



Ethnopharmacology of *Acorus calamus* L. among Indigenous Communities of Ganderbal District in Kashmir

**G. M. Bhat^{1*}, Rayees A. Bhat¹, M. A. Islam¹, Megna Rashid Bakshi¹, N. A. Pala¹,
Huzaifa Majeed¹ and Shahnaz Fatima¹**

¹Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Benihama Ganderbal Campus (UT of J&K), India.

Authors' contributions

This research work was carried out in collaboration with all the authors. Author GMB designed the study, performed the statistical analysis and wrote the protocol while the literature search and drafting of the manuscript was managed and done by the authors MAI, NAP and MRB field survey and data collection was done by the authors RAB, HM and SF. All the authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2021/v26i1230339

Editor(s):

(1) Dr. Ahmed Mohammed Abu-Dief Mohammed, Sohag University, Egypt.

Reviewers:

(1) Abdelkarim Guaadaoui, Mohammed First University, Morocco.

(2) Rajendra Gyawali, Kathmandu University, Nepal.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/64173>

Original Research Article

Received 25 October 2020
Accepted 30 December 2020
Published 31 December 2020

ABSTRACT

The present study was undertaken to collect the information regarding ethnomedicinal practices of *Acorus calamus* and data were collected by using a well-designed interview schedule from local herbal healers called "Hakeems, Bohris" experts in the Ayurvedic and Unani medicine, local collectors. The results indicated that the main ailment categories that are treated by *Acorus calamus* include skin diseases, renal/urinary disorders, muscular/skeletal disorders, respiratory diseases, eye diseases, fever and others. These diseases were treated traditionally by using its different parts after proper processing and at prescribed treatment procedure by the concerned Hakeem, bhoris, Ayurvedic and Unani doctors. The analysis also indicates that 65% of the rhizomes followed by 15% of leaves, 12% of root hairs, whole plant 8% are used for treatment of many diseases under ethno-medicines. Modes of utilization or preparations were powder, paste, decoction and juice. The treatments of diseases with *A. calamus* enumerated in this study

*Corresponding author: E-mail: bhatm67@gmail.com;

have given some useful leads for further biomedical research. Nevertheless, more phytochemical, pharmaceutical and clinical studies are needed to evaluate protective properties, efficacy and safety of all the claimed medicinal treatments.

Keywords: *Acorus calamus*; ethnopharmacology; diseases; rhizome; therapeutic use; goitre.

1. INTRODUCTION

The WHO has estimated that 80% of the world population meets their primary health care needs through traditional medicine only. The cultivation of medicinal and herbal plants has assumed greater importance in recent years due to their tremendous potential in modern traditional medicine, cosmetic and fragrance industries. One of the earliest records of sweet flag is the calamus of the Bible. The first record of sweet flag cultivation was in 1574 A.D. by the Austrian botanist Clusius, who obtained a rhizome from Asia Minor and propagated it in Vienna. Traditional knowledge of medicinal plants and their treatment methods in India are rooted in Ayurvedic Compendia (Sanskrit Medical Treaties) and in the unscripted dialects of the people in India, calculatedly compiled between 7th century BC and 6th century into all aspects of medicine, including the logic and philosophy behind the Indian medicinal system with special emphasis on the diagnosis of disease and treatment part. Health care in ancient times included the use of leaves, flowers, stems, berries and roots of herbs for their therapeutic or medicinal value. These medicines initially took the form of crude drugs such as tinctures, teas, powders and other herbal formulations. Nearly 70-80% people around the globe depends on medicinal plants for primary health care [1]. The use of plant-based drugs for the treatment of various ailments is increasing worldwide as they are considered much safer compared to synthetic drugs [2]. The world market value of pharmaceuticals derived from plants used in traditional medicine exceeds US\$ 20 billion. In USA, the annual sale of medicinal plants amounts to US\$ 1400 million. China being the largest exporter in medicinal plants as an annual sale of US \$ 4 billion. About 33% of medicinal plant species are trees, while about 52% are shrubs or herbs, a majority of medicinal plants are higher flowering plants. The tribal belt of India is rich in these plants and local tribes mainly depend on their collection and trade. The wild growing population of these plant species is fast reducing particularly in the known habitats and their substitutes and allies have appeared in the market. The scarcity of genuine herb leading

to use of substitutes and allies is likely to bring down the efficiency of formulation. Out of 25 million species of plants worldwide only 20000 have so far been listed as being of known of medicinal value and only 5000 have been phytochemically studied [3].

A. calamus L. commonly known as Sweet flag belongs to the family Acoraceae (Adoraceae). The plant *A. calamus* was found to be growing in its natural habitat (Wetlands) between an altitude of 1,000-2,300 meter and was not found to be cultivated by farmers in any part of the district. *A. calamus* is perennial medicinal herb is commonly growing on the banks of streams and in dampy marshy places in Kashmir valley. In Ayurvedic medicine *A. calamus* is an important herb and is valued as a "rejuvenator" for the brain and nervous system and as a remedy for digestive disorders. The rhizome of *A. calamus* is used for various medicinal purpose mainly appetite, fever, stomach cramps, tooth ache and cholic [4]. It is commonly used in traditional medicinal systems of Asian and European countries to treat appetite loss, diarrhoea, digestive disorders, bronchitis indigestion, chest pain, nervous disorders. *A. calamus* is effective in killing insect pests in stored rice and is considered to be better than chemicals for this purpose as it shows no residual effect. The rhizome is used as an insecticide and for protection from insect attacks [5]. The oil of *A. calamus* rhizomes has been analyzed by various workers for their chemical constituents [6]. Alcoholic rhizome extracts of *A. calamus* growing in South Africa were found to have anthelmintic and antibacterial activity. The aromatic constituents namely asarylaldehyde in roots and asarone in leaves are responsible for the smell of volatile oil [7]. Bhat et al. [8] reported that *A. calamus* based cottage industry was found to be the 5th major contributor to rural household income; the total collection of *A. calamus* was 4038.00 kg, of which average collection/household/annum was 67.3 kg, the total gross income generated from *A. calamus* among the sample households was Rs. 129120.00; of which average income/household/annum was Rs. 2152.00, the total net income generated was Rs. 96120.00; of which average income/household/annum was Rs. 1602.00 and the total average employment

was 68.66 man-days among the sample households in Ganderbal district of J&K. The traditional medicines based on Ayurveda, Siddha, Unani, etc. are still in use to provide primary healthcare, particularly to the rural folk. The traditional knowledge system has gained prime significance with regard to conservation, sustainable development and investigation for new use patterns of plant resources. Traditional medicine system includes the knowledge, skills and practices based on the theories, beliefs and experiences of indigenous communities to maintain their health problems. *A. calamus* based medicines are being used by them for the treatment of various ailments, thus a considerable amount of information on herbal medicines is available with these communities. Keeping the aforesaid facts in view the present study was undertaken to record *A. calamus* based herbal preparations used by the indigenous communities in treatment of various diseases.

2. MATERIALS AND METHODS

2.1 Study Area

The study was undertaken during 2018-19 in the Ganderbal (Fig. 1) district of Kashmir valley located between 34.23°N Longitude and 74.78°E Latitude at an altitude of 1616 MSL. The district is flanked by district Baramulla in the west, district Srinagar in the south, newly created district Bandipora in the North West, Arohoma forest in the north and district Kargil in the east. Ganderbal district enjoys a unique geographical position and it represents the last station depicting all the scenic features of the Kashmir valley. The presence of famous health resorts, Sonamarg and Mansbal lake and Sindh nalah flowing through areas adds to its beauty. There are three tehsils in the district namely, Ganderbal, Kangan, and Lar and comprises of four blocks viz., Ganderbal, Kangan, Lar and Wakoora. The total population of the district is 297446 persons (158720 males and 138726 females) spread over 113 villages. The population is differentiated as rural 250407 persons and urban 47039 persons. The literacy rate is 59.98% [9]. The district experiences both temperate and sub-alpine conditions having temperature varying from 5-20°C and rainfall of 700 mm. Nearly 70% areas of the district are hilly and semi-hilly covered with green forests.

2.2 Sampling

Purposive sampling technique [10] was employed in the District Ganderbal to select the

villages and households in order to reach target sample quickly.

The first stage was the selection of villages, 6 villages (Peerpora, Tulmulla, Rabitar, Darkpura, Sindbal and Shalbug) from district Ganderbal were selected which were near to wetlands. The second stage was selection of households. A sample of 60 households was drawn from the sample villages having 5 percent sampling intensity using simple random sampling technique for the field study. Structured interviews and non-participant observations [11] were used to obtain the information about the parts used, formulation method, disease treated and treatment procedure for various diseases from *A. calamus*.

3. RESULTS AND DISCUSSION

3.1 Ethnobotanical Practices of *A. calamus* L.

The main ailment categories that are treated include goitre, gastrointestinal diseases, skin diseases, swelling, constipation, renal/urinary disorders, muscular/skeletal disorders, respiratory diseases, eye diseases, fever, arthritis/joint pains, teething in babies, cough, sore throat, indigestion and spleen enlargement (Table 1). These diseases were treated traditionally by using different parts of the species after proper processing and at prescribed treatment procedure by the concerned Hakeem's, Bohris and experts in the Ayurvedic and Unani. The analysis indicated that rhizome was most frequently used part (65%) followed by leaves (15%), root hairs (12%), whole plant (8%) (Table 1). Several studies conducted across the world have been reported on traditional medicines to cure different diseases. The traditional Hakims as well as Bohris utilize different parts of plant as a remedy for treatment of different diseases under ethno medicines. However, the use of a particular plant depends on the user's needs. Each part of *A. calamus* was used for treatment of different diseases viz., rhizome, root hairs, leaves and as whole plant. Modes of utilization or preparations were decoction, juice, paste, powder. Most commonly used preparation were powder followed by decoction, juice, paste. Powder was found to be most common mode of utilization; this is due to the hard nature of rhizome and roots.

3.2 Important Medicinal Formulations of *A. calamus* L.

About thirteen formulations (Table 2) were available in the local market having *Acorus* as one of ingredient and were prescribed by the Ayurvedic Practitioners, Hakeem's to the patients for treatment of different diseases like male infertility, oligospermia, general fatigue Speech disorders, skin infections Rheumatism, improving memory, retention of urine etc. The results are in conformation with the findings of Nida et al. [12] while studying the ethno-medicinal utilization of *Bergenia ciliata* L. in Kashmir and reported that different parts of *Bergenia ciliata* L. were having medicinal value viz., rhizomes, roots, leaves, whole plant, flowers, latex and stem. A total of 104 ailments were found to be treated by *Bergenia ciliata*. The main ailment categories that are treated include gastrointestinal, skin diseases, renal/urinary disorders, muscular/skeletal disorders, respiratory diseases, eye diseases, oral infections, worm infections and gynaecological disorders, ENT, fever, cancer and others. Huzaiifa (2019) [13] while studying the ethno-medicinal practices and standardization of propagation technique for Sweet basil (*Ocimum basilicum* L.) under temperate conditions of Kashmir, reported that each part of *Ocimum basilicum* was having

medicinal value viz., flowers, stem roots, leaves, whole plant and seeds. A total of 90 ailments were found to be treated *Ocimum basilicum*. Tangjang et al. [14] also conducted an ethno botanical survey of medicinal plants in the Eastern Himalayan zone of Arunachal Pradesh, India. A total of 74 medicinal plant species were

reported that are distributed across 41 families and 61 genera were used by the local people in traditional health care system to cure at least 25 different diseases/ailments. Different modes of remedy preparation, routes administration for treating various ailments were observed during the study. The method of preparation was mostly decoction (32 species) or paste form (23 species), eaten raw (7 species) and others (powder) usually prepared from freshly collected plant material just before use. Sunga et al. [15] reported that *A. calamus* has been an item of trade in many cultures for thousands of years. It has been used medicinally for a wide variety of ailments and its aroma makes calamus essential oil valued in the perfume industry. The essence from the rhizome is used as flavour for pipe tobacco. When eaten in crystallized form, it is called "German ginger". In Europe *A. calamus* was often added to wine and the root is also one of the possible ingredients of absinthe. It is also used in bitters.

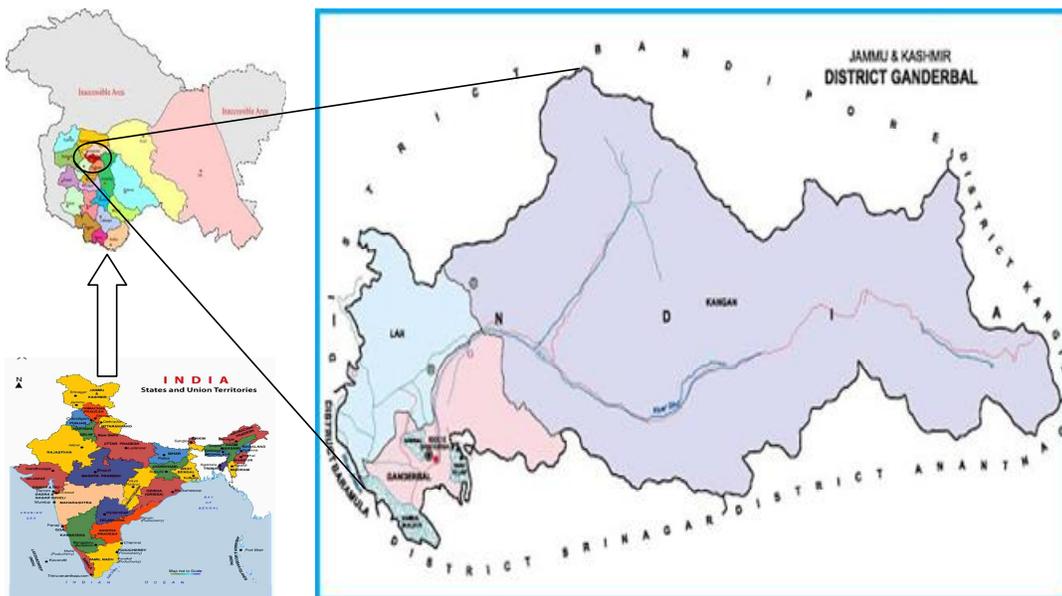


Fig. 1. Map showing study location

Table 1. Ethnobotanical practices of *A. calamus* L. among local people of Kashmir

S. No.	Disease treated	Parts used	Formulation method	Treatment procedure
1	Goitre	Rhizome	Dried rhizome	The rhizome is first dried and a thread is pierced into it and is weared on the neck for chewing to treat goitre
2	Gastrointestinal diseases	Rhizome	Powder/decoction	The crushed rhizome powder is given with kneaded flour for general gastric complaints.
3	Swelling, Constipation	Rhizome	Powder	The rhizome powder is mixed in 1 glass of water and taken 2 times for 15-20 days
4	Arthritis	Rhizome	Powder/decoction	The rhizomes are powdered mixed with mustard oil to make paste. Paste is applied on affected portion externally for 10 days for treatment of arthritis
5	Teething in Babies	Rhizome	Dried Rhizome	The rhizome is rubbed down and given with honey to children when teething.
6	Cough	leaves	Leaf extract	The leaf extract is mixed with sugar is taken twice a day for 5-10 days for treatment of cough
7	Sore Throat	leaves	Leaf extract	The extract of leaves is taken twice a day for 5-8 days for treatment of sore throat
8	Indigestion	Leaves	Powder/Decoction	The leaves are made into fine powder and decoction prepared, decoction of one cup is taken thrice a day for 2-5 days for treatment of indigestion

Table 2. Important medicinal formulations available in local market in which *A. calamus* L. is one of the important ingredient

S. No.	Medicinal formulations	Diseases treated
1.	Fortege	Useful in male infertility, oligospermia, general fatigue
2.	Colicarmin	Abdominal colic (antispasmodic) and carminative.
3.	Kafbin	Cough, Expectorant
4.	Hab –e- bachh	Memory enhancer
5.	Majun- Nisyaan	Dementia (forgetfulness), Memory enhancer
6.	Vacha Powder	Speech disorders, skin infections,
7.	Majun Vaj	Rheumatism, improving memory, retention of urine.
8.	Asabi	Nervine tonic useful in paralysis, epilepsy
9.	Majun Nisyan	Used in senile dementia, Alzheimers disease.
10.	Stresnil Tablets	Anti depressant and analgesic.
11.	Scavon vet cream	Antibavterial, prevention of Maggot formation
12.	Krush Tablets.	Used in kidney stones.
13.	Brainokan Capsules	Improving memory, stress reliever, headache, Migraine.

4. CONCLUSION

The present study reveals that the plant was found growing in its natural habitat (Wetlands) only, locally called as *Via gander* (Kashmiri). It was traditionally used for the treatment of different kinds of diseases. Each part of plant was used for treatment of different kinds of diseases under traditional and ayurvedic systems. The main ailment categories that are treated include goitre, gastrointestinal, skin diseases, renal/urinary disorders, muscular/skeletal disorders, respiratory diseases, eye diseases, fever and others. Herbal medicines derived from *A. calamus* are being increasingly utilized to treat a wide variety of diseases but very little knowledge is available regarding their modes of action. The traditional uses of *A. calamus* in healthcare practices provide clues to new areas of research for new biological compounds and discovery of new drugs. Nonetheless there more phytochemical, pharmaceutical and clinical studies are needed to evaluate protective properties, efficacy and safety of all the claimed medicinal plants.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee

has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Haq I. Safety of medicinal plants. Pakistan Journal Medicine Regulations. 2004;43(4): 203-210.
2. Sahoo N, Manchikanti P, Dey S. Herbal drugs: Standards and regulation. *fitoterapia*. 2010;81(6):462-71.
3. Fabricant DS, Farnsworth NR. The value of plants used in traditional medicine for drug discovery. *Environmental Health Perspectives*. 2001;109(1):69.
4. Divya G, Gajalakshmi S, Mythili S, Sathiavelu A. Pharmacological Activities of *Acorus calamus*: A review. *Asian Journal Biochemical Pharmacy Resources*. 2011; 1:57-64.
5. Jain N, Suri RK. Insecticidal, insect repellent and piscicidal plants of Dehradun. *Nagarjun*. 1980;23:177-181.
6. Oprean R, Oprean L, Tamas M, Sandulescu R, Roman L. Essential oils analysis II. Mass spectra identification of terpene and phenylpropane derivatives. *Journal Pharmacy Biomed Analysis*. 2001 24:1163-1168.
7. Venakutonis PR, Dagilyte A. Composition of essential oil of sweet flag (*Acorus calamus* L.) leaves at different growing

- phases. Journal of Essential Oil Research. 2003;15:313-318.
8. Bhat GM, Rayees A Bhat, MA Islam, TA Rather, FA Shahkhan, Huzaifa Majeed, Nida Rafiq. Importance of acorus calamus in rural livelihood security of district ganderbal in Kashmir valley, India. International Journal of Current Microbiology and Applied Sciences. 2020; 9(10):986994.DOI:<https://doi.org/10.20546/ijcmas.2020.910.118>
 9. Anonymous. Directorate of economics and statistics, district statistics and evaluation office, Ganderbal, Jammu and Kashmir; 2011.
 10. Ray GL, Mondol S. Research methods in social sciences and extension education. Kalyani publishers, New Delhi, India; 2004.
 11. Mukherjee N. Participatory rural appraisal. Methodology and Applications, Concept Publishing Company, Delhi; 1993.
 12. Nida R, Bhat GM, Islam MA, Sofi PA, Malik AR, Rather TAH, Pala Nazir A. Ethno medicinal utilization of *bergenia ciliata* L in Kashmir Himalaya, India. Journal of Pharmacognosy and Phytochemistry. 2019;8(6):2182-2184.
 13. Huzaifa M. Ethno medicinal practices and standardization of propagation techniques of *ocimum basilicum* L under temperate conditions of Kashmir. M.Sc Thesis Submitted to Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar; 2019.
 14. Tangjang S, Namsa ND, Aran C, Litin A. An ethnobotanical survey of medicinal plants in the eastern Himalayan zone of arunachal pradesh, India. Journal of Ethnopharmacology. 2011;134(1):18-25.
 15. Sung C, Myoun SP, Yu RL, Tae WK, Seon GD. A standardized bamboo leaf extract inhibits monocyte adhesion to endothelial cells by modulating vascular cell adhesionprotein-1. Natural Resource Practica. 2013;7(1):9-14.

© 2020 Bhat et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/64173>