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Indigenous knowledge on fibre extraction of Sunnhemp in Bundelkhand Region, India

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Indigenous knowledge plays a vital role in assessing the trend of evolution of human civilization; hence documentation of local uses of plants and traditional practices developed through use of human intellect now has become an important activity due to implementation of various issues related to Convention on Biological Diversity (CBD), Intellectual Property Rights (IPR), etc. Keeping this in view, an attempt has been made to document indigenous knowledge on fibre extraction of sunnhemp still practiced in some pockets among the tribal communities of Bundelkhand region, reflecting to preserve the age old tradition of farming communities residing there.

Keywords: Indigenous Knowledge, Fibre extraction, Sunnhemp, *Crotalaria juncea,* Bundelkhand, *Kewat.*

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Introduction

During the course of evolution, the traditional knowledge and practices developed on various uses of plants by our ancestors have been transmitted from one generation to other[1, 2]. Among the commonly used plant species by man, the fibre yielding plants hold the second position after the food plants with respect to their economic potential. The plant fibre has been used since long past mainly to keep body warm, to protect from adverse environmental conditions, to thatch leaf for shelter and other day to day domestic activities[3-7]. The Indian subcontinent holds a rich heritage of natural plant material due to wide range of topographic and climatic variations, fibres are one of these, which are used for variety of textile and industrial products. Sunnhemp (*Crotalaria juncea* L.) is one of the important textile fibres extracted from outer bark of the stem is considered oldest fibre yielding crop of India. It belongs to family Fabaceae and commonly known as *Bombay hemp/ Madras hemp/ Rattle pods*, etc. This crop has been mentioned in the early Sanskrit under the name of '*Sana*'[8]. Locally the crop is known by various names like *'Sonai'* or '*San*' (Hindi), '*Sanpat*' (Bengali), '*Tag*' (Marathi), '*Vakku*' (Malayalam) '*Sanpat*' (Oriya), '*Janumu*' (Telegu), '*Saab*' (Kannada) in different parts of India. It ranks second to jute among bast fibres and is more durable, lighter in colour and fairly resistant to moisture, mildew and micro-organisms[9-12]. Sunnhemp is an annual, 1-3 m tall herbaceous shrub. Stems are cylindrical and ribbed. Leaves are simple, linear-elliptic to oblong, 4-12 x 0.5-3 cm, bright green in colour and spirally arranged on the stem. Inflorescence is a terminal open raceme up to 25 cm in length with deep yellow flowers. Flowering is indeterminate. Fruit is an inflated pod about 3 x 1 cm, grooved, with a pointed beak, several seeded with softy hairs. Seeds are small, flattened kidney shaped, dark grey to black, loosened in the pod at maturity.

Its centre of origin is uncertain, but is believed to be native to India and Pakistan[13] and now cultivated throughout the India, Pakistan, Uganda and Rhodesia and in the western Hemisphere (e.g. Brazil). The fibre from the Indian Sunnhemp was first introduced into Europe in 1791 and 1792 by the East India Company[12]. During these days, jute was considered as less important fibre. Later on the sunnhemp was considered to be a far superior fibre than jute[14]. Sunnhemp is often grown in rotation with several different crop species as one of the most widely grown green manure crops throughout the tropics[15-18]. In India, six species of *Crotalaria* are used for fibre, of which the commercial fibre yielding species

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sunnhemp (*C. juncea*) is cultivated in almost all the states[19]. It also serves as a good fodder crop in many parts of the country; however, India is the largest producer of sunnhemp fibre. Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, Orissa and Uttar Pradesh states grow this crop mainly for fibre and cover nearly 87 % of the total area under cultivation. Cultivars from Madhya Pradesh are considered early maturing and yield superior fibre[12]. Now, because of erratic or discontinued cultivation in last one decade, the cultivable areas in sunnhemp growing states of India is gradually decreasing along with its age old traditional fibre extraction method.

Gathering indigenous knowledge associated with the plants has been an integral part of exploration and germplasm collection activity. During an exploration for collection of fibre crop germplasm, it was observed that the local farming/tribal communities are engaged in extraction of fibre from sunnhemp using indigenous traditional method in some pockets of Bundelkhand region. This region covers Jhansi, Mahoba, Orai, Banda, Hamirpur and Lalitpur districts of Uttar Pradesh and Datia, Tikamgarh, Sagar, Damoh, Panna, Narsinghpur and Chhatarpur districts of Madhya Pradesh and is inhabited mainly by schedule tribe communities, viz. *Dhimar*, *Ahirwar*, *Nai*, *Dhobi*, *Basorh*, *Gadaria*, *Mehtar*, *Sondhia*, *Chadar*, *Bunkar*, *Banskar*, *Kumhar*, *Jogi*, *Kori*, *Chipri*, *Raikwar*, *Manjhi*, *Kewat*, *Lodhi*, *Yadav*, *Jatav*, *Bhoi*, *Teli*, *Kalar*, *Lohar*, *Barhai*, *Khatik* and *Bedia*. They are largely depend on forests produce for their livelihood except sunnhemp cultivation because the cultivable land of the entire region is less fertile and low productive. *Mahuwa, Madhuca longifolia* (Koenig) Macbr. has been one of the major sources of food in the rural areas of these concerned districts. Apart from collecting *Mahuwa* and *Bidi* making, the inhabitants also earn from other useful species and several medicinal plants occurring in the region.

The present communication highlights on the traditional fibre extraction method of sunnhemp, which is presently on the verge of extinction thus needs specific efforts in order to document such indigenous traditional knowledge.

Materials and Methods

Keeping in view the decreasing pace of sunnhemp cultivation as well as dwindling traditional fibre extraction method, an exploration for collection of fibre crop germplasm along with associated indigenous knowledge was undertaken by National Bureau of Plant Genetic Resources (NBPGR), New Delhi in collaboration with Central Research Institute for Jute and Allied Fibres (CRIJ & AF), Barrackpore during December 2007. For recording indigenous knowledge, schedule tribe/backward communities, viz. *Kewat*, *Patel*, *Manjhi* (*Kushwaha*) were interviewed using an interview schedule and data on indigenous knowledge on traditional method of fibre extraction and processing was recorded following Guarino and Friis-Hansen[20,21]. The recorded information was authenticated with frequent query from old experienced folk of the community. Data on areas under cultivation, period of sowing/harvesting, processing techniques and uses, causes of genetic erosion was gathered by interviewing some selected respondents from drier parts of Datia, Tikamgarh, Sagar and Chhatarpur districts in Madhya Pradesh; Mathura, Jhansi, Mahoba and Hamirpur districts in Uttar Pradesh, where this crop was growing sporadically. During survey, local research organizations, viz. Indian Grassland & Fodder Research Institute (IGFRI), Jhansi and the progressive farmers of the region were contacted to have an idea about the traditional fibre processing method. Different sites were visited and the availability of germplasm and status of genetic erosion in crop and traditional practice of fibre extraction was observed carefully through interaction with the local farming communities, who have explained various factors responsible for genetic erosion in this crop.

Results and Discussion

It was observed that due to readily available alternative sources of fibre (plastic) for making ropes, cordages, bags, etc., as well as gradual reduction in number of ponds, the water bodies in villages, the farmers either have stopped or likely to abandon its cultivation[19, 22]. The farming communities of Bundelkhand region used to grow the sunnhemp in past for their livelihood but at present due to introduction of soybean and other cash crops as well as easy availability of plastic ropes, bags, etc., only schedule tribe/backward communities are growing this crop for fibre in limited pockets. The indigenous knowledge recorded on sunnhemp cultivation and local fibre extraction is given below:

Sowing: The released/promising varieties grown mainly in sunnhemp are: K-12 (black), K-12 (yellow), M-18, Belgaon, Chindwara, T-6, etc. besides local cultivars. For raising the crop, seed is retained either from the preceding crop or procured from local

markets of Sagar, Narsinghpur, Gorjhamar and Raisen in Madhya Pradesh. The crop is sown as a 'Kharif' crop just after pre-monsoon (South-west monsoon) rains in the month of June-July. About 75 kg seeds are sown in one acre of land. A light loam, moderately rich, well-drained soil is preferred[8,15] for fibre production. Manuring and weeding is not done at all in this crop. Sunnhemp is fast growing and generally suppresses growth of weed population due to dense canopy shading[23]. However, early season weed control has been shown to improve yields when sunnhemp is grown for fiber[24] but no herbicides are currently registered for use in sunnhemp production. Seeds are sown densely and thinning is not required because due to thinning the stem of plant becomes thick which is not considered good for fibre. Watering is must at least once or twice during crop season. For green manure, the crop is cut down in the month of August-September, while some stands are kept for seeds up to December.

Harvesting and threshing: The crop is harvested manually with the help of sickles and the stem is cut from the base. If grown for seed, plants are harvested after seeds are well set, and before pods are dry, so that no seed is lost during cutting and bundling prior to threshing. For seeds, a crop is allowed to stand until pods are fully ripe. In some areas plants are harvested at flowering stage as green manure. Stems are cut close to the ground and left in the field to wither for a few days, reducing the retting period for fibre extraction. After all leaves are removed, stems are bundled and stored for additional drying. They are then threshed by beating small bundles held by hand against a plank, placed in a sloping position over a threshing mat and pods separated. After threshing, the seeds are stored into jute bags for next year's sowing. Dried stems are then ready for retting. The fibre extracted from harvest of September-October is considered good as far as quality is concerned. Besides thick and long stemmed accessions, some accessions having short stem with thin lint type (Desi) from Danpur and Kallali-Tir villages of Hamirpur district of Uttar Pradesh were also collected.

The steps involved in traditional method of drying, retting, drying and knitting of fibre (Plate 1a-d) are as follows:

***Drying*:** On maturity, the crop is cut from base along with pods and made into bundles. The thick and thin plants of equal sizes are sorted out separately and tied in the bundles of 20-25 cm diam. These bundles are kept straight or laid in the field for drying for 2-3 days and then fruiting branch is harvested after drying. The pod less bundles are kept in the field or on the open places in and around the house or over the branches of

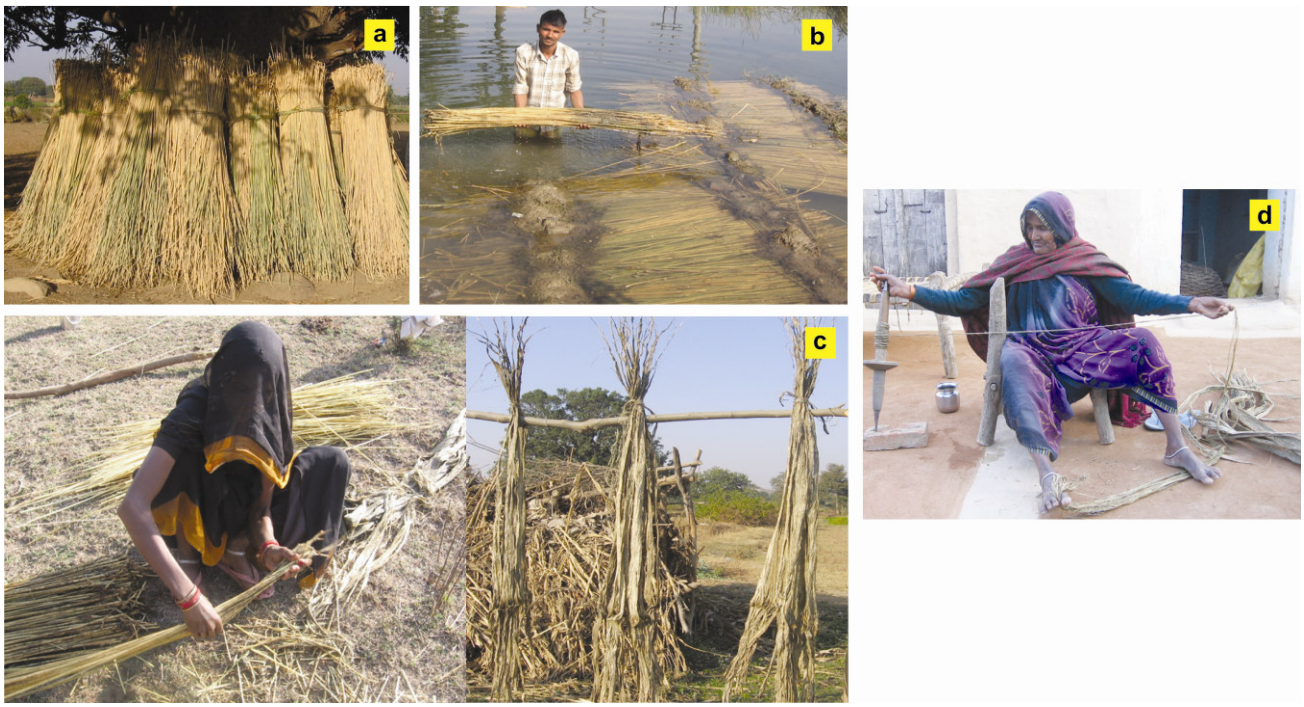

Plate 1—Various stages of Sunnhemp drying, retting and knitting in Bundelkhand- a. Drying of sticks for retting, b. Taking out retted sticks from water for extraction, c. Extraction and drying of raw fibre, d. Knitting of raw fibre using Peedi, Takan-bai and Takali

trees for further drying and shedding of leaves for about 10-12 days. In some areas, the leaves are removed by hand and plants are sent for retting immediately.

***Retting*:** Retting helps in extraction of fibre due to presence of microbes in water bodies being used for retting. Microbial growth seems to be necessary for retting[25], which occurred naturally during the process. Areas where sufficient water for retting is not available, the bundles are kept in the field till next monsoon. These bundles then dipped into water or submerged in nearby water sources, viz. river, ponds, tanks, and streams for about 6-7 days for retting. Stones are put on each bundle to push them into the water for submerging.The farmers believe that the muddy water enhances the rate of retting as compared to clear water may be because of presence of microbes in muddy water.

***Extraction*:** The fibre extraction process takes about 4-5 hours. In this process, after submerging each bundle is taken out from the pool and an individual plant stem is taken off from the bundles to peel off the bark. An individual stick from retted bundle is broken at the top to peel off the bast fibre by applying gentle force downwards. The extracted raw fiber is hanged either on trees, wooden sticks or ropes for drying. The raw fibre is also sold in market at the rate of Rs 10-15/Kg.

***Knitting*:** Knitting is done as per the requirement of ropes; for making ropes, the extracted raw fibre is dipped into the ash mixed water for about 10-15 minutes to make it soft and smooth. For knitting, the moistened raw fibre is hold by toe of right foot on one side and gently pressed with left foot on the other. A wooden structure, which has three main parts *Takali, Takan-bai* and *Peedi,* is used during the process. *Peddi,* a 10-15 cm high wooded frame with four stands knitted with sunnhemp fibre, is used for sitting. The height of one of the stands of *Peedi* is kept high and a furrow is carved on its top called *Takan-bai,* which supports the *Takali* (a spinning article) to take rounds. The raw fibre is now spun manually into a thread and stored onto *Takali.* The entire task is performed by the women folk of the community. For making ropes from spun thread, usually two persons hold both the ends of threads and stand on two opposite directions and take rounds at their place itself for making the rope.

The products prepared from the fibre of this plant play a key role in day-to-day activities related to farming of rural sector. These products are ropes and cordages which are mainly used in making cots, tying cattle in cattle shed, collecting fuel and fodder, etc. The straw of the crop is used as fodder. The flowers are cooked as vegetables in scarcity and considered good for stomach problems. It is believed that the quality and quantity of milk is increased when seeds are used as cattle feed. Seeds are also used as blood purifier, rejuvenator for sick cattle and remove maggot from wound when applied externally. Sticks are used as thatching material and as fuel. The farmers of the Bundelhand region informed that they earn about Rs. 12,500/ha annually by selling the finished products of sunnhemp.

Vanishing diversity in sunnhemp in India

The indigenous practice of extraction of stem fibre from *C. juncea* and other species by retting is a tedious process. Scarcity of water in *Crotalaria* growing areas and intensive labour demand are two main reasons for decreasing interest of the farmers for cultivation of sunnhemp in different parts of India[19, 22]. Besides, the synthetic/plastic made items have completely or partly replaced the marketability of fibre products because of low market price. Recent field surveys and exploratory studies conducted by the National Bureau of Plant Genetic Resources (NBPGR) in Uttar Pradesh, Punjab and Bundelkhand (Madhya Pradesh) have reported sporadic cultivation of sunnhemp on account of water scarcity in past one decade[26].

Conclusion

In the present CBD regime, protection to the indigenous knowledge preserved by the native people is required to check the loss of age old traditions. The indigenous knowledge on sunnhemp fibre extraction being practiced by farming community in Bundelkhand region needs to be promoted in various ways as market promotion will play an important role in making room for fibre products in the outside market. Intensive research and development programmes are still necessary in order to make raw materials available for commercial production of fibre products. A participatory approach through institutional and policy support is required for developing new strategies in fibre based cottage industry as well as reviving cultivation and conservation of sunnhemp in this region.

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