

ORIGINAL RESEARCH ARTICLE

Value chain study of medicinal plant Shankhpushpi (*Convolvulus pluricaulis*) in Barmer district of Rajasthan

PRADEEP PAGARIA^{1*} • LOKESH K JAIN²

Key Words

Livelihood
Medicinal Plant
Shankhpushpi
Value chain

ABSTRACT

The western part of India is massively enriched with natural vegetation of multipurpose trees and herbs that have great medicinal importance. In the Barmer district of western Rajasthan, about 120 plant species are known to be important for their medicinal and pharmaceutical values. Medicinal plants offer one of the sustainable alternative sources of livelihood with tremendous opportunities to generate income, employment and foreign exchange. Their utilization for preventing, treating and curing several human diseases by local healers and Ayurvedic practitioners represents the first line of defense against diseases in large parts of the rural areas of third world countries. Many farmers sell these naturally growing medicinal herbs to local traders and hence earn some bonus income. One of the most important such medicinal plants of Thar dessert area of Barmer district is Shankhpushpi (*Convolvulus pluricaulis* Choisy), of the family Gentianaceae. *C. pluricaulis* is a twining perennial herb and is considered as the most wonderful gift of nature to the mankind. This medicinal plant has a great potential for domestic trade in the AYUSH industry.

© CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow-226015

INTRODUCTION

District Barmer is situated in the western part of the Rajasthan state and is mostly arid. It shares border with Jaisalmer district in the north, Jalore district in the south and Pali and Jodhpur district in the east. In west, it also shares the international boundary with Pakistan. Apart from a small offshoot of Aravalli hills in the East, the region has vast sand-covered tract that stretches for miles and forms a part of the Thar Desert known. The district experiences extreme temperature and erratic rainfall. The rural/local population of Barmer

comprised mostly of scheduled castes, scheduled tribes and refugees of the Indo-Pak wars. The average annual rainfall of the district is only 277 mm and hence, cultivation are mainly confined to Kharif season crops like *Pennisetum glaucum* (pearl millet), *Vigna radiata* (green gram), *Cyamopsis tetragonoloba* (cluster bean). The income generated from selling these crops is often not sufficient for a family to survive round the year (Jain, 2014). The other major sources of income seems to be selling of raw produce of natural vegetation, rearing animal husbandry (small

*Corresponding author; Email: p_pagaria@yahoo.com

¹Krishi Vigyan Kendra, Barmer II (Rajasthan)

²College of Agriculture, Sumerpur (Rajasthan) 306902

Doi: <https://doi.org/10.62029/jmaps.v42i4.Pagaria>

ruminants) and traditional craft of patchwork and mirror embroidery. The district is also a home to 120 commercially valued medicinal herbs like shankhpushpi, *Caliotropis procera* (Oak), *Datura stramonium* (dhatura), *Citrullus colocynthis* (tumba) and *Clerodendarum phlomidis* (arnia). Many farmers sell these naturally growing medicinal herbs to local traders to earn some bonus income (Rathore and Mathur, 2019). Since most of these medicinal plants are collected from the wild, their increasing market demand is pushing several of these medicinal plant species into the domain of endangerment and extinction (Keshari and Pradeep, 2018).

The local farmers of Barmer district have reported that animals especially sheep and goats graze on *C. pluricaulis* and hence they do not cultivate it. Further, *C. pluricaulis* farming is not popular in the region also because it is considered to be a wild plant which grow naturally and hence does not require cultivation. In response to the growing demand of medicinal herbs like shankhpushpi by the drug manufacturing industry and also to reduce pressure on species collected from the natural wilderness, the government of India and pharmaceutical companies have initiated several joint efforts to produce medicinal plants through organized cultivation in last two decades (Uniyal, 2000; Lambert et al., 1997). The *C. pluricaulis* plant is in demand as it induces a feeling of calmness and peace, good sleep, relief in stresses, anxiety and mental tiredness, produce a significant reduction in the level of anxiety, and neuroticism. The whole herb is used as an alternative tonic and febrifuge. Various dosage forms and a wide array of its value-added products (active, natural principles and crude extracts) are being used in the traditional system of medicine and have reported therapeutic activity in experimental and clinical trials. (Thamboli and Wadker, 2019).

The present paper highlights the medicinal importance of *C. pluricaulis* along with its value chain aspects in the AYUSH trade. The farmers, local traders, wholesalers and retailers are the intermediaries of this value chain that needs to be

harmonized to and aligned boost shankhpushpi trade in the local as well as international markets. Some guidelines for proper alignment of all stock holders of this value chain are also enumerated here.

MATERIALS AND METHODS

Convolvulus pluricaulis - Pharmacology and trade

Shankhpushpi (*Convolvulus pluricaulis*) is medicinal herb of choice as a brain tonic especially for the conditions of memory loss, schizophrenia, convulsions and intelligence-related mental disability problems (Rathore and Mathur, 2019). *C. pluricaulis* powder is also used to improve the intellect qualities in children (Thamboli and Wadker, 2019). *C. pluricaulis* is also known to regulate the functions of the digestive system (Sairam et al., 2000). The consumption pattern of *C. pluricaulis* leaves and seeds is largely influenced by the demands from the medicinal industry. The major importer of this medicinal plant are countries of Asia and Africa continent. India is the leading exporter of *C. pluricaulis* leaves, seeds and roots (Agarwal et al., 2014). Rajasthan is the most important state in the country as far as cultivation of *C. pluricaulis* is concerned. Among other districts, districts of Barmer, Jodhpur and Bikaner account for more than 80% of Shankhpushpi cultivation. Medicinal plants are a major resource for the traditional medicine & herbal industry and provide livelihood and health security to a large segment of Indian population (Nagaraju et al., 2018). Moghadam et al., (2016) found that the arid and semi-arid region has economically advantage of producing the majority of medicinal plants. It may be recalled here that the domestic trade of the AYUSH industry in India is of the order of Rs. 80 to 90 billion (<https://www.qcin.org/images/QCI-NMPB-VCS-Brochure8.pdf>). The Indian medicinal plants and their products also account for exports in the range of Rs. 10 billion (<http://rsmpb.in>). India leads the list of the major traded medicinal plants like Shankhpushpi, Neem, Sonamukhi, Senna, Isabgol, Ashwagandha, Onion, Kalmegh, Brahmi, Sadabahav, Poppy etc., serving 60% of world's population for their primary health care needs.

These medicinal plants are not only used for primary health care in rural areas of developing nations, but also in developed countries as well.

Objective of the study

- 1) Identify the existing and possible potentials for livelihoods in the district.
- 2) Mapping & analysis of the value chain for livelihood options
- 3) Suggest economically viable models for livelihood enhancement

The methodology for the Livelihoods Planning exercise is described below as a 7-Step process. Each step applies tailored tools to get specific outcomes, as elucidated in Table 1. The collected data was used for (i) Secondary Research; (ii) Identifying present socio-economic status and current livelihoods; Scoping analysis of livelihood activities to identify clusters and; Developing a strategy for value chain alignment & integration for Livelihood mapping and planning for the district.

Study area

The Barmer district is situated in the south western corner of the Rajasthan extends from 70°50' to 72°52' East longitude and from 24°58' to 26°32' North latitude. It is a parts of Thar desert surrounded by Jaiselmer district in the north, Jalore

in the south, Pali, Jodhpur in the east and Sindh province of Pakistan in the west. Barmer is one of the oldest habitations of Indian it has of 14 Tehsils, 380-Grampanchayat with 2179 villages. The population of the district as per the census 2011 was 26,11,758 having a gender ratio is 896. The population density of the district is 69 per Sq. Km and the literacy percentage is 59.65. The district contributes just 2.5% to the total income of the state because per capita income is just Rs. 2824/- and the status of livelihoods is very poor. The education level is also very low.

Surveyed household profile: 252 numbers of household were surveyed in the district after finalizing the activities. These activities were finalized after making transect walks, few FGDs and consulting officer.

Value chain analyses

Value chain analyses is a frequently used tool to understand socioeconomic and power relationships in the production chain from the starting material to a final (generally a high value) product (Shahidullah and Haque, 2010). The value chain added value to the products and helps in taking this high valued product to the end user. The medicinal herbs can be grown well in the arid and semiarid region of the country with adequate irrigation arrangement. The timely marketing of the

Table 1: Tools used for data collection

Tool	Description
Transact Analysis	This tool was used to find-out the distribution of natural and the man-made resources among the different communities in the hamlets. The communities are sparse as they live in semi pucca structure popularly known as 'Dhani' on the agricultural land.
Village Mapping	This tool was used for mapping distribution and frequency of the land resources like irrigated and non-irrigated land, water resources like drinking water, irrigation water, census on livestock, human population and households and forest resources. It also helped to study the general topography and settlement pattern of the village and man-made education structures like schools, anganwadi etc.
Focused Group Discussions	This tool identified various social and economic groups in the localities and enumerated features and characteristics of groups. It also helped to establish the activities and enterprises that could be undertaken in the areas to ascertain the vocation and livelihoods, the status of women in the village and to gain an understanding of the gender related issues. Approx. 100 Focused Group Discussions were planned in 20 prospective villages with special focus on scheduled tribes, schedules castes, women and minorities.
Limited House Hold Survey	The household survey was structured focusing on the social, economic, political, institutional, dimensions of rural life and livelihoods in the selected villages. The research staff interviewed both male and female members of the household. A household sample survey was conducted in local language, using pre-tested survey instruments. Thus overall, 500 Households were surveyed for livelihood mapping.
Livelihood Analysis	This identified the livelihood options available with the villages round the year.
Interviews and Consultations with Officials	The field team conducted interviews with representatives from the key stakeholder groups, including representatives from local government, PRI representatives, local community groups for developing strategy models for value chain alignment

medicinal herbs plays an important role in enhancing farmers' income (Rathore and Mathur, 2019). The farmers or producers cultivate or produce crop and sell to the local traders or to the whole sellers. The value chain starts from the producers and ends with end consumers. The efficient value creates the value of crops and helps in creating link between farmers' producer and its ultimate consumers. These analyses help in understanding economic processes and are used in the context of socioeconomic and socioecological research. It was observed that various actors are involved within the marketing system and associated value chain of medicinal plant. These are producers (growers' or collectors), various type of traders, manufacturers and consumers (Hamilton, 2004). In most cases, Laird, (1999) found that the structure of the value chain is poorly integrated, with no or nominal vertical links, and it is usually secretive. Several factors were identified for such a poorly coordinated and obscure market chain, such as lack of market access and transaction problems, information gaps, lack of reliable buyers, and discriminatory and unfair pricing (Kop *et al.*, 2006). Uniyal (2000) further asserts that farmers' cultivating medicinal plants faces many obstacles like the lack of knowledge of cultivation and post-harvest techniques for some species and the lack of availability of good quality planting material. The characteristics of present medicinal plant value chain (MPVC) are informal at its upstream base (producers, gatherers and collectors) and better organized and formally structured actors downstream (processors and wholesalers/ retailers). The analysis of MPVC is also enhanced through considering the role of natural resource management, health concerns, and governance issues. Value chain analysis (VCA) provides base for better understanding of the linkages between local-level of nature, health, wealth and power (NHWP) dynamics and broader market systems. Booker *et al.*, (2012) proposed that it is possible to increase value chain efficiency and competitiveness but these improvements alone will not necessarily improve the lives of the rural poor. The value chain strengthening is a powerful tool for promoting NHWP-related development goals

and deliberating interventions to create opportunities among the rural poor. The Handbook of Value Chain Analysis (VCA) out-lined by Kaplinsky and Morris (2001) was considered very useful for analysing the value chain in order to assess the contributions made by community mem-bers engaged in primary production as well as the benefits they derive.

The producer or farmers are the source of supply of the raw material in the value chain of the crop while traders either retailers or whole sellers at local vicinity buy the raw material from the producer in prevailing prices. Since plant parts of the medicinal herbs are not consumed directly or are not directly in touch with processing units, farmers generally face lack of ready market for their produce. In value chain, the component of processing unit plays major role in marketing of the raw material. The processor rarely buys the raw material directly from the farmers for processing the herbs into the final product for better pricing of the products.

Value chain flow chart for Shankhpushpi in Barmer

Barmer region of Rajasthan state is home to numerous medicinal plants. Shankhpushpi is an important medicinal plant which grows naturally in the region. This is grown/collected by farmers as it has got immense business potential in medicinal plant industry. The flow chart of shankhpushpi value chain is summarizes in Fig.1. Shankhpushpi is a hardy spice which grows naturally in this area. The data shows only 3% households reported that they buy seeds from outside and then cultivates. Rest 97% do not do any farming (Fig.2). Farmers at village level collect the leaves from vicinity and sell it to local traders at Rs. 8 /kg. Local traders at block level further sell it to the big traders at district markets at Rs. 10-12 / kg. Here aggregation is done at large scale. Big traders at district level store the produce and also do basic sorting or cleaning of the produce. The big traders sell it to pharmaceutical companies and some even export them to other countries across the globe. As shown in Fig.1, the value chain of shankhpushpi can be divided into

three parts i.e. (i) Actors (ii) Value addition and (iii) Costing factors. Farmer sell produce to local traders for output marketing. Local traders' further supply the produce to big traders in controlled markets of Barmer and Jodhpur. Big traders finally sell the produce either to pharmaceutical



Figure 1: Various components of shankhpushpi value chain in India

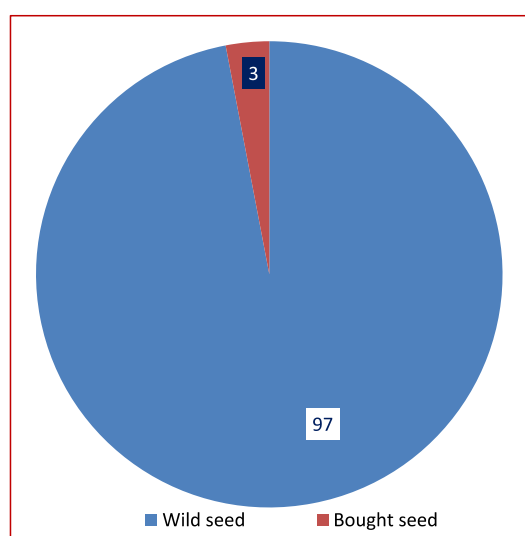


Figure 2: Percentage households with type of seed used for cultivation

companies or export. These pharmaceutical companies after processing, branding and advertising sell these products through retailers within country and exports it to other countries for generating income. Focus group discussions and household survey reveals that shankhpushpi grows naturally in the region depending on the rainfall. Farmers collect shankhpushpi at regular interval, dry it, store it in bags and sell after primary sorting when they need some cash for their livelihood. Many farmers do not realize the market potential of this herb. Our household survey data also revealed that in Barmer district, the average household land holding is 4 ha out of which 23% is wasteland. This wasteland has a potential to cultivate medicinal plants.

Gaps in the value chain

Lack of knowledge among farmers about business potential of the medicinal plants was identified as one of the major gaps. As farmers do not realize the potential, hence no proper production plans and aggregation system are present in the region. Lack of technical knowledge about how to cultivate the medicinal plants which grows naturally in the region also discourages the farmers. Lack of market information for medicinal plants is also a factor of this gap grow and where to market the produce. The overall SWAT analysis of value chain data is summarized in Table 2.

CONCLUSION

Medicinal plants offer impressive alternative livelihood for small farmers with tremendous opportunities to generate income, employment and foreign exchange. Many traditional herbs have shown to have medicinal value and can be used to prevent, alleviate or cure several human diseases. The arid eco-system of Western Rajasthan is a rich repository of genetic material of several important medicinal plants including shankhpushpi. The global market for the medicinal plants and herbal medicines is estimated to be worth US\$800 billion a year and the market for Indian traditional systems of medicine is about Rs. 4000 crores per year. Thus, there is an immense scope for undertaking the research on studies of traditional

Table 2: Constraints and Opportunities in value chain management of shankhpushpi in Barmer region

Stages	Constraints	Opportunity
Production	- Farmers do not do medicinal plant farming - As of now, no proper backward linkages at farmer's level - High seed costs	- Grows naturally and is found in abundance in the region - Big players are providing free good quality seed to farmers in the region - Grows on barren land which is in abundance in the region - Once seeds are sown it continue to give crop for three years minimum twice a year
Aggregation	- Aggregated at local trader level not at farmer level - Scale is still less as aggregation is not done in formal way	- Local traders at block level already procure the leaves and roots - Private players at district level claims to collect 100 tones in a day
Sorting and Grading	Not practiced as of now by farmers	- Easy process can be practiced at household level - Solar dryers can be installed for some medicinal plants - Fetches better prices
Marketing	- Un organized market - Local traders buy the produce at through away price	- Huge demand in the market at national and international level - Big traders at district level already present - pharmaceutical companies are already procuring from KVK

knowledge and ethno- medicinal practices used by the people of Rajasthan in curing common ailments and by the application of reverse pharmacology to develop new herbal products (Singhi, M.2014).

The efficient marketing and value chain alignment of medicinal herbs helps in more production and supply of the crops to the drug industry. Due to insufficient marketing facilities, the amount of post-harvest loss has intensified but it may be minimized by processing unit's interference. The efficient marketing information system and government support can encourage the farmers or producer to engage in the collection and/or cultivation of the herbs. The contract and cooperatives farming system are helpful for fetching good price for the farmer's produce. The analytical framework we propose here for shankhpushpi value chain allows an understanding of how the changing pattern of commercialization changes the value chain structuring and linkages. Further, it also highlights the impact of value chain alignment on the various elements of the chain from local producing householders to end user.

REFERENCES

- Agarwal P, Sharma B, Fatima A, Jain SK. 2014. An update on Ayurvedic herb *Convolvulus pluricaulis* Choisy. *Asian Pac J Trop Biomed* **4**: 245-252.
- Booker A, Johnstona D, Heinricha, M. 2012. Value chains of herbal medicines—Research needs and key challenges in the context of ethnopharmacology. *J Ethnopharmacol* **140**: 624–633.
- Chopra RN, Chopra IC, Handa KL, Kapur LD. 1958. *Indigenous Drugs of India*. Academic Publishers, New Delhi. pp 30-36.
- Hamilton AC. 2004. *Medicinal Plants Conservation and Livelihoods*. Biodiversity and Conservation. Kluwer Academic Publishers. The Netherlands **13**: 1477-1517.
- <http://rsmpb.in>
- <https://www.qcin.org/images/QCI-NMPB-VCS-Brochure8.pdf>
- Jain LK. 2014 Economics and gap analysis in Isabgol cultivation through frontline demonstrations in western Rajasthan. *Int J Agri Ext* **2**: 109-114.
- Kaplinsky M, Morris M. 2001. *A Handbook for Value Chain Research*. IDRC, Canada.
- Keshari P, Pradeep. 2018. A review of conservation and sustainable use of medicinal plant with special reference of *Tecomell aundulata* (Sm.) Seem. *J Pharma Phytochem* **3**: 09-13.

- Kop PVD, Ghayur A, Burt DSP. 2006. Developing a sustainable medicinal plants chain in India: Linking people, markets and values. In: R. Rubin, M. Slingerland and H. Nijhoff (Eds.): *Agro- Food Chain Networks for Development*. Springer. The Netherlands. pp 191-202.
- Laird SA. 1999. The botanical medicine industry. In: (Kate K. & Laird S.A (Eds.): *The Commercial Use of Biodiversity: Access to Genetic Resources and Benefit-Sharing*. Earthscan, London. pp 78–116.
- Lambert J, Srivastava J, Vietmeyer N. 1997. Medicinal plants: Rescuing a global heritage. The World Bank. Washington, D.C.
- Moghadam Z, Mohkami Z, Badihbarzin H. 2016. Analysis economic of medicinal plants production in tropical area. *Bulletin de la Society Royale des Sciences de Liege* **85**: 1308-1315.
- Nagaraju K, Vishwanath M, Aruna K. 2018. Seed quality enhancement techniques in medicinal and aromatic crops. *J Pharm Phytochem* **3**: 104-109.
- Rathore R, Mathur A. 2019 Scope of cultivation and value chain perspectives of medicinal herbs in India: A case study on Aloe vera and Isabgol. *J Pharma Phytochem* **8**: 243-246.
- Sairam K, Rao CV, Goel RK. 2000. Effect of *Convolvulus pluricaulis* chois on gastric ulceration and secretion in rats. *Ind J Exp Biol* **39**: 350-354.
- Schmitz H. 2005. Value Chain Analysis for Policy Makers and Practitioners. International Labor Organization (ILO), Geneva.
- Shahidullah AKM, Haque CE. 2010. Linking medicinal plant production with livelihood enhancement in Bangladesh: Implications of a vertically integrated value chain. *The J Transdisc Environ Stud* **9**: 1-18.
- Singhi M. 2014. Valuable medicinal plants of desert and their marketing scenario. Dr Manju Singhi Desert Medicine Research Centre, Jodhpur.
- Tamboli AM, Wadkar KA. 2019. A review on phytochemical constituents and pharmacological activities of *Convolvulus pluricaulis* plant. *Paripex - Ind J Res* **8**: 77-79.
- Uniyal RC. 2000. Research for Medicinal Plants Cultivation in India – a Reference Book'. In *Medicinal Plants Stakeholders' Meeting*. TRAFFIC-India, New Delhi.