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Traditional soap and detergent yielding plants of Uttaranchal

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Transmission of traditional knowledge from one generation to another is a vital tool for assessing the evolution of human civilization. Rural communities, particularly in the hilly areas have developed various techniques for utilization of plants according to their needs. There are a number of plant species used as soap and detergent in the hilly areas, where access to market is not possible. Now, due to change in socioeconomic and cultural conditions of these communities, they have abandoned the traditional use of plant species. Consequently, the existing traditional knowledge in respect to plant uses has disappeared. In view of this, an attempt has been made to document the plant species used as soap and detergent in Uttaranchal and local processing techniques with an aim to preserve the centuries old traditions of the society.

Keywords: Traditional soap, Traditional detergent, Natural soap, Natural detergent, Traditional knowledge, *Tharu, Boxas, Jaunsaris, Rajis, Bhotiyas*, Kumaun, Garhwal, Uttaranchal
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The traditional uses of plants and plant products are basis for human survival on the earth. Native inhabitants have used a variety of plants traditionally since ancient times. Wild economic plants constitute a larger portion of food consumed by local inhabitants in tribal and hilly areas[1,2]. A detailed account of wild edible plants including plant uses in Himalayan region has been enumerated[3,4]. A number of plants and plant formulations have been documented for maintaining a reasonable level of health with the application of associated traditional knowledge[5-7]. Likewise, plants used as soaps and detergents in different regions have also been described [8-10]. Uttaranchal state covering Kumaun and Garhwal regions is known for its rich vegetation wealth and cultural heritage. The inhabitants of this part of Himalaya are still using a number of plants as soaps and detergents. About 10-12 tribal communities, viz. *Tharu, Boxas, Jaunsaris, Rajis,* and *Bhotiyas* other than the non-tribal communities *Kumaunis and Garhwalis,* inhabit the remote localities of this region. The occurrence of these plants varies with the variation in altitude, temperature and micro-climatic conditions of the region. Indigenous plant species used as soaps and detergents in different localities of Uttaranchal hills have been documented along with associated traditional knowledge related to their use and process involved. Presently, the traditional approach of utilization of plants is being ignored by modern society in the region. With this objective, concerted efforts can be initiated for conservation and utilization of these plant resources by applying modern scientific techniques to upgrade the socioeconomic condition of the local inhabitants.

Methodology

An interview schedule was developed and data were collected from the primary sources. A flexible approach was adopted by using a less structured/ unstructured interview schedule. Data on uses and processing techniques were gathered by interviewing randomly selected farmers/respondents, from 5 district of Kumaun Himalaya (Nainital, Champawat, Almora, Bageshwar and Pithoragarh). From each development block of these districts, 3 villages were randomly selected. In each selected village, 5% farmers belonging 18 to above 60 year's of age group represented by 27.52% female and 72.48% male participants were randomly selected for interview. Lottery system was adopted for randomization. A total of 33 development blocks, 99 villages and 298 respondent farmers were sampled. The respondents were interviewed thoroughly as per the interview schedule and the information was recorded. The vernacular names were recorded in *Kumaoni* language in majority of cases.

During survey, different sites were visited and the availability of germplasm and habitat degradation status was observed carefully by holding discussions with the local people, who have explained about

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various factors responsible for degradation of economic species in the region. A non-participant observation method was used to explore the availability of soap and detergent yielding plants in the region. After compilation and tabulation of data, the coefficient of correlation by using the Karl Pearsons technique of coefficient of correlation and Regression Coefficient were drawn. Age groups, sex, caste, literacy level and annual income of the respondents were selected as constant variables and number of soap substitute plants as dependent variable.

Results

Plants and plant based products (Table 1) and detailed processing techniques (Table 2) involved in the utilization of plant material as soap and detergent by the local communities are mentioned. Processing technique of plant material is the outcome of traditional knowledge developed by the local inhabitants since time immemorial. The farming communities of Kumaun Himalaya are using a total of 22 plant species as soaps and detergents. The number of plants used as soaps and detergents vary from locality to locality, ranging from 2-14 species. The difference in availability status of plants is highly significant. The occurrence of plants up to an altitude of 2000 m shows positive correlation and beyond that it shows negative correlation; hence the number of plants being used as soap and detergent substitutes is declined with the increase of altitude. Number of plants used by the inhabitants in different altitudes (200-2800 m) depends on the availability of plant species around them. People living between 1500-2000 m altitude use maximum 14 plant species (63.63%) as soap and detergent. As far as the number of plants used as soap and detergent is concerned, it reveals that out of 22 plant species, 11 plant species are used as a bathing soap, 9 as a washing soap and 2 as both bathing and washing purposes. In terms of percentage, they are 50%, 40.90% and 9.10%, respectively.

The number of plants used as soaps and detergents vary from locality to locality, ranging from 2-14 species (Figs 1-6). Difference in availability status of plants is highly significant. The occurrence of plants up to an altitude of 2000 m shows positive correlation and beyond that it shows negative correlation; hence the number of plants being used as soap and detergent substitutes is declined with the increase of altitude. Number of plants used by the inhabitants in different altitudes (200-2800 m) depends on the availability of

Table 1 — Plants used as soaps and detergents by the local communities

Plant name	Local name	Use	Plant parts used
Aesculus indica *Griff.*	*Pangar*	Washing	Seeds
Agave spp.	*Rambans*	Washing	Leaves & young shoots
Asparagus filicinus *Buch-Ham.*	*Kairua*	Washing	Tuberous roots
Bassia butyrasia *Roxb.*	*Chura*	Washing	Seeds
Bauhinia vahlii Linn.	*Malu*	Bathing	Bark & tender shoots
Boehmeria rugulosa Wedd.	*Gethi*	Bathing	Bark
Ceiba pentendra (L.) Gaertn.	*Semal/Kapasu*	Bathing	Young shoots & bark
Chaerophyllum villosum *Wall. ex. DC.*	*Jangli gazar*	Washing	Tubers
Dioscerea belophylla *L.*	*Tarur*	Washing	Tubers
Dioscorea bulbifera *L.*	*Genthi*	Bathing	Young shoots
Eleusine coracana *(L.) Gaertn.*	*Madua*	Washing	Husk ash
Fagopyrum cymosum (D. Don.) Hara.	*Jhangara/ Pyakan*	Bathing	Stem & leaves
Gonostegia sp.	*Jiphal-jadi*	Bathing	Roots
Grewia optiva *Drummond.*	*Bhimal*	Bathing	Bark & young shoots
Impatiens balsamina L.	*Bud-til*	Bathing	Stem
Ipomoea cairica L.	*Bharad*	Bathing	Seeds
Litsaea chinensis Lam.	*Chatad*	Washing & Bathing	Seeds & cakes
Malva sylvestris *L.*	*Kunzi*	Washing	Roots
Quercus leuchotrichophora L.	*Banj*	Washing	Ash
Sapindus mukurossi Vahl.	*Reetha*	Bathing & washing	Seed coat
Sesamum indicum L.	*Til*	Bathing	Leaves
Sida rhombifolia *L.*	*Bhuinli*	Bathing	Bark

Table 2 — Processing techniques of traditional soap and detergent substitute plants

Plant species	Local processing technique
Aesculus indica Griff. (*Pangar*)	Seed coat of nut is removed by striking with a stone; after removing seed coat, seeds are boiled in the water for 15-30 min. Boiled seeds are crushed and cakes are made from it. These cakes are used as washing soap in the interior areas, particularly in *Bhotia* dominated belt of Munsyari in Pithoragarh district.
Agave spp. (*Rambans*)	Tender shoots and leaves are crushed with the help of a stone. The crushed shoots and leaves are rubbed on the water soaked clothes. It produces a kind of lather useful for washing of clothes only. It is not used for bathing.
Asparagus filicinus Buch-Ham. (*Kairua*)	Its tuberous roots are crushed with the help of a stone and rubbed on the wet hairs and body skin as soap. It is also used as washing soap.
Bassia butryasia Roxb. (*Chura*)	Sweet fruit bulb of *Chura* is consumed. Seeds of *chura* contain edible oil, which is sold under the name of *chura ghee* in Pithoragarh district. After expelling or extraction of oil, remaining cake is used as washing soap.
Bauhinia vahlii L. (*Malu*)	Bark and tender shoots are crushed and rubbed over the wet skin and hairs. It produces bathing quality lather.
Boehmeria rugulosa Wedd. (*Gethi*)	Bark produces a lather, which is used for bathing. Bark is crushed with a stone and rubbed on the wet body as soap.
Ceiba pendendra (L.) Gaertn. (*Semal*)	Tender shoots and bark of the *semal* is crushed with the help of a stone and used as bathing soap.
Chaerophyllum villosum Wall. ex DC. (*Jangli gazar*)	Tuberous roots are crushed with the help of a stone and rubbed over the wet clothes. It produces a kind of lather, which is useful for washing the clothes.
Dioscorea bulbifera L. (*Genthi*)	Tender shoots and twigs are crushed and rubbed on the wet hairs and skin; it produces a lather of bathing quality.
Dioscorea belophylla L. (*Tarur*)	Tubers are crushed with the help of a stone and rubbed over the wet clothes; it's lather removes the dirt of the clothes.
Eleusine coracana L. Gaertn. (*Madua*)	Ear head husk ash is used for washing the clothes in Kumoun hills.
Fagopyrum cymosum Meissn. (*Jhangara/ Pyakan*)	Stem and leaves crushed with hands are rubbed on the wet hairs and skin. It produces bathing quality lather. *Bhotias* of higher Himalayan region use it in a large scale.
Gonostegia sp. (*Jiphaljadi*)	Crushed tuberous roots rubbed on the wet hairs and body produces a kind of lather, which is used for bathing. It is considered very useful for softening of hairs.
Grewia optiva Drummond (*Bhimal*)	Crushed bark of tender shoots and twigs rubbed on wet hairs and skin produces lather, which is used for bathing.
Impatiens balsamina L. (*Bud Til*)	Crushed stem is rubbed on the body as soap while bathing.
Ipomoea cairica L. (*Bharad*)	Fruits crushed and rubbed on the body produces lather, which is used for bathing. Local communities also store its seeds for off-season use.
Litsaea chinensis Lam. (*Chatad*)	*Chatad* seeds contain edible oil. Oil is extracted locally; remaining cake is used for bathing as well as washing.
Malva sylvestris L. (*Kunzi*)	Roots crushed with the help of a stone and rubbed over the wet clothes produces lather, which is used for washing.
Quercus leuchotrichophora L. (*Banj*)	After burning of woods of oak, ash is used for washing of clothes. The ash is boiled in the water and is used for washing of clothes.
Sapindus mukurossi Vahl. (*Reetha*)	Dried and powdered seed coat produces lather, which is used for washing as well as bathing. Some times, seed coat is used for washing woolen clothes.
Sesamum indicum L. (*Til*)	Leaves crushed and rubbed on the wet hairs and body skin produce bathing quality lather.
Sida rhombifolia L. (Bhuinli)	Tender shoot bark rubbed on the hairs and body produces bathing quality lather, which is considered useful for softening of hairs.

plant species around them. People living between 1500-2000 m altitude use maximum 14 plant species (63.63%) as soap and detergent. As far as the number of plants used as soap and detergent is concerned, it reveals that out of 22 plant species, 11 plant species are used as a bathing soap, 9 as a washing soap and 2 as both bathing and washing purposes. In terms of percentage, they are 50%, 40.90% and 9.10%, respectively. On the basis of different habitat status, these resources are divided into three categories, i.e. domesticated, semi-domesticated and wild. Plant

Table 3 — Correlation coefficient of constants variables with dependent variable

Constant variables	Correlation coefficient with number of soap substitute plants revealed by the respondents
Sex	0.041
Age group	0.014
Caste	0.046
Literacy level	–0.218*
Income group	–0.170*

*Significant value

Table 4 — Regression coefficients of constant variables with dependent variable

Dependent variables (Y)	Intercept	Regression coefficient with constant variables				
		Sex (X1)	Age group (X2)	Caste (X3)	Literacy level (X4)	Income group (X5)
No of soap and detergent substitute plants revealed	+3.50	+0.122	–0.054	–0.022	–0.265*	–0.211*

***Significant value**

species, which are considered to be suitable for cultivation and are growing in the farmers field have been categorized under domesticated species, while those species, which are available in the wild state, growing in their surroundings and protected by them for sustainable use, are named as semi-domesticates. The data recorded on availability of plants in different habitats reveals that 63.64% plant species represent wild habitat, 18.18% each from domesticated and semi-domesticated habitats. The important domesticated plants are *Genthi (Boehmeria rugulosa* Wedd.), *Chura (Basia butyrasia* Roxb.), *Til (Sesamum indicum* L.) and *Madua [Eleusine coracana* (L.) Gaertn.], while semi-domesticated are *Bhimal (Grevia optiva* Drummond.), *Reetha (Sapindus mukurossi* Vahl.), *Semal [Ceiba pentendra* (L.) Gaertn.] and *Jhangara (Fagopyrum cymosum* Meissn.*)*.

To identify the social/demographic factor responsible for having good knowledge in respect of soap substitute plant species, the correlation coefficient technique by using the number of such plants, which they revealed, as dependent variable and sex, age group, caste, literacy level and income group as constant variables were applied (Table 3). Illiterate and lower income group respondents were found to hold higher knowledge related to soap and detergent yielding plants in comparison to literate and higher income group. The variables such as sex, age group and caste play almost negligible role. Correlation coefficient with sex, age group and caste is positive. Female, old aged and SC/ST caste respondents have slightly higher knowledge over their counterpart male, young and higher caste respondents, respectively but difference is not significant.

Association of constant variables with dependent variable, i.e. number of soap and detergent substitute plants revealed by the respondents has been estimated with the help of regression coefficients (Table 4). Dependent variable (Y) = No of soap and detergent substitute plants revealed by the respondents

$$Y = 3.50 - 0.122\ X1 - 0.054\ X2 - 0.022\ X3 - 0.265\ X4 - 0.211\ X5 \quad \ldots(1)$$

$$Y = 3.45 - 0.122\ X1 - 0.052\ X2 - 0.262\ X4 - 0.211\ X5 \quad \ldots(2)$$

$$Y = 3.25 - 0.052\ X2 - 0.245\ X4 - 0.211\ X5 \quad \ldots(3)$$

$$Y = 3.06 - 0.218\ X4 - 0.234\ X5 \quad \ldots(4)$$

Equation (4) reveals that with the increase of literacy level and income of the respondents, the number of soap substitute plant species they revealed is negative linear.

Discussion

Use of plant parts as soaps and detergents is an old aged practice in India. Prior to discovery of chemical soaps and detergents, people used plants, straw, ash, etc. for bathing and washing. Efforts have been made to document the information on soap and detergent yielding plants. A large number of plant species are still being used as substitute of soaps and detergents. The inhabitants of the region have identified 22 plant species occurring in different habitats. Similar study conducted in hot arid zone of India, 3 plant species were identified as a substitute of soap and shampoo. The seeds of *Hooken bei (Aristolochia bracteolate)* are used for softening the hairs, fruit pulp of *Hingot (Balanites aegyptiaea)* is used as a detergent for silk and plant ash of *Khar (Hatexylon recurvum)* is used as a substitute of soap in the region [7].

Using large number of plant species evidenced that the rich heritage of traditional knowledge does exist among the people of Uttaranchal. It is particularly attributed to the illiterates, poor and women folk of the region. Different species of *Agave* are mostly used as a substitute of detergent because of saponin compounds in its leaves and young shoots that produce lather for washing. Use of *Bhimal (Grewia optiva* Drummond) as a substitute of soap is very unique as the quality of its lather is very good for softening the hairs. The women folk use its young shoots for washing their hair, which is supposed to be a natural shampoo by the local communities[9, 10]. The inhabitants of middle to higher hills (1100-3000 m) use large number of plants in comparison to lower

Fig. 1 *Jiphaljadi* (*Gonostegia* sp.)

Fig. 2 Bathing with *Jiphaljadi* roots

Fig. 3 *Kairua* (*Asparagus filicinus*)

Fig. 4 Making lather with *Kairua*

Fig. 5 Bathing with *Bhimal* (*Grevia optiva*)

Fig. 6 *Rambans* (*Agave* sp.) for washing clothes

altitude areas (200-1000 m). However, the maximum numbers of plants occur in middle hill zone (1100-2500 m) due to variation in availability of plant species in different altitudinal gradients. Use of plant species as substitute of soap and detergent can save money on one hand and reduce hair problems on the other. Many species have great potential if added with the value or provided processing know-how of raw material to the users. Some of these are *Grewia optiva (Bhimal), Agave spp. (Rambans), Sapindus mukurossi (Reetha), etc.*

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