

EL-SEBAI A. IBRAHIM and I. MAHMOUD (*)

Medicinal Plants in Arab Countries (**)

Introduction

Medicinal plants, nowadays, have regained their previous considerable situation among the natives all over the world in the treatment of different diseases. Unlike synthetic drugs, medicinal plants were found safe and showed almost no side effects. The ancient Egyptians [1] 3,000 years B.C. used a considerable number of drugs such as aloe, castor oil, myrrh and pomegranate.

The use of products derived from plants for the treatment of different diseases dated back in history to the Ebers papyrus of Egypt circa 1550 B.C. [2]. This papyrus includes 900 prescriptions, accompanied by instructions for their preparation, mode of administration, doses, as well as characters of individual ingredients.

The use of herbs for therapeutic purposes in Arab countries dates back to immemorial times. In desert countries, like the greater part of our area, where people live in communities far away from each other, the inhabitants used to be short of, or almost deprived of proper medical care. Naturally, a group of local prescribers have to fill the gap using folk medicine formulae, based on crude materials from their local environment. Indigenous and naturalized plants, their infusions, decoctions, powders, juices, etc., constitute the backbone of their medicinal activities. In Arab countries, plants were traditionally prescribed and used for generations and probably for centuries with slight or almost no change, and with strong belief, leading in most cases to satisfactory results. If the patient is not cured or little progress is noted, then the reason is attributed to other unseen factors such as evil eye or heaven's curse, while the medicinal herbs have always been considered as good and effective drugs.

The Arabs added numerous new plants and medicaments to those already

(*) Faculty of Pharmacy, Jordan University of Science and Technology, Irbid - Jordan.

(**) Presented at the International Congress on «Medicinal Plants» (Sansepolcro (AR), 17-19 October - Roma, October 20th 1987), organized by the Accademia Nazionale delle Scienze detta dei XL.

known to the Greeks and Romans [3]. In their days pharmacy attained the highest reputation and became an independent branch of medicine. It is interesting to note that the first dispensary was opened in Baghdad.

Famous physicians and herbalists are known in Arabic history, such as Al-Antaki, Ibn Al-Baytar and Ibn-Sina who had reported the tremendous use of herbs to cure many diseases [4].

Several drugs obtained from medicinal plants (wild or cultivated) are produced in the Arab countries. Classification of these drugs indicates that some follow the modern scientific parameters, i.e., the knowledge about this class is written in textbooks, journals and some pharmacopoeias, and others are used in folk medicine. The knowledge of these drugs may be written in ancient books such as David El-Antaki prescriptions, however, and in most cases the knowledge is transferred from one generation to the other. The former class is available as modern pharmaceutical preparations in pharmacies, whereas the latter are available at the herbalist shops.

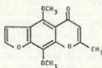
This lecture will concentrate on the most commonly produced and used medicinal plants in the Arab countries irrespective of their use in folklore or modern medicine. These drugs can be classified as follows.

Ammi visnaga (Umbelliferae)

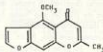
The drug relaxes smooth muscle and lowers the tonicity of the ureter. A decoction is used to ease the passage of kidney calculi.

The *Ammi visnaga* pharmaceutical preparations (Tab., injections) are widely prescribed by the physicians, to treat renal colic and kidney stones [5].

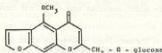
Ammi visnaga (Umbelliferae)



Khellin



Vinnugin



Khellin. glucoside

Ammi majus (Umbelliferae)

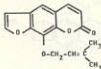
It contains Furanocoumarin, bitter principle xanthotoxin (ammoidin), in addition to other related bitter principles, imperatorin (Ammidin) and bergapten.

The pharmaceutical preparations in the form of paint and tablets are used in the treatment of leukoderma [6].

Ammi majus (Umbelliferae)



Xanthotoxin (Ammoidin)



Imperatorin



Bergapten

Matricaria camomilla (Compositae)

It contains volatile oil and flavonoid glycosides such as palustrin, quercetol and apigenin which is trihydroxy flavone.

Used as antispasmodic, respiratory antiseptic and it gives the hair a golden tint in addition to being hair tonic. Also used as medicinal tea to induce relaxation and sleep.

Nigella sativa (Ranunculaceae)

The fruit contains volatile oil containing nigellone, bitter principle nigellin, saponin glycoside melanthin and alkaloids nigelline and connigelline.

The volatile oil is antispasmodic and used in bronchial asthma and whooping cough. Melanthin is toxic to fish and warm blooded animals. Seeds are added to food and bread to give them good flavour.

Ficus carica (Moraceae)

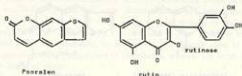
A coarse-leaved cultivated shrub for its fleshy edible fruit [7].

The leaves contain ficusin, bergapten, psoralen and rutin. The latex con-

tains albumin, gum, pectin, glucose and the proteolytic and amylolytic enzymes diastase, esterase, lipase and protease [8].

Unripe fruit is emetic while the ripe one is demulcent, nutrients, laxative and diuretic. The milky juice from the fresh green fruit is acid and destroys warts. Ficin, which is the dried latex, is used as ascaricide due to the presence of the proteolytic enzymes which digest round worms [9].

Ficus carica (Moraceae)



Henna (*Lawsonia inermis*); *Lythraceae*

A shrub cultivated in North Africa including Egypt. The leaves are greenish-brown to brown and about 2.5-5 cm long. Henna contains a colouring matter, lawson (a hydroxynaphthaquinone), various coumarins, luteolin and its 7.0-glucoside, fats resin and henna-tannin. Henna is commonly used as a dye for the hair, and wool washed in a dilute solution of ammonia and boiled in a decoction of the drug should be dyed a titian red.

Powdered leaf made into paste with water is used in dermatitis, hands and feet dye as cosmetic. Henna shampoos are well known.

Fenugreek (*Trigonella foenum graecum*) (*Leguminosae*)

It contains a number of steroidal sapogenin, particularly diosgenin, which is contained in the oily embryo, flavonoids and trigonelline alkaloid [10].

The decoction is used as a hot demulcent drink. Fixed oil is considered as a good lactagogue, it has been given to ladies after delivery.

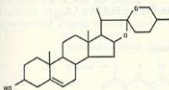
The sapogenin diosgenin is the cheapest raw material for the production of the female sex hormone progesterone.

Liquorice (*Glycyrrhiza glabra*) (*Leguminosae*)

It is found wild and cultivated mainly in Syria and Iraq. Liquorice is used as demulcent and expectorant and flavouring agent. Glycyrrhetic acid is used for the treatment of gastric and duodenal ulcer, also for the treatment of inflammatory conditions [11, 12].

Glycyrrhetic acid has been shown to have activity like cortisone and used as a starting material for semisynthesis of cortisones and sex hormones.

Trigonella foenum graecum (Leguminosae)



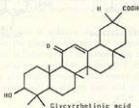
Diogenin



Trigonelline

It has been used also as a soft drink after maceration in H₂O and allays thirst because of H₂O retention. However, recently it has been reported that it may induce water retention.

Glycyrrhiza glabra (Leguminosae)



Glycyrrhetic acid

Capsicum (*Capsicum minimum*) (Solanaceae)

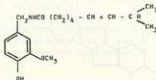
Grown in many places but particularly Sudan. It contains the pungent principle capsaicine, a liquid alkaloid which is pungent and a red coloring matter [13].

Applied externally as a stimulant and counter-irritant, internally is used as a pungent stomachic, carminative and stimulant to dispel flatulence and rouse the appetite.

Colchicum autumnale: Fam. Liliaceae, Egypt, Libia and Jordan, etc.

It contains the alkaloids colchicine, colchicine and demecolcine [14]. Total alkaloids in the seeds are more than in the corms. Colchicine is still the drug

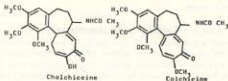
Capsicum minimum (Solanaceae)



Capsaicine

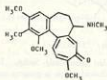
of choice in the treatment of gout. It has been reported that colchicine is a most powerful poison and has caused death in human adults in a single dose of only 5 mg. Death is caused by vaso motor paralysis.

Colebitum autumnale (Liliaceae)



Cholechicine

Colechicine



denecoleine

Cassia acutifolia, Alexandrian Senna: Leguminosae

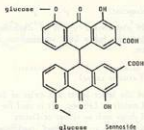
The chief constituents are 2 anthraquinone glycosides named sennoside A and sennoside B [15]. Commercial samples of Alexandrian pods contain 2.5 to 5.4% of sennoside A and B.

Sudan is the major source for senna.

Senna pods are used as laxative and are considered to be more effective than the leaves and to cause less gripping.

There are different pharmaceutical preparations containing mainly glycosides free from the gripping inducing factor.

Alexandrian Senna (Leguminosae)



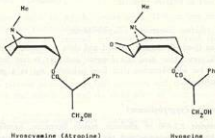
Hyoscyamus muticus:

Egyptian hyoscyamus (henbane) contains from 0.7 to 1.5% or even more of total alkaloids, most of which is hyoscyamine, which produces atropine on extraction [16].

In small doses the plant is sedative, analgesic, antispasmodic. Atropine is mydriatic, in large dose the plant is narcotic and hallucinogenic.

Henbane resembles belladonna and stramonium in action but is somewhat weaker. The higher relative proportion of hyoscyine in the alkaloid mixture makes it less likely to give rise to cerebral excitement than is belladonna. It is often used to relieve spasms of the urinary tract and with strong purgatives to prevent gripping.

Tropane Alkaloids (Solanaceae)



Atropa belladonna (Solanaceae)

The drug contains 0.3-0.6% of alkaloids, the chief of which is hyoscyamine.

Belladonna leaves are mainly used for internal preparations as sedative, antispasmodic and to lower secretion.

Datura stramonium (Solanaceae)

Stramonium usually contains 0.2-0.45% of alkaloids, the chief of which are hyoscyamine and hyoscyne, but a little atropine may be formed from the hyoscyamine racemization.

Cannabis; Marihuana (Cannabis sativa)

Hashish consists of the larger leaves and twigs of both male and female plants. It is cultivated mainly in Lebanon. It is used for smoking, either with or without tobacco and drugs such as opium or Datura.

Some principal components are cannabinalol, tetrahydrocannabinalol, cannabidiol, and cannabidiol carboxylic acid, etc.

Its medicinal properties were recognized some 5000 years ago. In the mid-nineteenth century it was used in Europe as a hypnotic, anticonvulsant, analgesic, antianxiety and antitussive agent. In recent years, addiction has become a problem all over the world.

Citrullus colocynthis (Cucurbitaceae)

Widely distributed in Egypt, Jordan, and Saudi Arabia.

It contains an alkaloid which produces very drastic purgation even in small doses. Other constituents are a crystalline alcohol, citrullol, and the glycoside of cucurbitacin E, neither of these is purgative. It is usually given with Hyoscyamus to prevent griping. It should not be given in case of pregnancy. It has many uses in folklore medicine.

Ricinus seed: (Ricinus communis) (Euphorbiaceae)

It contains fixed oil, ricinine alkaloid and ricin as a toxic substance.

Castor oil, once widely used as a domestic purgative, is now more restricted to hospital use for administration after food poisoning and as a preliminary to intestinal examination.

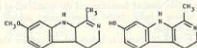
Peganum harmala (Zygopbyllaceae)

Seeds contains 2.5-4% of alkaloids, mainly harmaline, harmine, harmalol and vasicine known as peganine and peganine; small doses of harmaline cause

euphoria and large doses, cause hallucination. Seeds are used in India for the treatment of chronic malaria [17].

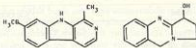
The alcohol extract of *peganum harmala* exhibited a prominent mutagenic activity of the *Salmonella typhimurium* TA - 98 and TA - 100.

Peganum harmala (Zygophyllaceae)



Harmaline

Harmalol



Harmine

Yohicine

VOLATILE OILS

The Arab countries are rich in volatile oils, especially those produced from citrus fruits, such as lemon and orange oils, as well as distilled water of citrus flowers and leaves which are commonly used as food flavour and in perfumery. Other volatile oils are: Peppermint oil, Geranium oil and jasmimum concrete [18, 19].

Mentha piperita: (Labiatar)

It contains volatile oil, which contains up to 78% of free menthol and up to 20% of menthol combined as esters.

The volatile oil and menthol are more commonly used than the herb. Menthol is widely employed in pharmaceutical preparations where it serves as a local antipruritic. It has been used as antiseptic and stimulant. It is also used in toothpaste and mouthwashes.

Mentha piperita grows in all Arab countries and it is a good source for exporting both the volatile oil and the dried plant to other countries.

Geranium oil: Geranium rogeritaram (Gerantiaceae)

It is cultivated in some countries, like Algeria and Egypt. It contains volatile

oil with characteristic odour. Water distillate after oil separation is still rich in odour and used as food flavour. The oil is commonly used in not very expensive perfumes.

Jasminum officinale (Oleaceae)

Occurs abundantly in Egypt, Algeria, Libya and Jordan.

Flowers contain the alkaloid Jasminine and the volatile oil of jasmine, which contains benzyl acetate, Linalol, linalyl acetate, benzyl alcohol, Jasmone, and bases with narcotic odours.

Volatile oil is used in cosmetics. Leaves are chewed for the treatment of mouth ulcers.

Egypt and Algeria export the concentrate of jasmone to other countries, particularly France.

Family Umbelliferae

Anise	Caraway
<i>Pimpinella anisum</i>	<i>Carum Carvi</i>
It contains volatile oil	It contains volatile oil, containing
Used as stimulant, carminative	50-60% of Carvone
Flavouring agent and extensively used in bakery	Used as an aromatic and carminative.

Family Umbelliferae

Fennel	Coriander
<i>Foeniculum vulgare</i>	<i>Coriandrum sativum</i>
It contains volatile oil (Fenchone and anethol)	It contains volatile oil (90 % of it is linalol)
Aromatic and carminative	Agreeable aromatic and carminative.

MEDICINAL PLANTS USED IN FOLKLORE MEDICINE

Ambrosia maritima (Dumisia) (Compositae)

It contains sesquiterpene lactones, ambrosin and dampsin, as major components and other minor sesquiterpene lactones of the pseudoguanolide skeleton.

The decoction of *Ambrosia maritima* is widely used in Egypt as an antispasmodic in renal colic and helps the passage of renal calculi.

CID renal tea is a pharmaceutical preparation composed of *Ambrosia maritima*, *camomile* and other herbal drugs.

Ambrosia maritima (Compositae)



Ambrosin



Damisin

Half bar:

The decoction of Half bar is used as an antispasmodic in renal colics. It grows in upper Egypt and is prescribed by herbalists.

Kahira Pharmaceutical Co. prepared two products named Proximol drops and proximol tablets from the petroleum ether extract of that plant. Further research is going on to isolate and identify the active constituents.

Olea europaea (Olive leaves and fruits) (Oleaceae)

The green fruit contains glycoside oleuropein and oleoside. The leaves contain glycoside, triterpene; oleanolic acid, saponin and elenolide [21].

The leaves show hypoglycemic activity as well as hypotensive activity.

Karkadeh (*Hibiscus sabdariffa*) (Malvaceae)

The plant grows mainly in Sudan and round the Aswan area. It contains the glycosides hibiscin HCL $C_{26}H_{30}O_{14}Cl$, and hibiscitrin, also two colouring anthocyanins, gossipetin (hydroxy flavone) and hibiscin. The part used is the dried calyx, which is red in colour.

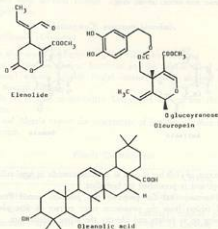
The calyx is used in most of the Arab countries as a hot soft drink in winter and a cold refreshing drink in summer. In Sudan, the dry extract of karkadeh is prepared on a large scale by the spray drying method. It reduces blood pressure, stimulates intestinal peristalsis and allays thirst. In Europe it is available as tea-bags and called red tea.

Onion (*Allium cepa*) (Liliaceae)

The bulbs contain flavones, enzymes, vitamins, volatile oil, quercetrin and a white crystalline alkaloid.

Onion juice is bacteriostatic in gastrointestinal infections. It is stomachic, expectorant and hypoglycemic.

Olea europaea (olive leaves and fruits), *Oleaceae*



Garlic (*Liliaceae*)

It contains volatile oil and alkaloids. It has a strong smelling odour and is used in cooking. Garlic in the form of pills is used to treat arteriosclerosis. In the form of cachets it induces hypoglycemia in some volunteers [20].

Diuretics and removal of renal Calculi:

Herbs inducing diuresis and still prescribed for expelling renal calculi are: *Kandur* (*Boswellia carterii*) *Buzur El-nachwa* (*Carum copticum*), *Raphan-tbus sativus*, *Brassica rapa*, *Petroselinum sativum*, Corn silk of *Zea mais*, *Khilla* (*Ammi visnaga*), *Damsissa* (*Ambrosia maritima*) and *Half bar* [22].

Treatment of Skin diseases:

Ficus latex (*Ficus* species), *Henna leaves* (*Lawsonia henna*) [23].

Cough Sedatives:

Bobung flowers (*Matricaria chamomilla*), *mahlab* (*Prunus mahlab*) and *Guava leaves* (*Psidium guajava*).

Hypotensives:

Karkadeh (*Hibiscus sabdariffa*), *Kabli* (*Terminalia chebula*) and the green leaves of olive (*Olea europea*).

Antiallergics:

Nigella sativa, and *Salvia officinalis* [24].

Cardiotonics:

Heart failure has been treated since old times by herbs such as *Adonis autumnale*, *Digitalis* (*Digitalis purpurea*), *Thevetia nerifolia* and *Squill* (*Urginea maritima*), *Cerbera odollum* and many other plants.

Cosmetics:

Henna and camomile.

Hypoglycemic drugs:

Bryonia syriaca, *Allium cepa*, Fenugreek, garlic, *Lupinus termis* and *Zizyphus lotus*.

From all the previous information about plants, several projects in most of the Arab countries are going on to evaluate these plants. Some of these plants are also recorded in the pharmacopoeias of other countries. However, the distribution of biological activity in the plant kingdom is an interesting topic. Plants have been particularly valuable as sources of new drugs since there is a historical legacy of folklore use of plants in medicine. The most commonly encountered pure compounds, derived from higher plants, are steroids (from diosgenin), morphine, codeine, atropine, reserpine, ephedrine, hyoscyamine, scopolamine, digoxin, digitoxin, pilocarpine, quinine, cocaine, strychnine and colchicine. They are used as very effective drugs or offer drug leads for introducing synthetic analogues. Continued examination of plants as a source of novel antitumor agents and apart from the vinca alkaloids may provide compounds that eventually may prove safe enough for use in humans. Also, the study of the structure-activity relationships of natural compounds, irrespective of their toxicity, has led to synthetic modifications having equal or better activity and possibly with less toxicity.

REFERENCES

- [1] INN EL-BITAR, *Mofradat El-Adwiyat Wa Al-Azzia*, Cairo, Part 1, 1890.
- [2] INN SINA A., *El-Kanon Fil Tebb*, El-Halaby & Co. for publishing & distribution, 14 Gawwad Hokeni St., Cairo.
- [3] DANFOOD EL-ANTARI, *Tazkarat Olu El-Albab*, 3rd ed., 1923.
- [4] SHARAF M., *An English Arabic Dictionary of Medicine Biology & Allied Sciences*, Government Press, Cairo, 1928.
- [5] BEBAYIAN A., *Illustrated Polyglottic Dictionary of Medicinal Plants*, Argo-Papazian Press, Cairo, 1936.
- [6] WATARI M., HONDA G., ASHIED M., *Herb Drugs & Herbalists in the Middle East*, Institute for the Study of Languages & Cultures of Asia & Africa.
- [7] *Medicinal Plants of North Africa*, by Loutfy Boudon. Reference Publication, Inc., Algonac, Michigan, USA, 1983.
- [8] *Pharmacognosy*, Ninth Edition, by G.E. Trease. Bailliere, Tindall and Cassell, London, U.K., 1966.
- [9] *Pharmacognosy*, Fourth Edition, by T.E. Wallis, J. & A. Churchill Ltd., London, U.K., 1960.
- [10] *Medicinal Plants in Libya* by P.T. Koth Hussein. Arab Encyclopedia House, Beirut, Lebanon, 1983.
- [11] *Medicinal Plants and Traditional Medicine in Africa* by A. Schowora. John Wiley and Sons Limited, New York, USA, 1982.
- [12] *Bio-Organic Chemistry* by M. Calvin and M.J. Jorgenson. W.H. Freeman and Company, San Francisco, USA, 1968.
- [13] *United States Pharmacopeia*, Twenty-First, 1984.
- [14] *British Pharmacopeia* 1980 (volume I and II). Cambridge, U.K., 1980.
- [15] *Egyptian Pharmacopeia* (The English text and the Arabic text). Cairo, Egypt, 1984.
- [16] *Organic Medicinal and Pharmaceutical Chemistry*, by Wilson and Geavold, sixth ed., Lippincott, Philadelphia, 1971.
- [17] *Medicinal plant constituents* by S.I. Balbasi, S.H. Hial, and A.V. Zaki. Egyptian Dar El-Kotob, 1981.
- [18] *Medicinal Plants of Jordan* by F.M. Karim and S.A. Qutman, Published by Yarmouk University, Irbid, Jordan, 1986.
- [19] AZZAM M.S., *Phytochemical investigation of certain plants used in Egyptian folk medicine as antidiabetic drugs*. Ph. D. Thesis, Faculty of Pharmacy, Cairo University, 1984.
- [20] GEORGY R.I.L., *Pharmacognostical study of certain Allium species growing in Egypt*. M. Sc. Thesis, Faculty of Pharmacy, Cairo University, 1978.
- [21] FARRAG N.M., *Phytochemical study of certain medicinal plants of Hypoglycemic action*. Ph. D. Thesis, Faculty of Pharmacy, Cairo University, 1980.
- [22] KARAWYA M.S., A.B. EL-WAHAB S.M., EL-QUEMY M., and FARRAG N., «Bull. Fac. of Pharmacy», Cairo University, 1984.
- [23] AND EL-WAHAB S.M. and SELIM M.A., «Bull. Fac. of Pharmacy», Cairo University, 1984. In Press.
- [24] SULEMAN F.G. and MENZEL E., «Harekeach Haivri», 9, 6 (1962).