



International Journal of Botany

ISSN: 1811-9700

science
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Traditional Knowledge and *ex situ* Conservation of Some Threatened Medicinal Plants of Swat Kohistan, Pakistan

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Abstract: Medicinal plants still provide primary health care to human race in different regions across the globe, especially in the developing world. The role of medicinal herbs as source of traditional medicine have decreased due to the introduction of allopathic drugs but still their importance as a prime source of rural health care can not be paralleled. Medicinal plants and their pertinent knowledge need to be conserved for the future generations. During present study, traditional knowledge of 16 threatened medicinal plants of Swat Kohistan was documented and a nursery was raised in lower Swat in an effort to conserve them. Only 8 plant species viz. *Bergenia ciliata*, *Dioscorea deltoidea*, *Bistorta amplexicaulis*, *Valeriana jatamansi*, *Valeriana pyrolifolia*, *Viola biflora*, *Viola canescens* and *Berberis lycium* survived and acclimatized to new habitat, while the rest failed to germinate.

Key words: Traditional knowledge, medicinal plants, *ex situ* conservation, Swat Kohistan

INTRODUCTION

The use of natural herbal drugs to alleviate suffering is perhaps as old as the origin of man itself on this planet. Plants and animals with medicinal properties were held in the highest esteem in indigenous medicine systems all over the world. All indigenous remedies, whether traditional or modern, have originated directly or indirectly from folklore and rituals or measures hold the key to the treasures of folk medicinal knowledge and ethno medicinal botany. It is estimated that 70-80% of people worldwide rely chiefly on traditional, largely herbal, medicine to meet their primary healthcare needs (Farnsworth and Soejarto, 1991; Pei Shengji, 2001) and the global demand for herbal medicine is not only large, but growing (Srivastava, 2000).

Conservation of medicinal plants needs both global attention and prompt action at the regional level. The most important role for medicinal plants in biological and ecological conservation stems from the foundations that they can provide for the involvement of people in conservation of natural habitats (Schopp-Guth and Fremuth, 2001). Historically, many indigenous societies have formulated and established their own traditional conservation methods, including the protection of plants, animals and ecosystems based on the society's cultural tradition and indigenous knowledge systems. With rapid population growth and economic development, the natural habitats have already been destroyed to a considerable extent. This situation is particularly critical

in the Hindukush-Himalays. For instance, in the Eastern Himalayan, 90% of the natural forest habitats have already been lost (Shinwari *et al.*, 2000).

Swat Kohistan: Swat Kohistan borders the Gilgit and Chitral in the North, District Swat in the South, Indus Kohistan in the east and upper parts of District Dir and some parts of Chitral in the west. The population of Swat Kohistan is 31029 and the area is about 206523 hectares (Anonymous, 1998). The minimum elevation of Swat Kohistan is 2000 m at Kalam. Kalam is the major town and center of Swat Kohistan.

Nature has been very generous to the region in its endowments of invincible peaks, gigantic glaciers and majestic streams, not to mention the splendor of its valleys, the meadows and high altitude plateaus.

Historically, the predecessors of the present Kohistani population are most likely the same as the Gawri, who inhabited the lower more fertile parts of district Dir from the days of Alexander the Great. In 11th century A.D. the forces of Mehmud of Ghazna conquered the area and the indigenous population was thus forced to flee to the remote and inhospitable upper mountains. Local traditions confirm that from these groups of Gawri settlers crossed the mountain passes in to Utror, Kalam and Ushu valleys which are now parts of District Swat, while the rest remained in the upper Panjkora valley of District Dir. During 14th century A.D. the Yousafzai tribe of Pukhtoons attacked the lower parts of Swat and Dir

districts forcing the already resident Pukhtoons to flee to the upper parts of Swat and Panjkora valley. Under the influence of these new immigrants, Kohistanis converted to Islam, probably in 15th or 16th century (Baart, 1997). As the new immigrants belong to Hanfia School of Islamic law, subsequently the new converted Kohistanis also belong to the same group of Sunni Muslims.

The Kohistanis enjoyed large degree of political independence for many centuries. After independence of India from British rule, the area came under the rule of Wali (former ruler of Swat) in 1947. At that time Swat was an autonomous state. The Wali (commonly called Baachaa Sahib of Swat) built roads, schools and hospitals in the area. During the reign of Wali Sahib, the area witnessed great development like other parts of Swat. The Kohistan area was finally incorporated with Pakistan in 1969. The residents of Swat Kohistan still enjoy semi-independent status, as the government is unable to exert her direct and efficient control due to its remoteness and partly because of local traditions and tribal system. The administration does not enjoy enough influence and authority in the area and the tribal traditions still take precedence over official Pakistani law.

Present study was aimed to identify the most frequently used medicinal plants in the Hindukush region of Pakistan and to conserve them out side their natural habitat on trial basis.

MATERIALS AND METHODS

An ethnobotanical project was conducted during 2002, in order to document the traditional knowledge and *ex situ* conservation status of important medicinal plants

of Hindukush mountains. For documenting traditional knowledge of medicinal plants, interviews were conducted with the local inhabitants, selected informants, the herbalists hakims (local physicians of eastern system of medicine), pansaries (medicinal plants sellers in the local markets). Questionnaire method was adopted during the survey in order to get qualitative and participatory approach about the plant resources and their medicinal utilization by the local people.

A nursery was established in lower Swat (Tindodog-1000 m altitude) with the help of the local people. Sixteen threatened plant species collected from Swat Kohistan were sowed during 2002. For each medicinal plant species, either seeds or rhizomes were sown in plots of 12×6 sq. feet size, with 3 feet plant to plant spacing. The germination dates, flower and seeds formation were recorded for successful medicinal plants.

RESULTS

The people of Swat Kohistan rely on medicinal plants for curing different ailments. The use medicinal plants in different forms i.e., powder, extracts and pastes. The rhizomes are most frequently used in the crude herbal drugs. Some collectors sell medicinal herbs in the local markets for earning their living hood. A survey indicated that most of the traditional medicinal knowledge comes from aged people. Gender wise, women especially old ones are more informative of traditional knowledge of medicinal plants than men. The survey also indicated that about 60% of the local population is relying on medicinal plants for primary health care. Traditional knowledge of some threatened medicinal herbs are shown in Table 1.

Table 1: Some threatened medicinal plants with their respective families, local names, conservation status in the area and pertinent traditional knowledge

Plant material	Part used	Conservation status	Traditional uses
Ranunculaceae			
<i>Aconitum heterophyllum</i> Wall. [Sarba Zailay]	Rhizome	Vulnerable	Fair color and gaining weight
<i>Caltha alba</i> Camb. [Makhan Path]	Whole plant	Endangered	Headache, toothache, mouth wash, potherb
Araceae			
<i>Acorus calamus</i> L. [Skhawaja]	Rhizome	Endangered	Dysentery, chronic diarrhea, rheumatism
Berberidaceae			
<i>Berberis lycium</i> Royle [Khawaray]	Rhizome/ rhizome bark	Endangered	Body and bones pain, stomachic, for arousing sex, treatment of internal wounds
Saxifragaceae			
<i>Bergenia ciliata</i> (Haw)Stemb. [Barmia]	Rhizome/leaves	Near Threaten	Rhizome for treatment wounds, discharge of pus, curing diarrhea in animal, leaves as tonic for muscular pain.
Polygonaceae			
<i>Bistorta amplexicaulis</i> (D. Don) Greene [Anjabar]	Roots/leaves	Vulnerable	Curing ulcer, rheumatic pain, backache, gout, eye sight
Liliaceae			
<i>Colchicum luteum</i> Baker. [Suranjan-e-Talkh]	Corms	Endangered	Carminative, laxative, aphrodisiac, joints pain
<i>Polygonatum verticillatum</i> All. [Permole]	Rhizome	Endangered	Rheumatism, aphrodisiac, increasing milk
Dioscoraceae			
<i>Dioscorea deltoidea</i> Wall. [Kanis]	Rhizome	Endangered	Relieve kidney pains
Geraniaceae			
<i>Geranium wallichianum</i> D. Don ex Sweet. [Rattan Jok]	Whole plant	Rare	Curing stomach acidity, stomachache, gastric problems, back pain, arthritis, rheumatism
Paeoniaceae			
<i>Paeonia emodi</i> Wall. ex Hk.f. [Mamaikh]	Rhizome/root/seeds	Endangered	Curing uterine diseases, colic, dropsy, epilepsy, blood purifier, body and bones pain

Table 1: Continued

Plant material	Part used	Conservation status	Traditional uses
Podophyllaceae			
<i>Podophyllum emodi</i> Wall. [Banasher]	Rhizome	Endangered	Curing toothache, curing hepatitis, abdominal pain
Valerianaceae			
<i>Valeriana jatamansi</i> Jones [Musk-e-bala]	Rhizome	Endangered	Curing backache, rheumatic pain, chronic fever, diuretic, jaundice, scorpion stings
<i>Valeriana pyrolifolia</i> Decne. [Musk-e-bala]	Rhizome	Endangered	Curing cholera, dysentery, carminative, antispasmodic, hysteria
Violaceae			
<i>Viola biflora</i> L. [Banafsha]	Flowers	Vulnerable	Diaphoretic, antipyretic, febrifuge, eczema, cancer, epilepsy
<i>Viola canescens</i> Wall. ex Roxb. [Banafsha]	Flowers	Vulnerable	Diaphoretic, antipyretic, febrifuge, eczema, cancer, epilepsy, stomach acidity, rheumatism



Acorus calamus



Paeonia emodi



Berberis lyceum



Podophyllum emodi



Valeriana jatamansi



Dioscorea deltoidea

Fig. 1: Some threatened medicinal plants

Table 2: *Ex situ* conservation of some threatened medicinal plants of Swat Kohistan

Plant name	Part used for propagation	Germination time	Flowering time in (Tindodog)	Flowering time (Kohistan)
<i>Bergenia ciliata</i>	Rhizome	20th Feb.	5th March	May
<i>Dioscorea deltoidea</i>	Seeds	1st week of March	15th May	July
<i>Bistorta amplexicaulis</i>	Seeds	Last week of Feb	May on wards	June on ward
<i>Valeriana jatamansi</i>	Rhizome	2nd week of Feb	March	April onward
<i>Valeriana pyrolifolia</i>	Rhizome	2nd week of Feb	March	April onward
<i>Viola biflora</i>	Rhizome	15th Feb	15th March	May
<i>Viola canescens</i>	Rhizome	15th Feb	15th March	May
<i>Berberis lycium</i>	Rhizome	1st week of Feb. (perennial)	1st week of March	May

Ex situ conservation: During the present study 16 threatened plant species (Fig. 1) were selected for *ex situ* conservation on trial basis. These include *Colchicum luteum*, *Bergenia ciliata*, *Dioscorea deltoidea*, *Bistorta amplexicaulis*, *Caltha alba*, *Valeriana jatamansi*, *Valeriana pyrolifolia*, *Viola biflora*, *Viola canescens*, *Berberis lycium*, *Polygonatum verticilatum*, *Acorus calamus*, *Aconitum heterophyllum*, *Podophyllum emodi*, *Paeonia emodi* and *Geranium wallichianum*.

These plant species were collected during January 2002 from different parts of Utror, Kalam and Ushu of Swat Kohistan and brought to Tindodog for *ex situ* cultivation. The altitude of Utror and Ushu is more than 2200 m; Kalam is 2000 m while that of Tindodog is 1000 m. The seeds or rhizomes of each plant species was cultivated in plots of 12×6 square feet size i.e. 3 feet plant to plant spacing. Some manure was also added to each plot in order to improve soil fertility.

The results showed that only 8 plant species survived in the new habitat while *Colchicum luteum*, *Acorus calamus*, *Caltha alba*, *Podophyllum emodi*, *Polygonatum verticilatum*, *Aconitum heterophyllum*, *Paeonia emodi* and *Geranium wallichianum* failed to germinate. These 8 plant species not only showed luxuriant growth but also produced flowers and fruits. Pertinent information to these plant species are given in Table 2.

DISCUSSION

Pakistan is blessed with diverse flora and climates. It has been estimated that more than 1000 plant species contain phyto-chemical properties while 350-400 plant species are traded in different local markets by 28 leading manufacturing units of Greco-Arabic, Ayurvedic and Homeopathic medicines. About 50,000 to 60,000 tabibs (practitioners of Greco-Arabic medicine) and a large number of unregistered practitioners scattered in rural and remote hilly areas of Pakistan utilize more than 200 plants as household remedies for curing several diseases. According to Haq (1983), Pakistan has about 40,000 registered practitioners of traditional medicine and majority of the population, especially villages, is getting

health care by tabibs. It is estimated that 60% of the population use the herbal prescriptions of traditional practitioners.

The people of Swat Kohistan like most other indigenous people relied on plant resources for their medicinal requirements and in this way a traditional system of folk recipes evolved in the area. More than 150 plant species are used for curing different ailments in the area and more than 60% of the population is still dependent on medicinal plants for primary health care. Different parts of the plant are utilized for medicinal purposes. For example the rhizome of *Berberis lycium* is used locally for body and bones pain. Rhizome bark is used for stomachache, strengthening sex organs and broken bones. The rhizome is dried and then crushed to powder. The powder is then mixed in a local sweet dish called Halwa. Some times the rhizome powder is administered with milk for giving relief in pains. Hamayun *et al.* (2003) reported similar observation for adjacent Buner Valley where plants are collected by the local people and are used in different ways. *Paeonia emodi* is used in backache, dropsy, epilepsy, convulsions, hysteria and uterine diseases. The use of plant as a source of traditional medicine was also reported by Shinwari *et al.* (2002), Sadaqat (1995) and Ahmad *et al.* (2004).

The removal of plants from their native habitats, for translocation off site to intensively managed facilities, represents *ex situ* conservation. This conservation strategy may use botanical gardens, arboreta, seed banks, clonal repositories, or more sophisticated green houses and laboratories for frozen storage of propagules or tissue culture of cells. It can also involve the informal culture of wild plants in nurseries, home gardens, or community botanical gardens. During colonial eras, *ex situ* propagation fostered the rapid spread of economic plants from one continent to another. Rubber and Cacao were taken from Brazil and established in south east Asia and west Africa, sugarcane and bananas were transferred from Southeast Asia to the Caribbean and central America and coffee moved around the world from East Africa to Latin America by ways of Indonesia. From cuttings of plants nurtured in botanical gardens to hybrid sees of cereals

developed in agricultural experiment stations, *ex situ* germplasm collections have revolutionized agriculture and forestry over the last 500 years.

For several decades now *ex situ* conservation has been pursued internationally in a highly organized fashion, through government supported seed banks and institutions such as the consultative group on international agricultural research. Most of their attention has been directed at agricultural phylogenetic resources, but wild plants also are being maintained *ex situ* on an increasingly large scale (Tuxill and Nabhan, 1998).

An *ex situ* conservation effort was carried out by cultivating 16 threatened and medicinally important plant species in Tindodog on trial basis. Only 8 plant species survived in the new habitat. These were *Bergenia ciliata*, *Dioscorea deltoidea*, *Bistorta amplexicaulis*, *Valeriana jatamansii*, *Valeriana pyrolifolia*, *Viola biflora*, *Viola canescens* and *Berberis lycium*. Similarly, Ahmad (2003) reported that 31 medicinal and aromatic plant species were cultivated in Swat at three different sites. Preliminary results shows that *Ginkgo biloba*, *Crocus sativus*, *Colchicum luteum*, *Matricaria chamomile*, *Viola odorata*, *Aconitum violaceum*, *Aconitum heterophyllum*, *Podophyllum emodi*, *Valeriana jatamansi* and *Bistorta amplexicaulis* can be grown successfully as minor crops on marginal fields.

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