Journal of Medicinal Plants Research Vol. 5(24), pp. 5857-5862, 30 October, 2011
Available online at http://www.academicjournals.org/JMPR
ISSN 1996-0875 ©2011 Academic Journals

Full Length Research Paper

Conservation of medicinal plants in Ajlun woodland / Jordan

Saleh Al-Quran

Department of Biology, Mu'tah University, P. O. Box 26, Karak, Faculty of Science, Jordan.
E-mail: salquran@gmail.com.

Accepted 13 September, 2011

Local knowledge about natural resources is becoming increasingly important in defining strategies and actions for conservation of medicinal plants. This study is trying to display the threatened status of medicinal plants of Ajloun heights region; identify the most important factors affecting the plants in their natural habitats. Previous studies summarized the presence of 46 medicinal plant species grown in the study region are still in use in traditional medicine for the treatment of various diseases needed much effort in terms of conservation. The non endangered species (N) are consisting of 31 species; the vulnerable ones (VU) are 5; the endangered medicinal plants (EN) are five species; they are: *Alchemilla vulgaris* L., *Crocus hyemalis* Boiss. and Blanche, *Pistacia palaestina* Boiss., *Rubia tinctorum* L. and *Salvia triloba* L.f.; while the critically endangered species (CE) are four species, they are: *Eryngium creticum* Lam., *Majorana syriaca* (L.) Raf., *Mandragora autumnalis* Bertol. and *Matricaria aurea* Sch. Bip. well-known safe medicinal plants such as *Achillea falcata*, *Matricaria aurea, Majorana syriaca, Allium sativum* and *Allium cepa*. The use of moderately unsafe or toxic plants was noted to be practiced by practitioners and herbalists rather than the locals. Some widely distributed toxic plants include *Ecballium elaterium* A. Rich., *Euphorbia hierosolymitana Boiss., Mandragora autumnalis* Bertol., and *Citrullus colocynthis*. (L.) Schrad. need further care in treatment. Deforestation, agriculture, mining, industrial plantation, timber extracting and wildfires are the most dangerous factors causing the forest loss in Ajlun. It is highly recommended for enactment of an act for the establishment of the traditional medicinal council, which is tasked with the responsibility for the registration of all traditional medicinal practitioners in the country to organize all the activities, is very essential.

Key words: Forest loss, medicinal plants, conservation, Jordan, Ajloun.

INTRODUCTION

Jordan is considered a meeting point for three continents: Asia, Africa and Europe located between 29°11′N and 33°22′E; bordered by Syria from the north, Saudi Arabia from both east and south, Iraq from the east and Palestine from the west. This unique location has led to diversity in climate, geology and topography. Geographically, Jordan is divided into four different zones: the Mediterranean, the Irano-Turanian, the Saharo-Arabian and the Sudanian. Within these diverse zones, there are a total of 13 different vegetation types each with many different floral and morphological characteristics. Although, Jordan is relatively a small country, it is characterized by great variation in wild plants. Around 2500 plant species (of which 100 species (2.5%) are listed as endemic) were recorded. The floral species in Jordan also include medicinal and herbal species as well as aromatic and spices species. From these plants, 485 species from 99 different families are categorized as medicinal plants, which are widely distributed all over the country (Al-Genidi,1992; Andrews, 1991; Brummitt, 2001; Budieri and Al-Husseini, 1994).

Ajloun consists of a Mediterranean hill country dominated by open woodlands of Oak and Pistachio. The elevation within the study area ranges between 750 and 1150 m a.s.l. The average of yearly rainfall is about 547.5 mm with a maximum monthly average of 115.9 mm (January) and a minimum of 0.0 mm (July and August). The mean annual temperature is 15.1°C varying between 29.4°C for the hottest month (August) and 2.3°C for the coldest month (January). Ajloun is characterized by having the highest rainfall in the country, the most fertile soils, and it supports the richest vegetation in the country, mainly in the form of forests (Royal Nature (R.S.C.N.), 2001). Baseline Ecological Survey of Ajloun woodland

reserve (Yousef et al., 2007). Practices of traditional medicine are based on hundreds of years of belief and observations, which predate the development and spread of modern medicine. Our ancestors started to learn from nature by tasting and using what was available. It is well known that old civilizations have flourished in the Middle East and used the natural plants for various daily needs, such as food, shelter, clothes and medic (Clarke, 1990). During the past decade, traditional systems of medicine have become a topic of global importance. Current estimates suggest that, in many developing countries, a large proportion of the population rely heavily on traditional practitioners and medicinal plants to meet primary health care needs.

Although modern medicine may be available in these countries, herbal medicines (phytomedicines) have often maintained popularity for historical and cultural reasons (Jones and Clarke, 1990; Karim and Al-Qura'n, 1986, 1987, 1988; Ormond, 1978; Qasem, 1976; Ramsar Convention Bureau, 1993).

Concurrently, many people in developed countries have begun to turn to alternative or complementary including medicinal herbs. Like other countries in the region, Jordan is composed of two different societies: one rural and the other urban. Both of them depend upon the rich traditional heritage. Folk medicine is widely practiced by the inhabitants of the remote areas or the nomads who generally inhabit the desert and some areas of the steppe and the uplands. The reliance on herbal medicine and the uncontrolled collection of medicinal plants might cause the disappearance of some medicinal herbs growing in the area and will add more plants to the list of the endangered plant species.

Screening the materials used in the traditional medicine in Jordan, concluded five categories including plants, animals, inorganic substances and other materials of mixed origins, either imported or native, which reflects the remaining of the ancient medical culture. Few plant species that provide medicinal herbs have been scientifically evaluated for their possible medical application. Safety and efficacy data are available for even fewer plants, their extracts and active ingredients, and the preparations containing them (Budieri and Al-Husseini, 1994).

Strikingly, even in most developing countries, the herbal medicines market is poorly regulated, and herbal products are often neither registered nor controlled. Assurance of the safety, quality, and efficacy of medicinal plants and herbal products has now become a key issue in industrialized and in developing countries. Both general consumer and health-care professionals need up-to-date and authoritative information on the safety and efficacy of medicinal plants. Adequate experience and proper handling of herbal medicine requires the licensing of knowledgeable and professional herbalists and regulating the procedures of medicinal plant handling to avoid malpractice and mistreatment (Sankar and Indresha, 2003; Sharma, 2000; Ved et al., 2005; Yousef et al., 2007; Zohary. and Feinbrun-Dothan, 1966 to 1988). The presence of Ajloun woodland Reserve might be positive criteria in this regard.

MATERIALS AND METHODS

The researcher relied predominantly on qualitative tools such as informal meetings, open discussions and observation, which enabled the presentation of accurate account of the interviewees' knowledge routed via oral sources. Data collected through direct interviews were immediately recorded. The interview aimed to assess several aspects such as plant sources of the medicinal plants and species situation in the communities, in addition to the threatened status. This survey was conducted during the period 2007 to 2009 as complementary to that done previously. A total of 25 (20 males and 5 females). Elders are traditional practitioners participated in the study. The age of the informants ranged between 40 and 60 years, with an average of 48.6 years. The elders who participated were identified by community members as those who were most knowledgeable in traditional medicine.

Practitioners, herbalists, shepherds and elder local experts who utilized medicinal plants as part or all of their therapeutic activity, were selected. Interview length ranged from 50 to 110 mm. Voucher specimens and field photographs were accomplished in Jordan wild flowers and medicinal plants by Karim and Al-Qura'n (1986). The identity of each plant species mentioned by the interviewees was verified and confirmed by a professional botanist using live specimens and photographs (Karim and Al-Qura'n, 1986). A medicinal use was accepted as valid only if it was mentioned by at least three independent practitioners. Some of the plant species mentioned is known to be rare or endangered species, so they were not easy to find during the survey. ROP calculations as calculated previously (Al-Quran, 2007).

RESULTS AND DISCUSSION

The survey entails Ajloun area, an evenly distributed forest with only one dominating vegetation type, the Evergreen Oak Forest. Although, Mediterranean areas are known to have a relatively high vegetation cover, this forest suffers a limited biodiversity. It is noticed that the number of plants used daily by the locals is very limited in comparison with the substantial number of medicinal plants found in this mountainous area. Moreover, few people in this area appear to know much about the use of medicinal plants and the related information seems to be lost through younger generations. Previous studies summarized the presence of 46 medicinal plant species grown in the study region are still in use in traditional medicine for the treatment of various diseases needed much effort in terms of conservation. In this study, threatened status of the medicinal plants of Ajlun was investigated, the non endangered species (N) are consisting of 31 species; the vulnerable ones (VU) are 5; the endangered medicinal plants (EN) are five species; they are: *Alchemilla vulgaris* L., *Crocus hyemalis* Boiss. and Blanche, *Pistacia palaestina* Boiss., *Rubia tinctorum* L. and *Salvia triloba* L.f.; while the critically endangered

species (CE) are four species, they are: *Eryngium creticum* Lam., *Majorana syriaca* (L.) Raf., *Mandragora autumnalis* Bertol. and *Matricaria aurea* Sch.Bip. (Table 1). Deforestation, agriculture, mining, industrial plantation, timber extracting and wildfires are the most dangerous factors causing the forest loss in Ajlun. It is highly recommended for enactment of an act for the establishment of the traditional medicinal council, which is tasked with the responsibility for the registration of all traditional medicinal practitioners in the country to organize all the activities, is very essential.

The most commonly used plants included *Achillea falcate, Matricaria aurea, M. syriaca*, *Allium sativum* and *Allium cepa*. The use of moderately unsafe or toxic plants was noted to be practiced by practitioners and herbalists rather than the locals. These plants include *Ecballium elaterium*, *Euphorbia hierosolymitana, M. autumnalis* and *Citrullus colocynthis*. Medicinal plants are usually used internally or externally which depends on the illness. The internal use of the medicinal plants consisted mainly of drugs used to relief stomach ache, back ache and muscle pain as well as constipation, cough, asthma and kidney stones. Practitioners advise the oral consumption of these plants. Interestingly, *A. falcata*, *M. aurea* and *M. syriaca* were the most commonly reported plants to be used in their traditional medicine (Yousef, 2007). The external use of medicinal plants in this area consisted mainly of drugs for inflammation and irritations of the skin (skin cracks, bruises, frostbite, scorpion bite and insect bite) and mucous membranes (irritations and infections of the mouth and gums, and hemorrhoids).

Some of well-known medicinal plants, which were mentioned but were not classified under a specific category, include *Alcea setosa* (edible), *Althaea officinalis* (emollient), *Cyperus rotundus* (hair depilator), *E. elaterium* (infantile jaundice), *Inula viscosa* (Magic trials) and *M. autumnalis* (highly toxic).

It is noteworthy, that many medicinal plants, which known to be used for the treatment of various illnesses were not mentioned at all by the locals although many of them are native plants to the study area. Examples include: *Amygdalus communis* oil used as hair tonic, *Arum palaestinum* leaf decoction used as antimicrobial and as anticancer, *Rhus coriaria* fruit decoction used for treatment of diarrhea and liver diseases and the valuable *Hypericum triquetrifolium* from which a decoction prepared from the aerial parts as antidepressant. Unfortunately, the latter observation highlights the fact that much of the ethnopharmacological heritage in the area has been lost within successive generations (Yousef, 2007). Ethnobotanical and ethnopharmacological research is very crucial in the development of drugs from natural sources. It is significant contraction in the variety and extent of medicinal plant usage in the Middle Eastern area suggest that the indigenous medicine of the area is diminishing and may disappear. This is paradoxical at a time when there is an increasing interest worldwide in herbal medicines. A diverse or wide collection of medicinal plant species and the knowledge concerning their medicinal use function as the raw material for new drug development research. The preservation of the know-how and plant species is a fundamental step toward developing efficacious remedies for various diseases.

In Ajlun, successive efforts have been made to recognize the importance of traditional medicine, because an estimated 40 to 50% of the population in both the urban centers and the rural areas depend on it for their everyday health-care needs. About 82% of the population in developing countries like Jordan lives in rural areas. With a population of 6 million therefore, it means there are some 4 million rural dwellers in the country. The reasons for this dependence on plant medicine among rural communities in developing countries are: (1) It is more easily available and comparatively cheaper in the rural areas. In some instances plant medicine is entirely free of charge. (2) The herbalists and practitioners live mainly in the rural areas. (3) Lack of health care and health posts in the rural areas and these are often inaccessible.

While the successive governments have been leaving no stone unturned over the years to encourage and promote traditional medicine in the country for obvious reasons, the main base of the practice medicinal plants are now threatened because of overexploitation. It is very clear through many investigations of Ajlun areas that man depends heavily on plants for his basic survival, and on plant products for food, medicine, clothing, shelter and numerous other needs, and from other side man's activities tend to destroy the forests and woodland – the natural habitats of these traditional medicinal plants. Many other activities which have contributed to forest losses throughout the country include: (1) collection and gathering of fuel- wood. (2) Burning of charcoal. (3) Road and trail construction. (4) Commercial timbering. (5) Hydro-electric power generation. (6) Exploitation of mineral resources by both large-scale and small-scale miners. (7) Housing, factories and other infrastructure. (8) Bush fires during the harmattan season (9) - Industrial pollution. (10) Exploitation of plant medicine from the wild for both local use and for export.

In view of the importance of plant medicine in the health care of the people, and the dangerous conservation situation for the medicinal plants in Ajlun, it is imperative to conserve wealth for the present and future generations. The following measures and strategies might be useful to be proposed which contain the situation include:

(1) Commercial exploitation of whole plants, bark, roots and tubers, corms and rhizomes from the wild should be banned by legislation. As a deterrent, defaulters should be made to pay heavy fines- in addition to the confiscation of the plant material illegally collected.

Table 1. Plants and herbs used for treatment of various human ailments in ajloun heights with their threatened status, medicinal part used and the recommendation uses.

No	Species	Thretened status	Part used	Recommendation uses
1.	*Achillea falcata L.*	N	Aerial parts	Carminative, depurative, stomachache, antispasmodic
2.	*Alcea setosa Alef*	VU	Leaves	Edible
3.	*Alchemilla vulgaris L.*	EN	Leaves and roots	Antidiabetic
4.	*Allium cepa L.*	N	Bulbs	Dental infections
5.	*Allium sativum L.*	N	Bulbs	Antihypertensive, scorpion bite, whooping cough
6.	*Althaea officinalis L.*	VU	Leaves	Emollient
7.	*Ammi visnaga Lam.*	N	Fruits	Diuretic, bladder stones
8.	*Anchusa strigosa [Soland.]*	N	Arial parts	Wounds healing
9.	*Anemone coronaria L.*	N	Flowers	Hemorrhoid
10.	*Ankyropetalum gypsophiloides Fenzl*	N	Roots	Female sterility
11	*Arbutus andrachne L.*	N	Fruits	Laxative
12	*Artemisia herba-alba Asso*	N	Flowering tops	Antidiabetic, antispasmodic
13	*Beta vulgaris L.*	N	Leaves	Antiinflammatory
14	*Capparis spinosa L.*	N	Fruits, roots barks and leaves	Backache
15	*Capsella bursa-pastoris (L.) Medik.*	N	Whole plant	Diuretic, astringent, haemostatic
16	*Centaurea iberica Trevir. ex Spreng*	VU	Leaves and flowers	Antispasmodic
17	*Ceratonia siliqua L.*	N	Fruits flowers and leaves	Laxative analgesic
18	*Chrozophora obliqua Schweinf.*	N	Roots	Wound healing, animal breast infection
19	*Citrullus colocynthis (L.) Schrad.*	N	Fruits raw seeds	Toxic plant. cathartic
20	*Crataegus aronia Decne.*	VU	Leaves	Kidney stone, diuretic and laxative
21	*Crocus hyemalis Boiss. and Blanche*	EN	Stigma filaments	Antitussive, antiasthmatic
22	*Cucurbita pepo L. (CP-ab)*	N	Seeds	Anthelmentic
23	*Cyclamen persicum Mill.*	N	Tubers	Hemorrhoids
24	*Cyperus rotundus L.*	N	Bulbs	Hair depilator
25	*Diplotaxis erucoides DC.*	N	Leaves	Anti-inflammatory
26	*Ecballium elaterium A.Rich.*	N	Fruit juice	Infantile jaundice
27	*Eryngium creticum Lam.*	CE	Roots	Scorpion and snakes bite
28	*Euphorbia hierosolymitana Boiss.*	N	Latex and roots	Purgative, eczema, psoriasis
29	*Inula viscosa (L.) Aiton*	N	Leaves and roots	Magic trials
30	*Majorana syriaca (L.) Raf.*	CE	Leaves seeds	Carminative, pectoral, antitussive, aperitive, antistomachache, carminative
31	*Mandragora autumnalis Bertol.*	CE	Leaves	Highly toxic (not used medicinally)
32	*Matricaria aurea Sch.Bip.*	CE	Flowers	Antispasmodic, analgesic, antipyretic, anticough, antinfluenza, antiasthmatic, antiflatulence
33	*Melilotus indicus (L.) All.*	N	Leaves	Aperitive
34	*Micromeria myrtifolia Boiss. and Hohen.*	N	Whole plant	Antispasmodic female sterility

Table 1. Contd.

35	*Olea europaea L.*	N	Fruits and leaves	Laxative with limejuice antihypertensive, livestock poisoning
36	*Paronychia argentea Lam.*	N	Aerial parts	Kidney stones, urinary tract infection
37	*Peganum harmala L.*	N	Seeds leaves	To ease delivery stomach ache
38	*Phagnalon rupestre DC.*	N	Herbs	Skin cauterization
39	*Pistacia palaestina Boiss.*	EN	Shoots leaves and roots	Antidiabetic, antihypertensive, antispasmodic
40	*Quercus coccifera L.*	N	Fruits and roots	Astringent (mouth gargle), peptic ulcer
41	*Rubia tinctorum L.*	EN	Barks and roots	Burns and wounds
42	*Ruta chalepensis L.*	VU	Leaves	Sudorific, antispasmodic, antidiabetic, colorant (manufacturing of fats), scorpion bite
43	*Salvia triloba L.f.*	EN	Leaves	Antispasmodic
44	*Sarcopoterium spinosum Spach*	N	Whole plant	Mouth ulceration, antidiabetic, depurative
45	*Smilax aspera L.*	N	Leaves or stems	Muscle relaxant
46	*Teucrium polium L.*	N	Aerial parts	Antispasmodic, antiflatulence, antidiabetic, kidney stones

N: non endangered. EN: endangered. VU: vulnerable.CE: critically endangered.

(2) Sustained harvesting of medicinal plants. For instance, traditionally, plants dug for their roots are covered up again with soil, allegedly to ensure the efficiency of the medication, but it appears the practice is, in effect, a conservation measure.
(3) Encouraging some of the traditional methods of protecting medicinal plants from destruction, abuse or misuse.
(4) Educating the people on the importance of plant medicine and the need to conserve the forests and woodlands which protect this heritage. The education should not be limited to medicinal plant collectors alone, but should also include the school children and the youth. In addition to the direct benefits derived from the forests and woodlands there are also indirect benefits as well.
(5) Protecting medicinal plants in forest reserves by initiation of botanical gardens, National Parks similar to that present in Debbeen and Biosphere Reserves from which exploitation by rotation is strictly controlled on the sustained yield system.
(6) Cultivating medicinal plants – practitioners and exporters of medicinal plants should be encouraged and financed to cultivate medicinal plants.

Conclusions and Recommendations

The enactment of an act for the establishment of the traditional medical council, which is tasked with the responsibility for the registration of all traditional medical practitioners in the country to organize all the activities, is very essential.

Plant medicine is a heritage from past generations. However, the present practice of collecting medicinal plants almost entirely from the wild with impunity is gradually reducing the populations of some species. The following immediate measures if taken may reduce the volume of the danger:

(1) Halting the destruction.
(2) Embarking on a serious cultivation programme to meet the needs of the large numbers of the population who still rely on plant medicine for their everyday health care. There will be no forests or woodlands left in the future from where plant medicine shall be harvested. Furthermore, many of our present day medicinal plants will be either endangered or completely wiped out into extinction.

It has a necessity for forest conservation of Ajlun woodlands because it is nature's pharmacy shop and many medicinal plants come from the forest. Medicinal plants have been used for millennia and would continue to be used for a long time. The present spate of bio-prospecting for natural based products and the search for a cure for diseases like AIDS, have added a new dimension to the harvesting of wild medicinal plants. Hence, the present high rate of deforestation would have a detrimental effect on the heath care delivery system in Jordan and Ajlun in particularly since the majority of rural poor depend on traditional medicine for their health care needs. Environmental awareness is as old as man and man could not have survived if he had not sought to understand his environment.

The medicinal plant conservation project has come at the appropriate time to make us aware of the problem of forest loss in our area. We appreciate the effect is making to cultivate and conserve medicinal plants for generations to come.

REFERENCES

Al-Genidi M (1992). Plants of Eastern Arab Countries and their Economical Importance. Dar Al-Ibdaa, Amman, Jordan.

Andrews IJ (1991). Is Azraq still an oasis? Bull. Ornithological Society of the Middle East, 27: 13-19.

Brummitt RK (2001). World geographical scheme for recording plant distributions. Plant Taxonomic Database Standards No. 2. 2nd edition. – 137 pp., Hunt Institute for Botanical Documentation, Pittsburgh.

Budieri A, Al-Husseini F (1994). The Royal Society for the Conservation of Nature - Jordan. World Birdwatch, 16(2): 19.

Clarke JE (1990). Comments on the state of Azraq Oasis. Unpublished report submitted to the Ramsar Convention Bureau, Gland, Switzerland.

Jones T A, Clarke JE (1990). Azraq Oasis, Jordan. Ramsar Convention Monitoring Procedure Report No. 16. Ramsar Convention Bureau, Gland, Switzerland.

Karim F, Al-Qura'n S (1986). Medicinal plants of Jordan.Yarmouk University Press, pags 11-30, Irbid, Jordan.

Karim F, Al-Quran S (1988). Wild Flowers of Jordan. Yannouk University Publications, Jordan.

Ormond RFG (1978). A Marine Park for Jordan. Report on the feasibility of establishing a Marine Park at Aqaba. ALECSO, Tunisia.

Qasem S (1976). Jordan. In: Smart, M. (ed.), Proc. Int. Conference on Conservation of Wetlands and Waterfowl, Heiligenhafen, Federal Republic of Germany, December 1974: 123-124. IWRB, Slimbridge, U.K.

Ramsar Convention Bureau (1993). Jordan. In: Directory of Wetlands of International Importance: Sites Designated for the List of Wetlands of International Importance. Prepared by IWRB for the Ramsar Convention Bureau, Gland, Switzerland.

Royal Society for the Conservation of Nature, RSCN (2001). Jordan National Report. *In:* Spagnesi, M. (ed.), Proc. Conference on the Conservation of Wetlands of International Importance especially as Waterfowl Habitat, Cagliari, Italy, 24-29 November 1980. Supplemento alle Ricerche di Biologia della Selvaggina, 111 (1): 863-872.

Sankar JH, Indresha H (2003): Report of the Threat Assessment and Management Prioritisation for the medicinal plants of Chhattisgarh & Madhya Pradesh. 23rd to 26th July 2003, Bhopal., p. 165

Sharma BD (2000): Affinities - Palaeobotanical and geological evidences, relationship with adjacent regions, past and recent plant migration. In: Singh NP, Singh DK, Hajra PK, Sharma BD (Eds.): Flora of India. Botanical Survey of India, Calcutta, pp. 1-200

Ved DK, Kinhal K, Ravikumar R, Haridasan K (2005). Conservation Assessment and Management Prioritisation (CAMP) for wild medicinal plants of North-East India. Med. Plant Cons., 11: 40-44.

Yousef M (2007). Ethnopharmacological survey of medicinal herbs in Jordan, the Ajloun Heights region. J. Ethnopharmacol., 110(2): 294-304.

Zohary M, Feinbrun-Dothan N (1966-1988). Flora Palaestina. The Israel Academy of Sciences and Humanities, Jerusalem. Vol. 1, 2, 3 and 4.