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Ecological, Taxonomical and Ethenobotanical Study of Wild Fruit Producing Xerophytes of District Bannu, Kpk

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The present study was carried out, to assess record and report the ecological, taxonomical and medicinal properties of wild fruit producing xerophytes of District Bannu. A total of 6 wild fruit producing plants species belonging to 5 families of Angiosperm were recorded. Based upon their utility, all plants are wild and fruit producing plants and are used as a honey bee species, fuel, timber, control erosion as well as protect environment from pollution. Also provide best quality wood as well as fruits for economically weak people. The most important families of wild fruits producing xerophytes are Rhamnaceae having two plants i.e. *Zizyphus mauritiana* & *Z. numalria*, while the remaining 4 families have one species each, i.e. *Mimosaceae* (*Acacia senegal*), *Capparadaceae* (*Capparis deciuda*), *Salvadoraceae* (*Salvadora oleoides*) & *Eleagnaceae* (*Elaeagnus angustifolia*). Most plants are wild shrub or tree found in xeric habitat some can also grow in sandy soil such as *Acacia senegal* while some of them grow in clay type of soil such as *Capparis deciuda* and *Salvadora oleoide*. Informants including local people i.e. Farmer, Herbalists, Hakim and Medicinal plants user were interviewed for the collection of data through questionnaire. It is suggested that vulnerable and over-exploited medicinal plants may be conserved for sustainable use and to protect environment and also prevent soil erosion in desert. Some medicinal plants are depleting in Bannu District due to lack of interest by the local people e.g. *Elaeagnus angustifolia*. If local community does not give proper attention to the plant then soon a time will come that this species will be depleted from this area.

Keyword: Ethnobotanical, *Caricapapaya*, Leaves and Root Aqueous Extracts.

1. Introduction

District Bannu is a green valley, irrigated by River Kurram and Hill torrents. It is famous for its condiments, fruits and vegetable, as Edward (First settlement officer of District Bannu) called it a vegetable emerald. The People of District Bannu are still forced to practice traditional or alternative medicine for their treatment. The knowledge of uses of plants transmitted from one generation to the next^[6]. People use plants in many ways such as medicinal, Timber, wood, Fuel wood, Food, Fodder etc^[7]. In developing countries like Pakistan, the benefits of modern medicines and health care reach only to a small percentage of the population. These hardly ever reach the masses living in the rural areas. The

inhabitants of the area have also used medicinal plants for the treatment of various diseases and have for long time been dependant on surrounding plants wealth for their requirements of life such as some local medicinal plants are used by the local people in District attack for treatment of diabetes^[2].

2. Material

The equipments during the Research work were Note Book, Map of the area, Pencil, Plant Presser, old English News Papers and Blotting Papers, Polythene Bags, Knife, Compass, Altimeter and Camera.

3. Method

The present study was conducted during 2010-2012, Work plan was prepared and general information about the area, soil, plant distribution, culture and vegetation was collected before the start of field work. Topo sheets and maps were obtained from concerned offices.

The methodology comprises the following phases:-

1. Ecological data
2. Collection of medicinal data/ Ethno botanical study
3. Taxonomic work.

1. Ecological data

During field work plants are classified according to their habitat, soil condition, topographic factors etc. During collection soil types, habitat and habit of the plants are noted

2. Collection of Medicinal Data/ Ethno botanical study

For collection of Medicinal data, the following steps were used:-

A. Field Work

Frequent trips were arranged the area i.e. Khujari, Bharat, Kakki, Mandan, MiraKhel, IsmailKhel, Sokari, Bada MirAbas, Mandew, Domel, Township Bannu, Azim kala Bannu etc. during the spring, summer, autumn and winter seasons during 2010-2012. Plants were classified according to their habitat, soil condition economic value, Taxonomic characters, traditional, local uses and other related information was gathered through interviewing and filling questionnaires from farmers, timber dealers, and common people but priority was given to elder people who were real user and had a lot of information about the plants and their traditional uses. The working plan was prepared according to the life form of the plants and utilization of the plant product by local people.

B. Ethnobotanical Inventory

The Ethno botanical inventory consists of families names in alphabetical order followed by Botanical name, local name, part used, flowering period, voucher specimen no. and Ethno botanical uses.

C. Collection & Preservation

Plants were collected from various sites during the period of research work. The specimen were dried in folded newspapers. The plants were tagged with signified data, local and other characteristic about the plant species. The specimens were pressed in a presser with blotting paper b/w the adjacent specimen. The blotting papers and News Papers were changed from time to time depending upon the weather and situation of plant. Dried species were poisoned by 2% solution of Mercuris Chloride and Ethyle Alcohol, mounting of specimens was made on standard herbarium sheets of size (41.25cm) x 28.75cm

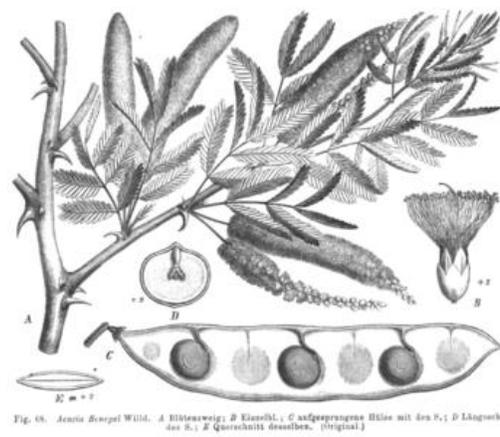


Fig. 68. *Acacia Senegal* Willd. A Blütenzweig; B Einzelbl.; C aufgesprossene Blüte mit den N.; D Längsschnitt der N.; E Querschnitt desselben. (Original)

Fig1: *Acacia Senegal* (L.) Wild

3.1 Taxonomic Work

3.1.1 Identification and Voucher Specimen Number

The identification were also conformed with the help of available literature^[10,14] and using herbarium of Botany Department, University of Science and Technology Bannu and Herbarium of Biological Sciences, Quaid-e-Azam University, Islamabad. Results were rechecked and compared with literature like that^[13,3,8]. They were accessioned and submitted in the

Herbarium, Department of Botany, University of Science and Technology Bannu.



Fig 2: *Acacia Senegal* (L.) Wild

4. Results

The xeric plant species studied were 6 belong to 5 angiosperm Dicot families. Based upon their utility all plants are wild. The most common wild edible fruit producing medicinal plants in this area are *Acacia senegal*, *Capparis deciduas*, *Salvadora oleoide*, *Elaeagnus angustifolia*, *Zizyphus numalaria* and *Zizyphus mauratiana* L. Some are Veterinary Medicinal Plants which are used as a whole or in part e.g *Capparis decidua*, *Salvadora oleoide* etc.

4.1 Detail Taxonomy

4.1.1. Botanical name: *Acacia senegal*

Authority: (L.) Willd.

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Fabale
Family:	Fabaceae-Pea family
Genus:	<i>Acacia</i>
Species:	<i>Acacia Senegal</i> (L.) Wild

4.1.2 Description

The generic name 'acacia' comes from the Greek word 'akis', meaning a point or a barb. *Acacia Senegal* is a deciduous shrub or tree, growing to 15 m tall and usually branch from the ground. Branches fork repeatedly and in mature trees mostly form a rounded, flat-topped crown. The

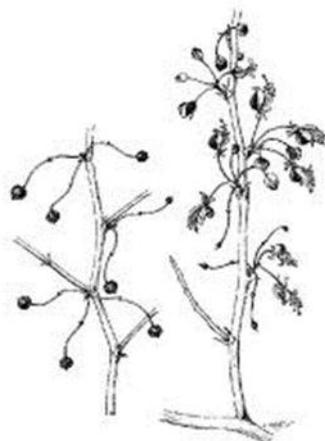
bark is grayish or white, but in old trees, it may be dark, scaly and thin, showing the bright green cambium layer just below the surface if scratched with a nail. Powerful hooked thorns, 3-5 mm long, with enlarged bases appear at the nodes of the branches. Leaves are bipinnate, 3-8 pinnae (glands between gynoecium uppermost and lowermost pinnae); rachis up to 2.5 cm long; pinnacles are pairs of 8-15, green; 2 stipular spines strongly recurved with a 3rd pseudo stipular, between them. Flowers are yellowish-white and fragrant, axillary pedunculate spikes, 5-10 cm long. It has 5 deep lobes. Petals are five in number. A mass of short stamens. Pistil inconspicuous. Fruit yellow to brown, papery, dehiscent pod, 2-19cm long, 1-3.5 cm wide, flat and thin with either rounded or pointed end but some time, small, shiny, dark brown. *senegal* are based on variation in natural distribution as well as differences in morphological characteristics such as the presence or absence of hair on the axis of the flower spike, colour of the axis, shape of pod tips, number of pinnae pairs, occurrence of a distinct trunk and shape of the crown. There are 1-8 seeds per pod. Seed: round and flat, 8-12 mm in diameter, olive brown. There are 10,000-30,000 seeds/kg. Brenan.



Fig 3: *Capparis deciduas* (Forssk.) Edgew

4.1.3 Habitat and Ecology: *Acacia senegal* is drought-tolerant. It is associated with a wide range of vegetation types, from semi-desert grasslands to Anogeissus woodlands. It prefers clay plains and rocky hill slopes. It is found in the drier parts of world specially, Anglo-Egyptian Sudan and the northern Sahara and is also found throughout the vast area from Senegal to the Red Sea and to eastern India. It extends southwards to

northern Nigeria, Uganda, Kenya, Tanzania and southern Africa. In Pakistan it is found chiefly in KPK and Balochistan. In Sudan, the tree both exists in the wild as well as cultivated - mainly on sandy hills.



Capparis decidua (Forsk.) Edgew.

4.1.4 Folk Medicinal Uses: A pioneer, nitrogen-fixing tree that is mainly grown for production of gum but also used for fuel, wood, fodder, rope, dune stabilization and soil improvement. Leaves and pods are browsed by sheep, goats, camels, impala, and giraffe. Dried seeds are also used for human consumption. It is highly suitable in agro forestry systems in combination with watermelon, millet, forage grasses and others. In Sudan it is grown in “gum gardens” for gum production as well as to restore soil fertility.

4.2. Botanical Name: *Capparis decidua*

Authority: (Forsk.) Edgew

Syn(s) *Capparis aphylla* (Heyne) Roth.

Capparis sodata R. Br.

Sodada decidua Forssk

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Brassicale
Family:	Capparidaceae
Genus:	Capparis
Species:	<i>decidua</i>

4.2.1 Description

The generic name is derived from the Arabic 'kappar', the name for Capparis. *Capparis*

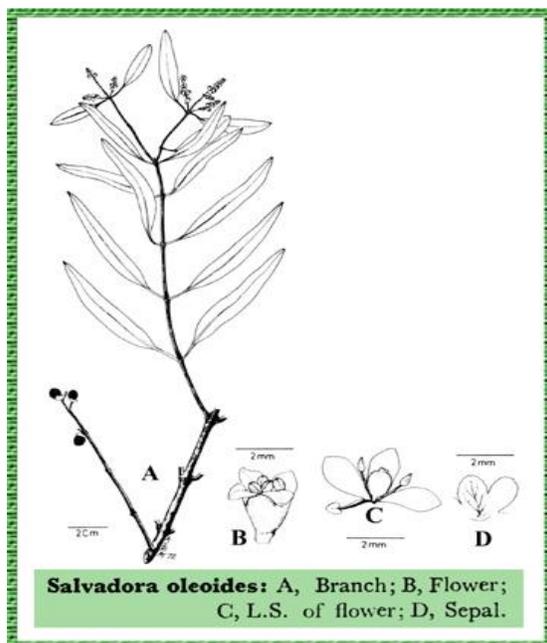
decidua is a bushy shrub in dense tufts, 4-5 m high, or occasionally a small tree with many green vine-like apparently leafless branches, hanging in bundles. Bark turns whitish-grey colour with age, but most branches and twigs are a glossy dark green. Small, light brown spines occur in pairs on the twigs at each node. Leaves are very minute (2 mm long), with a very short life span on young shoots, so that the plant looks leafless most of the time. Flowers pink, red-veined, in small groups along the leafless shoots, in the axils of the spines. Fruit a small many-seeded ovoid or sub-globulous, slightly mucronate pink berry of the size and shape of a cherry, becoming blackish when dry.



Fig 4: *Salvadora oleoides* Deone

4.2.2 Habitat and Ecology

It is tolerant to prolonged drought and an interesting plant by reason of its excellent adaptation to arid condition. *C. decidua* is one of the important multipurpose tree species of desert and arid regions of the Indian subcontinent, Africa and Saudi Arabia. This species is common in dry tropical Africa, especially in the Sahel, where it sometimes constitutes lines of small trees in Wadi beds, as in Mauritania for instance. In West Africa, the area of distribution is identical to that of *Cadaba farinosa*; its southern limit corresponds to the northern loop of the Senegal River. In the Republic of Niger it reaches the Konadougou. Its area includes Tibesti (West Chad), much of the Sudan (except the extreme South) the Arabian Peninsula, Jordan, India, Pakistan, Iran, the Mascarene Islands and Natal.



4.2.3 Folk Medicinal Uses:

The UN-ripen fruit is used as anthelmintic in animals. It is also used for that animal which eats little grass. The decoction of its flower is used in sciatica. Its ash is mixed with ghee and used in backache and rheumatism. It is a hedge plant and used as fuel wood, its wood is used by cobbler for its high quality for them having less xylem fibers

4.3 Botanical Name: *Elaeagnus angustifolia*

Authority: (L.)

Common Nam: Russian olive, oleaster

Kingdom:	Plantae
Phylum:	Magnoliophyta
Class:	Magnoliopsida
Order:	Rhamnales
Family:	Elaeagnaceae
Genus:	<i>Elaeagnus</i>
Species:	<i>angustifolia</i>

4.3.1 Description:

It generally consisting of 80 species. *Elaeagnus angustifolia* is a deciduous small tree or shrub of height 5-10 m. Shiny brownish red spines are present on plant. The upper surfaces of its leaves are light green in color and are covered with silvery star-shaped hairs, and the lower surface of its leaves are silvery white and densely covered with scales, this is the xeric character which reflect light similarly, Stems, flowers, and fruits of the plant are covered with silver-white scales. Leaves alternate, simple, entire, 4-8 cm,

lanceolate to oblong, more silvery on lower surface, 3-7cm long and 1-1.3cm wide, obtuse at the apex, appear from may-June. Inflorescence generally umbel-like, axillary, the fragrant yellow flowers are small, erect, bisexual and have bell-shaped calyx tubes and a conspicuous, glabrous, conical floral disc, which surround the base of the style. Fruits are olive-shaped, dry, pink and elliptic, 9-12 mm long and 6-10 mm wide, mature in September. Such type of plants establishes primarily by seed, vegetative propagation can also occur in them.



Fig 5: *Zizphus jujube* Mill

4.3.2 Habitat and Ecology:

Elaeagnus angustifolia has a wide habitat range, including mountainous areas, Plains, sands, and desert, with little preference as to soil type, temperature, or moisture. *Elaeagnus* has a wide distribution in the subtropical and temperate regions of East and Southeast Asia, and is rare in the rest of Asia or temperate Europe. It is relatively shade tolerant, and once established, can persist throughout serial stages and become the climax dominant species.

4.3.3 Folk Medicinal Uses: The ripen fruit is edible. It is also used for ornamental as well as pleasure smelling. Flowers are beautiful and better odour. It is a hedge plant and also used as fuel wood, its wood is used by cobbler for its high quality value.

4.4 Botanical Name: *Salvadora oleoides* Deone

Authority: (Deone)

Local Names: Pushtoo (Plamoo), Gujarati (khakan,pilava pilu,mityal); Hindi (pilava pilu, mityar, mitijal, godpilu); Tamil (kalawa, kohu, karkol)

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Brassicales
Family:	Salvadoraceae
Genus:	<i>Salvadora</i>
Species:	<i>Oleoides</i>

4.4.1 Description

Salvadora oleoides is a shrub or small tree, attaining 6-9 m height under favorable conditions; trunk short, often twisted or bent, up to 2 m in diameter; branches drooping, numerous, stiff, often swollen at forks; bark grey or whitish-grey. Leaves glaucous, linear-or ovate-lanceolate, coriaceous and somewhat fleshy, dark greenish-yellow when young, grey when mature. Flowers sessile, greenish-white, minute in paniculate spikes, often clustered; calyx cup-shaped, in 4 rounded, obtuse lobes. Fruit a drupe, globose, about 6 cm in diameter, usually yellow when ripe, dark brown or red when dry. Seeds greenish-yellow, about 3 mm in diameter. The generic name was given in 1749 in honour of an apothecary of Barcelona, Juan Salvadory Bosca, by Dr Laurent Garcin, botanist, traveler and plant collector. The tree generally flowers in March-April and fruits in June New leaves appear in April.



Fig 6: *Ziziphus nummularia* Lam.

4.4.2 Habitat and Ecology:

The tree is found in the arid regions of western India and Pakistan. It suffers considerably from frost. The natural Vegetation is typical of the tropical thorn forest. *Salvadora oleoides* is highly salt tolerant and grows in coastal regions and on inland saline soil.



Fig 7: *Elaeagnus angustifolia* L.

4.4.3 Folk Medicinal Uses: The ripen fruit is edible. Maswak is also prepared from its branches. It is a hedge plant and used as fuel wood, its wood is used for different purposes by cobbler.

4.5 Botanical Name: *Ziziphus jujube* Mill.

Authority: Mill.

Syn. *Ziziphus mauratiana* Lam.

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Rosales
Family:	Rhamnaceae
Genus:	<i>Ziziphus</i>
Species:	<i>Z. jujube</i>

4.5.1 Description

Jujubes are species of the genus *Ziziphus* Tourn. ex L. *Ziziphus* belongs to the family Rhamnaceae. The name *Ziziphus* is related to an Arabic word used along the North African coast, zizoufo used for *Z. lotus* (L.) Desf. but also related to the ancient Persian words zizfum or zizafun; and ancient Greeks used the word ziziphon for Jujube. There are two major domesticated jujubes, *Z. mauritiana* Lam. the

Indian Jujube or beri and *Z. jujuba* Mill. The Chinese or common jujube. These two species have been cultivated over vast areas of the Old World. However all jujubes remain relatively minor crops although demand for production remains steady in many parts. Tree or shrub, evergreen or deciduous; two thorns one straight and another curved. Leaves: Leaves are alternate, ovate; elliptic or oblong. Inflorescence: Inflorescence small raceme, glabrous or pubescent. Calyx: It is 3 mm, deltoid. Corolla mostly yellow green or white. Stamens: Stamens mostly five in number. Style bifid. Drupe elliptic or spherical.

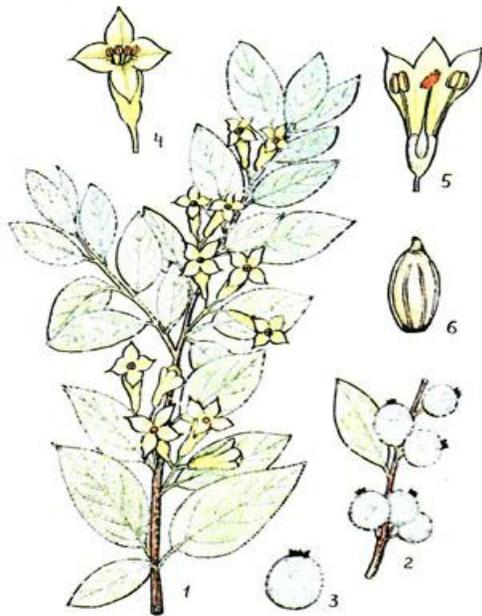


Fig 8: *Elaeagnus angustifolia* L.

4.5.2 Habitat and Ecology:

Z. jujuba is native to temperate Asia, particularly China and neighboring areas of Mongolia and the Central Asian Republics. In cultivation is spread westwards to the Mediterranean, throughout the Near East and SW Asia and spread eastwards in cultivation to Korea and Japan. Like *Z. mauritiana* this species also naturalises in many Asian countries and 'wild' populations are to be found. It is mostly cultivated in China, India, Central Asia and southwest Asia. *Z. jujuba* is adapted to subtropical and warm temperate areas. It prefers a relatively dry climate during the growing season but cool during its dormancy. It can tolerate

lower temperatures than Indian jujube and can survive -10°C .

4.5.3 Folk Medicinal uses: Timber wood, hedge plant and shade tree. Honey bee species and best honey is that of *Ziziphus* species. Timber used in making 'charpais', for its stiffness. Fruit are iron tonic and digestive. The plant is used as folk lore especially for goat. Branches are used in fencing. Leaves of this plant especially young leaves are used by the diabetes patient

4.6 Botanical Name: *Ziziphus nummularia*

Authority: Wight & Arn.

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Rosales
Family:	Rhamnaceae
Genus:	<i>Ziziphus</i>
Species:	<i>Z. nummularia</i>

4.6.1 Description:

Deciduous shrub, 1-3 m high; branches numerous, hardly curved and pubescent with two thorns one, straight and the other curved. Leaves: Leaves are alternate, ovate roundish, 5-15 or rarely 30 mm long, 5-20 mm wide, pubescent in both surfaces especially on lower surfaces. Inflorescence pubescent raceme. Flowers are few in a small axillary cluster or cyme which is larger than its peduncle. Flowers have a disk obscurely lobed. Calyx is 3 mm long. Corolla, yellow, 3 mm long. Stamens are five in number, Style bifid. Fruit is an ovoid-oblong edible drupe 1.5-2.3 cm long, dark reddish brown to black, each being short stalked and may be pendulous. Pulp sour to sweet. It is shrubs or small trees up to 8-10 m high with rigid spreading boughs and stiff branches; an appearance often producing a gnarled shape. Tree forms tend to have a small canopy extending 3.5-4.5 m. Trunks may be short or long depending on genotype. Branches are armed with paired spikes, one of each pair larger than the other and straight, the shorter one recurved. Older parts of older trees can lose their spines. Branchlets are flexuous, green and glabrous when young.

4.6.2 Folk medicinal uses: It is used as fuel, hedge and fencing. Fruit are used by game bird and human beings. Fruit is an iron tonic and digestive. The leaves are eaten by goats' and camels. The young stem and leaves are used by the diabetes patient. It is a good honeybee species and honey of this plant is very costly and popular.

4.6.3 Habitat and Ecology

Zazyphus nummularia is adapted to subtropical and warm temperate areas. It prefers a relatively dry climate during the growing season but cool during its dormancy. It can tolerate lower temperatures than Indian jujube and can survive -10°C. *Z. nummularia* is native to temperate Asia, particularly China and neighboring areas of Mongolia and the Central Asian Republics. In cultivation is spread westwards to the Mediterranean, throughout the Near East and SW Asia and spread eastwards in cultivation to Korea and Japan. Like *Z. mauritiana* this species also naturalises in many Asian countries and 'wild' populations are to be found. It is mostly cultivated in China, India, Central Asia and southwest Asia.

4.6.4 Folk medicinal uses: It is a good honey bee species and honey of this plant is very costly and popular. It is used as fuel, hedge and fencing. The leaves are eaten by goats and camels. The young stem and leaves are used by the diabetes patient. Fruit are used by game birds and human beings. Fruit is an iron tonic and digestive.

5. Discussion

Work on biodiversity received much less attention as compare to food plant species^[11]. The oxygen supply in the earth atmosphere is result of photosynthesis by green plants. Fossil fuel comes from plant material. Plants also create and modify local environmental condition on which many species of animals and other plants depend. So plants form the basis of life^[12]. They provide us ready made food, medicines for ailment, fodder and forage for our domestic animals, fuel wood for burning, flowers for celebration

materials for making agriculture tools, timbers for constructions and many more useful items. Different plants have been curing the diseases are several ailments at a time. Towards the middle of 20th century the single contribution of medicinal plants as a research and development reduced in favor of synthetic chemicals. Now, this tend is reversing once again in favor of plants as the later have been discovered to possess more balanced. Effective least injurious with no or much reduced side effects, are natural products. Therefore, herbal medicines have a special attraction, particularly to those who feed up or disappointed with other method treatment. The demand of medicinal plant is increasing day by day as compared to their production in the area. To avoid in discriminate and unscientific collection of medicinal plant, the local people should be trained for authentic identification and scientific collection. Besides, these farmers of the area should be motivated to cultivate medicinal plants^[9]. Many drugs have been developed from the medicinal plants at various research centers around the world by utilizing the information obtained from the local communities^[16]. The local inhabitants who are custodians of this precious germ plasma resources and folk knowledge of local ecology from many centuries may be involved in any medicinal plants conservation program.

5.1 Conservation And Phytochemical Evaluation

Herbal/ethno botanical gardens should be established, with the cooperation/ involvement of local people, NGOs and Government, for the conservation of wealth of rare and seriously threatened medicinal taxa of Pakistan. Nurseries should be developed to supply propagating materials of medicinal plants to local inhabitants^[5]. With the in-vitro technology, those plants should be immediately grown which are very difficult to grow, efforts should be made to evolve simple, efficient and economical protocol for rapid multiplication and genetic stability of germ plasma of medicinal plants. To meet the

required demands of the raw materials efforts should be made to cultivate the medicinal plants on large scale. In this regard, Special attention should be given to highly valuable and threatened plants of the area. Habitats/ecozones, where genetic erosion of local medicinal plant is under severe threat should be identify by ethnic knowledge and practices should be documented. Efforts should make to demonstrate some of medicinal plants. Phytochemicals analysis of these useful plants should be conducted for their correct identification and authenticity^[1]. Moreover, the information related to chemical compound may useful for research workers involved in pharmacological and pharmaceutical research. Some researcher studies the antimicrobial screening of some selected tribal medicinal plants^[4]. The present status of useful plants of the area can be improved by educating the people about the uses of plant. To document knowledge of the plants used in the area should be supporting tools for communities' participation to natural resource management on sustainable basis. There is a need of careful conservation of the plant resources of the region otherwise many plant may be lost for ever and become extinct.

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