

Chapter One

PLANTS AND PHYTOMEDICINE

Plants as a Therapeutic Source

Plants have always played a major role in the treatment of human and animal diseases. Medicinal plants can be used in different forms : 1-as raw materials for extraction of active compounds or for extraction of abundant but inactive constituents which can be transformed by partial synthesis into active compounds. 2- as such or as extracts or as traditional preparations.

Medicinal plants is a therapeutic resource much used by the traditional population of the world specifically for the health care. World-wide interest in the use of medicinal and aromatic plants is increasing. Beneficial effects of plant based medicines and other plant based products are being rediscovered. Ethnobotanical information is leading to the discovery of novel phytopharmaceuticals and other phytoproducts. This trend has made their commercialization a necessity. Therefore, industries based on medicinal and aromatic plants have been established all over the world with a view to manufacture the so-called green products to satisfy the growing demand. Nevertheless, validation and utilization as a phytopharmaceutical product need much basic and applied research in order to put this resource on the same level as the patented pharmaceutical products so achieving acceptance by the medical system, and satisfying the requisite of efficacy, safety and quality.

The development of formulation of drugs of plant origin involves botanical identification of the vegetable drug, cultivation and post-harvest procedures, extraction procedures, standardization of extracts and pharmaceutical formulation. This means that the phytotherapeutics are in the hands of personnel from different disciplines. The production of phytotherapeutics or drugs from plants needs the co-operation of a big team of horticulturists, botanists, ecologists, taxonomists, phyto-chemists, pharmacists, pharmacologists, pharmaceutical specialists, marketing and distribution specialists, etc. The modern development of phytotherapy requires the integration of scientific results of different disciplines, namely, ethno-

botanical, agro-technical, biomedical, industrial, registration and marketing, and education and dissemination. Doubtless this puts the issue of medicinal plants and phytotherapeutics in a critical situation as the synchronized co-operation among these specialists is not an easy task.

The plant products available in the commercial market still lack, to some extent, quality certificates that inform us about the content of the active ingredients or about a necessary standardization procedure. Standardization is more difficult with drugs whose active principles are not well known. No one is prepared to take plant products seriously unless certain elementary quality control criteria have been fulfilled. Also, physicians are not prepared to prescribe the raw plant drugs. A full acceptance of phytopharmaceuticals and the integration of phytotherapy into the concepts of classical medicine can be achieved only if phytopharmaceuticals meet the same criteria of quality as synthetic pharmaceuticals.

Adulterated phytopharmaceuticals have been put on the market in different countries. Moreover, we should be aware of the problems with contaminants like pesticides.

The safety and quality of phytopharmaceuticals must be guaranteed, even if efficacy is already recognized and traditionally accepted.

The development of medicinal and aromatic plants is hindered by lack of technical and economic data.

It is interesting to note that in many countries all over the world the drugs are exhibited in the shops in a more or less similar manner. The photos in plate show the exhibition of drugs in a store in Mendoza (Argentina) and in Cairo (Egypt). Trade in the drugs obtained from wild plants is very common everywhere. However, there is no proper attention paid to its socio-economical aspects in the developing countries.

The economic value of phytomedicines:

Soldati (1997) estimated the world-wide sales of over-the-counter phytomedicines to be \$ 10 billion, with an annual growth of 6.5%. The US market for botanical medicine is estimated to exceed \$ 2 billion at retail sales in 1997 (**Brevoot** 1997). Due to this demand, both universities and pharmaceutical companies devote themselves to the research of medicinal plants.

The European market for Herbal Medicinal Products (HMP) represents \$7 billion of the \$ 14 billion global retail market. Based on thousands of years of herbal tradition, business conditions in Europe are very favourable. There are well established guidelines and regulations to register HMP as drugs in many European countries. Germany is the leading market with approx. 50% of the sales in Europe, followed by France and Italy. In Germany still 50% of

the HMP are prescribed by physicians and reimbursed by the health insurance system. Some multinational pharmaceutical companies like Boehringer Ingelheim, Bayer, Novartis and Roche are active in the field of HMP.

On the other hand, in developing countries, there are no reliable available data on the economy of the medicinal plants. The problem is more significant in the case of wild medicinal plants. However, these are the plants subjected to degradation and may be to extinction within a few years. In view of the consequences of the GAAT, it is important to assess the value of these plants as an important biological resource and to document the intellectual property rights.

Conservation

Medicinal plants are an important health and economic component of the floras in developed as well as developing countries. Increasing world-wide interest in herbal remedies, expanding reliance of local health care of traditional remedies, and a renewed interest in the development of pharmaceuticals from plant sources have greatly increased trade in medicinal plant materials. Important populations of medicinal plants are found not only in the regions and ecosystems with high biological diversity but also in less diverse floras and in floristic communities that are not a common focus of conservation efforts. For instance, in the arid and semi-arid zones of the Middle East, the floras comprise very important genetic resources of crop and medicinal plants. The conservation of medicinal plant species in the wild is indispensable.

While little is known about the population status of the majority of medicinal plant species, it is clear that most medicinal plants are collected from wild populations, and many are seriously threatened with extinction by lack of local harvest controls and habitat degradation. The current focus of attention on biodiversity prospecting has diverted attention from the more serious environmental threat posed by large-scale harvest of medicinal plants for phyto-medicine production. Efforts to comprehend conservation needs and provide incentives for long-term sustainable harvest of medicinal plants are few. National and international regulation and protection may have some effect, but the most important role and responsibility for sustainable use belongs to industry and consumer support for local conservation.

The great surge of public interest in the use of plants as medicines is based on the assumption that the plants will be available on a continuing basis. However, no concerted effort has been made to ensure this, in the face of threats posed by increasing demand of vastly increasing human population and extensive destruction of plant rich habitats.

The disappearance of the medicinal plants from their natural habitats has an unseen consequence. This is the knowledge of the medicinal healers. In some parts of Egypt, as well as other Arab countries, this healer is known as a “doctor” or *hakim*. Those traditional doctors usually have a long and inherited experience. The erosion of such important genetic resource and their deterioration are accompanied with the disappearance of knowledge and traditional experience. Consequently, a loss of the intellectual property rights.

There is a great need to provide a framework for the conservation and sustainable use of plants in medicine. Ethnobotanical studies should be encouraged which represent basic studies to help implementing conservation programmes.

Drugs obtained from these plants are sold in the market, they are sold either fresh or dried. Shops selling these drugs, either fresh or dried, are found in the old part of the cities in the Arab region, and also in the Islamic countries. These shops are full of drugs obtained from the same country or imported from different countries. All over the Arab, and also the Islamic World, One finds that these shops are in the old part of the city. These shops occur in narrow lanes and are full of drugs, which may be obtained from the same country or imported from different countries. The continuous use of these plants impose a considerable pressure on the naturally growing plants in the deserts and semi -deserts of the region. In such habitats, the rate of exploitation is more than the rate of establishment of new stands of the collected plants. Doubtless, this has consequences affecting the components of the environment, including the biodiversity.

Agriculture of medicinal plants:

The production of medicinal and aromatic plants requires an understandings of plant growth, ecology, business, economics, law, conservation, and a lot of other subjects related to tillage and gathering plants, While developments such as machinery, fertilizers, and pesticides, have helped farmers meet demands for quality materials at affordable prices, the balance with farming costs, and labour compels society to set directions and establish limits. The technology of producing plants continues to evolve with the movement of laboratory and field experiments to farms and forests with the expectation that advancements create better farming. The current task is to examine and measure farming methods according to established principles in accordance with the common needs of communities. By taking advantage of progress in biology, engineering, and other disciplines, medicinal and aromatic plant growers can undoubtedly continue to harvest high-yielding crops.

Use of wild desert plants and their cultivation is not a new practice. It has been common in many countries all over the world. In U.S.A., Mexico, India and many other countries, such plants have been cultivated over varied areas and produced considerable economic return.

The wild medicinal plants growing in the desert region of Egypt can be a good source for cultivating vast areas in the desert with the least ecological consequences in addition to the conservation of such resource. The advantages and benefits of the cultivation of wild medicinal plants as given by **Batanouny** (1994a) include:

1- *Conservation of water*

- Desert plants have low water consumption. The wild medicinal plants, as other desert ones, are endowed with characteristics and adaptations making them drought resistant and/or drought tolerant.
- One can make use of seepage water along the margins of the farms and irrigation canals. The yield can be a reasonable cash crop for the farmers in the desert.
- The wild plants are able to tolerate the unavailability of continuous exogenous water supply for reasonable periods.

2- *Sustainable development*

- Cultivation of wild plants do not introduce new weeds or other new pests to the ecosystem.
- Many wild plants do not need the use of pesticides. This is a privilege of plants cultivated under desert conditions, i.e. under almost their natural habitat conditions.
- Minimal ecological consequences for the agro-ecosystem
- Minimal degradation, salinization, soil erosion, waterlogging, etc.

3- *Improvement of the economy of wasteland*

4- *Environmental protection*

- Dune stabilization
- Wildlife habitat
- Biodiversity conservation

5- *Economical improvement*

- Fill a gap in the domestic needs such as folk medicine and pharmaceutical industries.
- Potential for exports, especially pharmacoepial drug plants
- Potential for creation of small industries in cutting, drying, grinding, extraction, packing, etc..

- Provides cash (crop) income for settlers in newly reclaimed land and desert areas.

Historical Review

As early as 3000 B.C., the ancient Egyptians put much confidence in plants for curing many diseases. Up till now, the same confidence is still existing among the contemporary Egyptians and a “turn-back” to “remedy by herbs” is now becoming a global rather than regional or national request. This is strongly favoured, since the natural drugs have little or no side effects as do the chemically synthesized medications.

In view of the diversity of the habitats and the climate of the country, the biota exhibits considerable diversity. The plant resources, despite the climatic aridity, are diverse and some of them could be unexpected food or remedy for the natives. The medicinal plants growing in the various habitats in Egypt represent a major and important component of these plants, which are threatened and some are on the brink of extinction. The present study covers a historical review of the knowledge of medicinal plants in Egypt as well as the neighbouring countries.

Since times immemorial, the use of plants for curing human diseases has been in practice everywhere. Such use of plants is a part of the human history in Egypt as well as in all the countries of N. Africa and the Middle East.. The people in the region depended mainly on traditional medicine for their health care needs and the ailments of their animals. The folk medicine in the region is full of recipes for curing various diseases. The term “*Attar*” in Egypt and “Herb’s seller” in Tunisia denotes the persons who sell drugs and medicinal plants for curing diseases or for health care. The shops of attarin occur in the narrow lanes of the old part of the city in any Arab country. It is the quarter of the city which represented the core of the old city, with mosques. The drugs and the medicinal plants, from every corner of the world, are exhibited in a very attractive way. The beautiful colours are attractive, and the odour is characteristic of the whole quarter. One smells cumin, cardamom, coriander, cinnamon, pepper, liquorice, etc.; all mixed together with perfumes. This is not in a particular city, but it observed in all the cities of the Arab World. The photos given here represent show the exhibited drugs and the diseases which they cure. It is noteworthy that this is also the case in many other countries all over the world. For instance, in Argentine, one can see the same exhibition in the city of Mendoza. These photos (Photo 1- 6) are shown in coloured plates 1 to 3.

In Egypt, the famous Ebers Papyrus, written in 1550 B.C., gives 842 prescriptions, that are not explicitly magical, they are made of 328 different ingredients. Among them are plant species growing in Egypt or other N. African countries, e.g. *Artemisia absinthium*, *Acacia spp.*, *Balanites aegyptiaca*, *Bryonia spp.*, *Hyoscyamus muticus*, *Myrtus communis*, *Onopordon spp.*, *Ziziphus spp.*, etc.

Dioscorides, in his *Materia Medica*, gave the names of many plants from Egypt (*Acacia nilotica*, the Egyptian thorn) and Cyrenaica (*Dorema ammoniacum*). The “*Materia Medica*” was translated to Arabic in the IXth century A.D. by **Stephan son of Basil**. However, improved translations were done later.

The Muslim herbalists wrote over centuries many books and treatises on medicinal plants in the Islamic World, including Egypt. In view of the vast area occupied by the Islamic nation, the names of these plants were given in Arabic, Amazighy (Berber), Greek, Persian, Hindi and other languages. In the present book, we are not going to give a detailed study of the history of writings on medicinal plants of the Moslem World. However, we shall concentrate on the scholars and writings more or less related to the medicinal plants in North Africa, and specially Egypt.

Abu Bakr Mohammed b. Zakariya ar-Razi (d. about 313 Hj, 925 A.D.), known in Europe mostly under the latinized name of *Rhazes*. *Rhazya* spp. were called after him, e.g. *Rhazya stricta*, (in Arabic *harmal*; one should distinguish between the *harmal*: *Peganum harmala* and the *harmal* for *Rhazya* in the countries of Arabia). He was a Persia Muslim, who produced a most incredible number of works on medicine, natural sciences, logic, metaphysics, mathematics, alchemy, theology and ethics. Among them is the bulky work “*Continens*” (*al Hawi fi’Tibb*) in 20 volumes on therapeutics. It has been the main source for writings in this field for centuries.

One of these Moslem Scholars who was born and lived in North Africa is **Ibn El Jazzar al-Quairawani** (died 389 Hj, 1005 A.D.) who wrote many books; one of them about simple drugs. This book includes 272 drugs, mainly of plant origin, and has been translated to Greek, Latin and Hebrew.

Among the famous Muslim physicians and philosophers is **Ibn Sina (Abu Ali al-Husain b. Abdallah** (d. 428 Hj, 1036 A.D.), known in Europe as *Avicenna* (the name of the genus *Avicennia* was given after him). He wrote hundreds of books and treatises His book the “*Canon of Medicine*” (*al-Qanun fit’Tibb*) contains a section on simple drugs. This is frequently quoted by many writers after **Ibn Sina**. The book was translated to Latin, e.g. the Latin edition “*Abuali ibn Tsina (Avicenna) Canon Medicinæ*” *interprete et scholiaste V.F. Plempio*. Lovain 1658 (Fig. 1).

Abu Ga'far Ahmed b. Mohammed al-Ghafiqi (d. about 1160 A.D.) wrote "**Book of Simple Drugs**". Meyerhof and Sobhi (1932) wrote about this book : "is not equalled in excellence or in sense". **Al-Ghafiqi** abridged the writings of **Dioscorides** and the great **Galenos** in succinct language yet (preserving nevertheless) their full meaning. After their text, he mentioned all that was new in the sayings of later scholars concerning simple drugs, and what everyone of them had collected and known afterwards. This book became a collection of the sayings of those who excelled in (the knowledge of) simple drugs, and an encyclopaedia to which one had to refer in case of necessity for verification. **Gregorius, Abul-Farag Ibn al-Ibri** (Son of the Hebrew), latinized *Barhebraeus* (d. 1286 A.D.). He wrote an abridged version of the "**Book of Simple Drugs**" of **Al-Ghafiqi**. Meyerhof and Sobhy published parts of this book with excellent commentaries in 5 volumes from 1932 to 1940 as publications of the Faculty of Medicine, the Egyptian University.

Abul-Abbas an- Nabati, Ibn al-Rumiya (d. 637 Hj. 1239 A.D.) who had been given the title (**Botanist**), made an excursion in N. Africa, the Levant and Iraq. After his return to Seville in Andalusia, he established a pharmacy for selling drugs and wrote a book entitled : *Botanical Journey*.

Another famous Muslim Scholar in N. Africa is **Ibn al-Beitar** (**Diya' ad-Din Abu Mohamed Abdallah bn Ahmed Ibn al-Beitar** (died 646 Hj., 1248 A.D.) who wrote the well-known monumental work "*Gamie Al Adwiyah wal-Aghzia*." which has been translated to Latin (in 1758) and other languages. He made an expedition in N. Africa, the Levant and Asia Minor. **Ibn al-Beitar** described 1400 drugs, including 300 not mentioned by **Dioscorides** and other herbalists before **Ibn el-Beitar**. It is interesting to mention that he gave the names of the plants in different languages, its description, habitat and geographical distribution. **Leclerc** in his "Histoire de la Medicine Arabe" called him "the greatest botanist of the East".

Abu'l-Muna Dawud b. Abi Nasr known as **Kohen Al Attar** (d. 658 Hj, 1259 A.D.) lived in Cairo in the XIIIth century A.D. and composed in 1295 a book on the composition of remedies divided into 25 chapters. This book *Minhag Ad-Dukkan* (i.e. the *Management of the Shop*) had a wide-spread reputation and is still used by all the native bazaar druggist of the Near East. It survived in many MSS and was printed five times since 1287 A.H. (1870 A.D.) in Cairo alone.

A famous scholar is **Dawud b. Umar al-Antaki** (d.1008 Hj, 1599 A.D.), who lived in Cairo and left an alphabetical list of drugs and medical terms known as *Tadkirat Uli al-Albab* "*Memorandum for Intelligent People*". It was printed for the first time in Cairo in 1254 A.H. (1838 A. D.), and then

numerous times since. It is in favour with the oriental druggists. It is used till now by the contemporary druggists in Egypt and the other Arab countries.

A Muslim Andalusian Scholar, **Al-Ghassani** (d. 1019 Hj., 1611 A.D.) innovated a system for the classification of the plants. He described in his book about 380 drugs, mainly of plant origin. He described the plants, their habitats and differentiated between annual and perennial herbs. He introduced diagnostic characteristics of the different plants of the various families.

In modern ages, publishing the manuscripts of these scholars and others took place. Writing about medicinal plants became very common. Institutes, universities and research centres hosted many studies on the medicinal plants of the different countries in Egypt and other countries in the Middle East and North Africa. Phytochemical screening and search for active principles in wild plants represent common projects in the different countries. Ecological, taxonomic and floristic studies of medicinal plants took place.

In 1960 a book on the medicinal plants in arid zones was published by UNESCO (**UNESCO** 1960). Both the botanical and pharmacological aspects of medicinal plants growing in the arid zones were presented in that book. Later, in 1983, **Boulos** wrote a book on the medicinal plants in North Africa in which he gives information about these plants and their therapeutic uses in folk medicine. Scientists from the region wrote many books and articles about the medicinal plants (*cf.* **Batanouny** 1989, 1994b).

Nevertheless, there are gaps of knowledge about the medicinal plants in the region, e.g., their autecology, distribution, productivity, possibility of cultivation. In view of the rapid extensive exploitation of the wild medicinal plants in the region. It is indispensable to undertake studies on these plants and investigate methods and measures of conservation.

Wild Medicinal Plants in Egypt

The conspicuous habitat diversity in the country, as a result of geographical, physiographic, edaphic and climatic conditions, is reflected upon the plant life. More than two thousand species grow wild in Egypt.

Doubtless, man has been using hundreds of these species for their therapeutic value or as condiments.

The list of medicinal plants in Egypt and the Arab countries is inexhaustible (*cf.* **Batanouny** 1983). There is no complete inventory of medicinal plants of the region.. In the present study, the pharmacopoeial medicinal plants will be studied separately. Then, we shall deal with the common plants used in folk medicine. Some plants which have been studied for their content of active principle and found to be of potential medicinal value will be included in the present study.

Table 1- Total Plant Species, Endemic and Threatened Species in Egypt.

Country	Total Number	Endemic Species	Threatened Species
Egypt	2076	70	98

World Resources 1994-95

1st- Pharmacopoeial Wild Medicinal Plants

These are plants used in folk medicine since a long time ago. Recent and modern studies on these plants proved the occurrence of active principles in them. Their pharmacological activity had been investigated. They are among the pharmacopoeial drugs in different pharmacopoeias; either in the Arab countries or abroad.

2nd- Plants Used in Folk Medicine :

There are numerous plant species which are collected from the field to be sold in the “ *Attarin* “ or the herb’s seller shops.

C- Plants of Potential Medicinal Value :

Many plant species were investigated for their active constituents. This has been done depending on the information of the folk use of these plants, or in species with relatives of species, genera or he same family, known from other countries to have active constituents. These activities began with the establishment of the Egyptian University, especially the School of Medicine.

The establishment of the National research Centre in the mid-fifties and the units of medicinal plants and pharmacognosy was the prominent start in the study of the wild plants, especially the desert ones. The activities of this unit represent a milestone in the phytochemical studies of wild plants. The senior author (**K. H. Batanouny**) was lucky to be in intimate scientific relation with the head of this unit Late Prof. **Zakariya F. Ahmed** and his co-workers since the mid-fifties. The continuous collaboration with the scientific school of Professor **Ahmed** produced a tremendous number of publications by his co-workers covering the investigation of many desert plant species. These studies were either dealing with phytochemical screening of these plants, or mainly the separation of the active constituents of these plants and their pharmacological test. Innumerable number of active principles were separated and investigated. Also, the units of natural products in the National Research Centre and the departments of Pharmacognosy at the Faculties of Pharmacy, and Chemistry at the Faculties of Science in the Egyptian Universities contributed a lot to our knowledge about the wild medicinal plants. Meagre trials were done to compile these studies. It seems indispensable to have, at least an annotated bibliography of the literature dealing with the Egyptian wild plants. Studies on the cultivation and domestication of wild medicinal plants are still fragmentary. Such studies were conducted mainly on the traditional cultivated medicinal and aromatic plants. This shows the great need for such investigations.

Examples of plants reported for their content of active principles, one mentions : *Ajuga iva* (L.) Schreb., *Alhagi graecorum* Boiss., *Anabasis articulata* (Forssk.) Moq., *Anthemis cotula* L., *Argemone mexicana* L., *Artemisia monosperma* Delile, *Brassica tournefortii* Gouan, *Calendula arvensis* L., *Centaurea calcitrapa* L., *C. glomerata* Vahl, *Chenopodium ambroiodes* L., *Cucumis prophetarum* L., *Cynomorium coccineum* L., *Dipcadi erythraeum* Webb & Berthel., *Diploaxis harra* (Forssk.) Boiss., *Eminium spiculatum* (Blaume) Schott, *Ephedra alata* Decne., *E.aphylla* Forssk. (= *E.alte* C.A. Mey.), *Euphorbia* spp., *Fagonia* spp., *Farsetia aegyptia* Turra, *Ferula* spp., *Gnaphalium luteo-album* L., *Gypsophila capillaris* (Forssk.) C.Chr., *Haloxylon salicornicum* (Moq.) Bunge ex Boiss., *Hyoscyamus albus* L., *Hypocoum pendulum* L., *H. procumbens* L., *Jatropha glauca* Vahl, *Lactuca* spp., *Lavandula coronopifolia* Poir., *Lotus arabicus* L., *Marrubium alysson* L., *Melilotus* spp., *Nicotiana glauca* Graham, *Nitraria retusa* (Forssk.) Asch., *Onopordon alexandrinum* Boiss., *Pancratium* spp., *Physalis angulata* L., *Polygonum equisetiforme* Sm., *Retama raetam* (Forssk.) Webb & Berthel., *Rumex* spp., *Scorzonera* spp., *Senecio* spp., *Sinapis arvensis* L., *Solanum* spp., *Sonchus* spp., *Thesium humile* Vahl, *Vaccaria hispanica* (Mill.) Rauschert, *Varthemia candicans* (Delile)Boiss., V.

montana (Vahl) Boiss., *Verbascum* spp., *Withania somnifera* (L.) Dunal, *Zilla spinosa* (L.) Prantl, and *Zygophyllum* spp.

Phytogeographical Regions in Egypt :

Muschler (1912) wrote : “In citing the several localities for each species, it has appeared expedient to arrange them under five phytogeographical regions, into which the large area embraced by the flora has been divided”. He used the division adopted by **Ascherson and Schweinfurth** (1887) in which they divided the country into five phytogeographical regions. These are: Mediterranean region, Nile-delta region, Oases of the Libyan desert, Desert region, and the red Sea region. Later, two regions were added, namely Sinai and Gebel Elba (**Taeckholm** 1974).

The phytogeographical regions of the country are (Fig.2):

- N:** The Nile region including the delta, valley and Faiyum
- Nd** The Nile Delta, including Cairo, but not further south
- Nv** The Nile Valley, from Cairo to Wadi Halfa
- Nf** The Nile Faiyum
- O:** The oases of the Western Desert: Wadi Natrun, Siwa, Farafra, Bahariya, Kharga, Dakhla, Kurkur, Dungul and Uweinat.
- M:** The Mediterranean coastal strip from the border with Libya near El Sallum to the borders with Palestine at Rafah
- Mma** The Western Mediterranean coastal region , ma stands for Marmarica.
- Mp** The Eastern Mediterranean coastal region , p stands for Pelusiatic-Tanitic branches of the Nile.
- D:** All the deserts of Egypt except that of Sinai
- Da** The Arabian Desert east of the Nile
- Da sept.** The part of the Arabian desert from Wadi Tumilat to Qena-Quosseir road (sept. stands for septentrionale, North)
- Da mer** The part of the Arabian desert from Qena-Quosseir road southwards (mer stands for meridionale, South).
- Di** The Isthmic desert, i.e. El-Tih desert and the region north of wadi Tumilat
- DI** The western desert, Libyan desert, west of the Nile.

GE	Gebel Elba and surrounding mountains, situated in the south-
	eastern corner of Egypt at the Sudan Frontier.
R	Red Sea coastal region
S	Sinai proper, i.e. South of El Tih Desert

Table 1- Distribution of the Wild Pharmacoepial Medicinal Plants in the Different Phytogeographical Regions in Egypt

Species	Phytogeographical region
1. <i>Ammi visnaga</i> (L.) Lam.	N, Mp
2. <i>Ammi majus</i> L.	N, O, Mp
3. <i>Citrullus colocynthis</i> (L.) Schrad.	D, O, N, M, R, GE, S
4. <i>Datura stramonium</i> L.	N, Mma
5. <i>Glycyrrhiza glabra</i> L.	O
6. <i>Hyoscyamus muticus</i> L.	N, O, M, D, R
7. <i>Plantago afra</i> L.	Mp, Da, Di, R, GE, S
8. <i>Plantago lanceolata</i> L.	Nd (Cairo-Inshas road)
9. <i>Plantago ovata</i> Forssk..	Nd, M, Di, Da sept, Dl, S
10. <i>Senna alexandrina</i> Mill.	Nv, Da mer, R, GE, S
11. <i>Senna italica</i> Mill.	Nv, O, Da, Dl, GE, S
12. <i>Silybum marianum</i> (L.) Gaertn.	N, O, Mma, Di, (canal banks)
13. <i>Urginea maritima</i> (L.) Baker.	Mma (Sidi Barrani), Mp, Di

Table 2- Distribution of the wild medicinal plants used in the folk medicine in the different phytogeographical regions of Egypt

Species	Phytogeographical
---------	-------------------

	Region
1. <i>Acacia nilotica</i> (L.) Delile	N, O, D, R, GE, S
2. <i>Achillea fragrantissima</i> (Forssk.) Sch.Bip.	O (Kharga), Mp, Di, Da.sept, Dl, R, S
3. <i>Adiantum capillus-veneris</i> L.	N, O, M, Da, R, GE
4. <i>Adonis dentata</i> Del.	M, Di, Dl
5. <i>Ambrosia maritima</i> L.	Nd, Nv, O, M (muddy canal banks)
6. <i>Anastatica hierochuntica</i> L.	O (Uweinat), D, R, S
7. <i>Anchusa hispida</i> Forssk.	Mma
8. <i>Artemisia judaica</i> L.	Mma, Da, Dl, R, GE, S
9. <i>Balanites aegyptiaca</i> (L.) Delile	Nv, O, Da.mer, Dl, GE
10. <i>Bryonia cretica</i> L.	Mma
11. <i>Calotropis procera</i> (Aiton) W.T. Aiton	Nf, Nv, O, Da, Dl, R, GE, S
12. <i>Capparis spinosa</i> L.	O, D, S
13. <i>Centaurea pumilio</i> L.	Mma, maritime sand
14. <i>Centaureum pulchellum</i> (Swartz) Druce	N, O, M, Di, S
15. <i>Centaureum spicatum</i> (L.) Fritsch	N, O, M, Di, S
16. <i>Cleome droserifolia</i> (Forssk.) Delile	O (G.Uweinat), D, R, GE, S
17. <i>Colchicum ritchii</i> R.Br.	M, Di, Dl, S
18. <i>Commiphora opobalsamum</i> (L.)Engl	GE
19. <i>Cymbopogon proximus</i> (Hochst.) Stpf	Da.mer, GE
20. <i>Cyperus rotundus</i> L.	N, O, M, D, R, GE, S
21. <i>Juniperus phoenicea</i> L.	Di, very rare
22. <i>Moringa peregrina</i> (Forssk.) Fiori	Da, R, GE, S, rocky crevices
23. <i>Origanum syriacum</i> L.	Di, Da.sept, S
24. <i>Peganum harmala</i> L.	M, Di, Da.sept, S
25. <i>Pluchea dioscorides</i> (L.) DC	N, O, M, Da.sept
26. <i>Posidonia oceanica</i> (L.) Delile	Mma
27. <i>Primula boveans</i> Duby	S, endemic
28. <i>Rumex vesicarius</i> L.	Mma, Da, R, GE, S
29. <i>Solenostemma arghel</i> (Delile) Hayne	Di, Da, S
30. <i>Salvadora persica</i> L.	Nv, O, Da, R, GE, S
31. <i>Solanum nigrum</i> L.	N, O, M, D, R, GE, S
32. <i>Thymus bovei</i> Benth	Di, Da.sept.
33. <i>Thymus capitatus</i> (L.) Link	Mma, rocky habitats

34. <i>Teucrium polium</i> L.	Mma, Di, Da.sept, Dl, S
35. <i>Tribulus terrestris</i> L.	N, M, D,R, S, GE
36. <i>Urtica pilulifera</i> L.	M, Nd, weed
37. <i>Urtica urens</i> L.	N, M, Di, Da.sept, weed .
38. <i>Ziziphus spina-christi</i> (L.) Willd.	N, O, M, R, GE, S
39. <i>Zygodhllum coccineum</i> L.	Da, R, Di

The great surge of public interest in the use of plants, as well as some animal products, as medicines is based on the assumption that the plants will be available on a continuing basis. However, no concerted effort has been made to ensure this, in the face of the threats posed by increasing demand of vastly increasing human population and extensive destruction of plant-rich habitats.

Drugs obtained from these plants are sold in the markets all over the region. Shops selling these drugs, either fresh or dried, are widespread in the main cities of the country. Usually, these shops are found in the old part of the city (Figs. 3, 4, 5, and 6). All over the Arab, and also the Islamic World, one finds that these shops are in the old part of the city. These shops occur in narrow lanes and are full of drugs obtained from the same country or imported from different countries. The fragrant odours of the powders of the drugs and condiments can be smelled in the area where these shops are located. The visitors to these shops are diverse, with different educational backgrounds; everybody is asking the help of the *attar* and his advice for the treatment of some diseases, or for fattening or reducing weight. After birth, the woman needs nutritive drinks, which can be obtained by decoctions from compound drugs and materials mixed by the *attar*. The most famous prescriptions by the *attar* include those drugs for cough, urinary stones, abdominal pains, diabetes, rheumatism, spasms, aphrodisiac, constipation, headache, liver problems, skin diseases, etc. The continuous use of these plants impose a considerable pressure on the naturally growing plants in the deserts and semi-deserts of the region. In such habitats, the rate of exploitation is more than the rate of establishment in the harsh desert environment.