



Research Article

Household dynamics and livelihood dependence on *Bergenia ciliata* in Rural Kashmir, India

Nida Rafiq, G. M. Bhat, M. A. Islam, Saima Farooq, Megna Rashid Bakshi, Huzaifa Majeed, Rayees Ahmad Bhat, Shahnaz Fatima

Abstract

Bergenia ciliata L. is a rhizomatic herb with fleshy leaves, growing up to 30 cm tall, belonging to Family Saxifragaceae. In Kashmir, it is locally called as Patherphand, Zakhm-e-hayat, Pahand, Pashanbhed etc. Purposive sampling technique was employed in the area of study (Central districts Ganderbal and Srinagar). The study investigated the collection, consumption and sale of *Bergenia ciliata* and its contribution to household income and employment besides analyzing the factors influencing the *Bergenia ciliata* exploitation in the locality using Ex-Post-Facto Research Design. Purposive sampling technique was employed in the area of study (Central districts Ganderbal and Srinagar). The total average collection/annum/family of *Bergenia ciliata* was 75.4 kg, and from the collection 69.5 kg were processed, 5.9 kgs were used for consumption/annum. Average sale/annum was 63.6 kg, generating a total average gross income of ₹8050.00, with a total average net income of ₹6966.66 and providing average employment of 184.66 man-days/family/annum. Household characteristics influencing the *Bergenia ciliata* livelihood in the locality indicated that among the respondents, who were engaged in the *Bergenia* trade in the surveyed area, (83.33%) were old aged, 23.3 % were illiterate and 81.66% of respondents were having large-sized families, 63.33% were marginal farmers, 48.33% possessed livestock between 6 to 10. Proximity to the forests was 1.83 km where the surveyed households visited frequently. The area owned under Agroforestry/homestead forestry plantation was mostly (< 0.10 ha) for (53.33%) of the households. A considerable number of households were found mostly depend on *Bergenia ciliata* collection and sale for their subsistence as well as livelihood earnings in the area of study.

Keywords *Bergenia ciliata*, collection, consumption, employment, marketing

Introduction

Human use of plants as medicines could be dated back to the Middle Paleolithic Age, which is about 60,000 years ago, according to fossil records [1]. Some of the substances that were used include oils of *Cedrus* species (cedar) and *Cupressus sempervirens* (cypress), *Glycyrrhiza glabra* (licorice), *Commiphora* species (myrrh) and *Papaver somniferum* (poppy juice), most of which are still in use today for treating ailments ranging from coughs and colds to parasitic infections and inflammation [2]. Bista and Webb [3] reported non-timber forest products (NTFP) use is an integral part of the rural economy of Nepal. A marketing chain and financial analysis of *Valeriana jatamansi* (Sugandh bala) revealed that various trading and marketing channels existed from the district level NTFP outlets.

Received: 30 September 2020

Accepted: 23 January 2021

Online: 25 January 2021

Authors:

N. Rafiq, G.M. Bhat ✉, M. A. Islam, S. Farooq, M. R. Bakshi, H. Majeed, R. A. Bhat, S. Fatima

Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Benhama Ganderbal Campus (UT of J&K), India

✉ bhatm67@gmail.com

Emer Life Sci Res (2021) 7(1): 7-13

E-ISSN: 2395-6658

P-ISSN: 2395-664X

DOI: <https://doi.org/10.31783/elrs.2021.710713>



Tejaswi [4] reported that most employment (55%) was generated by the wage sector followed by NTFPs collection (26%) and other sectors (19%) among tribes of Western Ghats in Karnataka. Also, wage earnings generated the highest average annual income per household (₹14244/annum) followed by NTFPs (₹5505/annum) and other sectors accounting 10% of the total tribal income. Opaluwa et al., [5] revealed that most of the Non-Timber Forest Products (NTFPs) collectors were females, married, and had large household size, earning between N10000-N 20000 from the sale of these products.

Table 1. *Bergenia ciliata* collection, consumption and marketing

Particulars	Total	Average
Collection/annum (kg)	4524.00	75.4
Processing/annum (kg)	4190.00	69.5
Consumption/annum (kg)	354.00	5.9
Sale/annum (kg)	4170.00	63.6
Gross income (₹)	483000.00	8050.00
Transportation/other costs (₹)	65000.00	1083.34
Net income (₹)	418000.00	6966.66
Employment (mandays)	11079.60	184.66

Table 2. Contribution of *Bergenia ciliata* to household income and employment

Livelihood source	Income (₹/HH/annum)	Employment (Man-days/HH/annum)
Bergenia based cottage industry	8050.33 (12.81)	68.25 (21.26)
Herbal medicine	18683.33 (29.73)	80.50 (25.07)
Agriculture	14883.33 (23.68)	74.41 (23.18)
Livestock rearing	13220.50 (21.04)	70.31 (21.90)
Wage labour	250.25 (0.39)	2.50 (0.77)
Business	1000.33 (1.59)	2.00 (0.62)
Service	6666.66 (10.61)	22.28 (6.94)
Other activities	75.50 (0.12)	0.15 (0.04)
Total	62830.23(99.97)	321.00(99.78)

Figures in the parentheses show percentage

Over three fourth of the earth's population depend primarily on raw plant products to meet their daily healthcare needs [6] In developing countries, 65-80 per cent of the population depends exclusively on medicinal plants for basic care of health [7]. The state of Jammu and Kashmir, a mountainous zone in the north-west Himalaya with the most complex and diverse physic-geographically is bestowed with rich floral diversity. The diversity in its climate and altitude have resulted in an ideal environment for the development of a rich variety of forests. Forests being the planet's most important terrestrial ecosystem are linked with the economic and physical welfare of mankind. Interestingly, the Kashmir Himalaya alone contributes nearly 2,000 (20%) of the plant species within just 2.15 per cent (15,948 km²) of the total land area [8].

Bergenia ciliata, locally known as *Patherphand*, *Zakhm-e-hayat*, etc. belonging to Family Saxifragaceae is endemic to the Northern and Eastern temperate Himalayan region. It is growing in natural forests of Kashmir. Local people collect it, use it for treatment of different diseases and sell the surplus quantity which fetches a good amount thereby playing an important role in their lively hood. Keeping the growing demand for medicinal plants in view the present study entitled as Household dynamics and livelihood dependence on *Bergenia ciliata* in rural Kashmir, India was therefore undertaken with the purpose to know the lively hood security provided by *Bergenia Ciliata* among inhabitants of Srinagar and Ganderbal districts.



Methodology

The present study was carried out in the two central districts of Kashmir valley viz., Srinagar and Ganderbal during 2017-18. The information was collected using a well-developed questionnaire. The study investigated the collection, consumption and sale of *Bergenia ciliata* and its contribution to household income and employment besides analyzing the factors influencing the *Bergenia ciliata* exploitation in the locality using Ex-Post-Facto Research Design. Purposive sampling technique was employed in the two districts viz., Srinagar and Ganderbal and the first stage was the selection of villages in which 5 villages, (Sonamarg, Rayel Kangan, Lar and Gund) from district Ganderbal ,(Faquir Gujari, Chek Dara, Dara, Harwan and Saedpora) from district Srinagar were selected. A sample of 60 households was drawn from the sample villages for the study. The respondents interviewed were either household heads or eldest members. The household survey was prepared based on the basis of literature referred, reconnaissance survey of the study area, and discussion with local people, and consultation with the experts. The quasi-participant observation method was used to record the data based on personal observation and interaction with the respondents. This technique helped to have first-hand on-the-scenes contact with the respondents, examine the behavior in a natural situation and study the situation based features of conduct. The facts were gathered by assuming several roles as a participant, interviewer, stranger, or listener in various social, cultural, religious or political activities.

Table 3. Age, education and family size of the sample households (N=60)

Age		Education		Family size	
Category	household	Category	household	Category	household
Young (up to 30 years)	-	Illiterate	14 (23.33)	Small (up to 5 members)	11 (18.33)
Middle (31 to 50 years)	10 (16.66)	Below primary	12 (20.00)	Large (> 5 members)	49 (81.66)
Old (> 50 years)	50 (83.33)	Primary	5 (8.33)	-	-
-	-	Middle	11 (18.33)	-	-
-	-	High school	9 (15.00)	-	-
-	-	Intermediate	6 (10.00)	-	-
-	-	Graduate & above	3 (5.00)	-	-
$X \pm S.E. = 55.45 + 0.89$		$X \pm S.E. = 2.26 + 0.23$		$X \pm S.E. = 1.81 + 0.05$	

Figures in the parentheses show percentage

Table 4. Size of land holding and herd size in the sample households (N=60)

Size of land holding		Herd size	
Category	household	Category	household
Landless	03 (5.00)	No livestock	06 (10.00)
Marginal (< 1.00 ha)	38 (63.33)	Up to 5 livestock	17 (28.33)
Small (1.01-2.00 ha)	15 (25.00)	6 to 10 livestock	29 (48.33)
Medium (2.01-4.00 ha)	04 (6.66)	> 10 livestock	08 (13.33)
Large (> 4.00 ha)	0 (00.00)	-	-
$X \pm S.E. = 1.43 + 0.09$		$X \pm S.E. = 1.8 + 0.12$	

Figures in the parentheses show percentage

Household livelihood contribution of Bergenia Ciliata

The questions asked through the interview schedule included data on socio-economic characteristics of growers, collection per annum, consumption /annum, sale /annum, quantity marketed, income generation, various sources of households' income and economic contribution of *Bergenia ciliata*.



The socioeconomic variables of the Farmers/growers included age, education, social participation, family composition, land holding, livestock possession, housing status, subsequent occupation, wealth status and annual income and the variables were measured using the “Socio-economic status scale” of [9] after some modification. The observations extracted from the survey were used to triangulate and validate the data gathered through a household survey, interpret the results and draw inferences.

Quasi-participant observation

This method was used to record the data based on personal observation and interaction with the respondents. This technique helped to have first-hand on-the-scenes contact with the respondents, examine the behavior in a natural situation and study the situation based features of conduct. The investigator gathered the facts by assuming several roles as a participant, interviewer, stranger, or listener in various social, cultural, religious or political activities.

Results and Discussion

The total average collection/annum of *Bergenia ciliata* was 75.4 kgs, from which 69.5 kg were processed, and 5.9 kg consumed/ annum and the total average sale/annum was 63.6 kg which generated gross income of ₹8050.00, net income of ₹6966.66 and provided total average employment 184.66 man-days/family/annum. (Table 1). The structure of household average gross annual income consisted of all off-farm and on-farm sources among the surveyed population was ₹62830.23 from which *Bergenia* based cottage industry contributed (12.81%), was the 4th major component of the household economy after herbal medicine, agriculture, and livestock rearing in the study area (Table 2).

Table 5. Main occupation, family labour and gross annual income in the sample households (N=60)

Main occupation		Family labour		Gross annual income	
Category	household	Category	household	Category	household
Wage labour	12 (20.00)	1	12 (20.00)	Very low income (Up to ₹30000/annum)	12 (20.00)
Caste occupation	6 (10.00)	2	17 (28.33)	Low income (₹30001 to 60000/annum)	37 (61.66)
Cultivation	27 (45.00)	3	22 (36.66)	Medium income (₹60001 to ₹90000/annum)	9 (15.00)
Business	10 (16.66)	>3	9 (15.00)	High income (>₹90000/annum)	2 (3.33)
Service	03 (5.00)			-	-
Any other	2 (3.33)			-	-
X ± S.E. = 2.86 ± 0.16		X ± S.E. = 2.4 ± 0.12		X ± S.E. =44918.33±2145.585	

Figures in the parentheses show percentage

Household characteristics influencing the *Bergenia ciliata* livelihood in the locality

(A) Age, education, family size and herd size

Among the respondents who were engaged in the *Bergenia* trade in the surveyed area (83.33%) were old aged, 23.3 %were illiterate and 81.66% of respondents were having large-sized families, 63.33% were marginal farmers, 48.33% possessed livestock between 6 to 10 (Table 3 and 4).

(B) Main occupation, labor force and gross annual income

Cultivation was the main occupation for (45.00 per cent) of the respondents followed by wage labor (20.00%), business (16.66%), caste occupation (10.00%), service (5.00%) and any other (3.33%). Maximum households (36.66%) possessed labor force 3, followed by 28.33 per cent of households having



labour force of 2, 20.00 per cent. A considerable percentage (61.66%) of the respondents belong to low-income category, followed by very low income (20.00%), and high income (3.33%) (Table 5).

Proximity to forests, frequency of forest visits and forest resource possession

The average proximity to the forests among sample households was observed to be 1.83 km. The frequency of forest visits indicated that the people visit the forest frequently (fortnightly/ monthly) in the study site. The area owned under Agroforestry/homestead forestry plantation was mostly (< 0.10 ha), (53.33%) of the households (Table 6). *Bergenia ciliata* collection is an important subsidiary occupation among the sample households; almost all the households collect a variety of NTFPs from the forests. Herbal medicine is an integral part of NTFP which is collected, consumed and sold by the local people for subsistence and livelihood earning. The majority of the *Bergenia ciliata* collectors depend on the district and urban markets besides other local markets altogether and sell their products directly to locals and consumers in the district capitals.

Table 6. Proximity to forests, frequency of forest visits and extent of agroforestry/homestead forestry of the sample households (N=60)

Proximity to forests		Frequency of forest visits		Forestry resource possession	
Category	household	Category	household	Category	household
< 5 km	28 (46.66)	Very frequently	5 (8.33)	< 0.10 ha	32 (53.33)
5-10 km	14 (23.33)	Frequently	27 (45.00)	0.11-0.20 ha	12 (20.00)
10-15 km	18 (30.00)	Occasionally	21 (35.00)	0.21-0.30 ha	9 (15.00)
> 15 km	0 (00.00)	Never	7 (11.66)	> 0.30 ha	6 (10.00)
X ± S.E. = 1.83 ± 0.11		X ± S.E. = 2.03 ± 0.12		X ± S.E. = 1.66 ± 0.15	

Figures in the parentheses show percentage

Most *Bergenia ciliata* collectors, especially women, approach the vehicles at the checking points along the high ways to sell their products. Although *Bergenia ciliata* trade is done in both local and urban markets, the marketing is unsystematic and unorganized and therefore, the real benefits of the trade at the local level are unknown. The study shows that *Bergenia ciliata* marketing in the study areas often occurs in formally, resulting in uncertainty about prices and income effects. Marketing is done independently, it is disorganized, discrete and producers lack the necessary marketing skills and evidence essential for optimum performance. The price received by the collector depends on the length of the chain, location, quality and means of transportation. For *Bergenia ciliata* sold in the communities, the bargaining power of farmers depends on the number of traders coming to the village to buy the product, the accessibility of the village, the supply of *Bergenia ciliata*, the degree of the perishability of *Bergenia ciliata*, and the level of market information available to farmers. Collectors who are closer to urban markets get a higher price than those far away from urban markets. Although the local people collect *Bergenia ciliata* in large quantities, they mostly sell their products to the local traders and shopkeepers by cash or kind, since the majority of them were poor and unemployed having little marketing exposure. The collectors mostly recognize *Bergenia ciliate* by leaves, flowers or by smelling. The findings are in confirmation with the studies [3, 10-13], who reported non-timber forest products (NTFPs) collection, consumption and marketing as an integral part of the rural economy, livelihood sustenance and health care. Although, agriculture was found to be the major occupation of the local people, it is practiced for a limited period of six months from May to October only and only a few agriculture crops viz., potato, pea, maize, cabbage, cauliflower, and turnip are grown during this period. Further, the size of agricultural lands is marginal having undulated topographic conditions with inadequate irrigation facilities mostly depending on rains. Thus, the physiographic conditions affect productivity as well as return on investment from agriculture. Conversely, in the case of livestock rearing the population of the bovines is limited and they rear mostly sheep, goats and poultry only which procure only household needs and fetches little income. Some locals were also having small-sized shops and other business establishments and very people were engaged in service, wage labor and other professions accruing limited earnings. Hence, a considerable number of households were mostly dependent on *Bergenia ciliata* collection and sale for their subsistence as well as livelihood earnings. The collection, consumption



and sale of *Bergenia ciliata* also provide substantial direct, secondary and self-employment among the local population in the two districts. There is a multitude of studies [4-5, 13-23] all over the world corroborating that the NTFPs are the major constituent playing a significant role in income and employment security among rural communities.

Conclusion

Bergenia ciliata collection is an important subsidiary occupation among the sample households; almost all the households collect a variety of NTFPs from the forests. It was not found cultivated by the farmers in any surveyed area of these two central districts (Srinagar and Ganderbal) of Kashmir. Average collection/annum/household was 75.4 kg, with an average sale of 63.6 kgs, generating a total average gross income of ₹8050.00 and providing average employment of 184.66 man-days/family/annum *Bergenia* based cottage industry was found the 4th major component of household economy and employment after herbal medicine, agriculture and livestock. The considerable number of households were found mostly depend on *Bergenia ciliata* collection and its sale for their subsistence as well as livelihood earnings.

References

- [1] D. S. Fabricant and N. R. Farnsworth (2001). The value of plants used in traditional medicine for drug discovery. *Environ. Health Perspect.*, **109**: 69-75.
- [2] A. Gurib-Fakim (2006). Medicinal plants: Traditions of yesterday and drugs of tomorrow. *Mol. Aspects Med.*, **27**: 1-93.
- [3] S. Bista and E. L. Webb (2006). Collection and marketing of non-timber forest products in the far western hills of Nepal. *Environ. Conserv.*, **33**: 244-255.
- [4] P. B. Tejaswi (2008). Non-Timber Forest Products (NTFPs) for Food and Livelihood Security: An Economic Study of Tribal Economy in Western Ghats of Karnataka, India. No. 138-2016-2006. 2008.
- [5] H. I. Opaluwa, U. Onuche and F. A. Sale (2011). Factors affecting the collection and utilization of Non-Timber Forest Products in rural communities of North Central Nigeria. *J. Agric. Food Tech.*, **1**: 47-49.
- [6] B. Barrett and D. Kieffer (2001). Medicinal plants, science, and health care. *J. Herbs Spices Med. Plants*, **8**: 1-36.
- [7] M. De Fatima Agra, K. N. Silva, I. J. L. D. Basilio, P. F. De Freitas and J. M. B. Filho (2008). Survey on medicinal plants used in the region Northeast of Brazil. *Braz J Pharmacogn.*, **18**: 472-508.
- [8] G. H. Dar, R. C. Bhagat and M. A. Khan (2002). Biodiversity of the Kashmir Himalaya. Valley Book House, Srinagar, India.
- [9] P. Venkataramaiah (1990). Development of socio-economic status scale, (Doctoral dissertation, Ph. D. Thesis.); 1990.
- [10] C. Shackleton and S. Shackleton (2004). The importance of non-timber forest product in rural livelihood security and as safety nets: Review of evidence from South Africa. *S. Afr. J. Sci.*, **100**: 658-664.
- [11] P. P. Baruah and J. Mondal (2010). Traditional knowledge concerning wild food species of garos living in and around norkek biosphere reserve, Meghalaya. *Annals For.*, **18**: 255-262.
- [12] D. Sharma, B. K. Tiwari, S. S. Chaturvedi and E. Diengdoh (2015). Status, utilization and economic valuation of Non-Timber Forest products of Arunachal Pradesh. *J. For. Env. Sci.*, **31**: 24-37.
- [13] M. S. Suleiman, V. O. Wasonga, J. S. Mbau and A. Suleiman (2017). Non-timber Forest Products and their contribution to household's income around Falgore Game Reserve in Kano in Nigeria. *Ecol. Process.*, **6**: 23. doi: [10.1186/s13717-017-0090-8](https://doi.org/10.1186/s13717-017-0090-8)
- [14] M. D. Mistry (1992). The impact of the forest action on the household economy of the tribals. In: *The price of forests-proceedings of a seminar on the economics of the sustainable use of forest resources*, edited by Anil Agarwal, CSE, New Delhi.
- [15] R. K. Namdeo and N. C. Pant (1994). Role of minor forest products in tribal economy. *J. Tropical Forestry*, **10**: 36-44.



- [16] M. S. Pervez (2002). Role of non-timber forest products in the economy of dwelling households of Dhading district, Nepal: An Economic Analysis, M.Sc. Thesis, University of Agricultural Sciences, Bangalore.
- [17] Foppes, J. and Ketphanh, S. 2004. NTFP use and household food security in Lao PDR. Proceedings Symposium on Biodiversity for Food Security 14 October, 2004, pp35-43. Laos Ministry of Agriculture and Forestry, Vientiane.
- [18]. B. Babulo, B. Muys, F. Nega, E. Tollens, J. Nyssen, J. Deckers and E. Mathijs (2009). The economic contribution of forest resources use to rural livelihoods in Trgray, Northern Ethiopia. For. Policy Econ., **11**: 109-117.
- [19] M. Maske, A. Mungole, R. Kamble, A. Chaturvedi and A. Chaturvedi (2011). Impact of non-timber forest produces (NTFPs) on rural tribes economy in Gondia district of Maharashtra India. Arch. Appl. Sci. Res., **3**: 109-114.
- [20] R. Sarmah and A. Arunachalam (2011). Contribution of non-timber forest products (NTFPs) to livelihood economy of people living in forest fringes in Changlang district of Arunachal Pradesh, India. Indian J. Fundamental Applied Life Sci., **1**: 157-169.
- [21] M. A. Islam, S. M. S. Quli, R. Rai, and P. A. Sofi (2013). Livelihood contributions of forest resources to the tribal communities of Jharkhand. Indian J. Fundamental and Applied Life Sci., **3**: 131-144.
- [22] V. Kumar (2014). Impact of non-timber forest products (NTFPs) on rural tribals economy in PeechiVazhani wildlife sanctuary, Western Ghats, Kerala. Int. J. Forest Usuf. Management, **15**: 80-100.
- [23] U. B. Shrestha and K. S. Bawa (2014). Economic contribution of Chinese caterpillar fungus to the livelihoods of mountain communities in Nepal. Biol. Conserv., **177**: 194-202.