

Processing of nettle (*Girardinia diversifolia*) in the units of Uttarakhand

■ NEHA GARG, KANWALJIT KAUR BRAR AND HARINDER KAUR SAGGU

Received: 17.07.2017; Revised: 08.11.2017; Accepted: 23.11.2017

■ **ABSTRACT** : Sixteen nettle units established in Chamoli and Uttarkashi districts of Uttarakhand by Uttarakhand Bamboo Fibre Development Board were surveyed to document the production processes of nettle textiles. There were five fibre processing units and three spinning units with total strength of 310 workers. Nettle plants were collected from hilly areas by workers without paying any cost to the land owners. Nettle stalks were subjected to running water retting, beating and washing, bleaching with kaoline paste followed by carding and spinning. From one kilogram of nettle bark 400 g fibres could be extracted. Ultimately 300 g nettle yarn could be obtained from one kilogram nettle bark. Opening of nettle enterprise holds a promising opportunity for the economic upliftment of rural people.

■ **KEY WORDS**: Nettle, Technical process, Employees

■ **HOW TO CITE THIS PAPER** : Garg, Neha, Brar, Kanwaljit Kaur and Saggu, Harinder Kaur (2017). Processing of nettle (*Girardinia diversifolia*) in the units of Uttarakhand. *Asian J. Home Sci.*, 12 (2) : 602-608, DOI: 10.15740/HAS/AJHS/12.2/602-608.

See end of the paper for authors' affiliations

NEHA GARG

Department of Apparel and Textile
Science, College of Home Science,
Punjab Agricultural University,
LUDHIANA (PUNJAB) INDIA

The nettle plant was earlier used extensively in Europe for making clothes, until 16th century when cotton was brought to the country. Nettle lost its popularity, since cotton was much easier to harvest and spin. However, it has been found to be used until 18th century in Europe for making sturdy household clothes. Nettle made a brief come back during First World War when Germans fell short of cotton and nettle substituted cotton in soldiers' uniforms. Nettle production started in Europe in the 19th century. During the Second World War also they remained a popular choice, however, during this time other cheaper fibres became more readily available (Anonymous, 2005). Nettle or *Bichu Buti* is a fibre that grows wild as undergrowth particularly in Chamoli and Uttarkashi districts in Uttarakhand. The

stem fibres are pliable which are used to weave or knit fabrics. Stinging nettle is found growing in temperate and sub-tropical area of Uttarakhand. The fibre is present in the inner bark of the stalk and undergoes various processes from harvesting to finishing (UBFBD, 2011). Uttarakhand Bamboo Fibre development Board has been making efforts to promote nettle production which has great scope for self-employment of the rural people. The study has been conducted with the objectives mentioned below.

- To study profile of nettle units of Uttarakhand districts.
- To acquaint the knowledge regarding technical processes involved in manufacture of nettle yarn.

RESEARCH METHODS

This study was conducted in Chamoli and Uttarkashi districts of Uttarakhand. Sixteen nettle units were found in Chamoli and Uttarakashi districts, out of which four units in each district were taken for the study. An interview schedule was prepared to obtain relevant information from the managers/supervisors of the units regarding the production processes in the manufacture of nettle yarn. The information regarding nettle units and its employment pattern was gathered and documented.

RESEARCH FINDINGS AND DISCUSSION

There were sixteen nettle units in Chamoli and Uttarkashi that were established by Uttarakhand Bamboo Fibre Development Board under the scheme of Campa Uttarakhand and Integrated Liability Support Project to promote self employment of skilled workforce.

Profile of nettle units :

The four units in Chamoli district namely, Mangroli, Trikot, Trishula and Nagali and four units in Uttarkashi district namely, Gajoli, Shrikot, Panow and Pani Gaon were selected for the study. There were two nettle fibre processing units, and two spinning units in Chamoli. But in Uttarkashi, there were three fibre processing units and one spinning unit. Besides, these units were carrying out processing of cotton as well.

Socio-personal traits of managers/supervisors of nettle units :

Nettle units were managed by the managers/supervisors working under UBFDB. Data in Fig. 1 indicate that 37.50 per cent each unit managers/supervisors as respondents from Chamoli and Uttarakashi districts of Uttarakhand were found both under age group of 25 to 35 years and between 45 to 55 years, whereas only 25.00 per cent of them were found between 35 to

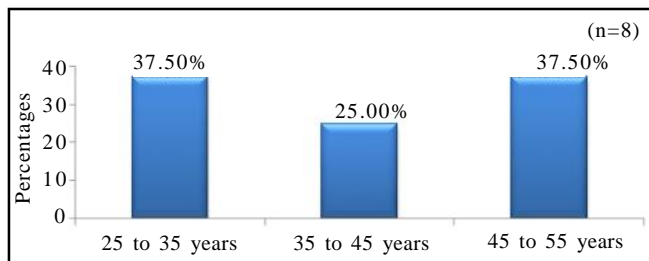


Fig. 1 : Age group of respondents in Uttarakhand nettle units

45 years of age. Fifty per cent of respondents in Uttarkashi district were found upto the age of 25 to 35 years followed by 25.00 per cent of respondents each falling under 35 to 45 years and 45- 55 years of the age group, respectively. None of the respondents was found above 55 years of age in both the districts.

It was observed from the results that majority of respondents (62.50%) in Uttarakhand were educated up to graduation level and rest of them (37.50%) were matriculate (Fig. 2). Majority of respondents in Chamoli district were graduate (75.00%) and only 25.00 per cent of them were matriculate. In Uttarkashi district, 50.00 per cent respondents were matriculate and 50.00 per cent were graduate. None of the respondents were found to be post graduate in both the districts.

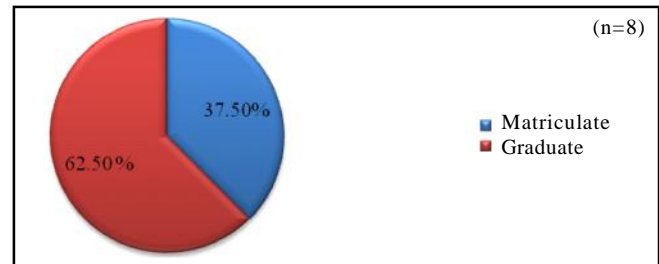


Fig. 2 : Educational status of respondents in Uttarakhand nettle units

Employees working in nettle units and their salary:

The data indicate that out of the total eight units, the employees were working as managers in three units, in rest of the five units there were posts of supervisors. The monthly remuneration by Uttarakhand Bamboo and Fibre Development Board, paid to these employees was Rs. 12000.00 for managerial post, whereas it was Rs. 11666.67 for the supervisors (Fig. 3). It was also observed

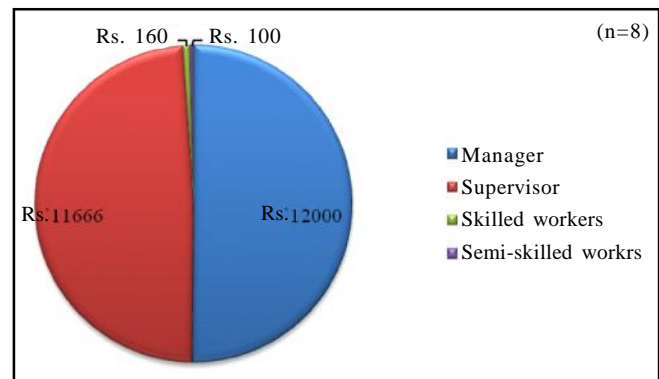


Fig. 3 : Salary/wages of managerial staff and workers

that no female employee was working either as manager or as supervisor in any of the units in Chamoli and Uttarkashi districts.

Number of workers :

There were 310 total workers performing various production activities in the units (Table 1). Out of which skilled female workers (37.09 %) were more than male workers (24.19 %). Similarly, there were 25.81 per cent semi-skilled female workers and rest were the male worker (12.91%). No unskilled workers and child workers were found working in any of the selected units.

Table 1 : Number of skilled and semi-skilled workers (n=310)		
Skill level of workers	Workers	
	f	%
Skilled workers		
Male	75	24.19
Female	115	37.09
Semi-skilled workers		
Male	40	12.91
Female	80	25.81

f= Frequency, % = Percentages

The data show that Rs. 160 (approx) per day (8 hours) were given as daily wages to the skilled workers irrespective of their gender and on an average Rs. 100 per day (8 hours) were given as daily wages to semi-skilled workers (Fig. 3).

Technical processes involved in manufacture of nettle textile (Plate 1-15) :

Nettle is a grass specie found in the upper reaches of Himalaya range of India and Nepal. The plant requires rich soils with high organic matter and good moisture content. It was observed that it grows in abundance at the halting points of shepherds. This indicates that the plant grows well near the areas where there is at least some human activity. It is also observed to be thriving in areas having a good forest canopy, with heavy leaf litter fall (UBFBD, 2011).

Harvesting :

Harvesting of nettle or *allo* was done from November to January. After harvesting the plant, the outer dead bark was removed and inner bark (bast fibre) was peeled. If the harvested plant was dry, then it was soaked in water for a day before peeling the bark (Plate

1).

Retting :

Retting is a process of subjecting the plant material to the action of micro-organisms and moistures to rot away most of the woody cellular tissues and pectins present around the fibre bundles to separate of the fibres from the stem (Anonymous, 2009). Controlled retting is done to loosen and remove gummy (pectinous) substances which glue fibres together particularly, in case of all the bast fibres. Retting can be carried out in a number of ways:

- Water retting - Stalks were left in water, and were acted upon by the bacteria.

- Dew retting - Stalks were left out in the field for six weeks, and were acted upon by the fungi.

- Chemical retting - Stalks were placed in chemical solution.

Amongst these methods dew retting is more commonly used as chemical methods tend to damage the fibres (Gurung *et al.*, 2012). In Uttarakhand retting of nettle bark was mainly carried out in the running water of river or stream. But sometimes, it was also carried out in the retting pits having still water (Plate 2).

Sun-drying and bundling :

The bark obtained after retting could be dried in one day depending on the weather. Dried peeled barks were bundled and stored in a well ventilated room (Plate 3 and 4).

Degumming :

Inner barks were cooked in a drum containing water and ash of any kind of wood to make cooking of dry ribbon more viable in terms of consumption of fuel wood and extracted fibre ratio. Degumming process takes nearly four hours, but time required for cooking fresh bark was comparatively lesser. When caustic soda (NaOH) was used instead of wood ash (calcium carbonate), it took one and a half hours to complete the process. Wood ash was preferred by all the units since it did not irritate to the skin (Plate 5).

Beating :

Usually cooked fibres were washed out in running water of river accompanied by frequent beating with wooden mallet or hammer. The beating and washing in

running water was repeated for two to three times. One worker was required for one day to beat 18 kg of cooked fibres (Plate 6).

Bleaching :

The fibres thus extracted were mixed with rice husk (chaff), or maize flour, or in a white clay (kaoline) $Al_2Si_2O_5(OH)_4$ (dicotanhedral phyllosilicate clay) paste to bleach the pulp to obtain white shining fibres and to make these soft. The main use of the rice husk was to make the fibres soft and suitable for spinning (Plate 7).

Washing, cleaning and drying :

After bleaching, the clay flour or chaff was removed by washing and repeated beating. Then, extracted fibres were dried through sun drying method (Plate 8 and 9).

Opening and carding :

The entangled mass of fibres goes through the opener and then carded in a carder (Plate 10 and 11).

Spinning :

After opening and carding, the fibres were ready for spinning to convert into yarn. Mostly, female workers were involved at all stages of collection and processing. The spinning can either be done with self-constructed hand spindle made of wood or with spinning wheel. Spinning on the hand spindle is slower than using a wheel. But the hand spindle is preferred because it is very light to carry, and women find it handy and suitable for spinning. The fineness of the yarn depends largely on

the skill of the spinner and also on the quality of the fibres. Nettle was hand spun by using a *Bageshwari charkha* (Plate 12).

Weaving :

Only frame loom was used for the outsourced weaving process in the both districts (Chamoli and Uttarkashi). Two persons were required to fix the loom. After setting the warp on loom, weaving was done by intersecting the longitudinal threads, the warp, *i.e.*, “that which was thrown across”, with the transverse threads, the weft, *i.e.* “that which was woven”. In the loom, yarn processing included shedding, picking, battening and taking-up operations. These were the principal motions. Shedding, in which the ends were separated by raising or lowering harness frames to form a clear space, where the pick was passed. Picking in which the weft or pick was propelled across the loom by shuttle. Beating-up, or battening, in which the weft yarn was pushed up against the fell of the cloth by reed. Every time the harness moved up or down, an opening was made between the threads of warp, through which the pick was inserted. Then, the weft thread was inserted by a shuttle. The weft thread was carried on a pirn, in a shuttle that passes through the shed. When a pirn was depleted, it was ejected from the shuttle and replaced with the next pirn. The constructed fabric must be wound on a cloth beam that was called taking-up. At the same time, the warp yarns must be let off or released from the warp beam that was called letting-off (Plate 13 and 14).



Plate 1 : Harvesting of nettle plant



Plate 2 : Retting of nettle stalk



Plate 3 : Sun drying of nettle bark



Plate 6 : Beating of nettle fibres



Plate 4 : Bundling of nettle residue



Plate 7 : Kaoline bleaching of nettle fibre in progress



Plate 5 : Degumming of nettle fibres



Plate 8 : Washing of nettle fibres



Plate 9 : Drying of nettle fibres



Plate 12 : Spinning of nettle yarn on Bageshwari charkha



Plate 10 : Opening of nettle fibres

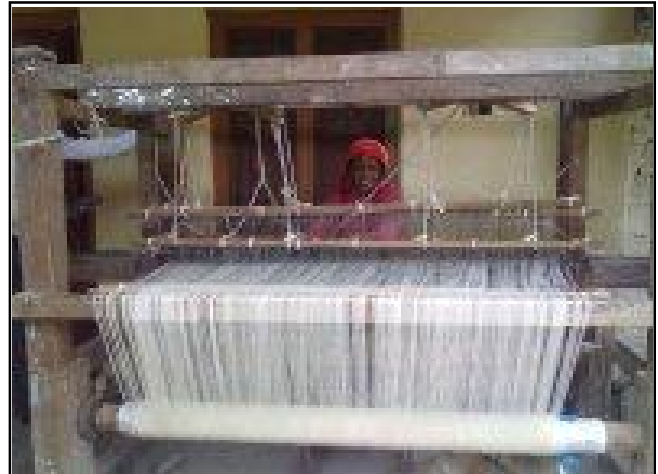


Plate 13 : Weaving on frame loom



Plate 11 : Carding of nettle fibres



Plate 14 : Finishing of nettle fabric

Table 2 : Cost variables of pure nettle yarn

Cost variables	Quantity	Amount (Rs.)
Nettle stalks	1 kg	50
Processing (retting, degumming, bleaching and washing)	1 kg	40
Fuel and other tools	1 kg	10
Carding and spinning	400g	125
Cost of nettle yarn	300g	225

Finishing :

The yardage was finished by milling. It was a cutting process where a milling cutter was used to remove material from the surface of a work piece. The milling cutter was usually a rotary cutting tool, often with multiple cutting points. As opposed to drilling, where the tool was advanced along its rotation axis, the cutter in milling was usually moved perpendicular to its axis so that cutting occurs on the circumferences of the cutter (Plate 15).

Cost estimation of nettle yarn :

Nettle cultivation cost was nil since it is a wild forestry plant. The data depict that labour and transportation cost of nettle stalks was Rs. 50 per kg. Its processing (retting, degumming, bleaching and washing) cost was reported as Rs. 40 per kg. Cost of fuel and other tools was calculated at the rate of Rs. 10 per kg. The process of converting fibres to yarn, *i.e.* carding and spinning were the major cost component of the process. The cost of these processes was Rs. 125 per 400 g as only 400 g nettle fibres could be extracted from one kilo gram nettle stalks. Only 300 g nettle yarn was obtained after carding and spinning process of 400 gm nettle fibres. Thus, cost of one kilo gram of nettle yarn was Rs. 750 (Table 2).

Hartl and Vogl (2003) mentioned that pressing issue related to Puwa (nettle) sector was that research development activities need to focus on domestication, cultivation, regeneration and commercialization by the communities in order to preserve their precious culture and to convert this traditional knowledge into a local

enterprise.

Conclusion:

Natural raw material of nettle is abundantly available free of cost. Besides, very simple tools and equipment or processes are used for fibre extraction and manufacture of nettle textiles. Very soft and attractive nettle fabrics and handloom products were developed. Nettle enterprises hold an encourage potential of growth.

Authors' affiliations:

KANWALJIT KAUR BRAR AND HARINDER KAUR SAGGU,
Department of Apparel and Textile Science, College of Home Science,
Punjab Agricultural University, LUDHIANA (PUNJAB) INDIA

REFERENCES

- Anonymous (2005). Fibres from Nettle and Hemp Wild Fibres natural fibres. <http://www.h:/Natural.htm>
- Anonymous (2009) In Encyclopedia Britannica <http://en.m.wikipedia.org/wiki/Retting> (retrieved on June 03, 2009).
- Gurung, A., Flanigan, H., Ghimeray, K.A., Karki, R., Bista, R. and Gurung, P.O. (2012).** Traditional knowledge of processing and use of the Himalayan Giant Nettle (*Girardinia diversifolia* (Link) Friis) among the Gurungs of Sikles, Nepal. *J Plants People and Applied Res* **10**:167-74.
- Hartl, A. and Vogl, C.R. (2003).** Production and processing of organically grown fibre nettle (*Urtica dioica* L.) and its potential use in the natural textile industry: A review. *J. Amer. Alt. Agri.*, **18**: 119-28.
- UBFDB (2011) *Himalayan Nettle*. Uttarakhand Bamboo and Fibre Development Board. Uttarakhand, India.

12th
Year
★★★★★ of Excellence ★★★★★