

Full Length Research Paper

Study on the ethnopharmaceutical values and traditional uses of *Capparis spinosa* L.

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This paper highlights the ethno-pharmaceutical importance of *Capparis spinosa* L. (Capparidaceae) used by many local people of district Chitral since century under the traditional system of medicine. In this context, a survey was conducted during summer 2010 in different ecologically and economically important sites of the study area. The aims, the current endeavour was to prepare an ethno-pharmaceutical inventory of *C. spinosa* and also to raise awareness regarding its usage. Additionally, to explore its agro-industrial potentialities for the socio-economic uplift of the inhabitants of district Chitral, Pakistan. The methodology of the survey focused on a series of consultation with local hakims (traditional healers) and people of different age groups. The results revealed that *C. spinosa* is a multipurpose plant used for the curing of various human illnesses in traditional system of medicines. The young fruits and tender branch tips are used in pickled and also as a condiment agent. The study also revealed that the tender young shoots including immature small leaves are eaten as a vegetable. Additionally, ash from burned caper roots has been used as a source of salt in indigenous system. Generally men had a greater knowledge than women regarding the therapeutic value of *C. spinosa*. This species is mostly collected by children and women and gathering is generally done for supplementary income. The collectors are not properly trained in the post harvest treatment of collected materials. Recommendations are given in the spheres of training in identification, sustainable collection, processing, value addition, equitable sharing of benefits of *C. spinosa*, trade monitoring and cooperative system of marketing.

Key words: *Capparis spinosa*, multipurpose species, ethno-pharmaceutical value, local people, traditional system of medicine, human illnesses.

INTRODUCTION

The mountainous area of the study is covered by dry temperate coniferous forest. This forest helps in maintaining a microclimate in the area and also helps to keep several fresh water springs and a perennial stream alive. This region has been regarded as a natural reservoir for the collection of a variety of wild medicinal and aromatic plants. These species are collected without reference to conservation needs, and with limited tangible benefits occurring to local communities. It is, therefore,

important to create awareness amongst communities, particularly for the species, which are under high bioenvironmental pressure in the area.

Gathering and processing of medicinal and aromatic plants for family use in human and livestock treatment is centuries old practice, and have also been used virtually in all cultures. *Capparis spinosa* is one such plant having high diverse economic and medicinal value in all system of medicines like in Iranian, Unani, Chinese, Ayurvedic and Greco-Arabi System of medicines (Azaizeh et al, 2003; Larsen and Smith, 2004; Al-Quran, 2008). The use of traditional medicine for maintenance of health in most of the developing countries has been widely observed as a custom (Chevallier, 1996; Hamilton and Hamilton,

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2006). Furthermore, an increasing reliance on the use of medicinal and aromatic plants in the developed societies has been traced to the extraction and development of several drugs and chemo therapeutics from these plants as well as from traditionally used rural herbal remedies (Sher et al., 2010a). Moreover, in these societies, herbal medicines have become more popular in the treatment of minor ailments and also on account of the increasing costs of personal health maintenance.

In Pakistan, 2000 medicinal and aromatic plants species are estimated to exist, however, very few of them are harvested and 90% of the country medicinal herbs requirement is imported (Sher, 2000). This is mainly due to the knowledge on medicinal and aromatic plants being confined to the tribal areas. Some fear that soon this indigenous knowledge will be lost. Even so, medicinal and aromatic plant species are important local cures for over 50% of the population and these are made into herbal medicines by around 40000 Hakims (Sher et al., 2010b). Among these one of the most important one is *C. spinosa*, a source of caparine used in orthodox medicine to treat bronchial asthma and high fever. The medicinal and aromatic plant species have supported livelihood of many people in the area. They are being collected for export both to national and international markets. The high dependency of rural people on medicinal and aromatic plants for subsistence and unsustainable harvesting practices has resulted over exploitation of resources in different areas of the country. The traditional practice of extracting forest resources especially medicinal and aromatic plants is mostly unsustainable. There is a lack of resource tenure and custodianship, understanding of sustainable use and management parameters, proper harvesting and collection procedures and knowledge of market requirements. These are important barriers to the sustainable utilization of medicinal and aromatic plants.

Harvesting practices used by untrained collectors may adversely affect the recovery of some plants populations especially of *C. spinosa*. Studies have revealed that commercial collectors have non selective harvesting habits where changes in population size and structure of important medicinal and aromatic plants species occurred; lack of knowledge about the part used and time of collection lead to misuse of species. The appropriate timing to collect the desired parts of plant of certain age will determine the yield percentage and quality of therapeutically active biochemical ingredients (Hamilton and Hamilton, 2006). Secondly, lack of knowledge concerning economic value of medicinal and aromatic plants has led to their mismanagement and least profitable exploitation not entirely by local residents but also by visiting collectors.

The global importance of MAPs is evident from the fact that in 2006, world wide trade of MAPs touched upon 60 billions of US dollars. With the increase in demand for MAPs, such trade is expected to further grow to 5 trillion by the year 2050 (Lang, 2008). It is also estimated that

Europe alone annually imports about an average market value of US\$ 1 billion from Africa and Asia (Larsen and Smith, 2004; Sher and Hussain, 2009).

The pressure arising from the implementation of WTO is opening new avenues for the diverse use of wild herbs such as their uses as herbal dyes, herbal fertilizers and pesticides and other biocides. *C. spinosa* possess incalculable number of pharmaceutical and ethnobotanical importance that contains important bioactive agents and has the potential of promoting useful biochemical compounds in various pharmaceutical and food industries (Gadgoli and Mishra, 1999). However, the development and commercialization of *C. spinosa* based bio-industries in the Kingdom of Saudi Arabia dependent upon the availability of facilities and information concerning upstream and downstream bio-processing, extraction, purification and marketing of the industrial potential of *C. spinosa*. The present study was, therefore, initiated to document the ethnobotanical and pharmaceutical importance of *C. spinosa* and also to explore its agro-industrial potentialities for the remote pocket area of Pakistan, that is, District Chitral.

In the study area, *C. spinosa* has been collected and sold in the local market by few local collectors. However, very limited knowledge is available on the economic potential of *C. spinosa*, which can be utilized in the farming system. Keeping in mind the attractive prices and demand of *C. spinosa* both nationally and internationally, the present study was designed and developed to evaluate the potential of *C. spinosa* in District Chitral.

MATERIALS AND METHODS

Study sites

Chitral is also known as Chitral and Qashaqar. It is the northern most remote district of North-West Frontier Province (NWFP) and is situated about 366 km from Peshawar. It lies between 35°12' and 36°50' North Latitudes and 71°02' to 73°53' East Longitudes, and is centrally perched with the Hindu Raj mountain range in the South, the Hindu Kush in the West and North, the Mashambur in the East and Western extremity, and the Karakoram in the North-East. District Chitral is administratively bounded on the Northwest by Afghanistan, on the South by Districts of Dir and Swat, and by District Ghizer of Northern Areas in the East. It is mostly inhabited by Chitralis with some Pathan population in southern part and more importantly some Kalash, thought to be the aborigines, people who are living in isolated valleys, in lower Chitral.

The economy of the inhabitants is mostly agro-pastoral. People usually keep goats, sheep, cows and horses/donkeys. Both agricultural and livestock economy are at the subsistence level except for some dry fruits and coarse woolen cloth, called Patti, which are marketed both at local and national levels.

Rationale for selection of *C. spinosa*

The literature review in general and perhaps the last comprehensive market survey of medicinal herbs in Pakistan (Anonymous, 2000) in particular, and also the study conducted during MACP (Sher, 2000) suggest that, among the check list of

Medicinal flora of district Chitral the targeted plant is in high demand at the local, national and international markets. As a mandate of *Centre of Botany and Biodiversity Conservation, University of Swat*, the mitigation measures are important for high demand species in the face of likely over-exploitation.

C. spinosa L. (Capparidaceae family) is known with a number of common names; caper (English), Bergesodab (Persian) and Titali, ab karir, kachia phal (Urdu), Chitrali (Kaveer). The genus is represented by 250 species including shrubs, trees and woody climbers. *C. spinosa* is distributed in northern parts of Pakistan, Middle East countries and also occur in many countries of Europe and South Asia. It prefers to grow in saline habitat with halophytic ecological community (Al-Yemeni and Zayed, 1999). It is a medium size perennial spiny bush that bears rounded, fleshy leaves and big white to pinkish-white flowers in July to August. Leaves are alternate, round to ovate, thick, and glistening. Leaf stipules may be formed into spines, this is the reason it is called spinosa. It has beautiful white colour hermaphrodite flower, producing large, kidney shaped, and gray-brown color seeds in September.

Ethnobotanical survey

A survey on the ethnobotanical importance of *C. spinosa* was conducted during summer 2010 in different ecologically and economically important sites of District Chitral. Before the survey, topographic map and other relevant informations of the study area were obtained from Forest Department of Chitral. Information about the knowledge of local people regarding local names, uses, part used, marketing, processing and recipe preparation from *C. spinosa* were known and recorded from the local inhabitants. Generally the key informants were elderly persons with the age group of 40 to 70 years. A questionnaire was developed to conduct semi-structured interviews for recording information.

To identify any amendments required to the questionnaire, a pre-test was conducted in the nearby village. Any revisions needed as a result of this pre-test were noted and undertaken in the following day of the pre-test.

Additionally, literature survey was conducted to document and compile the importance of *C. spinosa* (Al-Said et al., 1988; Gadgoli and Mishra, 1999; Fici, 2001; Inocencio et al., 2002; Lemhadri et al., 2007; Sushila et al., 2010; Sher et al., 2010b). Plants specimen was collected, dried, preserved and mounted on standard herbarium sheets. The voucher specimen number (CSC-02-1109) was deposited at the Herbarium of the Centre of Botany and Biodiversity Conservation University of Swat, Pakistan.

RESULTS AND DISCUSSION

Indigenous knowledge and *C. spinosa*

The forest, grassland and even agriculture land of the study area support incalculable number of plant species, of which many have potential economic, medicinal and other ethno-botanical values. Majority of the people living within and around the study area relies on the plant resources for centuries. The study showed that the local people have rich indigenous knowledge about distribution, abundance, harvesting, uses and marketing of medicinal and aromatic plants including *C. spinosa*. The indigenous knowledge however, differs in extent among gender, occupational and social groups. For example the Hakims and tenants possess comparatively higher knowledge regarding the medicinal importance of *C. spinosa* than

the general people. Similarly, the men have more knowledge than women. Similar results were also reported by Sher and Hussain (2009) and Azaizeh et al. (2003), They reported that the gathering and processing of *C. spinosa* for family use in human and livestock treatment is centuries old practice, and have been used virtually in all cultures.

The results of the present study had also shown that in the study area children were the main collectors (50%) followed by women (30%) afghan refugees men (15%) and local men (5%).

Ethnopharmaceutical importance

The current study documented major variation in the ethno-pharmaceutical uses of the same *C. spinosa* for treating human illnesses. In lower parts of the study area, it is used for the treatment of typhoid while in upper parts of the area as a blood purifier and refreshing agent. However, the fruits and flowers contain glucoside, Rutine and are particularly recommended for palsy, dropsy, gout and rheumatism. The results of the present study are in line with the study of Sushila et al. (2010) and Sher et al. (2010b). However, their reported species of Caper is different from our species.

The study also reported that in some area, the decoctions from the root bark have been used in traditional medicines for the curing of colicky pains, dyspepsia, dropsy and anemia. The present findings are supported by Inocencio et al. (2002), Eddouks et al. (2004) and Lemhadri (2007). They reported that the root bark of Caper is used as an analgesic and carminative agent and possess antihypertensive activity. Moreover, Al-Said et al. (1988) and Sher and Alyemeni (2010) also reported that the herbal tea made of caper root and young shoots is considered to be beneficial for the treatment of rheumatism and stomach problems.

The present study also documented that the decoction of the floral buds and young leaves of *C. spinosa* is used internally for curing of gastrointestinal infections, diarrhea, and dysentery and also useful for the removal of kidney stone. Externally, the same recipe is used to treat skin diseases like wet and dry eczema. The study also showed that this recipe is used to improve eyesight and to treat all kinds of eye diseases in traditional system of Arab medicine. Our findings are supported by earlier reports where decoction of the unopened flower buds of Caper are laxative and externally treat eye infections. The buds are a rich source of compounds known as aldose-reductase inhibitors, it has been shown that these compounds are effective in preventing the formation of cataracts (Purohit and Vyas, 2005). The buds are harvested before the flowers open and can be pickled for later use; when prepared correctly they are said to ease all kind of stomach problem (Al-Said et al., 1988; Gupta and Ali, 1997; Fici, 2001). Another study proved that *C. spinosa* decoctions treat skin, while the first recorded

use of the caper bush was for medicinal purposes in 2000 BC by the Sumerians. It has been suggested that Capers have been used or are still being used in reducing flatulence, in the treatment of rheumatism, anemia and gout. Further medical uses include ingesting for improving liver functions, as diuretics, and kidney disinfectants (Aghel et al., 2007). Infusions and decoctions from caper root bark have been traditionally used for dropsy, anemia, arthritis and gout (Bown 1995; Chopra et al, 1986; Aghel et al., 2007).

The present study generally concluded that actual traditional uses are empirical, being based on observations and not on controlled experimental evidences. In most cases, *C. spinosa* is considered specific for a particular illness, but also sometimes for other minor uses. Differences in the traditional use of the same species for a range of therapeutic responses thus create a field of research. The current research into the traditional use of medicinal plants suggests that the therapeutically active constituents are present with naturally balanced counterparts, and the actual chemical assay shows differences in their pharmaceutical properties. These findings are in line with the study of Fragiska (2005), who reported that *C. spinosa* has the potential to support the formations of different agro-based industrial products. Moreover, Sushila et al. (2010) also reported that in ayurvedic medicine, capers are recorded as hepatic stimulants and protectors, improving liver function and also act as a appetizer agent.

Therefore, despite criticism that the use of traditional medicine is anachronistic, as is the use of a stone throwing machine in a modern war, it often happens that traditional medicine can cure diseases which cannot be healed by orthodox medicine.

Culinary uses

The present study revealed that *C. spinosa* is well known for their culinary properties, the floral buds have been used in pickled or preserved in granular salt. They have also long been used in recipes of salads, pasta, meat, sauces and garnishes to add a pungent spicy flavor and aroma to food. The current study reported that its floral buds and fruits are mainly collected for commercial purposes. Manual labor is required to gather capers and the buds must be picked early in the morning just as they reach the proper size. After the buds are picked, they are usually sun-dried, and then pickled in a vinegar brine. Either way, rinse before using to flush away as much salt as possible. The taste is slightly astringent and pungent, and they can lend piquancy to many sauces and condiments. Similar finding was reported by Fici (2001), who stated that the salted and pickled caper bud is often used as a seasoning and garnish. Furthermore, he also reported that Capers are a common ingredient in Mediterranean cuisine, especially Italian. The young fruits

and tender branch tips can also be pickled and used as a condiment. The flower buds are pickled and used as flavouring in sauces, salads. Both the capers and the young berries are used in sauces and pickling, primarily by Europeans. Tender young shoots including immature small leaves may also be eaten as a vegetable, cooked and used like asparagus or pickled. More rarely, mature and semi-mature fruits are eaten as a cooked vegetable. Additionally, ash from burned caper roots has been used as a source of salt (Chevallier, 1996; Sher and Alyemeni (2010).

Miscellaneous uses

The current study showed that *C. spinosa* is a multipurpose plant and used in almost all kind of medicine system, as a culinary agent and also used in food industries. The study also revealed that capers have been used as flavoring for centuries and extract of the root *C. spinosa* is used for cosmetic purposes. It is also useful in treating rose-colored rashes and capillary weaknesses. It is used also as an ornamental plant. *C. spinosa* grow and occur in ecologically fragile rocky saline niches of the study area, the present study, therefore, recommend *in-situ* conservation and *ex-situ* management for its sustainable production. It is only possible with the active participation of local community members.

C. spinosa is drought tolerant and produces a great vegetative cover which protects soils from erosion and water loss and can be highly useful as for the prevention of land degradation. It can also be used for the reclamation of saline soils, calcareous soils and fallow lands. Similar results were also reported by Scakali et al. (2008) and they observed that *C. spinosa* can be a promising species that can be used for the re-evaluation of degrading or eroding lands in the Mediterranean countries.

Conclusion

Indigenous knowledge behind the uses, collection and management of *C. spinosa* is fastly eroding. One reason for this is the lack of awareness among the local community regarding the economic and medicinal importance of *C. spinosa*. Another factor contributing in the declination of medicinal and aromatic plants cover and eroding of indigenous knowledge is the inadequacy of the medicinal and aromatic plants market and lack of government support. This is, therefore, an issue of national policies and must be addressed.

The study recorded highly valuable information about *C. spinosa*. It is widely distributed and quite common in the study area. The Chinese scientists opined that the oil extracted from this species is used to cure cancer and

the juice extracted from the fruits is sold and used as tonic. Similarly, the Chinese scientists have developed small-scale enterprise from the species like preparation of Jams and prickles etc. The Chinese are earning an annual profit of 03 million US\$ from this single species. *C. spinosa* can develop similar scope in our country especially in the remote pocket District Chitral.

One important lesson learned from this study is that the establishment of a community based enterprise that depends on local biodiversity can be a strategy to provide more equitable returns to community groups and hence incentives for conserving the resource base. The present study, therefore, suggest its full sustainable exploitation with the aim to benefits the people of District Chitral from its agro-based industrial potentialities.

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