmir, India.

1. INTRODUCTION

Reliable, secure and safe energy sources are fundamental to the well-being and socioeconomic development of all societies (World Bank, 2015). Energy is an integral part of a society next to food which is needed to fuel economic growth and development (Ullah and Tani, 2017). One of the renewable sources of energy which will play an important role in mitigating energy crises is leaf litter charcoal. Leaf charcoals are any type of bio-fuel derived directly or indirectly from trees and shrubs grown on forest and non-forest land. Leaf charcoal is a renewable and CO_2 neutral source of energy, which, if used in a sustainable and efficient way can contribute to a cleaner environment (Asikuallah and Masakazu, 2017). In many developing countries, leaf charcoals are still commonly used for household cooking, heating, rural industries, household functions and ceremonies, cattle protection etc. (Islam et al., 2015). The leaf charcoals also provide economic benefits, such as the creation of additional employment and income, especially in rural areas (Ycaza and Barre, 2018).

In rural Kashmir, the energy requirement for body warming is fulfilled by the charcoal produced from Chinar (*Platanus orientalis* L.) leaf litter collected from departmental plantations, trees outside forests (TOF), communal woodlots and private sites. The Chinar charcoal is the most important source of energy for the millions of households and almost all the Chinar leaf litter are removed every year in rural Kashmir (Mushtaq et al., 2014; Islam et al., 2018). The Chinar (*Platanus orientalis*) is a large, deciduous gigantic tree of the Platanaceae family, growing up to a height of 30 m and a girth above 12 m and known for its longevity and spreading crown (Khuroo et al., 2010). The Chinar tree called locally '*Booune*' in Kashmir is an integral part of indigenous culture and tradition. Almost every village in the Kashmir valley has Chinar trees which have survived for ages, because Chinar is basically a long-living tree. The tree gives a tough, hard, high quality and expensive wood known as 'lace wood' which is used for delicate furniture industry. The tree leaves and grayish barks are used as medicine and the twigs and roots are used for making dyes. The grand leaves are borne alternately on the stem, deeply 5-7 lobed with 12-20 cm length and palmate or maple-like with long stalk. The dried leaves litter are burnt to make light charcoal and used in fire pots (*kangri*) as charcoal during harsh winter.

The dried Chinar leaves litter is the major feedstock as a renewable source of energy through charcoal. The Chinar charcoal making also helps in solid waste management and saves the environment due to the extraordinary collection of leaf litter for bio-fuel. The rural people primarily depend on dried Chinar leaf litter and exploit these resources through primitive methods for household energy security. These ITKs has been derived from the management experiences through trial and error methods and handed down from previous generation to present generations (Islam et al., 2017). These ITKs may be exploited and blended with scientific technologies to explore more sustainable and human friendly methods of charcoal making. There are several studies on use and management of Chinar trees and fuel wood exploitation for household energy security across the Kashmir, but the comprehensive work on this aspect is still lacking in Kashmir Himalaya. Therefore, there is an urgent need to explore and document existing ITKs related to charcoal making from Chinar (*Platanus orientalis* L.) leaf litter practiced in Kashmir Himalaya. Keeping this in view, this study was taken up in the rural Kashmir.

2. MATERIALS AND METHODS

2.1 Study Area

The current study was carried out in Manasbal range of the Sindh Forest Division of Jammu and Kashmir UT. The Sindh Forest Division lies on the geographical coordinates of 34°7'0" to 34°28'0"N and 74°42'0" to 74°26'0" E in the mountainous and rugged terrain of Kashmir valley (Anonymous, 2011). The altitude ranges from 1587 to 5248 m above mean sea level. The total area of the demarcated forest of the division is 37901 ha. This tract is as thickly populated as any other hilly area of the valley, primarily by

rural population. The entire population is of Kashmiri Muslims including the 'Gujjars', who inhabit the villages very near or adjoining to forest areas, except for a few "Pakhtunis" at Gutli Bagh, "Dards" at Barnebugh and "Bhots" at Serbal in Sindh valley (Census of India, 2011). Agriculture using varieties of paddy is the main land use and livelihood source. Forests provide a wide spectrum of NTFPs for local communities constituting a major livelihood component. The study site have typical temperate climate with three distinct seasons viz., rainy, winter and summer. The area experiences both temperate and sub-alpine conditions and receives excessive annual rainfall of 700 mm and temperature varying from 5°C to 20°C. Sindh Forest Division is comprised of three forest ranges viz., Sindh, Manasbal and Harren/ Shalabugh; out of these ranges Manasbal range was the selected area of the study.

2.2 Sampling Technique

Multi-stage random sampling technique (Ray and Mondol, 2004) was used in the selection of the sample villages and the representative households for the field study. In first stage, ten forest fringe villages were selected from the Manasbal range. The sample villages selected were Wangat from Wangat block; Arhama and Anderwan from Chittergul block; Chuntvalivar and Chanthan from Lark; Barnebugh from Barnebugh; Preng, Worpash, Baba wayil and Bailawussan from Gutlibagh block. In the second stage, a total of 104 households were selected randomly having 5% sampling intensity in the sample villages. Household women heads or eldest women members were considered as the respondents. Prior verbal consent was sought from the concern *panchayat* head as well as the women informants by briefing clearly about the objectives and purpose of the study before interview.

2.3 Data Collection and Presentation

The primary ITKs on collection of Chinar leaf litter, packing and transportation, charcoal making, drying and storage of charcoal, seasonality calendar, livelihood mainstay and gender dimension of Chinar charcoal making were gathered through structured interviews and non-participant observations (Kumar, 2012). The livelihood perspectives and economic value of charcoal were determined by the local market rates ascertained by periodic market surveys. The ITKs documented were represented through words, sentences or even paragraphs of free flowing text.

3. RESULTS AND DISCUSSION

3.1 Collection of Chinar Leaf Litter

Generally, the leaf collectors, charcoal producers, *kangri* burners and even charcoal sellers are indigenous women (Figure 1). The big and quality leaves are collected by hand picking the fallen leaves from the ground in the woodlots, village commons or other plantations. The women sweep dry leaves of the Chinar tree to gather them into a heap with her broom. They spend 4 to 5 hours to collect 20 kg leaves form the tree stands and to make them into a heap to carry home as head loads. They go to Chinar stands

either early in the morning or afternoon to collect fallen Chinar leaves and this practice is in vogue for about 3 months from October to December.

3.2 Packing and Transport of Chinar Leaf Litter

The dried leaves are packed loosely in the bags or baskets using ropes or rag. The bags or baskets usually possessing 5-10 kg of dried leaves are generally transported as head loads by the women to their home (Figure 2). The carrying capacity of head load women is around 10 kg. Generally, the dried Chinar leaves are charred to charcoal in the home backyard by the women but sometimes they store the leaves in the stockrooms made for the purpose in the home.

3.3 Chinar Charcoal Making

The Chinar leaf charcoal locally known as '*Punn Tsenei*' is most effective tool to fight winter in Kashmir usually used in *kangris*. The charcoal making from the dry Chinar leaves is a key indigenous technology (Figure 3) and the skill is transferred from generation to generation through learning by doing, folklore, song and poetry. A stick, long-handled broom, handy water buckets and a technique to douse flames is needed to make charcoal. They first prepare heap of the Chinar dry leaves which is ignited from the down very carefully using match sticks. A crimson blaze creates a magical glow in the backyard. They move her long-handled broom to stir the fire that will go into making much needed charcoal for the bitterly cold winter months. The leaves are allowed to burn for about 15-20 minutes, after which water is sprinkled on the burning leaves to extinguish the fire. A little carelessness can destroy the whole efforts and they get just ash. They have to wait patiently to extinguish the fire at the right time so that the leaves do not burn down completely. When the Chinar leaves get half-burnt water is sprinkled over the heap to extinguish it completely. Once the fire is extinguished, they have the required charcoal but if the fire is allowed to burn for long, all they get is ash. After extinguishing the fire, more water is sprinkled on the char to ensure that no leaf is left burning. A head load of about 10 kg of dried leaves yields about 3.5 kg charcoal and one woman makes two bags of Chinar charcoal after toiling the whole day.

Figure 1. Collection of Chinar leaf litter

Figure 2. Packing and transportation

Figure 3. Charcoal making

Figure 4. Drying of Chinar charcoal

3.4 Drying of Chinar Charcoal

The Chinar charcoal are dried for 7-8 hours in an open space under sun with utmost care to avoid breakages (Figure 4). The time should not exceed more than this as it could reduce the quality of the charcoal. The Chinar charcoal requires some moisture which helps in avoiding breakage while packing. By and large, the drying place is made up of mud and usually located in the homestead.

3.5 Storage of Chinar Charcoal

The Chinar charcoal should not be packed tightly into the plastic bags, but filled only loosely (Figure 5). The bags should be air-tight to not let air into it. The bags are stored in the stockrooms made for the reason in the home. The Chinar charcoal bags are kept away from the other inflammable objects that may inadvertently catch fire. A handy rose can filled with water is also kept to sprinkle water on the charcoal to avoid any mishap.

3.6 *Kangri* Burning with Chinar Charcoal

The *kangri* is a clay-pot filled with glowing embers and enclosed in elegant handmade wicker baskets which are carried as a personal warmer. It is a traditional fire-pot used by people to keep them warm during harsh winter months. *Kangri* is a special portable, light, inexpensive and versatile heater that Kashmiri people keep in their *pheran*. The *pheran* is a long woolen veil reaching down to the knees worn by almost all Kashmiri people during the cold winters. The manufacture of the *kangri* involves traditional skill and local artisan's exquisite designs in the craftsmanship. The *kangri* remains an enduring emblem of local craft that is eco-friendly and cost-effective. The *kangri* case is weaved from the withies of *Indigofera pulchella*, *Parrotia jacquemontiana*, *Cotoneaster baciliaris*, *Salix triandra*, etc. The withies collected go through a process of cutting of branches, cleaning, grading, soaking, peeling and drying before final weaving around the bowl-shaped earthenware. The earthen-pots are decorated with shiny colorful threads and delicate designs to provide aesthetic elegance, functional utility and add dignity to people. *Kangris* are ignited by just 250 grams of Chinar charcoal using wooden or paper torch (Figure 6). It is cheaper than oil, gas and wood-fired heaters and costs from ₹ 70 to ₹ 1500 (Figure 7).

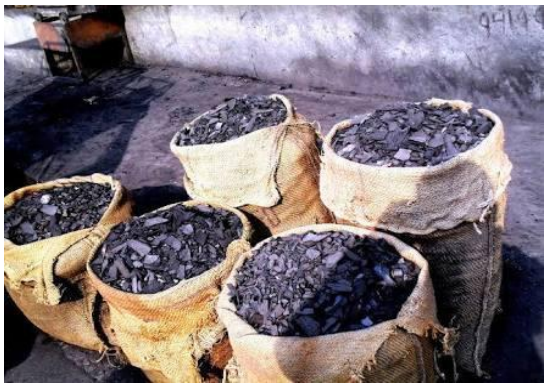

Figure 5. Storage of charcoal

Figure 6. *Kangri* burning with charcoal

Figure 7. Body warming by Chinar charcoal

Figure 8. Drudgery of women in charcoal burning

3.7 Seasonality Calendar of Chinar Charcoal Making

The seasonality of Chinar leaf litter collection extends for 3 months from October to December while charcoal making from Chinar leaves and *kangri* burning using the charcoal exist for around 9 months except during June to August. Chinar leaf litter collection is usually not possible in the months of January to September as new leaves generate and tree remains evergreen with limited shedding of dried leaves to sustain its health and growth in this period. The Chinar leaf litter processing and charcoal making varies with the seasonal occupation of the local people including the crop cultivation and allied agricultural activities.

3.8 Livelihood Mainstay of Chinar Charcoal

The charcoal making from Chinar leaf litter is a prevailing household cottage industry securing substantial employment and income opportunities for the indigenous people since time immemorial in the valley. Although, charcoal making from Chinar leaf litter is a widespread activity for livelihood sustenance among majority of the indigenous people but some of them are working in an informal way to increase their household income. The manually prepared Chinar charcoal are sold in local markets at nominal prices. The return from selling of raw Chinar charcoal is less remunerative and not commensurable with the labour spent. This is hardly enough to survive on and even this trivial income is

seasonal. The Chinar charcoal making is not a primary occupation for the producers; this is just a supplementary source of income. The Chinar charcoals move from primary producers to the consumers either directly or via local petty traders.

3.9 Gender Dimension in Chinar Charcoal Making

Almost all the regular activities in Chinar charcoal making *viz*., collection of dried leaves, packing and transportation, charcoal burning, drying, storage, *kangri* burning with charcoal and marketing of charcoal were performed exclusively by women (Figure 8). Decisions on all the regular activities related to Chinar charcoal making were taken independently by women. The Chinar charcoal making is a very hard work, cumbersome and time consuming job. They suffer from burn injuries and several other smoke related diseases, hence, the drudgery must be alleviated by introduction of eco-friendly innovations and technologies like arrangement of alternative energy sources at household, supply of low cost kilns for production of charcoal, entrepreneurship in charcoal manufacture *etc*.

4. CONCLUSION

The study led to conclude that charcoal making from Chinar leaf litter is unique intervention playing a vital role in the energy security, rural economy and well-being of indigenous societies in Kashmir. Hence, the Chinar charcoal based energy security needs to be strengthened and secondary employment should be created through establishment of Chinar charcoal based cottage industries, value addition of Chinar charcoal and organized marketing system for Chinar charcoal. The ITKs documented in the study will be visualized as a base for its future prospects through value addition by mechanization. Technology refinement on *kangri* charcoal making from Chinar leaves and drudgery alleviation of rural women in *kangri* charcoal making through eco-fuel development needs to be planned.

REFERENCES

1. Anonymous, 2011. Directorate of Economics and Statistics, District Statistics and Evaluation Office, Ganderbal, Jammu and Kashmir.
2. Asikuallah SM and Masakazu T. Fuel wood consumption and its impact on forests in the Teknaf Peninsula on the Southern Coast of Bangladesh. *American Journal of Environmental Sciences*, 2017;13(3): 225-232.
3. Census of India, 2011. A - 5 State Primary Census Abstract – 2011, Government of India.
4. Islam MA, Qaisar KN and Bhat GM. Indigenous knowledge in traditional agroforestry systems of Kashmir valley: current challenges and future opportunities. *International Journal of Forestry and Crop Improvement*, 2017;8(1): 68-77.

5. Islam MA, Quli SMS, Rai R, Ali A and Gangoo SA. Forest biomass flow for fuel wood, fodder and timber security among tribal communities of Jharkhand. *Journal of Environmental Biology*, 2015;36(1): 221-228.
6. Islam MA, Sofi PA, Bhat GM, Wani AA, Gatoo AA and Malik AR. The determinants of fuel wood exploitation for household energy security in Kashmir Himalaya, India. *Journal of Pharmacognosy and Phytochemistry*, 2018;7(2): 3548-3554.
7. Khuroo A, Malik AH and Reshi ZA. Taxonomic and biogeographic patterns in the native and alien woody flora of Kashmir Himalaya, India. *Nordic Journal of Botany*, 2010;28(2010): 685-696.
8. Kumar R. Research Methodology – A step by step guide for beginners. Dorling Kindersley (India) Pvt. Ltd., New Delhi, India, 2012.
9. Mushtaq T, Sood KK and Peshin R. Delineating key determinants of domestic fuelwood consumption of rural households in Western Himalaya- Policy implications. *Journal of Mountain Science*, 2014;11(1): 195-204.
10. Ray GL and Mondol S. Research Methods in Social Sciences and Extension Education, Kalyani Publishers, New Delhi, 2004;pp. 66-76.
11. Ullah SMA and Tani M. Fuel wood Consumption and its Impact on Forests in the Teknaf Peninsula on the Southern Coast of Bangladesh. *American Journal of Environmental Sciences*, 2017;13(3): 225-232.
12. World Bank. World Bank rural population indicators. Washington (DC), 2015.
13. Ycaza SR and Barre JT. Charcoal Briquettes Manufactured from Dried Mango Leaves (DML)– An Alternative Solid Fuel Source. *Ciencia*, 2018;37(1); 13-24.