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Sustainable traditional dyeing of wool by *Bhotia* tribe in Himalayan region: A case study

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Abstract

Bhotia tribe is one of the community residing in the high Himalayan region of Uttarakhand state that shares the border with Tibet. The tribe is divided into five sub-groups viz., the *Jadhs*, *Marchas*, *Tolchas*, *Shaukas* and *Rung*. The present study was conducted in the five villages namely Lata and Chinka from Chamoli, Darkot and Baluwakot from Pithoragarh and Dunda from Uttarkashi of Uttarakhand for exploring the information from different sub-groups of *Bhotia* tribe about plants used by them for extracting dyes and used for traditional textile coloration in past and during present time. The rich flora of Himalayan region in Uttarakhand has been abode to varieties of plant species. The wild plant species were used by the *Bhotia* tribals for dyeing their woolen products. These plant dyes were obtained from *jangli palak* (*Rumex nepalensis*), *bagmaru* (*Eupatorium*), *kilmora* (*Berberis asiatica*), *akhrot* (*Juglans regia*), *dholu* (*Rheum aystrale*), tea leaves, *tantri* (*Rheum moorcroftianum*), *kaphal* (*Myrica esculenta*), *darim* (*Punica grantum*), *burans* (*Rhodendron araborium*) and *harda* (*Terminlia chebula*). Today only *Shauka* and *Jadh* tribals are using natural dyes for dyeing woolen yarn. Reasons for the reduction in usage of natural dyes among *Bhotia* tribals were the extinction of plant species, change in land use, natural disasters, government restriction on plucking certain plant species, the availability of synthetic dyes and colored yarns at low cost in the market. The identification of factors that led to the non-practice of sustainable dyeing practice among tribals for woolen craft will help in planning and conducting interventions through public, private and government organizations.

Keywords: Natural dyes, Sustainable, Textile dyeing and Traditional tribal textiles.

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INTRODUCTION

The Himalayan region of Uttarakhand has been known for its rich diversity of flora and fauna. It has been considered as a source of various natural products. The *Bhotia* tribe residing in the high Himalayan region for centuries has utilized this abundant Himalayan flora and fauna in their day-to-day activities (Bhatt *et al.* 2009). The *Bhotia* tribe is divided into five sub-groups viz., the *Jadhs* in Uttarkashi, the *Marchas* and *Tolchas* in Chamoli, and the *Shaukas* and *Rung* in Pithoragarh. *Khampa* is also a sub-group of *Bhotia* tribe, spread all over the Uttarakhand, are the migrants from Tibet (Bhatt, 2016). They also used to weave earlier but now majorly engaged in business, so

the *Khampa* tribe was excluded from the survey. Before 1962, *Bhotia* tribe used to trade with Tibet and were also known as the 'international traders' community. Weaving had been the patronymic business of *Bhotia* people who were involved in weaving well-designed carpets (*dun* and *asan*), blanket (*pankhi*), quail (*law*), quilt (*thulma*) and fabric from self-processed fibers and dyed yarns of wool (Bhatt, 1999). The wool was collected from the sheep reared by them and processed through scouring, carding, spinning and dyeing with traditional indigenous techniques (Srivastava and Goel, 2018). In the present study, different sub-groups of *Bhotia* tribe were explored to gather information about the plants used for extracting

dyes; their usage in textile coloration in the past and status during present times to establish sustainability aspects of the traditional craft in Uttarakhand state.

MATERIALS AND METHODS

Study area and data collection: The descriptive research design was used for the present study. Data was collected from five sub-groups of *Bhotia* tribe i.e., *Tolcha*, *Marcha*, *Shauka*, *Rung* and *Jadh*. One village was selected for each sub-group of *Bhotia* tribe. Hence Lata and Chinka villages located in Chamoli district were taken for *Tolcha* and *Marcha* sub-groups, Darkot and Baluwakot villages located in Pithoragarh district were selected for *Shuka* and *Rung* sub-groups and Dunda village was selected from Uttarkashi district for *Jadh* sub-group (Fig. 1). Further, ten families were selected purposively from each village. Hence the total fifty families constituted a sample for data collection. The sample of the study comprised of 100 percent females as weaving was practiced by women during their leisure time that has now become part of their daily routine.. The selected families were practicing the weaving craft on traditional loom although processing materials has been affected due to technological advancement. The information was collected through a



Fig. 1. Showing villages (encircled) of the study area.

survey utilizing interview schedule and checklist developed by the researcher and assessed by the panel of Clothing and Textiles experts. Photography was done to collect visuals of the materials used in wool fiber processing and observation of the process was done to establish the actual process of dyeing.

RESULTS AND DISCUSSION

The data collected through personal interview method is tabulated and analysed under the following heads.

General description of *Bhotia* tribe: The *Bhotia* tribe, before 1960 used to trade with Tibet and

Table 1. General profile of weavers from *Bhotia* tribe (n=50).

S.N.	Parameter	Variables	Sub-groups of <i>Bhotia</i> Tribe (%)					Total (%)
			<i>Tolcha</i>	<i>Marcha</i>	<i>Shauka</i>	<i>Rung</i>	<i>Jadh</i>	
1.	Age (in years)	20-30	20	10	50	40	30	30
		31-40	---	---	20	30	40	18
		41-50	70	30	20	20	30	34
		51-60	10	20	---	10	---	8
		61 and above	---	40	10	---	---	10
2.	Education level	Illiterate	50	40	20	30	---	28
		Primary School	20	40	10	20	20	22
		Middle School	10	---	---	---	---	2
		High School	---	---	20	---	20	8
		Intermediate	20	10	40	20	20	22
		Graduate	---	10	---	20	30	12
	Post Graduate	---	---	10	10	10	6	

Table 2. Traditional plant dyes used by *Bhotia* tribe.

S.N.	Local name	Botanical name	Parts used	Colour yield	Availability	Wild/ cultivated
1.	<i>Jangli palak/ Khukhuyinya*</i>	<i>Rumex nepalensis</i>	Root, stem	Yellow	Common	Wild
2.	<i>Bagmaru*</i>	<i>Eupatorium</i>	Leaves	Green	Common	Wild
3.	<i>Kilmora</i>	<i>Berberis asiatica</i>	Root	Yellow	Rare	Wild
4.	<i>Akhrot*</i>	<i>Juglans regia</i>	Bark and outer covering of seeds	Rust brown, maroon	Common	Cultivated
5.	<i>Dolu</i>	<i>Rheum aystrale</i>	Root	Yellow	Rare	Wild
6.	<i>Kaphal</i>	<i>Myrica esculenta</i>	Bark	Yellow, maroon	Common	Wild
7.	<i>Haldi*</i>	<i>Curcuma longa</i>	Root	Yellow	Common	Cultivated
8.	<i>Tantri/ Archa</i>	<i>Rheum moorcroftianum</i>	Root	Yellow	Rare	Wild
9.	<i>Darim</i>	<i>Punica grantum</i>	Fruit rind	Yellow	Common	Cultivated
10.	<i>Burans</i>	<i>Rhodendron araborium</i>	Flower	Pink, Maroon	Common	Wild
9.	<i>Harda*</i>	<i>Terminlia chebula</i>	Fruit	Black	Common	Cultivated

* Plant material still in use by the *Bhotia* tribal for dyeing their woolen yarn

Table 3. Stages in production process of traditional textiles.

S.N.	Stages	Traditional method			Conventional method		
		Raw material	Equipment used	Waste generated	Raw material	Equipment used	Waste generated
1.	Shearing	Fleece	Scissor	Fiber	Fleece	Electric shear	Fiber
2.	Grading	Fleece	Grading table	Stain wool	Fleece	Grading table	Stain wool
3.	Scouring	Fleece and reetha	Tub	Fiber, dust grease and reetha solution	Fleece and detergent	Tub	Fiber, dust grease and detergent solution
4.	Sorting	Scoured wool	--	Teasels and fibre lint	Scoured wool	--	Teasels and fibre lint
5.	Carding	Wool	Hand carder	Dust and fibre lint	Wool	Carding machine	Dust and fibre lint
6.	Spinning	Wool	Charkha and Takli	Fibre lint	Wool	Charkha and Takli	Fibre lint
7.	Dyeing	Plant material	Dyeing vessel	Colour, plant material, fibre lint	Synthetic dyes	Dyeing vessel	Colour, fibre lint, synthetic dye
8.	Weaving	Yarn	Loom	Threads and cloth scarp	Yarn	Loom	Threads and cloth scarp

had accepted the woolen industry as an essential part of their lifestyle. Men used to trade woolen products prepared by women at home in cold winter months during their leisure time. The four sub-groups of *Bhotia* tribe follow the Hindu religion except for *Jadh* who also follow Buddhism. *Bhotia* people live in remote hill areas of Uttarakhand state. They have permanent houses for the summer and winter season at distinct locations. During summer they used to move to the high altitude village for farming and in the winters they come to the lower regions and, carried out woolen craft particularly weaving. Weaving tradition used to be adopted as a hobby by the young girls aged between 12 to 15 years. The young girls used to get their lessons from their mother and grandmother during the winter season.

The present study indicates that the age of weavers ranged between 20 to 50 years which shows that the younger generation is also adopting their traditional craft of weaving. However, the number of weavers above 50 years was found decreasing. The possible reason might be general health and eyesight related problem which is generally seen at this time of life cycle. Maximum weavers among the selected respondents (28%) were illiterate and 22% weavers were educated up to primary and same percentage of weavers were educated up to intermediate level i.e., 20% (Table 1).

Dyeing tradition of *Bhotia* tribe: The traditional method of producing woolen products among *Bhotia* tribals in past was more sustainable in nature i.e., it was a socially acceptable craft, had no or very less impact on the environment and was remunerative in nature. The processing steps involved from procurement of fiber to dyeing of yarn were shearing, grading, scouring, carding, spinning and dyeing (Dantyagi, 1983) as follows:

Shearing: It refers to the removal of hair from the animal. Earlier, the shearing of sheep was performed with the help of scissors by the local people. It was a very tedious and time-consuming process. Tribal people used to shear twice a year between the months of April-May after winter and September-October after the rainy season.

Grading: It is a process of separating the wool according to the quality. The tribal people separated the body wool and stain pieces manually from the bulk of fibers using grading table. The wool was also graded according to the length and fineness. Long and fine length wool were generally used for making clothing fabric while the coarse fibers were used for making quilts and carpets.

Scouring: It is done to remove all the impurities adhered to the wool fibers like dust, stain, grease etc. The warm water method was used by *Bhotia* tribal for scouring wherein, the wool fibers were soaked till water turns lukewarm. The warm water was obtained from natural hot water source rather than boiling. The *reetha* (*Sapindus mukorosii*) so-

lution was added to the boiling water, in case wool fibers were highly soiled. The fibers were taken out and beaten with the wood stick of *ruees* (*Cotoneaster affinis*). The specialty of the stick was that while beating it wouldn't break easily and left no wooden residue in the wool. Then the wool fibers were rinsed with lukewarm water and dried in sun. It generally took 2 to 3 days for wool to completely dry up. The scouring process improved the aesthetic quality of the fiber. After washing, the teasels present in the wool were hand-picked, making it tedious and time-consuming process. Fineness, length, softness, and color of the wool determined its use. Thus, scouring and cleaning of wool were essential preliminaries before carding.

Carding: It was performed manually by carding brushes which were made of wood with fine, flexible nails on the surface. The wool fibers were spread on the surface of one card/ paddle and another card was used to brush. It removed the physical impurities and short fibers and further aligned the fiber along one direction.

Spinning: The spinning was done on *Bageshwari charkha* or *taku/takli*. The carded wool fibers were held in the left hand and fed to the charkha driven by the treadle or *taku/talki* driven by right hand. *Taku* was a small spinning machine and was portable. For making thick yarn *taku* was used while for making fine yarn *charkha* was used. The prepared yarn was then wrapped around the bobbin. The amount of twist in yarn depend upon the nature of the fiber and purpose for which the yarn was to be used while weaving. Long fibers need less twist to hold them strongly together than short ones. Thick yarn needed less twist than finer yarns.

Dyeing: It was used to color the woolen yarn. The yarns were dyed in hanks using open bath container and aqueous method. The natural dyes were used by *Bhotia* tribals for dyeing which was extracted from plant resources collected from nearby forest areas. The dye yielding plant materials were not cultivated in the locale but instead grew abundantly in wild. Collecting these materials from the forest areas was a seasonal job. The procedure of dyeing included drying of plant material and grinding it into powder form. The dye was extracted through overnight soaking and aqueous boiling method, its filtrate was used as a dye solution. The hanks of yarn were dipped in the hot filtrate, stirred continuously until the dye solution turns lukewarm. The soda ash was added for improving color properties. Then the hanks were rinsed in cold water and hung for drying. The plants used mainly as dye sources were *jangli palak* (*Rumex nepalensis*), *bagmaru* (*Eupatorium*), *kilmora* (*Berberis asiatica*), *akhrot* (*Juglans regia*), *dolu* (*Rheum aystrale*), tea leaves, *kaphal* (*Myrica esculenta*), *haldi* (*Curcuma longa*), *tantric* (*Rheum moorcroftianum*), *darim* (*Punica*

granatum), *burans* (*Rhodendron araborium*) and *harda* (*Terminlia chebula*) (Sharda and Rastogi, 2013).

Table 2 depicts the details of the dye yielding plants used by the *Bhotia* tribals. Sustainable textile processing involved processes utilizing eco-friendly resources and method of production that had little or no effect on the environment and generated sufficient revenue/ economic benefits. Table 3 displays the materials used in different processes and type of waste generated after processing of wool fibers by the traditional and conventional method. The traditional wool processing generated waste in the form of dust, fiber lint and soiled water from scouring and dyeing processes. The fiber lint constituted of solid waste and was bio-degradable in nature. The effluent generated from scouring was released in water bodies as scouring was usually carried out in flowing water near the hot water spring. Scouring process released only the wool grease and *reetha* nut extract whenever it was used. The effluent released after the process didn't contain any chemicals. For washing/ scouring, *Reetha* nut (*Sapindus mukorosii*) was used. *Reetha* contains saponin, a natural detergent which was used for cleaning wool fiber and it is an environmental friendly material (Puskar, 2012). The yarns were dyed with natural colors in a small quantity on a particular season and used throughout the year. The characteristic of effluent was dependent upon type of material used in the process. Natural plant dyes used by the tribal community for dyeing woolen yarns involved the use of minimal chemicals. Dyeing was carried out in the households to a very small scale. Hence the lefts over dye bath were discharged on the land around the household where it easily degrades.

Current scenario of wool processing: The conventional method of wool processing used presently amongst *Bhotia* tribal has changed. The ingredients used in wet processing presently were mainly non-bio-degradable in nature. It is clear from Table 3 that in conventional methods, use of *reetha* nuts had been replaced by detergents for scouring/ washing process and synthetic dyes had substituted natural dyes to a large extent. Although few natural dyes were in use among *Bhotia* tribes for wool coloration, as given in Table 2 with an asterisk (*) mark. These were particularly used by craftsmen of *Shauka* and *Jadh* sub-groups of *Bhotia* tribe for dyeing woolen yarn. The craftsmen of other sub-group had started to use synthetic dyes for coloring wool yarn. Reasons for increased use of detergents and synthetic dyes were their easy availability at low cost and ease in the application during scouring and dyeing, respectively. The effluent released from these two processes was not treated and directly released in the water bodies.

The dyeing with synthetic dyes needed the use of

a little amount of *tezaab* (acid) for maintaining acidic pH of dye bath as wool was dyed in acidic media for better exhaustion and improved colour fastness (Chattopadhyay, 2011). The acidic dye effluent resulted in high BOD and turbidity which affected the quality of water. Thus, there would be an adverse impact on the environment due to conventional scouring and dyeing methods used by craftsmen of *Bhotia* tribe. In the present scenario, both the scouring and dyeing processes were prevalent in each household. The exception was observed in the cases where natural products were used, scouring was still carried out near hot water sources. The effluent from households were released into the drainage system, which led to the flowing water bodies. The very recent development under Namami Ganga project (2015) was the establishment of the sewage treatment plant in hill areas which might also reduce the impact of synthetic materials in scouring and dyeing processes.

Reasons for the reduction in usage of natural dyes by *Bhotia* tribals: There would be various socio-economic and technical factors which resulted in shifting of *Bhotia* tribes from natural resources to the synthetic resources for wool processing. The factors can be stated as:

Traditionally dye materials were collected from the forest area, but today it has been affected by-

- Reduced forest cover due to government and private infrastructure.
- Increase in human population led to increased pressure for cultivated lands, which in turn affected the forest area to fulfill the needs.
- Increased incidence of forest fire and natural calamities like frequent landslides which have reduced the availability of wild plants.

Seasonal and regional specificity of dye yielding plant.

Tedious and time-consuming collection and extraction process.

Limited range of color obtained from natural dyes.

Poor fastness properties of natural dyes.

Development of only subtle shades i.e. bright colors are not available.

Establishment of medicinal characteristics of wild plants resulting in their limited use for high-value pharmaceutical products.

Government restriction in use of certain plant species owing to their categorization as endangered species.

Migration of *Bhotia* tribals to the different geographic location with limited or non-availability of required natural resources.

Conclusion

The woolen handloom craft practiced among *Bhotia* tribals in Uttarakhand has a long history. The processing steps and tools used for the manufacturing are still primitive as compared to the other

woolen product producing states of India. The traditional process of manufacturing wool textiles by the *Bhotia* tribe was more sustainable as compared to the recent process. The conventional process has been improved due to the advancement in technology which resulted in increased use of manufactured resources that are mostly synthetic in nature. The *Bhotia* tribals have adopted conventional method for the sake of low cost and easy application. Hence there is a need to promote awareness among this tribal communities about the sustainable character of traditional indigenous woolen craft. This will improve not only the market value of their products due to eco-friendly nature but will also upsurge the woolen cottage industry in Uttarakhand. This effort will further increase possibilities of self-employment for tribals and will reduce their migration from the hills.

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