

## Lichen-moss harvesting practices and their marketing strategy In Uttarakhand, India

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**ABSTRACT:** The present article is based on the concept of socioeconomic status of lichens (Kumar, 2009) and a compiled report of Appropriate Technology India, Ukhimath (Garhwal). Out of three auction sites of the State Ramnagar auction/ mandi (market) is the biggest market of lichen & moss followed by Tanakpur and Rishikesh. Traders of the mandi level are getting maximum profit from lichen & moss sector. [New York Science Journal. 2009;2(4):24-30]. (ISSN: 1554-0200).

**Key Words:** Lichen, Marketing, Uttarakhand State.

### INTRODUCTION

Lichens are the unique group of plants that consists of two unrelated organism, a fungus and an alga, growing together in a close symbiotic association. The study of lichen remains quite neglected throughout the world, through they together with mosses form dominant organism in ecosystem covering 10% of the earth terrestrial habitats, particularly higher elevations (Nash & Egan, 1988). Kumar & Upreti (2008) and Kumar (2009) lichen exploitation is a common practice among the villagers and the rivals in moist temperate regions of the Western Himalaya to collect the lichens together with tree twigs as oak and other trees bears luxuriant growth of lichens. Upreti et al (2005) mentioned the members of the families Parmeliaceae and Physciaceae are the ones most exploited commercially and are recommended by inclusion in the CITES list. However, Kumar (2008) reported Parmelioid lichens are commercially trading lichens from Garhwal Himalaya i.e. *Everniastrum*, *Parmotrema*, *Cetrariopsis*, *Bulbothrix*, *Hypotrachyna* and *Rimelia* collected by rivals together with two fruticose genera, *Ramalina* and *Usne*. Within Uttarakhand State of India where the present study was carried out 75 species of Parmelioid lichens reported, of which 27% each are known in Mussoorie hills and Saryu river valley near Pindari Glacier area, 17.5% are in Chaubatia-Ranikhet followed by 12.1% and 10.8% in Nain Singh top en route to Milam Glacier and Chopta-Tunganath peak (Divakar & Upreti, 2005).

Approximately 750 metric tons of lichens are collected from Uttarakhand hills, 800 metric tons are imported from other regions of India, including Himachal Pradesh, Sikkim and Assam and out of which about 50-80 tons are exported (Shah, 1997).

Total three bigger markets of lichen-moss of the State viz. Ramnagar, Tanakpur and Rishikesh were visited during 2005. Except Rishikesh, other two markets are approximately similar in trade and turnover system of lichen and moss. In subsistence and rural economies, the role of contribution of lichen-moss is as crucial as source of food, fodder and nesting material etc. it helps to generate additional employment and income. Since lichens and mosses grow in the hilly areas, it is important source of livelihood for the people living in the area. Local people extract lichen-moss and sell it to the middlemen (local contractors) as they do not have the resources to reach the market or the auction sites, where they can fetch remunerative prices for their produce. Lichens are sold at rates of approximately half a dollar/kg (Upreti et al 2005, Kumar, 2009) and mosses are 0.11 dollar/kg in the local markets. The price however becomes triple for lichens and double for mosses when these materials reach in the auction sites. A trained collector can easily collect 6-8 kg of lichens with twigs (Kumar, 2009).

*Description of the government and semi government corporation involved in the marketing of lichen and moss in the State:*

*Zila Bhesajh Sangh Sahkari Samiti (ZBSSS):* It is a registered public institution central society under corporative samiti Act 1965. ZBSSS is in operation since 1983 in almost all the district of the Uttarakhand state. President who is the head of the samiti is selected in every five years. There are many societies formed in the villages by ZBSSS. The directors among themselves elect the president. Secretary of the ZBSSS is supposed to be the government employee. The main objectives of the ZBSSS are to provide training on extraction of medicinal plants in the hilly area through scientific method, employment to the cooperative society members, and establishment of ZBSSS based small enterprises, improve the economic condition of the farmers by providing training on cultivation of those plant species which are becoming extinct. ZBSSS is also helps in preventing the exploitation of local village collectors from different middlemen and contractors and making them available remunerative price for their produce. The

percentage of profit of the ZBSSS earned through commission is sheared among its members. About 10% of the profit is sheared.

*Van Vikas Nigam (VVN):* VVN is semi Government Corporation with divisional sales manager (DSM) directly from corporation, regional manger equivalent to conservator of forest from forest department. Previously the forest department (FD) used to directly give tenders to the contractors for the extraction of timber as well as other forest produces, as a result of which was massive exploitation of forest produce by local contractors. In order to regulate the trade of minor forest produce, FD involved VVN. Initially this Nigam was established with their prime objective of storage, production and trade of timber. Since 2004 VVN diversified its activity and earned into the field of ecotourism and medicinal plants also from the time was declared as an herbal state, the government asked the FD to take active role in the production, sustainable harvesting, conservation and marketing of forest produce. The FD with the help of VVN has also started commercial activities regarding medicinal and aromatic plants. Apart from these two agencies, Kumaun Mandal Vikas Nigam (KMVN) and Garhwal Mandal Vikas Nigam (GMVN) are performing the similar role as of ZBSSS.

## MATERIALS AND METHODS

*Study area:* Uttarakhand, the 27<sup>th</sup> State of the Republic of India, was formed on 9<sup>th</sup> Nov. 2000 and, carved in out of the hilly tracts of Uttara Pradesh. It lies between 28°53'24" East and 31°27'50" North latitude and between 77°34'27" and 81°02'22" longitude. It has international boundaries with Tibet in the North and Nepal in the East. Himanchal Pradesh and Hariyana lie to its west and Uttar Pradesh to its south. The state with predominance of mountains and hills is spread over 13 districts with an area of 51,082 sq. kms or about 5.5% of such terrain of India (NRIF, 2004). It has a forest cover of 64.80%. The major forest types found in the state are sub-tropical, temperate and alpine forests. The total agriculture land in the state is 14% of its geographical area. Vast topographical, climate and seasonal variation makes the state rich in floral as well as faunal diversity.

Climate changes from subtropical in the southern foothill with average temperatures of about 30°C and winter temperature of about 18°C. Warm temperate conditions in the middle Himalayan valleys, with average summer temperature of 25°C and cool winters. A cold alpine climate is observed at higher elevation where summers are cool and winters are severe. At elevation about 4880m the climate is very cold with freezing temperatures and the area is permanently snow covered. There are rains in July-September due to south west monsoon and occasional snow fall in winter months (November-February), due to western disturbances at higher elevations.

A survey was conducted in different district of Uttarakhand during year 2005. Market surveys were conducted to identify the marketing channels, price spread, and prospective markets in the important places. A detailed study of lichen & moss conducted by rural population of necessary for establishing the trade and ensuring proper margin to the collectors. The major auction markets (called mandis) and traders in these areas were interviewed in order to know the quantum of trade of lichen & moss in Uttarakhand.

*Sampling frame:* Information was collected from collectors, contractors (middlemen), small and big traders, commission agents from three trading centers (Ramnagar, Tanakpur and Rishikesh).

### Method of sampling:

*Criteria for selection of forest division:* Badrinath and Kedarnath forest divisions were selected for the study in Garhwal region where the lichen & moss takes place in large scale. In BFD blocks selected for the study were Narayanbagar, Tharali and Dewal. These three blocks were studied as the primary collectors from the adjoining villages sell their produce to the local contractors from this division. The major villages of BFD involved in the extraction of lichens are Vaan, Dungari, Man, Kolpuri, Kuling Ghes-Balan, Himni, Mundoli, Ratgawn, Bursol etc.

*Selection of auction sites:* Before October, 2004 there was no regulation in the trade of lichen & moss. Entire trade was done privately without involvement of any Government agencies. Only the local contractors had to be approach the ZBSSS, from there they used to get approval for the forest department for "Ravanna" and then they could sell there produce anywhere in India in the open market. But after October 2004 in order to provide remunerative price to the primary collectors, Govt. took steps involving semi government corporation, VVN in this trade. In Uttarakhand, three auction sites are involved in the auctioning of lichen and moss viz. Ramnagar, Tankpur and Rishikesh. These auction sites were studied in order to estimate the quantum of lichen and moss from Uttarakhand.

*Selection of contractors at block level:* about four contractors from Tharali, five from Narayanbagar and two from Dewal block of district Chamoli Garhwal were interviewed in order to estimate the quantum of lichen & moss collected and priced received by the primary collectors for their produce.

*Technique for data collection:* Both primary and secondary data was collected for the study. Secondary data was collected in order to obtain the information and gets the idea regarding the availability of lichen & moss quantity trade from each of the auction sites, information sources for getting the relevant information regarding the study were as follows: Forest department (KFD & BFD), VVN, Bhesajh Sangh etc. Similarly, the primary data was collected from the local contractors, traders and commission agents. These techniques involved in the collection of data were personal interviewed and discussion through semi-structure interview. To explore the exiting value addition process, interviews with the people at each level were conducted at primary collectors level, traders level and on site visit.

## RESULTS

The lichen and moss collection season is of six months in a year and one trader collects the produce from about 15-20 primary collectors. Table 1 shows on an average quantity of lichen is about 301 qtl per trader per season and the total quantity of lichen loaded from three blocks comes out to be 4515 qtl per season. Tharali block has found maximum contribution about 1750 qtl followed by Narayanbagar 1715 qtl and Dewal 1050 qtl lichen per season.

*Seasonal availability of lichen-moss (L & M):* The extraction of L & M takes place mainly from October to March. After 31<sup>st</sup> of March extraction of produce is completely banned as fire season commence. From July to September the produce can not be extracted because of monsoon season. The availability of lichen depends on monsoon as it is supposed to be the most effective season for its growth.

*Market information at primary collector level:* Primary collectors of BFD extract the lichen and moss from the allotted range and sell them to the contractors at Tharali, Narayanbagar and Dewal. They sell the produce to the contractors at these places after drying. All produce collected are sold and they do not keep it for personal use. The primary collector collects about 4-5 kg of lichen material per day but Kumar (2009) reported 3.39 kg lichen/day/collector in its collection period during October to March. The laborer collects lichen material 15-20 kg per day. The lichen is collected directly from the trees as well as from the ground that is fallen lichen.

The laborer collect the maximum amount of lichens about 5 quintals per month as they are hired especially for this job, but the villagers (primary collectors) collect it as a part time job apart from their agricultural and other household activities.

*Different mode of marketing of L & M:* In order to study the marketing channel for L & M, it is important to know the past and the present mode of marketing of this produce as well as the role of different institutions and organizations involves in the promotion of the trade. Prior to the year 2005-06, the L & M and other medicinal plants were not regulated. It was on the basis of contractor system. The only registered society that helped in the promotion of trade was Zila Bhesajh Sangh Sahkari Samiti (ZBSSS), which was responsible for regulating the trade only at extraction level. It had nothing to do with marketing of the produce.

After October 2004, Forest Department (FD) took active role by involving two semi government corporations namely Van Vikas Nigam (VVN) and Kumaun Mandal Vikas Nigam (KMVN) for Kumaun and Garhwal Mandal Vikas Nigam (GMVN) for Garhwal region. VVN now plays important role in auction of L & M.

*Marketing channels for L & M:* Out of three prevailing marketing channels for L & M, first two are more in practice. The main purpose of involving the ZBSSS and VVN in this trade is to regulate the extraction of the produce so that it is not overexploited and to provide remunerative price to the primary collectors (villagers) prevent their exploitation from contractors and middlemen.

*Channel first:* In this channel the forest department gives contract to two agencies for collection of L & M namely ZBSSS and VVN. Forest department is also involving KMVN for Kumaun and GMVN for Garhwal. The local traders whosoever is interested in the extraction of lichen and moss approach the ZBSSS for their area for contract. These contractors deposit a sum of Rs. 10,000.00 as registration fee in the form of security. This fee is refundable

after 31<sup>st</sup> March when extraction of produce from the allotted ranges (areas) gets over. The FD opens only few ranges for the extraction of the produce. This goes on the rotational basis i.e. if range 1 was opened last year, the range 2 will be opened this year and range 3 the consequent year.

The local traders collect lichen and moss from two sources viz. primary collectors and laborers appointed by them. The permit is provided to the villagers for the collection of L & M. The villagers collect the produce on daily basis and after drying sell the produce to the local contractors. These contractors have retail shops in the village itself. When sufficient quantity of L & M is collected by the local traders, they tabulate the quantity of L & M in terms of sack bags, number of trucks in the sack bags are loaded and other information about quantity etc. in the form of 'Talika' (tabular form) to the ZBSSS. The ZBSSS cross checks the information and forwards it to the forest department. The DFO forwards it to the range office, where they charge their royalty (Rs. 210.00/qtl., which was previously Rs. 160.00/qtl), which includes sale tax and income tax. After all these formalities of the FD issues transit pass locally called as 'Ravanna' to local traders. Ravanna tells the route to be followed by the contractor to the auction places (mandi). This Ravanna is valid till seven days from date of issue. The produce then reaches the VVN depot. VVN is responsible for the auctioning of the produce. This is a public auction and any person involved in buying for the produce can participate in this. After auction, the produce is loaded in truck and transported to its destination places for example Kannauj (a town of Uttar Pradesh). The commission charged of different commission agents from the trades given in table 2 and estimated expenses & profit per truck is given in table 3.

*Second channel:* It is also known as Van Panchayat Channel. In this method, the villagers with the permission from the Panchayat can extract the L & M from the Van Panchayat/ (called community) forest. The VP has to seek permission from the ZBSSS but the FD does not charge royalty. This fee is issued by the Panchayat for village development works. ZBSSS only takes the commission of selling price of the lot. After this the ZBSSS transports the produce of VVN depot for auction. The process is similar as in channel first.

*Third channel:* This channel is known as 'Bandhak' in local language or pledge. This is rarely practiced. According to this method, 75% of the amount of the goods sale is given to the traders and rest 25% is retained by the ZBSSS after deduction of its commission of 10% returns the rest 15% to the traders after completion of sale of the entire produce.

*Auction process at the VVN depots:* In Uttarakhand, auction of L & M takes place at three places, namely Ramnagar, Tankpur and Rishikesh. The auction is conducted at the VVN depots at these places. The date of auction is fixed and is different for each of these places. This is a public auction and any person can participate in it and can buy the produce by calling the price. Table 4 shows the produce from different places comes to these depots for auction.

*Fixing of price at auction:* The rates of lichen and moss are fixed on per kilogram basis. The standard rate is fixed by local traders and is approved by VVN officials. This standard rate is fixed keeping in view the entire expenses on transportation, cost price and profit. After this standard price is fixed, the private traders participate in auction process and call their price. The highest bidder gets the produce and within seven days, the price is paid to the local contractors.

*Quantity analysis of lichen and moss traded at different auction sites:* Table 5 shows the quantity of the lichen and moss at VVN depots in an auction. It is depicted that majority of the produce traded is lichen. It is evident that, out of all the three auction depots Ramnagar is the biggest mandi (market) and the number of participants is very high (Table 5).

Two auctions are held in each month, and it can be estimated that if in Ramnagar, in the last auction 500qtl of lichen and 76 qtl of moss was traded so in the a month total trade in approximate terms was of 1000 qtl of the lichen and 150 qtl of moss. The number of months auction takes place in one season is 8 (i.e., total number of an auctions in a year are 16). Approximate trade in terms of quantity in one season from Ramnagar mandi is around 8000 qtl lichen and 1200qtl for moss. The auction system in Ramnagar mandi was initiated from October 2004.

In Tanakpur, auction system was initiated from January 2005. The sales in the auction were not regular, if in one auction three was sale the other one showed nil sales. Total quantity of lichen traded from January to April was about 600 quintals and moss traded from the time of initiation of auction is about 7 quintals.

In Rishikesh, auction began from December 2004, and the total trade in terms of quantity in lichen up to April was 939 quintals and moss was 18 quintals.

*Price analysis at primary collector level:* The villagers (primary collectors) sell the produce weekly or twice in a week at the retail shops of the local contractors in the villages. They get about Rs. 25-35 per kg for lichens and Rs. 5-6 per kg for moss being extracted. The price of the produce fluctuates depending upon its quality and as well as availability. About three different qualities or grades of lichens are about Rs. 35-40 per kg for primary collectors.

Grade 1<sup>st</sup> supposed to be the best quality and is known as Phoolmaal in local language (*Everniastrum* species of lichen). It does not have any bark or moss attached to it. Their price is about Rs. 35-40 per kg for the primary collectors.

Grade 2<sup>nd</sup> contains the mixed percentage of grade 1<sup>st</sup>, mosses and bark of trees. The price of this grade is about Rs. 20-35 per kg for the primary collectors.

Similarly, Grade 3<sup>rd</sup> is known as 'Patthar Chura' growing over the rock surface (saxicolous lichens). The price fetched by the primary collectors for this grade is about Rs. 25 per kg.

**Table 1: Quantum of lichen material traded at contractor level from BFD in one season (October to March)**

Local market of district Chamoli Garhwal	No. of traders	Qty./ Trader (in Qtls.) (Number of trucks X quantity per truck)	Total quantity (in Qtls.) (Number of traders X quantity per trader)
Narayanbagar	07	7X35= 245	07X245= 1715
Tharali	05	10X35=350	05X350=1750
Dewal	03	10X35=350	03X350=1050
		<b>Total</b>	<b>4517</b>

**Table 2: Percentage of commission**

Name of organization	Commission charges
Van Vikas Nigam (VVN)	1% of selling price
Bhesajh Sangh	10% of selling price

**Table 3: Calculation of profit to the traders**

Capacity of a truck	Price of one truck lichen (@ Rs 3500.00/QtI	Expenses/ Commission	Royalty/	Selling Price @ Rs. 7500/QtI	Net Profit (Selling cost- Total expenses) - purchase cost
1	2	3		4	5
40 QtI	Rs. 140000.00	FD= Rs. 8400.00 VVN= 1% of column 4= Rs. 3000.00 BS= 10% of column 4= Rs. 30000.00 Net commission= 41400.00 Transportation cost= Rs. 4000.00 Total Expenses (Total commission + Transportation Cost) = Rs. 41400.00+4000.00 = Rs. 45400.00	210X40QtI=Rs. 8400.00	Rs. 300000.00	300000.00-45400.00 = Rs. 254600.00- Rs. 140000.00= Rs. 114600.00

**Table 4: The produce from different places comes to the depots for auction**

VVN Depots	Sources of produce to the depots
Ramnagar	Nainital, Badrinath (Chamoli), Bageshwar and Almora
Tanakpur	Pithoragarh and Champawat
Rishikesh	Kedarnath forest division (Rudraprayag)



**Table 5: Status of lichen & moss traded at different auction sites of the state on weekly basis**

Auction sites	Number of participants	Forest produces	Quantity (Qtls.)	Price Rs/Kg	Average price Rs./Qtl.	Total cost of the produce (Rs.)
Ramnagar	35	Lichen	502.8	50-83	6650.00	3343620.00
		Moss	76.57	24.10-30	2705.00	207121.85
Tanakpur	18	Lichen	228.00	42-70.60	5630.00	1621440.00
		Moss	1.6	18-21.50	1975.00	3160.00
Rishikesh	15	Lichen	70.00	60	6000.00	420000.00
		Moss	No moss	-	-	-

**DISCUSSION:**

Atkinson (1982) mentioned that the lichens from the Uttar Pradesh (now Uttarakhand) hills are traded in the plains of the country for medicinal uses as tonics, febrifuges and antipyretics. The big trading centers are located in Ramnagar, Tanakpur and Rishikesh. The Badrinath Forest Division (BFD) of the Uttarakhand state is situated extensively as majority of the trade outflow to the mandis or auction sites. The primary occupation of the peoples is agriculture, but owing to the subsistence nature of hill agriculture, they are partially dependent on surrounding forest resources for their livelihood. The primary collectors are ignorant of the market price and due to less income, are not able to participate in the auction. In the last two months quantity of lichen traded from Rishikesh was decreasing and traders are more and more participating in Ramnagar and Tanakpur depots. At the traders level, the value addition is done by the grading of lichens. The process of grading involves separating the different qualities of lichens and marketing them by giving different graders. The traders with manufacturers are also involved in the production of end products.

In the two auctions moss was not traded from Tanakpur and Rishikesh depots. In Ramnagar auction the traders from Kannauj also participated but they were not allowed to purchase the produce to local traders bid very high price. It was done so that the manufactures from Kannauj or other places brought the produce from the local traders of Ramnagar so that they could get their own share profit. In Ramnagar auction, traders from Nainital, Bhimtal, Nandprayag, Chamoli participated in auction. The other produce like Tejpatta, Coriander, Baelgiri contributes very little from Tanakpur and Rishikesh mandi. The major role of the VVN was the collection of lichen & moss and conducting a public auction.

*Conservation Strategy:* Kumar (2009) suggested a collector for the major part of the year can earn a reasonable income by collecting the fallen lichens without being destructive with some knowledge of the lichen fall and seasonal pattern. In case of lichen and moss sector, the ZBSSS provides training to the collectors on scientific harvesting technique. The bark of the respective trees should not be pulled out while its extraction. Upreti (1995) mentioned the ethnobotanical, commercial utilization of lichens and decline of forest cover as the leading factors to loss of lichen diversity in India. Singh and Sinha (1997) mentioned agriculture, urbanization, construction of road, building on hills, mineral extraction, hydroelectrical projects, shifting cultivation are responsible for depletion of many lichen rich habitats.

In this article the author have to describe the status of harvesting, collection and marketing strategy of lichens in the state. The excessive field information has been collected from several lichen collectors of Chamoli district Garhwal. A perusal of available literature (see references) has indicated that a study on lichen harvesting and marketing is not available. Therefore present article will certainly help to asses the demand of lichen and moss at different levels, so that major bottle-necks faced by the villagers in trading of lichen and moss can be removed.

This information will be the first attempt to answer these basic queries and help in collection, grading, trading, conservation and management of lichens. Define the current and future option available for alternate livelihood from the lichens. It will be help to guide immediate and long term management, policy and decision making strategies

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