PART II

FLORA OF EGYPT

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CONTENTS

ECOLOGICAL CHARACTERISTICS

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Egypt is one of the north African countries occupying the north-eastern corner of the African Content and extends eastward in the Asian Content for approximately 61,000 km^2 , the area of the Sinai Peninsula. In shape, Egypt is approximate roughly a square. It measures 1073 kms in length from north to south, 1226 km from west to east in its greatest width, and embraces a total area of almost exactly a million sq. kms . It is situated between the parallels of 22^o and 32^o N Latitudes and consequently it lies for the most part within the temperate zone and less than a quatrter of it lies south of the Tropic of Cancer. The whole country forms part of the greatest desert belt that stretches eastward from the Atlantic across the whole of North Africa and onwards through the **Arabian** Peninsula. (Fig . 34)

Egypt is characterized by a warm and almost rainless climate. The air temperature frequently rises to over 40^oC by day during summer, and seldom falls as O^oC even during the coldest nights. The average rainfall over the country as a whole is only a centimeter a year. Even along the Mediterranean littoral, where most rain occurs the average yearly precipitation is less than 20 cms (200mm) and the amount decreases very rapidly as one proceeds inland from the coast. Thus, while Alexandria, on the Mediterranean coast, has average annual rainfall of 190 mms, Cairo , some 200 kms inland , has only 30 mm, Assiut, which lies some 340 km south of Cairo, has about 5mm, areas south of Assiut has practically no rain at all. With so scanty a rainfall, it is not to be wandered that the greater part of Egypt consists of barren and inhospitable desert. Indeed, if the rain that falls within her own borders is the sole source from which Egypt could take water supplies, the whole land would be one vast uninhabited desert. But, fortionately, the Nile traversing the entire length of the country on its northward course to the Mediterranean, continually bring down into Egypt large volumes of water obtained from the heavy rainfall of tropical highlands lying far to the south and the supplies thus furnished, being led by artificial canals over the narrowe strips of alluvial land on either side of the river within its

valley, and over the Fayium Depression and the Delta, serve to render these areas as fertile as any land of the world. It is true that Egypt fertile land is the Gift of the Nile . The desert area of Egypt is about 96% of the total area of the country and consists of stony plateau in many place, dissected by valleys and in others,pitted with huge depressions and oases or covered with drifted sands.. In some regions the desert is mountainous.

Ecologically, Egypt can be divided into 4 main regions : The Nile Region, the Western Desert, the Eastern Desert and the Sinai Peninsula . The Nile region comprises all of the land formed and irrigated by the River Nile and these include: the Nile Valley (or Upper Egypt) that extends from Wadi Halfa (350 km south of Aswan) in the Sudan-Egyptian border northwared to Cairo for approximately 1530 km., the Nile Delta (or lower Egypt) from Cairo northwsrd to Rosetta and Damietta at the Mediterranean Coast and the Nile Fayium , a depression in the Western Desert. Fayium is also irrigated with the Nile water through Bahr Yusuf canal (150 km long) that takes its water from Ibrahemia Canal at the City of Dairut (40 north of Assiut). Apart from these lands, directed by the River Nile, the Nile Region of Egypt may comprise also : the northern lakes of the Nile Delta and the Deltaic Mediterranean Coast. The Western Desert comprises three subregions : the Western Mediterranean Coast , the Oases and Depressions and Gebel Uweinat. The Eastern Desert comprises : the Red Sea coastal land and the Inland Desert. The Sinai Peninsula comprises three subregions: the northern subregion that includes the eastern section of the Mediterranean coastal land of Egypt, the central and southern subregions with their coastal areas along the Gulf of Aqaba and Gulf of Suez.Each of the 4 main regions of Egypt is characterized by its environmental charcteristice which produce different floristic elements. (Fig . 35)

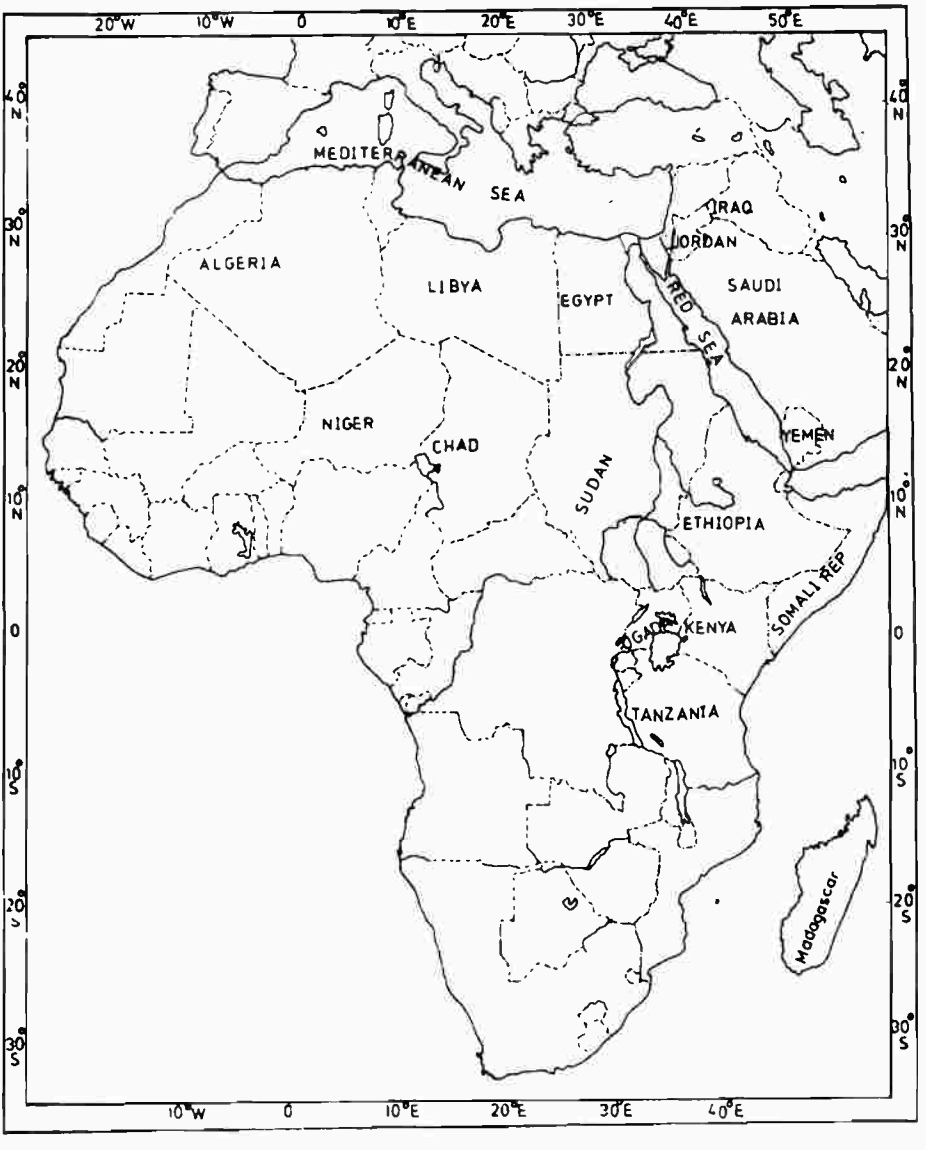

Fig 34 : Location of Egypt in Africa .

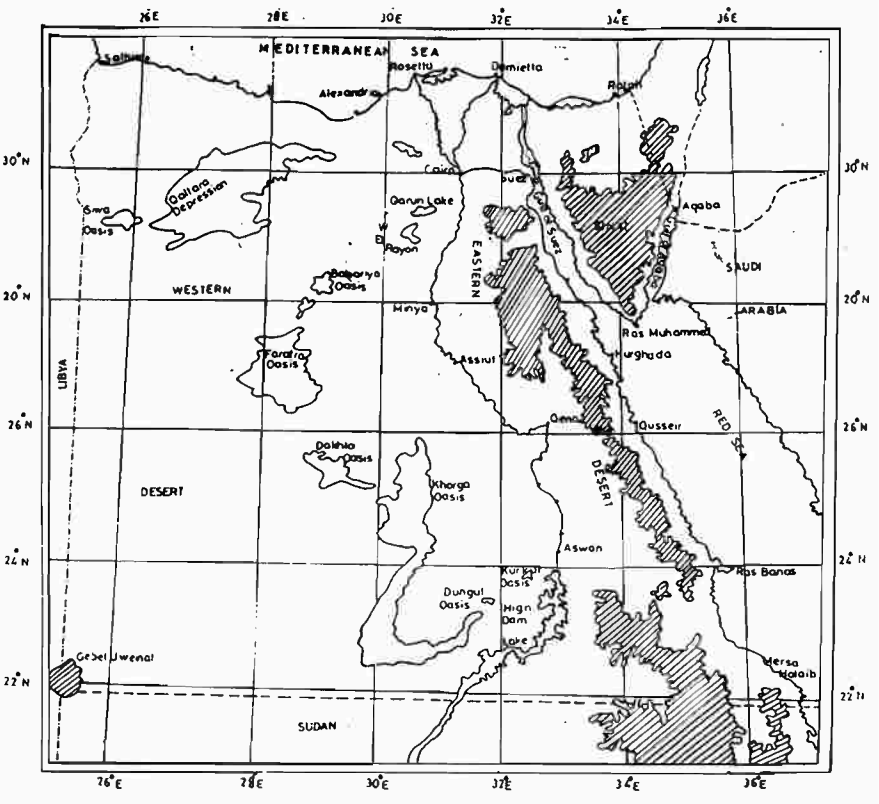

Fig 35 : Map of Egypt

HISTORICAL NOTES

HISTORICAL NOTES CONCERNED WITH THE FLORA OF EGYPT

The botanists in modern times who studied the Egyptian flora were :

1 - **Petter Forsskal** , Swedish (1732 - 1763) , a pupil of linnaeus . He joined a Danish expedition of 6 persons to the Orient in 1761 . He herborized around Alexeandria , Cairo and Suez and then continued to Arabia .

2 - **Alyre Reffenau Delile** , French (1778 - 1850) , joined Napoleon's expedition to Egypt as a member of the scientific staff . He arrived Egypt in 1798 and left again in 1800 in connection with the English occupation of the country . He succeeded with great difficulties to take with him all his notes on the Egyptain flora , which appeared in print in 1813 in a beautifully illustrated volume " Flora Aegyptiacae illustratio " accompanied by text " Flora d' Egypte " .

3 - **Edmond Boissier** , Swiss (1810 - 1890) , a citizen of Geneva . Made many journeys to Spain and also to the Orient . Spent his life writing a magnificent book in 5 volumes and one supplement , all in latin , but with the flora of all Middle East .

4 - **George Schweinfurth** , German (1836 - 1925) , born at Riga , came to Egypt in 1863 and made a journey down the Red Sea coast . A few years later he made a new extensive journey to the very heart of Africa where he stayed 3 years continuously exploring and botanizing . His book on this journey , " In the heart of Africa " has appeared in 9 languages .After his return from this journey , he devoted his time to the exploration of Egypt . He made 10 great journeys into the Arabian Desert, mapping all these districts . He visited Kharga and other parts of the Libyan Desert. Practically no region of Egypt was unknown to him . In 1875 he founded the Royal Geographical Society in Cario, of which he became the first chairman . He was also for some years chairman of the Institut d' Egypte .

5 - **Ibrahim Ramis** , Egyptian (1896 - 1928) , was a surgeon

with botany as a hobby . He wrote a book " Bestimmungstahellen zur Flora von Agyptien " , which appeared after his death , 1929 . This book deserves our greatest respect . It is a fine work written with real love to the subject . Ramis collections are kept in the Agricultural Museum .

6 - **Vivi Tackholm** Swedish (1898 - 1987)

Came to Egypt with her husband Gunnar Tackholm (1891 - 1933) , the first botanist of the Egyptian University (now Cairo University) , in 1926 . The young couple spent the following three years (1926 - 1929) working together in Cario helping to establish the Department of Botany and to creat its herbarium . During these years the Tachholms joined several expeditions to various parts of Egypt and planes to write the flora of Egypt . The husband died early (1933) and the young wife decided to come backe to Egypt to devote her life to realise that dream . She did write 4 volumes of the flora of Egypt and two editions of the Students Flora of Egypt .

The School of Vivi Tackolm is still active with her Egyption students who are distributed in the universites of Egypt .

THE WESTERN DESERT

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The Western Desert of Egypt occurs on the west side of the River Nile . It Extends from the Mediterranean coast in the north to the Egyption - Sudano border in the south . (about 1073 km) and from the Nile Valley in the east to the Egyptian - Libyan border in the west with a width between 600 - 750 km . The Western Desert thus , covers about two thirds of Egypt (area = 681 , 000 km^2) . It comprises three main subregions , namely :

I The Western Mediterranean coast that extends for about 575 km between Sallum in the west to Abu Qir in the east .

II The Oasis and Depressions

III Gebel Uweinat

WESTERN MEDITERRANEAN COAST

The Western Mediterranean region of Egypt or Mariut area stretching from Alexandria to Sallum , represents a type of arid desert but with increased rainfall . We may call it semi - arid desert The same climatic conditions do meet us also in the Deltaic (middle) and Eastern coastal areas .

The semi - desert area west of Alexandira was richly populated and culivated in ancient days , especially during the Graeco - Roman time , 2,000 years ago . The goverment nowadays tries to restore it to its ancient state and to transform it into pastures or agricultural lands . For instance , it has been proposed to make a canal from the Nile bringing fresh water all along the coast . The project has already strarted , hundreds of feddans(= 4200 m^2 each) are irriguted with Nile Water . Also , 400 windmills have recently been constructed all along the coast for puming up freshwater . Trials have been made to introduce suitable forage plants resistent to drought . Still another project has been proposed to plant the rocky ridges all along the coast with olives like in olden days .

The vegetation of this semi - desert area of Egypt is almost entirely dependent upon the rainfall , at least up to the present . In certain years

there is very little rain and the vegetation is poor . Other years rain is abundant and the flora is very rich .

Mariut comprises the coastal area 575 km long , 25 - 30 km broad , that stretches from Alexandria to Sallum . It is a region of about 2 million acres (5 million feddans) .

During Predynastic periods the rainfall was richer than nowadays , there was a grass vegetation all over the desert and a popultation living on hunting and agriculture .

When the climate dried up , the cultivation got restricted to the coastal belt and to the western delta up to the so called " Canopic " branch of the Nile . At that time the Mariut Lake was a freshwater lake of much larger extent than nowadays with a long arm running parallel to the sea and separated from it by a ridge , 10 - 30 m . high . The ridge was densely popuated in olden days , and the capital of the ancient kingdom Mareotis , " Taposiris Mangna" , was situated where we now have Abu Sir . The kingdom of Mareotis reached its height during the beginning of our era , the Graeco - Roman period , and was famous especially for its wine . There were vineyards all over the country .

Irrigation in olden days was carried out :

1- by **Cisterns** cut out in the rocks and with small holes for drawing the water . There are still such cisterns left , e.g one at Sultan Omar with a capacity of 32, 000 gallons of water , another at Abu Hamad of 13.500 gallons , two at Burg El-Arab .

The rainfall nowadays , however , is not sufficient to fill them entirely .

2- by **wells** . Especially near Alexandria where wells replaced cisterns . They were dug along the shores or in the depression between the ridges or on the hills themselves . The best water was obtained from the wells on the hills . As a rule the water about sea level improves from west to east because of the influence of underground supplies from the Nile .

3- by kurum (singular karm) . These are rectangular areas surrounded by a 3 - 4 m . high wall serving as artifcial catchment basins in

the ancient irrigation scheme . The raised walls allowed local run-off of the rain into the centre and the soil bordering their outer edges . The interior contained vineyard and olive yards. Remains of such kurum are still to be seen at the station of Ikingi , Burg el Arab , etc .

The cultivation of grapes and manufacture of wine finished when the lslamic rule was established after the Arab conquest . In addition thatCanopic branch of the Nile silted up in the 12 th century , so that there was no freshwater supply for the Mariut Lake . Thus the cultivation around the lake diminished .

After the Turkish conquest in the 16 th century every thing chaged . Alexandria became a small city of 10,000 inhabitants only . The capital of Mareotis fell into ruins . There were no people and no cultivation . Wind , sand , rain completed the destruction . Thus the ancient rich state of Mariut , 2000 years ago totally disappeared on account of ,

1. geographical and geological changes .
2. slow climatic degeneration .
3. neglect of man .

All wells and kurum are nowadays covered with sand and Mariut Lake of today is much smaller than formerly and its water nowadays is saline . The arm of it runnig parallel to the sea , is filled with water only part of the year . Here the ground is under water during winter and coverd by salt crusts during summer .

The Habitat Types of Mariut Coastal Area From Sea Landward

Mariut nowadays is a part of the arid desert , but with increased rainfall in winter , maximum in December - January. The total amount is 5 - 20 cm yearly . The humidity is rather uniform , 60 - 75% , and there is dew most part of the year . Temperature 20 - 35°C in summer, 10 - 25° in winter It is characterized by 4 main habitat types ; coastal sand dunes ,rocky ridges, salt marshes and barley fields (Fig . 36)

VIEW OF THE MARIUT AREA FROM NORTH TO SOUTH

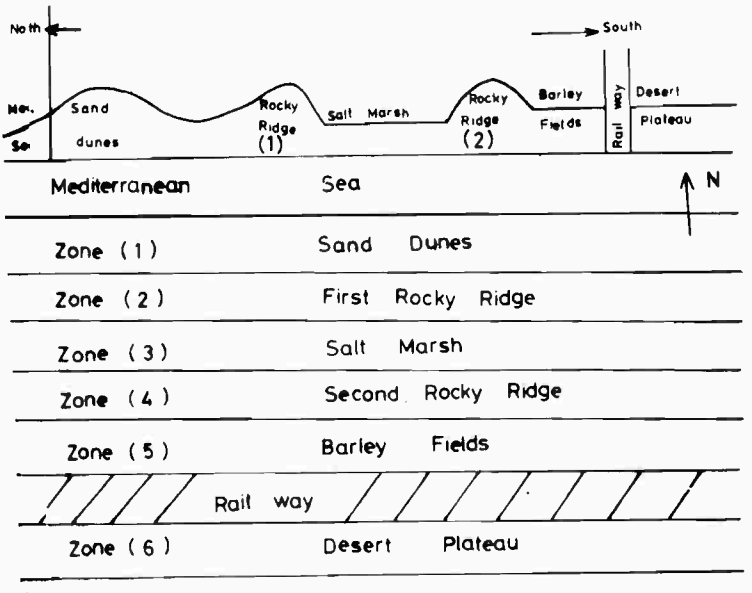


Fig (36) View of Mariut coastal Area From North to south.

1. **Dunes** . Next to the seashore is a atrip of snow - white glittering sand dunes . This area is abot l mile wide . The sand is " oolitic " consisting of granules of calcium - carbonte washed up by the sea due to the north wind . There are three types of dunes :

a. small of irregular shape .

b. larger , more regular ones of 10 - 20 sqm . and 3 -4m . high , moving .

c. fixed dunes , 10 m . high . of cemented carbonate of lime .

Flora : on the seashore is found a number of more or less dried - up algae washed up by the waves . Among these are sphaerical fiber balls " **pilae marinae** " formed by the leaf - sheaths fiber of *Posidonia oceanica* (Potamogetonaceas) .

In the moving sand is growing a grass , *Ammophila arenaria* , with narrow leaves and spike - like panicle . It is an excellent sand - binder , known in Arabic as Gazzouf .

Other plants seen in the sand dunes are :

Ononis vaginalis *Orlaya maritima*

Lotus polyphyllos (argenteus) *Hyoseris lucida*

Silene succulenta etc ..

A bulbous plant , *Pancratium matitimum* , " Susan " , with strap - shaped seaves is frequently met with in the sandy dunes . It flowers in summer with an umbel of large white , strongly scented flowers . The bulbs have the power of lengthening their neck as fast as the wind happens to accumulate sand over them .

We may also see the very rare *Helianthemum sphaerocalyx* with glabrous leaves and large yellow flowers . It is endemic in Mariut .

Where the dunes are cemented and form a rocky substratum , we see:

Crucianella mritima *Echium sericeum,*

Echiochilon fruticosum and others .

Many plants of this area grow in cushion - shape . Most of the perennials have long roots , eiher penetrating deeplyinto the dground or running horizontally . Certain plants acquire a characteristic aspect when growing in maritime dunes . For example , *Echinops spinosissimus* gets thick , almost fleshy leaves

2. Rocky ridges . South of the dune area are two ridges of calcareous hills running parallel to the sea shore , covered with sand and clay and with an interesting flora of small rock species . Along the northen ridge that runs next to the sea there is an sxtensive fig cultivation .

Among rock plants of this area should be noticed :

Helichrysum conglobatum *Thymus capitatus*

Globularia arabica *Phagnalon rupestre*

Teucrium polium

Fumana thymifolia *Dactylis hispanica*

3. Salt marshes . Between the two ridges of calcareous hills , there is a large depression which is an extension of the Mariut lake . As mentioned before , it is covered witd water during the winter months . In summer it forms a brilliant white sheet of solid salt . Westwards , it is never filled but is merely a moist salty ground which dries up in summer and in the winter is marshy enough to make the ground difficult to cross , at least in certain places . Soil is clayey with gypsum crystals . The width of the depression is a few kms

On the slopes of the marshes is cultivation . In the middle there are partly bare areas , partly an open vegetation of marsh plants . Common are :

Halocnemum strobliaceum with woody branches and densely beset with buds of small scale-like leaves, which have the appearance of miniature rose-buds.

Salicornia fruticosa *Frankenia revoluta*

Suaeda fruticosa *Limonium pruinosum*

Limoniastrum monopetalum , Cressa cretica.

A little grass, *Sphenopus divaricatus*, covers the ground in certain places like a brown veil.

4 . Flora of the barley fields. The southern ridge slopes gently southwards to a wide plain crossed by the railway. Then it raises gently again into the desert plateau. The soil here is loose and generally cultivated by the beduins with barley. These barley fields are famous for their rich weed flora, which however is entirely depending upon rain. If rain comes, it is not unusual to export 9,000 tons barly from Burg el Arab only. If no rain, the beduins have to buy their barley supply from outside. The weed flora in mariut is dominated by 3 families:

Compositae (c.100 species).

Leguminosae (c.100 species).

Gramineae (over 100 species).

Next to these comes Cruciferae with c.50 species.

Interesting plants are:

Asphodelus microcarpus . A tall plant with sword-shaped leaves and spindle-shaped tubers, of which may be prepared a powder," risras", used by shoe makers as glue. Most risras of the Egyptian market is imported from Syria, where the plant also is found.

Cynara sibthorpiana, wild kharshouf, a spiny plant with large white flower heads.

Mesembryanthemum crystallinum and M.nodiflorum ,the former with large flat , the latter with cylindrical leaves , both covered with water - filled glistening papillae .

Alkanna tinctoria , prostrate plant with blue or violet flowers and a root which may be used as a colouring agent.

Achillea santolina with small yellow flower-heads in dense corymbs and very strong aromatic scent.

Lygeum spartum, a grass with a single terminal large spikelet. It is called "halfa" . In Tunisia and Morocco it is collected for paper-making, for manufacturing baskets, hats etc.

Fagonia cretica, with large.,intensely purple flowers and of prostrate growth.

Bupleurrum subovatum and *Eryngium campestre,* belong to Umbelliferae, but have heads instead of umbels. *Eryngium* is spiny .

Lolium temulentum is a grass with sessile spikelets It is poisonous due to a fungus, parasitizing in its grain and producing the mortal poison temuline.

Convolvulus althaeoides , differs from the ordinary C. *arvensis* in its lobed hairy leaves and purple flowers.A creeper or climber

5 . Fruit trees cultivated at Burg el Arab and suitable for Mariut.

Last century the cultivation of trees in the Mariut area was in a very bad state, but it has now been improved gradually. In the experimental station of the Ministry of Agriculture at Burg el Arab, all sorts of fruit trees have been tried. Those best suited for the climate of this region and which really could stand a rainless year without getting destroyed are:

Fig . It grows extremely well in the sandy dunes all along the

coast. It is grown mainly for consumption at Alexandria, as the variety grown in Mariut is less suitable for drying.

Kharroub. Both drought and salt-resistent. Gives a good yield of fruits. The fruits are falling from the tree when rip and are collected from the ground.

Almond . Also resistant to drought and salt. It is also used for grafting other fruits. Peach may be grafted on almond with good result.

Date palm . Not affected by salty water but requires irrigation.

Nabq . (*Ziziphus*), produces heavy crops.

Grapes are found in most beduin gardens but needs watering in case of low rainfall .

Olive. This is the best suited tree for cultivation along the coast. It could grow without irrigation and could stand a rainless year., It starts giving fruit usually 7 years after the planting and continues giving crops over thousand years. In Tunisia there are some trees said to have been planted by the Romans 2000 years ago, and still yielding fruit. The variety in Mariut is the Tunisian " Shemelali", which is excellent for oil-pressing. It is also pickled nowadays.

Egypt imports olive oil from other countries which could easily be produced here, if the cultivation of Mariut could be extended all along the coast. It could be mention that with very little money , a very important project can be realized.

List Of Some Selected Species Of The Habitats of Mariut Coastal Area

a) Sandy Dunes

Ammophila arenaria , Euphorbia paralias , Lotus argentus , Sporobolus pungens, Crucianella maritima, Ononis vaginalis, Echinops spinosissimus, Silene succulenta , Reseda alba, Pancratium maritimum, Hyoseris lucida, Launaea tenuiloba, Echium sericeum, Salvia lanigera, Cakile maritima, Plantago albicans, Lygos raetam, Agropyron junceum Thymelaea hirsuta, Urginea maraitima, Gymnocarpos decandrum , Globularia arabica, Plantago squarrosa etc .

b) Rocky ridges

Thymelaea hirsuta, Gymnocarpos decandrum, Helianthemum stipu-

latum, Lotus corniculatum, Herniaria hemistemon, Scorzonera alexandrina, Carduus gebulus, Plantago notata, Lygeum spartum, Stipa capensis, Limonium tubiflora, Medicago minima, Malva aegyptiaca , Reaumuria hirtella , Teucrium polium , Lotus creticus , Arisarium vulgare , Reichardia orientalis , Orlaya maritima , Nonnaea viviana , Moricandia suffruticosa , Thymus capitatus , Echinops spinosissimus , Pituranthus tortuosus , Asphodelus microcarpos , Hammada articulatum , Anabasis articulata , Stipa capensis , Noaea mucronata etc .

c) Non - Saline areas

A chillea santolina , chrysanthemum coronaria , Eryngium creticum , Calendula aegyptiaca , Thymelaea hirsuta , Plantago albicans , Papaver rhoses , Onopordon alexandrinum , Asphodelus microcarpus , Linaria haelava , Avena sterilis , Emex spinosus , Echiochilon fruticosum , Papaver hybridum , Emex spinosus , Beta maririma , Limonium tubiflorum , Hippocrepis bicontorta , Ranunculus asiaticus , Urginea undulata , Arisarum vulgare , Planntago crypsioides , Francoeuria crispa , Allium erdelli , Anagaellis arvensis , Daucus syrticus , Echinops spinossismus , Vicia cinera , Lathyrus cicera , Hordeum marinum , Atriplex halimus , Malva parviflora , Lycium europaeum , Reseda alba , Centauraea pumila , Lotus creticus , Hyoseris lucida , Helianthemum ellipticum , Astragalus mareoticus , Erodium hirtum , Moricandia nites , Silene villosa , Ifloga spicata , Buplerum subovatum , Gagea fibrosa , Scorzonera alexandrina , Beta maritima , Avena sterilis , Odontospermum graveolens , Medicago littoralis , Reseda decursica , Brassica tournefortii , Lolium perenne , Astragalus forskalei , Alkanna tinctoria , Artemisia inculta etc .

d) Saline Areas

Limoiastrum monopetalum , Juncus rigidus , Halimione portulacoides , Cressa cretica , Arthrocnemum glaucum , Salicornia frduticosa , Halocnemum strobilaceum , Limonium pruinosum , Atriplex halimus , Sprobolus pungens , Suaeda salsa , Inula crithmoides , Sphenopus diviricatus , Zygophyllum album , Frankenia pulverulenta , Mesembryanthemum nodiflorum , Suaeda pruinosa ; Suaeda fdruticosa .

In the swampy areas : *Phragmites australis ,Typha domingeansis , Cyperus* spp , *Juncus acutus J. Subulatus* etc .

The sea weeds include : *Zostera nara , Cymodocea nodosa , Posidonia oceanica* etc .

The annual bush *Kochia indica* grows also in the saline areas of the Western Mediterranean coast . It is a fodder plant for domestic animals .

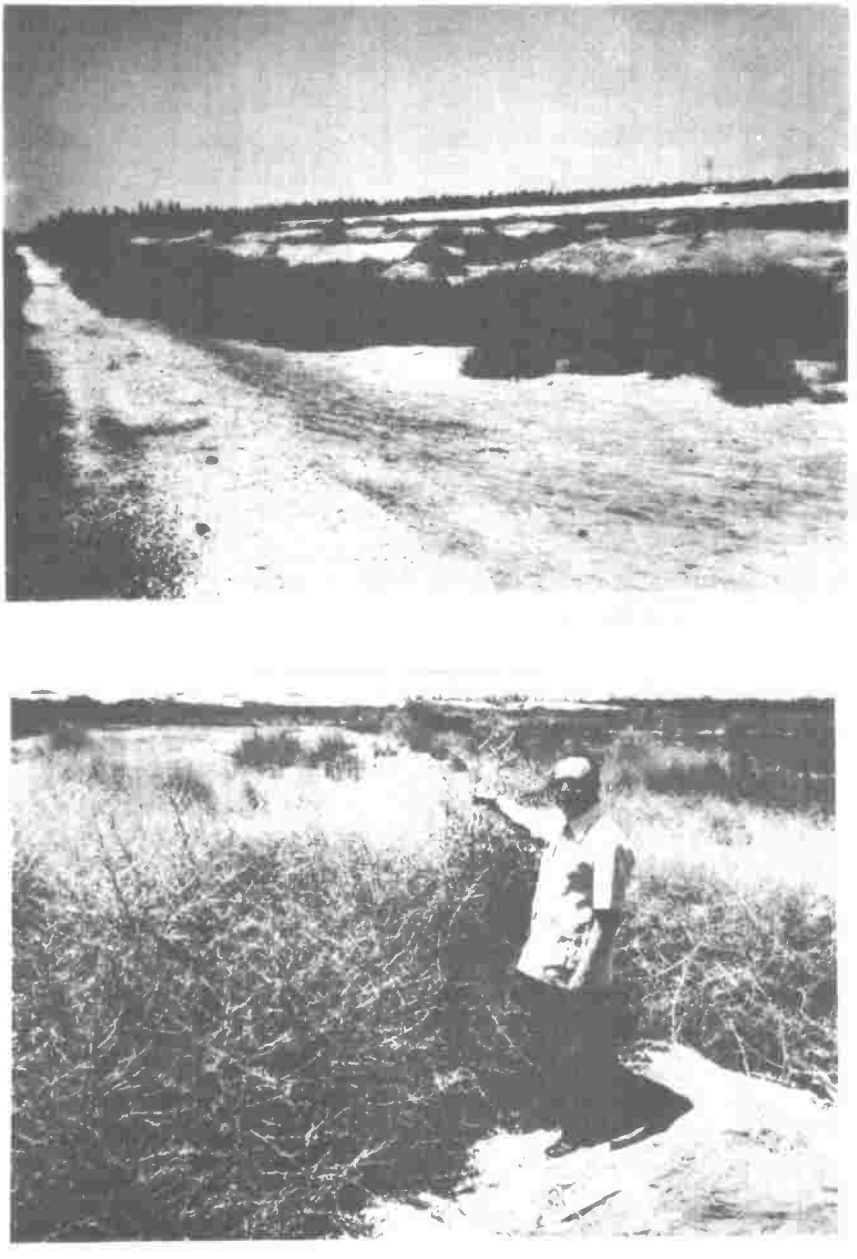


Photo 20 : Kochia indica vegetation , Salt march habitat Mediterranean coast, Egypt .

MARIUT FLORA

There are about 850 species known from the Mariut area . The following are the most common .

1 - Aizoaceae :

Aizoon hispanicum
Mesembryanthemum nodiflorum, M. Crystallinum .

2 - Amaryllidaceae :

Pancratium maritimum

Aracease :

Arisarum veslingii
Eminium spiculatum

3 - Boraginaceae :

Moltkea callosa

(= Moktlkiopsis ciliata)

Echiochilon fruticosum .
Echium setosum
E. sericeum
Alkanna tinctoria
Gastrocotyle hispida
Anchusa aegyptiaca

4 - Compositae :

Echinops spinosissimus
Carduus getulus
Atractylis flava
Onopordon alexandrium
Carthamus glaucus
C. mareoticus
Centaurea pumila
C. glomerata
C. alexandrina
Erigeron crispus
Filago spathulata
F. mareotica
Gymnarrhena micrantha
Phagnalon rupestre
Helichrysum conglobatum
Inula crithmoides ,Varthemia candicans
Pallenis spinosa
Anthemis microsperma
Anacyclus alexandrinus
Achillea santolina
Diotis maritima
Matricaria aurea
M. tridentata
Chrysanthemum coronar ium
Senecio desfontainei
Calendula micrantha
Hyoseris lucida
Hedypnois rhagadioloides
Urospermum picroides
Thrincia tuberosa
Picris radicata
Scorzonera alexandrina
launaea capitata
L. nudicaulis
L. resedifolia
Reichardia orientalis
Sonchus oleraceus
Aetheorrhiza bulbosa
Crepis sencioides

5 - Cyperaceae :

Cyperus leavigatus
C. capitatus
C. rotundus, Carex divisa

6 - Euphorbiaceae :

Euphorbia peplus
E. terracina

E. paralias
7 - Frankeniaceae :
Franknia revoluta
F. pulverulenta
8 - Gerniaceae :
Erodium hirtum
E. laciniatum
E. gruinum
E. cieonium
9 - Globulariaceae :
Globularia arabica
10- Caryoply llaceae
Spergularia marirna
S. diandra
Stellaria pallida
Minuartia procumbens
Polycarpon succulentum
Herninaria hemistemon
H. hirsuta
Parronychia arabica
P. nivea
Gymnocarpos decandrum
Silene succulenta
S. colorata
S. biappendiculata
11 - Chenopodiaceae :
Noaea mucronata
Beta vulgaris
Chenopodium murale
Blackiella inflata
Halimione portulaeoides
Atriplex stylosa
A. halimus
A. coriaced
Halocnemum strobilaceum
Salicornia fruticosa
Suaeda fruticosa
S. pruinosa
Salsola tetrandra
S. longifolia
S.kali
S.villosa
Kochia indica
12- Convolvulaceae :
Convolvulus arvensis
C. althaeoides
Cuscuta planiflora
13. Cruciferae
Matthiola humilis
koniga arabica
Erucaria microcarpa
E. hispanica
Carrichtera annua
Moricandia nitens
Brassica turnefortii
14 - Gramineae
Bromus scoporius
B. rubens
B. rigens
B. fasciculatus
Trachynia distachya
Ammophila arenaria
Sporobolus arenarius
Polypogon monspeliensis
Stipa capensis
Cynodon dactylon
Phalaris minor
P. paradoxa
Cutandia memphitica
C. dichotoma
Sphenopus divaricatus
Aeluropus lagopoides
Dactylis hispanica
Lamarckia aurea
Phragmites australis
Elytrigia juncea
(Elymus elongatus)
Aegilops bicornis
A. kotschyi
Hordeum leporinum
Lolium rigidum
Pholiurus incurvus
Schismus barbatus
Koeleria phleoides

Lygeum spartum
Avena alba
A. fatua
A. sterilis
15 - Cistaceae :
Fumana thymifolia
Helianthemum lippii
H. ellipticum
H. sphaerocalyx
H. vesicatium
16 - Iridaceae :
Iris sisyrinchium
Gladiolus segetum
17- Juncaceae :
Juncus acutus
J. arabicus (= J. rigidus)
18 - Labiatae :
Thymus capitatus
Teucrium polium
Marrubium alysson
Ajuga iva
Salvia lanigera
S. aegyptiaca
S. verbenace
19 - Cynomoriaceae :
Cynomorium coccineum (parasite)
20 - Liliaceae :
Bellevalia alexandrina
B. sessiliflora
Leopoldia comosa
Allium roseum
A.aschersonianum
Asphodelus microcarpus
Ornithogalum tenuifolium
21 - Malvaceae :
Malva aegyptia
M.parviflora
M.sylvestris
22 - Orobanchaceae :
Orobanche crenata
O.ramosa
O.aegyptiaca
Cistanche violacea
23 - Resedaceae
Reseda decursiva
24 - Rubiaceae :
Valantia hispida
V. lanata
Crucianella herbacea
C. maritima
25 - Rutaceae :
Haplophyllum tuberculatum
26 - Santalaceae :
Thesium humile
27 - Leguminosae
Ononis vaginalis
O. reclinata
O. serrata
Trigonella stellata
T. maritima
Medicago hispida
M. cilliaris
M. minima
M. truncatula
M. litoralis
Melilotus indicus
M. siculus
Trifolium tomentosum
T. resupinatum
Hymenocarpus numularius
Lotus pusillus
L. creticus
L. corniculatus
L. polyphylios (argenteus)
L. palaestinus
Scorpiurus muricata
Astragalus hamosus
A. tribuloides
A. cruciatus
A. boeticus
A. annularis
A. hispidulus
A. peregrinus
A. alexandrinus

A. spinosus
Alhagi maurorum
Vicia sativa
V. calcarata
V. cinerea
Lathyrus aphaca
L. marmoratus
L. pseudicera
Pisum humile
28 - Papaveraceae :
Papaver rhoeas
P. hybridum
Roemeria hybrida
Hypecoum aegyptiacum
Fumaria dendiflora
F. bractosa
F. judaica
29 - Plantaginaceae :
Plantago notata
P. crypsoides
P. coronopus
P. lagopus
P. albicans
P. crassiflolia
30 - Plumbagincceae :
Statice thouini (= Limonium thouini)
S. pruinosa (= Limonium spinosum)
S. delicatula (= Limonium delicatum)
Limoniastrum monopetalum
31 - Polygonaceae :
Emex spinosus
Rumex dentatus
Polygonum equisetiforme
32 - Scrophu lariaceae
Linaria albifroms
L. haelava
L. albiforns
33 -Solanacease :
Lycium europaeum
Nicotiana glauca
Tamaricaceae :
Reaumria mucronata
Tamarix nilotica
35 - Thymelaeaceae :
Thymelaea hirsuta
36 - Umbelliferae :
Eryngium campestre
E. creticum
Bupleurum subovtrum
B. semicompoditum
Pituranthus tortuosus
Malabaila suaveolens
Orlaya maritima
Daucus syrticus
Torilis bodosa
36 - Urticaceae :
Urtica pilulifera
37 - Zygophyllaceae :
Peganum harmala
Fagonia cretica
Zygophyllum album
38- Posidoniaceae
Posidonia oceanica
39 - Primulaceae :
Anagallis arvensis
40 - Ranunculaceae :
Ranunculus asiaticus
Adonis dentatus .

Flora of A Sector Along The Western Desert

Cario - Alexandria desert rood runs from Cario in a NW derection till Alexeandria for about 220 km . Along this section of the Western Desert the plant life varies due to the variation of the climatic conditions . The amount of rainfall increases towards Alexandria from 24 mm / year in Giza , 38 mm in Tahrir Provicw (85 km north of Cairo) , 138 mm in Ameriya (30 km South of Alexandria) to about 170 mm in Alexandria . Air temperature shows the opposit trend : decreases northward , relative humidity increases and evaporation decreases northwards .

In the extreme southerne part of the sector the plant cover is very poor . Few scattered individuals of *Aristida Plumosa* , *Calligoum comosum* , *Eremobium lineare and Zygophyllum coocineum* grow .

After km 46 north of Cairo the number of plants increases and the flora include : *Aristide plumosa* , *Pituranthus* tortuosus , *Artemisia monosperma* , *Helianthemum lippii* , *Gymnocarpos decandrum* , *Echinops spinosissimus, Polycarpaea repens* , *Panicum turgidum* , *Moltkiopsis ciliata* , *Convolvulus lanatus* , *Calligonum comosum* , *Fagonia glutinosa Zygophyllum album* , *Astenatherum forshalei* , *Neurada procumbens* , *Ifloga spicata* , *Schismus Barbatus* , *Eremobium lineare* , *Silene villosa* , *Erodium laciniatum* , *Launaea cassineana* etc . This flora continues till Km. 157 north of Cairo, then new elements start to appeare e.g. *Thymelaea hirsuta, Anabasis articulata, Salsola tetrandra, Avena alba, Noaea mucronata, Anthemis microsperma, Medicago minima, Asphodelus fistulosus , Crucianella herbacea , Lycium europaeum , Helianthemum stipulatum , Daucus syrticus , Trigonella maritima* etc , photo *21* Coming nearer to the coast , the number of plants and the density of vegetation increase . .

Photo 21 : Commnity of **Thymelaea** hirsuta at the section of Cairo - Alexandria desert road .

II THE OASIS AND DEPRESSIONS OF THE WESTERN DESERT

The Western Desert of Egypt is characterized by a number of oases and depressions , namely : Siwa Oassis , Moghra Oasis , Baharia Oasis , Farafra Oasis , Dakhla Oasis , Kharga Oasis , Kurkur Oasis , Dungul Oasis , Qattara Depression , Wadi El - Natrun Depression , Wadi El - Rayan Depression and some other small depressions .

The climatic conditions of these oases and depressions are arid or extreme arid : high temperature , low humidity , high evaporation and rainfall is negligible . Thus , the artesian undergound water is the main water resources of these depressions which can be obtained by digging wells or from the natural springs . Natural lakes and lagoons are present in many of these oases e . g . Siwa lake in Siwa Oasis , lakes of Wadi El - Natrun Depression etc .

In general , five vegetation types can be recognized in these oases and depressions , namely : a) hydrophytes b) helophytes c) halophytes d) psammophytes and e) xerophytes .

a + b Hydrophytes and Helophytes

The swampy habitats are formed by the overflowing of the under-

ground water to the depressed areas of these oases . Lakes and lagoons are usually filled with water in which hydrophytes grow . The helophytes are present in the shallow watered edges of these water bodies .

Typha domingensis and *Phragmites australis* are the most abundant reeds of these swamps . In Wadi El - Natrun there is another giant species of *Typha* , namely T. *elephantina* , restricted to it , never recorded elsewhere in Egypt (photo 22) Also , in Wadi El - Natrun Lakes , particularly Um Risha Lakes . there are stands dominated by the ancient *Cyperus papyrus* from which the ancient Egyptians manufactured the first paper in history . The other swampy flora of the oases include : *Berula erecta , Samolus valerandii , Cyperus articulatus , C. mundtii , C. fuscus , C. difformis as* well as the hydrophytes e.g *lemna gibba , L.minor , L.perpusilla , Marselia minuta and Nympheae coerulea ,Utricularia gibba* (found only in Kharga oasis , never recorded elsewhere in Egypt) , *Potamogeton pectinatus , Ruppia maritima , Zannichillia palustris , Najas armata* , and some algae e . g *Chara* sp . The wet fringes of these lakes and lagoon are suitable habitats for the growth of *Cyperus laevigatus , Juncus acutus , J. rigidus , Panicun repens etc* .

Photo 22 : Typha elephantina , Wadi El - Natrun Lakes .

C - The Halophytes

The halophytes (the flora of the salt marsh habitat) are widely present in the oases and depressions of the Western Desert of Egypt . Some species e . g. *Cladium mariscus*arepresent only in Siwa Oasis , never seen elsewhere in Egypt . The other halophytes include : *Cyperus laevigatus* that form *Cyperus* meadows around the lakes of Wadi El - Natrun , *Juncus rigidus* , J . acutus both are present in all oases , as well as *: Nitratia retusa , Zygophyllum album , Cressa Cretica , Alhagi maurorum , Tamarix nilotica , Suaeda monoica , Aeluropus lagopoides , Kochia india , Sporobolus spicstus , Cyperus laevigatus , Salicornia fruticosa , Frankenia revoluta , Paspalidium geminatum etc (photo 23)*

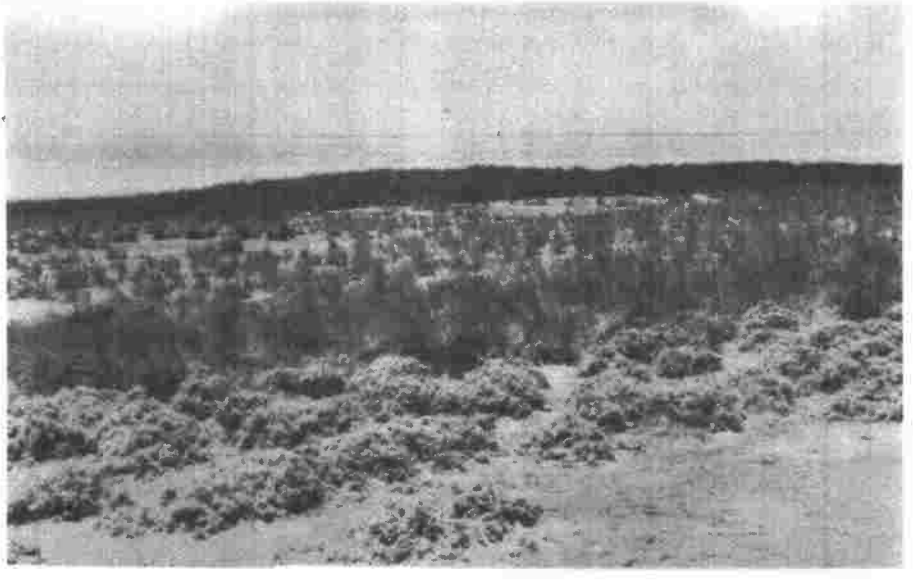


Photo 23 : Salt marsh vegetation dominated by **Juncus rigidus** , Siwa Oasis .

d - Psammophytes

These are the plants that inhabit the sand formations : sand bars , sand hillocks and sand dunes which are usually associted with the lakes of the oases and depression . In Wadi El - Natrun Depression , for example , the lakes are associated with sand bars (on the eastern side) dominated by halfa grassland : *Desmostachya bipinnata* associated with *Sporobolus spicatus , Panicum turgidum , Juncus acuts , Artemisia monisperma* and *Phoenix dactylifera* . On the Western side of these lakes , there are sand hillocks with *Tamarix nilotica* (photo 24) , *T . passeri-*

noides and *Nitraria retusa* as abundant plants . You may find also : *Zygophylolum album* and *Sporobolus spicatus* .

Photo 24 : A sand hillack with **Tamerix nilotica** growth , Siwa oasis .

On the south and southeastern sides of lake Siwa there are extensive areas of huge sand dunes where *Zygophyllum album* , *Aristida scoparia* , and *Cornulaca monacantha* grow (photo 25) . The most interesting plant of these dunes of Siwa is : *Populus euphraticus* (photo 26) . It is a naturalized tree that was introduced to Siwa during the Roman time (331 B.C.) . These trees were used as sand - fixing and windbreaks . It is only present in Siwa Oasis .

Photo 25 : Zygophyilum album , Cornulaca , monacantha and Aristida scoparia on the sand dunes of Siwa Oasis .

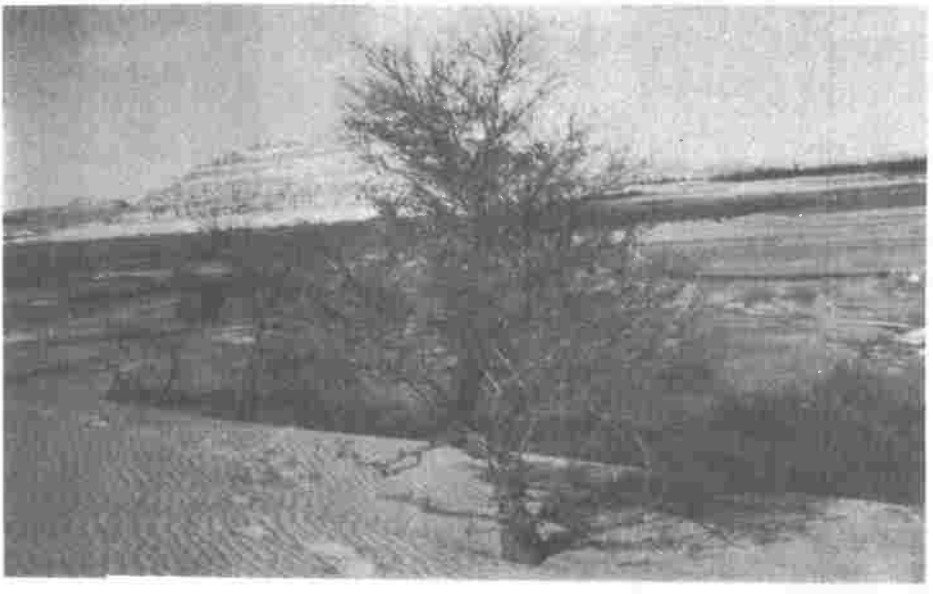


Photo 26 : Populus euphraticus tree , sand dune , Siwa Oasis .

e. Xerophytes

The lands surrouding the oases and depressions of the Western Desert of Egypt are characterized by the growth of xerophytes , mostly perennials . These include : *Artemisia monosperma , Panicum turgidum , Pituranthus tortuosus , Aristida plumosa , Salsola baryosma , Zygophyllum simplex , Fagonia arabica , Acacia raddiana , Pergularia tomentosa . , Capparis leucophylla , Hyoscyamus muticus , Zizyphus spinachristi , Trichodesma africanum , Calotropis Procera , Hyphaena thebaica , Aerva tomentosa , Balanites aegyptiace , Francoeuria crispa , Lagonychium farctum (= Prosopis farcta) , Stipagrostis scoparia , Citrullus* colocyn*this* etc . In these oases ,. date and dome palms are very common (photo 27) . In dungul Oasis , there are few individuals of the anient tree of family Plamae , namely : *Medemia argune* , never recorded elsewhere in Egypt .

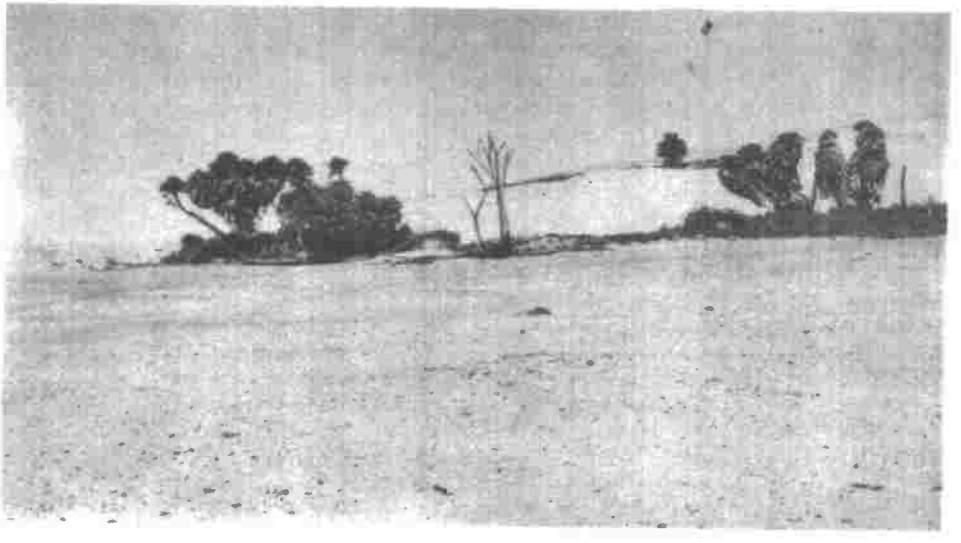


Photo 27 : Data palm (**Phoenix dactylifera**) and domepalm (**Hyphaene thebaica**) groves in Dungul Oasis .

III Gebel Uweinat

In the extreme southwestern portion of the Western Desert of Egypt where the boundaries of Egypt , Sudan and libya meet , lies Gebel Uweinat : The Mountain of little springs .

The flora of Gebel Uweinat is not of the Mediterranean type and includes genera and species common in the wadis of the Eastern Desert of Egypt .

Phoenix dactylifera and *Hyphaene thebaica* as well as *Tamaix nilotica* grow in dense thickets near the springs and wells . Under the palms there is a salt marsh vegetation where halophytes e . g . *Juncus rigidus* , *Sporobolus spicatus* . *Imperata cylindrica Alhagi maurorum* etc . grow . In the swampy patches *Phragmites australis* , grow .

The xerophytic flora include : *Cassia italica* , *Aerva Javanica* , *Francoeuria crispa* , , *Crotalaria aegyptiaca* , *Cleome* chrysantha , C. droserifolia , Fagonia thebaica , *Panicum turgidum* , *Acacia raddiana A. ehrenbergiana* , *Maerua crassifolia* , *Ficus salicifolia* , *Ochradenus baccatus* . *Lavandula stricta* , *Salyia lanigera* , *Corchorus depressus* , *Hyoscyamus boveanus* , *Crotalaria thebaica* , *Shouwia thebaica* , *Convolyulus prostratus* , *Monsonia nivea etc* .

THE EASTERN DESERT

THE EASTERN DESERT

The Eastern Desert of Egypt occupies the area that extends from the Nile Valley eastward to the Gulf of Suez and the Red Sea which is about 223,00 km^2 (i . e 21% of the total area of Egypt) . It is higher than the Western Desert of Egypt and it consists essentially of a back-bone of high and rugged mountains running parallel to the coast . This range of coastal mountains of the Red Sea e . g . Ataqa , Shayeb El - Banat , Elba etc . divide the Eastern Desert into two main subregions : The Red Sea coastal land and The Inland Desert

I. THE RED SEA COASTAL LAND

The Red Sea Coastal land of Egypt extends from Suez southwards to Marsa Halaib at the Sudano - Egyptian borber for about 1100 km . It comprises the western coast of the Gulf of Suez (from Suez to Hurgha-da , about 400 km) and the northern section of the Western (African) coast of the Red Sea proper (from Hurghade to Marsa Halaib , 700 km) . This coastal area is situated within a region of arid climate with mean annual rainfall ranges between 3 - 25 mm . In the mountainous area there is orographic rain which has its effect on its flora : richer flora than the coastal desert of the Red Sea .and other parts of the Egyptian deserts.

Four vegetation types have been recognized in the Red Sea cosatal region of Egypt .

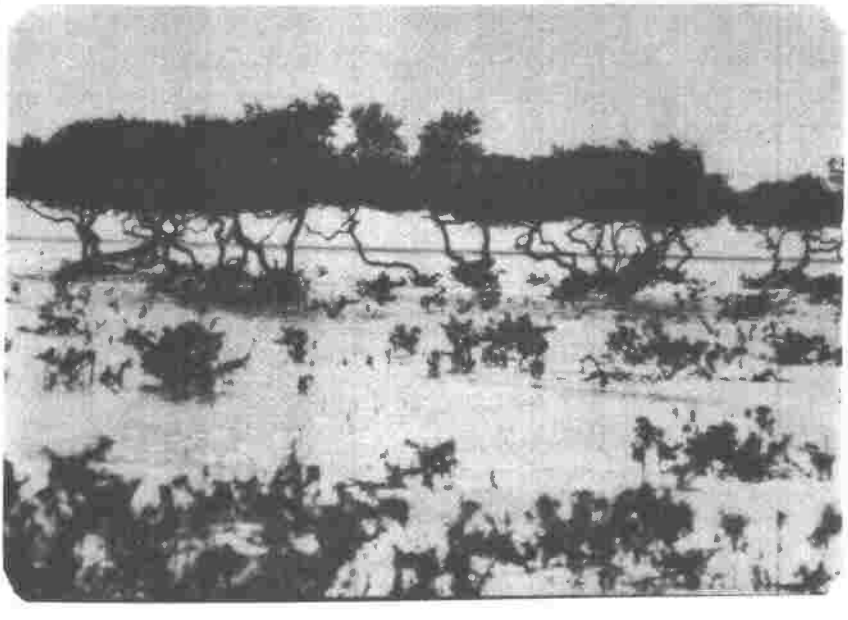
A. Mangrove Vegetation

B. Littoral Salt Marsh vegetation

C.Coastal Desert vegetation

D. Mountainous Vegetation

The mangrove vegetation is present only along the Red Sea coast absent from any other coastal areas of Egypt . It is represented by com-mon trees and shrubs of *Avicennia marina (* family Avicenniaceae) that appear in the shore line starting from Hurghada sonthwards , absent in the north . Also , there are trees and shrubs of *Rhizophora mucronata* (family Rhizophoraceae) in the most southern part of the Red Sea Coast of Egypt . (photos 28 , 29) .



Photos 28 , 29 : Mangrove vegetation dominated by **Avicennia marina** , Red Sea coast .

A number of sea weeds are constantly washed up on the shores among which are : *Cymodacea ciliate , C. rotundate . C. serrulata* (Cymodoceaceae) , *Diplanthera (or Halodule) uninervis* (Cymodoceaceae) , *Halophila stipulaceae , H. ovalis , Thalassia hemprichii* (Hydrocharitaceae) .

Ain Sokhna is a hot water spring located at the shore line 50 km south of Suez . It is characterized by a salt marsh vegetation (halophytes) the flora of which include : *Juncus rigidus , Cressa cretica , Arthrocnemum glaucum , Halocnemum strobilaceum , Nitraria retusa and Tamarix nilotica* . The water creeks in Ain Sokha is dominated by *Phragmites australis* .

The salt marsh vegetation occupies the land paralled to the sea water and comprises halophytic communities arranged in zonal pattern dominated by : *Halocnemum strobilaceum , Arthrocnemum glaucum , Salicornia fruticosa , Halopepolis perfoliata (chenopodiaceae) , Limonium pruinosum , L.axillare* (plumbaginaceae) , *Zygophyllum album* (Zygophyllaceae) (photo 30) ; Aeluropus brevifolius *(photo* 31 *) , Sporobolus spicatus , Imperata cylindrica , Halopyrum mucronatum , photo 32 , (Gramineae) , Nitraria retusa (Nitrariaceae) Tamarix nilotica (Tamaricaceae , Suaeda monoica (photo 33) Suaeda fruticosa , S. vermiculata , Atriplex farinosa (Chenopodiaceae) (photo* 44) *Tamarix passerinoides (* Tamaricaceae) *Juncus rigidus* (Juncaceae) and *Alhagi maurum* (leguminosae) . The water creeks dissecting these salt marshes are suitable habitat for the growth of swamp plants e.g. *Typha domingensis and Phragmites australis* .

photo 30 : Zygophyllun album community , Red Sea Coast .

Photo 31 : Aeluropus brevifolius growth , Salt marsh habitat , Red Sea Coast .

Photo 32 : Halopyrum mucronatum growing in the sand dunes of the , Red Sea Coast .

Photo 33 : Suaeda monoica community , salt marsh , Red Sea Coast .

Photo 34 : Atriplex farinosa bushes , Red Sea Coast .

The Red Sea coastal desert (coastal plain) is dissected by several wadis that run eastward towards the Red Sea . In these wadis many xerophytic plants grow among these we may mention : *Cleome droserifolia , C. arabica , Hammada elegans , Anabasis articulata , Zygophyllum coccineum , Z. decumbens , Lindenbergia ,sinaica , Capparis decidua , Lygos reatam , Zilla spinosa , Taverniera aegyptiaca, Tephrosis apollina , Launaea spinosa , Panicum turgidum , Lycium arabicum , Salsola baryosma , Calotropis procera , Aristida adscensionis , Zygophyllum simlex,Artemisia judaica , Pulicaria undulata , Francoeuria crispa , Pennisetum dichotomoum , Heliotropoium luteum , Parnonychia desertorum , Colocynthis vulgaris , Cucumis prophetarum , Fagonia arabica , F. parviflora , Pituranthus tortuosus etc. The woody shrubs and trees include : Acacia ehrenbergiana , Acacia raddiana , Acacia tortilis , Balanites aegyptiaca , Leptadenia pyrotechnica , Phoenix dactylifera , Hyphaene thebaica , Salvadora persica* etc (photos 35 , 36 , 39 , 41 , 43) .

The forest vegetation is present in the mountainous area of the Red Sea Coastal land of Egypt particularly Gebel Elba area located in the southeastern corner of Egypt on the Sudano - Egyptian border (height = 1436 m) .

Gebel Elba is the only mountainous area in Egypt with a forest vegetation mainly consisting of *Acacia* trees intermingeled with *Moringa peregrina* and *Balanites aegyptiaca* . In the shaded areas of the mountains some other shrubs and trees may grow e . g . *Ficus pseudesycomorus , Olea chrysophylla , Delonix elata , Dodonaea viscosa , etc* . The most interesting plant of Gebel Elba are : *Dracaena ombet* (liliaceae) a succulent shrub with thick stems and terminal rosettes of stiff leaves on top of its branches . This plant grow only at the high slopes of the mountains . The other plant of ecological interst . is *Caralluma retrospiciens* (Asclepiadaceae) , a leafles succulent undershrub cactus like in shape that grow in the stony grounds of the mountains photos : 37 , 38 ,40 , 42, 44 ,) .

A feature that gives a , outstanding effect of the *Acacia* plants of Gebel Elba is the Liana Loranthus acaciaea which live on these trees . Ferns which are rarely present in the other regions of Egypt are here well represented with a number of small rock specie e.g *Adiantum* sp .

Photo 35 : Salvadora persica , Red Sea Coastal Descrt .

Photo 36 : Salsola baryosma Red Sea coastal Desert .

Photo 37 : Slope of a mountain and Wedi of the Red Sea **Acacia raddiara** is domirant in the Wadi .

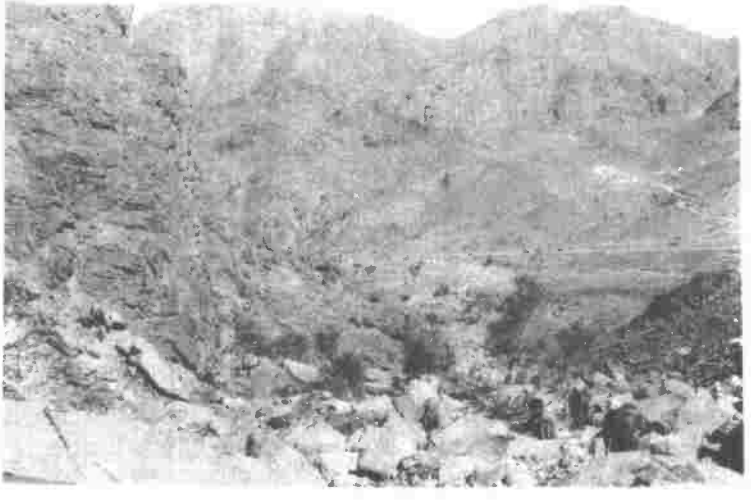


Photo 38 : Moringa peregrina shrubs growing at the foot of high mountain , Red Sea Coast .

hoto 39 : A big wadi in the Red Sewa coastal desert with Acacia raddiana .

Photo 40 : Shrubs of **Dodonaea viscosa** , Red Sea mountain .

Photo 41 : Balanites oegyptiace trees in one of the wadis of the Red Sea Coastal desert .

Photo 42 : Dracaena ombet on a high slope of Gebel Elb*a* mountain of the Red Sea Coast .

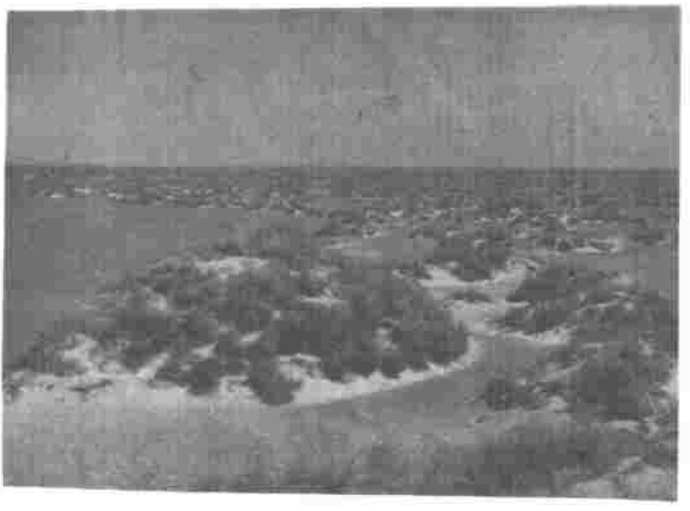


Photo 43 : Hammada elegans community , Red Sea Coastal desert .

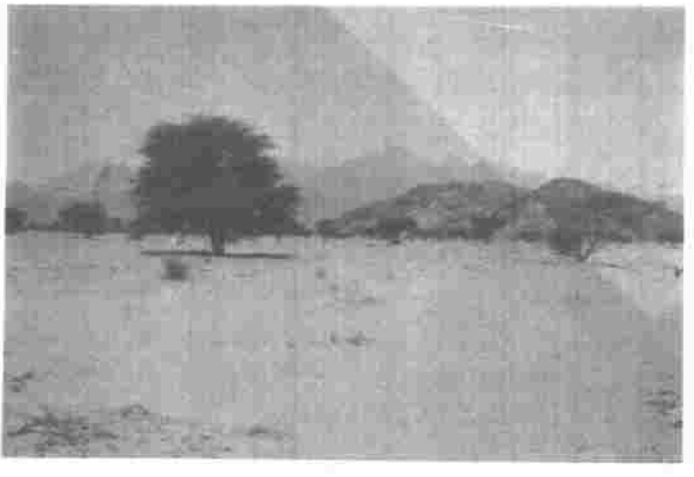


Photo 44 : Acacia raddiana tree and A. tortilis shrubs in one of the Wadis of the Red Sea Coast .

2 THE INLAND DESERT

The inaland part of the Easterm Desert of Egypt is the desert country located between the range of the coastal mountains and the River Nile . It is characterized also by several Wadis that run westwards towards the River Nile and some also run northward cutting Cario - Suez Desert Road bordering this inland desert from the north . The flora of Cairo-Suez Desert Road and three representative wadis, namely : Wadi Hof, Wadi Qena and Wadi Allagi will be given .

CAIRO - SUEZ DESERT ROAD

Along Suez road the dominating feature is here a wide open desert with low hills covered with pebbles which are rounded , smooth and originating from transported materials .

This is the type of desert described as " Gravel Desert " . The gravel desert is srerile . The vegetation is located to smaller and larger water courses filled with wind - borne sand originating partly from the mobile dunes seen in the distance , partly from the ground itself which in the immature stage is a mixture of sand and pebbles .

The sandy courses in the beginning show a flora of small ephemerals , among which also annual grasses . We observe é . g . *Stipa capensis and Schismus barbatus* .

When the sand sheet gets a little thicker , perennial grasses take the place of the ephemeral vegetation . We notice *Panicum turgidun* and *Lasiurus hirsuts* . These are tussock forming , and we observe how small sand - hills (baby - dunes) are accumulating around them .

The next step following an increased thickness of the soil , is the appearnce of a shrub vegetation . We notice how *Hammada elegans* is competing with *Panicum* and gaining over it . Retama raetam , *Convolvulus lanatus , Farsetia aegyptia , Zilla spinosa* and other shrubby plants become more and more common in such places .

The next stage in the succession will be represented by a climax stage with a vegetation of trees , if it continues undistrubed . Such a stage , however , is only rarely met with in the desert due especially to biotic factores . Grazing goats and human interference (Charcoal - burning) hinders natural develompent .

In rainy years there is a very rich flora along the Suez road of small ephemerals (annuals) , among the dominating species is *Mesembryanthemum forskalei* .

Other very common ephemerals are : *Matthiola livida , Neurada procumbens , Arnebia tinctoria , Centaurea pallescens and C. aegyptiaca . Ifloga spicata , Filago spathulata , Plantago ovata* etc . All of them are herbaceous and of small size . They have a very rapid development which allows them both to flower and produce seed before the hot season sets in . They are all behaving as mesophytic plants , thus with normal transpiration and assimilation .

There are several interesting bulbous plants along Suez Road . We have *Parcratium sickenbergeri* (Amaryllidaceae) with curled strap-shaped leaves , *Dipcadi erythraeum* with large brown flowers and narrow furrowed leaves : *Allium desertorum* with very narrow leaves and the umbel in the beginning enclosed in a large scarious bract , *Urginea undulata* with crisp - margined leaves etc .

Ephedra alata is a peculiar gymnosperm , a leafless shrub with small cone - like female inflorescences which develop a dry cone - like fruit , quite different from *Ephedra alte* which has fleshy red berries .

Plants common along the Suez road

1- Aizoaceae :
Meswmbyanthemum forshalei, Aizoon canariense
2. Amayllidaceae :
Pancratium sickenbergeri
3- Asclepiadaceae :
Daemia cordata (= Pergularia tomentosa)
Calotropis procera
3- Boraginaceae :
Moltkia callosa (Moltkliopsis ciliat)
Arnebia tinctoria
Gastrocotyole hispida
Arnebia decumbens
Haliotropium luteum
Echiochilon frutocosum
5- Euphorbiaceae :
Euphorbia kahirensis
6- Geraniaceae :
Monsonia nivea
Erodium byroniaefolium
E. lactiniatum
7- Gnetaceae :
Ephedra alata
8- Gramineae :

Panicum turgidum
Lasiurus hirsutus
Aristida plumosa
A. ciliata
Stipa capensis
Schismus barbatus
9- Capparidaceae :
Cleome arabica
10- Caryophyllaceae :
Gypsophila capillaris
Silene villosa
Robbairea delileana
Paronychia desertorum
Pteranthus dichotomus
Gymnocarpos decandrum
Polycarpon succulentum
Polycarpaea repens
11- Chenopoiaceae :
Haloxylon salicornicum
(= Hammada elegans) .
Halogeton alopecuroides
Bassia muricata
Anabasis articulata
12- Compositaea :
Echinops spinosisimus
Atractylis flava
Centaurea pallescens
Centaurea aegyptiaca
Centaurea lippii
Ifloga spicata
Filago spathulata
Pulicaria undulata
Anthemis melampodina
Cotula cinerea
Senecio desfontainei
Calendula micrantha
launaea cassiniana
L. nudicaulis
L. spinosa
Sonchus oleraceus
Reichardia orientalis
13- Labiatae :
Salvia aegyptiaca
14- Leguminosae :
Retama raetam (Lygos roetam)
Acacia raddiana
Astragalus spinosus
A. mareoticus
A. bombycinus
A. tribuloides
Medicago laciniata
Lotus pusillus
Trigonella stellata
Ononis reclinata
Onobrychis ptolemaica
15- Liliaceae :
Dipcadi erythraeum
Urginea undulata
Allium desertorum
Bellevalia flexuosa
16- Plantaginaceare :
Plantago ciliata
P. ovata

16- Polygonaceae :
Emex spinosus
Rumex roseus
18- Resedaceae :
Reseda kahirina
19- Convolvulaceae :
Convolvulus lanatus
20- Cruciferae :
Zilla spinosa
Diplotaxis harra
Farsetia aegyptia
Savignya parviflora
Matthiola livida
Pseuderucaria clavata
21- Rosaceae
Neurada procumbens
22- Rutaceae :
Haplophyllum tuberculatum
23- Scrophulariaceae :
linaria haelava
24- Solanaceae :
Hyoscyamus muticus
25- Umbelliferae :
Pituranthus tortuosus
26- Zygophyllaceae :
Zygophyllum simplex
Fagonia latifolia
F.glutinosa & F. bruguieri
Zygophyllum coccineum

FLORA OF WADI HOF

Wadi Hof is one of the big wadis (Valleys) of the Eastern Desert of Egypt located in Helwan Area to the south of Cairo . It runs westwards to debouch its water into the River Nile . The landform of wadi Hof is of the " erosion pavemnent " . The climate affects Wadi Hof is arid with light amount of rainfall (mean annual = 30 mm) .

Common Wadi Hof Plants

1- Asclepiadaceae
Daemia cordata (= Pergularia tomentosa
2- Boraginaceae
Trichodesma africanum
3- Capparidaceae :
Cleome arabica
Capparis spinosa
4- Caryophyllaceae :
Herniaria hemistemon
Telephium sphaerosperum
Gypsophila decanderum
Paronychia lenticulata
Pteranthus dichotomus
5- C ruciferae :
Farsetia aegyptia
Zilla spinosa
Matthiola livida
Diplotaxis harra
D. acris
Anastatica hierochuntica
6- Cucurbitaceae :
Citrullus colocynthis.
(Colocynthis vulgaris)
7- Chenopodiaceae :
Bassia muricata
Haloxylon salicormicum (= Hammada elegans)
Atriplex halimus
A. leucoclade
8- Cistaceae :
Helianthemum kahiricum
H. lippii
9- Compositae :
Centaurea aegyptiaca
C.pallescns
Ifloga spicata
Filago spathulata
Cotula cinerea
Senecio coronopifolius
Reicharida orientalis
Achillea fragrantissima
Artemisia judaica
Echinops spinossimus
Iphiona mucronata
Launaea nudicaulis
Pulicaria crispa(= Francoeuria crispa)
Phagnalon barbeyanum
Odontospermum graveolens
(= Asteriscus graveolens)
10- Euhorbiaceae :

Euphorbia cornuta
11- Geraniacease :
Erodium glaucophyllum
E. laciniatum
12- Gnetaceae :
Ephedra alata
13- Gramineae :
Schismus barbatus
Cynodon dactylon
Pennistetum dichotomum
14- Labiatae :
Salvia aegyptiaca
Stachys aegyptiacea
Lavandula pubescns
L. coronopifolia
15- Leguminosae :
Alhagi maurorum
Trigonella stellata
16- Malvaceae :
Malva parviflora
17- Menispermaceae :
Cocculus pendulus
18- Moraceae :
Ficus pseudosycomorus
19- Plantaginaceae :
Plantago ovata
20- Polygonaceae :
Rumex vesicarius
21- Resedaceae :
Reseda pruinosa
Caylusea canescens
22- Rutaceae
Haplophyllum tuberculatum
23- Scrophulariaceae :
Linaria sp .
Scrophularia deserti
24- Solanaceae :
Lycium arabicum
25- Tamaricaceae :
Reaumuria hirtella
Tamarix sp
26- Umbelliferae :
Pituranthus tortuosus
27- Urticaceae :
Paritaria alsinifolia
Forsskalea tenacissima
28- Zygophullaceae :
Fagonia kahirina
F. mollis
Zygophllum coccineum
Z. simplex
29- Nitrari aceae
Nitraria retusa .
Zygophllum coccineum
Z. simplex
Nitraria retusa

The photos : 45 - 46 representativce plants of the inland desert of Egypt .

Photo 45 : Citrullus colocynthis plants and fruits , inland desert wadi .

Photo 46 : Acacia rortilis shrubs and **Panicum turgidum** grass in one of the wadis of the Eastern Desert .

WADI QENA

Wadi Qena is one of the most notable feature of the inland part of the Eastern Desert of Egypt . Unlike the other Wadis of the Eastern Desert which run eastwest or westeast , Wadi Qena runs north - south to debouch into the RIver Nile near the City of Qena . It is , almost, running paralles to the Nile Valley , though its water flows in the opposit direction . It is the greatest Wadi in the Eastern Desert with length about 300 km .

The drainage system of Wadi Qena may be , ecologically , divided into two parts : the deltaic plain and the main channel .The deltaic plain or the downstream *section of the Wadi is characterized by thin vegetation comprising : Zilla spinosa , Hammada elegans , Francoeuria crispa crispa , Artemisia judaica , Cleome droserifolia , Aerva javanica , Zygophyllum coccineum , Ochradenus baccatus , Leptadenia pyrotechnica , Calligonum comosum , Heliotropium bacciferum , Pergularia tomentosa , salsola baryosma , Capparis spinosa , Acacia ehrenbergiana, Tamarix aphylla , T. mannifera* etc .

The downstream section of Wadi Qena is characterized by extensive hillocks of a relic growth of old Tamarix Plants . The principal channel of wadi Qena upstream of the deltaic part is a wll defined course bounded on both sides by gently sloping plateau . The plant growth s mostly ed on both sides by gently sloping plateau . The plant growth is mostly mainly an *Acacia ehrenbergiane* scrubland of various density . The associate species include : Salsola baryosma , Zilla spinosa , Artemisia *Judaica , Francoeuria crispa , Aerva Javanica , Leptadenia pyrotechnica* etc .

WADI ALLAQI

Wadi Allaqi is one of the most extensive drainage systems in the Nubain section of the Eastern Desert south of Aswan . It has an important role in the history of Egypt as it comprises remains of old settelements and ancient gold mines , The Umm Qareiyat has a history extending from Ancient Egyptian time till the early decades of this century .

Wadi Allaqi may , ecologically , be divided into four main Sections : a mountainous east (upstream) section , a middle hilly section , a low plateau section and a deltaic section .

The mountainous (upstream) section of Wadi Allqi as it drains

some of the mountains that form the natural divide between the inland and coastal (Red Sea Coast) parts of the Eastern Desert , receives occasional rainfall that may form accidental torrents which repesent the main source of water of Wadi Allaqi . Thus , the vegetation of this part of the wadi is , by far , the richest and in certain localities plant growth acquires a form that may by desribed as a desert - forest with trees of *Acacia raddiana* and *Balanites aegyptiaca* and lianas such as *Cocculus pendulus* and *Ochradenus baccatus* . *Salvadora persica* , *Acacia tertilis* and *Acacia ehrenbergiana* are widely distributed in this upstream part of Wadi Allaqi .

The vegetation of the middle section of Wadi Allaqi is essentially open scrubland of *Acacia ehrenbergiana* with associate trees of *Acacia raddiana* . *Acacia tortilis* is absent from this section of the Wadi whereas *Salsola baryoma* , *Fagonia indica* , *Indigofera argentea* , *Morettia, philaena* , *Cassia senna* , *Aerva javanica* , *Aristida plumosa* etc . are present . In this section also of Wadi Allaqi there are several fossil hillocks with dead remains of *Tamarix aphylla* and *Salvadora persica* which are obviously relic of extensive *Tamarix* and *Salvadora* thickets .

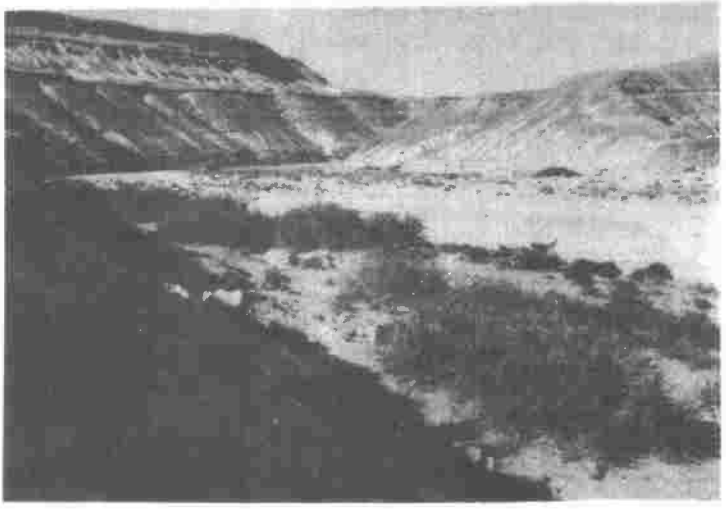


Photo 47 : vegetation on the side terrace of a wadi is the Eastern Desert .

In the low plateau section of Wadi Allaqi there is an open scrubland of Acacia ehrenbergianawith occasional individuals of *Acacia raddiana* . Fossil hillocks of Tamarix aphylla are present while those of *Salvadora persica* are abset . There are patches of green cover domiated *by Salsola baryosma associated with : Cassia senna , Citrullus colosythis,Triathema crystallina , Fracoeuria crisa , Cistache tictoria (parasite on Salsola terandra) , Convolvulus prostratus , Fagoia indica Morettia philaea etc* .

Wadi Allaqi pours onto a wide deltaic plain covered with a matrix of gravel and sand , The surface deposits of this delta is coarse at the mouth of the channel and soft near the fringes of the Nile . The whole delta became a part of the reservoir of the lake of the High Dam south of Aswan . In this section , no Acacia plants are recognized . Indivduals of Hyoscyamus muticus , Aerva javainca , Crotalaria aegyptiaca , Citrullus colocynthis , Echinochlon colonum , Trigonella hamosa , Beta vulgaris , Glinus lotoides , Typha domingensis , Sonchus oleraceus , Imperata *cylindrica* etc . are present .

THE SINAI PENINSULA

THE SINAI PENINSULA

The Sinai Peninsula is a triangular palteau occupuing the north - eastern corner of Egypt with its head in the at Ras Muhammed and its base in the north along the Mediterranean Coast . The area of the Sinai Peninnsula (61,000 km^2) is about 6% of the total area of Egypt and represents its Asian part .

The Sinai Peninsula has 3 coastal areas : 1 - in the north , the eastern section of the Mediterranean coatstal land of Egypt that extends from Port Said to Rafah for about 240 km , 2 - in the west , the eastern coast of the Gulf of Suez that extends from el - Shatt (facing Suez) to Ras Muhammed for about 400 km and 3 - in the east , the western coast of the Gulf of Aqaba that extends from Aqaba to Ras Muhammed for about 235 km .

Sinai is characterized by high mountains in its southern section the most important ones are : Gebel Saint Katherin (2641 m) , Gebel Musa (2285 m) Gebel Halal (890 m) and Gebel Hammam Faraon .

Several Wadis are present in the Sinai Peninsula , some are running westward to the Gulf of Suez e.g Wadi Firan , Wadi Sidri , Wadi El - Tor etc . Also there are wadis run eastward to the Gulf of Aqaba .

The climate affecting Sinai is semi - arid along the Mediterranean coast , arid along the coasts of the Gulf of Suez and Gulf of Aqaba and Rl - Tih Plateau . In the southern region where there are high mountains orographic rain occurs and snow is also common during winter at the top of these mountains .

The flora of Egypt comprises about 2300 species belonging to 130 families . Out of these 63 species are endemics in the different regions of Egypt : Western Desert , Easern Desert , The Sinai Peninsula and The Nile region . In the Sinai Peninsula there are about 1247 species belonging to 94 families as follows : 46 endemic species , 346 not endemics but are confined to the Sinai Peninsula without being penetrated to the other regions pf Egypt and 855 are present in Sinai Penisula as well as in other region (or regions) of Egypt . Thus , though the total number of the flora of the Sinal Peninsula represents about 49. 92% of the total number of the flora of Egypt, yet the endemics of Sinai make

the main buik (76. 19%) of the total endemics of Egypt . Family Labiatae comprises , relatively , highest number of endemics *(6, e. g Origanum syriacum v. aegyptiacum , Ballota kaiseri , Thymus decussata etc .)* , followed by caryophyllaceae *(5 , e. g Dianthus sinaicus , Silene leucophylla etc.) 4 , plants in Scrophulariaceae (e. g Verbascum schimpericum , Kickxia macilenta etc .)* and compositae *(e . g , Phagnalon sinaicum , Scorzonera drarii etc .)* 3 plants in leguminosae (e . g *Vicia sinaica)* and *Udmbelliferae (e , g Ferula sinaica)* , two plants in cruciferae , Resdedaceae and Dipsacaceae and one species belong to each of *Ranunculacea , Liliacea e , Juncaeae Gramineae* etc .

The flora of the Mediterranean coast of Sinai comprises ; *Halocnemum strobilaceum , Arthrocnemum glaucum , Suaeda vermiculata, Nitraria retusa , Tamarix nilotica, Limoniastrum monopetalum , Juncus rigidus Zygophyllum album , Cressa cretica Cyperus laevigatus , Salsola kali* etc . in the salt marshes . The sand dune habitat of this coastal area are characterized by the growth of *Ammophila arenatia* assciated with : *Artemisia monosperma , Cornulaca monacantha , Panicum turgidum , Stipagrostis scoparia , Pancratium maritimum , Astragalus tomentosus, Silene succulenta , S. villosa , Euphorbia paralias , E.peplis , Cyperus capitatus etc* . In the coastal desert grow : *Thymelaea hirsuta , Achillea fragrantissma , Artemisia monosperma, Lycium europaeum . Lagonychium farctum , Pituranthus tortuosus , Echinops galalensis , Tamarix aphylla , Zizyphus spina - christi , Fagonia arabica* etc .

Four vegtation types have been recognized in the southern section of Sinai namely : Mangrove , Salt marsh , desert and mountains .

The mangrove vegtetation is present in Ras muhamed area only where *Avicennia marina* grow . The salt marshes are present along the coasts of the Gulf of Suez and Gulf of Aqaba where halophytes grow e.g. *Halocnemum strobilaceum , Arthrocnemum glaucum , Limonium pruinosum , Halopeplis perfoliata , Zygophyllum album , Nitraria retusa , Tamarix nilotica , Juncus rigidus , Aeluropus brevifolius , Alhagi maurorum* , The reed swamp vegetation is present in the swampy habitat where *Typha domingensis ad Phragmites australis* grow .

In the wadis of the southern region of Sinai the xerophytic vegetion comprises the follwing flora : *Hammada elegans , Artemisia , judaica , Achillea fragrantissima , Zygophyllum decumbens , Acacia raddiana , Capparis cartilaginea , Lycium* shawii , *Fagonia mollis , Cleome droserifolia , Iphiona mucronata , Lygos raetam , Tamarix aphlla,*

Phoenix dactylifera , Aerva javanica , Zilla spinosa,Convolvulus lanatus , Farstia aegyptia, Ochradenus baccatus , Zygophyllum coccineum , Ephedra alata , Fagonia sinaica , Lavandula pubescens , Solanum nigrum etc .

The flora of the mountains of Sinai include : *Juniperus phoenicea* , family cupressaceae . (Plants grow only in the cold area of the world) , as well as the following plants : *Moringa peregrina , Ficus pseudosycomorus , Origanum syriacum , Galium sinaicum , Cratagus sinaica , Stachys aegyptiaca , Gymnocarpos decandrum , Zilla spinosa , Capparis cartilaginea , Peganum harmala , Varthemia montana , Reseda pruinosa , Gomphocarpus sinaicus , Hyoscyamus muticus , H. boveanus , Alkanna orientalis , Francoeuria crispa , Launaea spinosza , Thymus decussatus etc . Cupressus semipervrens* (semi - wild) is commonly present also in these mountains .

THE NILE REGION

TTE NILE REGION

The River Nile extends from Lake Tanganyika in Tanzania (Latitud 3°S) to the shore of the Mediterranean Sea (Latitude 31° 15'N) for a length of about 6625 km . In this long course the river flows generally a south to north path , both its source in Equatorial Africa and its mouth in the Mediterranean Sea lies within one degree of the same meridian of longitude . Of the total course of the River Nile only a terminal of 1530 km lies within the borders of Egypt . It enters Egypt from the Sudan at Wadi Halfa , 350 km south of Aswan . The Nile Valley (the Upper Egypt , Nv) extends from Wadi Halfa southwards to Cairo for about 1285 Km. and comprises the lands irrigated by the River Nile on its both banks . The Nile Delta (the Lower Egypt , Nd) appeara as a triangular in shape : about 170 km in length and 220 km in breadth . Its lands are irrigated by water of the Rosetta Branch (about 239 km) and Damietta Branch (about 245 km) . Both branches start from the Delta Barrage (Muhammed Ali Barrage) , 20 km north of Cairo . The northern coast of the Nile Delta close to the Mediterranean sea is characterized by three shallow lakes : Lake Manzala (in the east) lake Burullus (in the middle) and Lake Idku (in the west) . These lakes were formed by the River Nile during the past history and are receiving the main bulk of drainage water from the Nile Delta lands .

The northern coast of the Nile Region of Egypt : the deltaic Mediterranean coast, extends from Abu Qir to Port Said for about 180 km . and landward in a NS direction for an average of 15 km from the Sea .

Fayium province is one of the depressions of the Western Desert of Egypt . Being the nearest to the Nile Valley and after being connected with the River Nile with Bahr Yusuf Canal , Fayium Depression is considered as a part of the Nile Region (Nf) . Its Lowest part is occupied by a shallow saline lake called birket Qatrun .

Formerly all the Nile lands were watered by the inundation (or basin) system . During the past century a number of great canals were constructed to allow prerennial irrigation . This scheme was completed with the construction of several barrages towards the end of the last century for rising the water level for feeding the canals . In 1902 the

Aswan Dam (old Dam) was ready and the High Dam (new Dam) was ready on 1965 (El - Sadd El - Aaly) .

The cultivated strips of land around the Nile is largest at Cairo and diminishes as one proceeds south . South of Aswan it disapears completely and in most places the naked desert borders the Nile directly .

The Nile Delta starts 20 km north of Cairo, is embraced by the Rosetta and Damietta Branches . Its area is about 22,000 Km^2 while the area of the Nile Valley (cultivated lands) is 12000 km^2 Thus , the , delta comprises about 63% of Egypt's fertile land .

The soil of the agricultural lands of the Nile Region of Egypt are classified into : loam , clay and sand . Loamy soils are mainly composed of Nile silt and form the majority of Egyptian soils . Clay soils occur in small amounts where sandy soils are principally found at the edges of the desert . Soil impregnated with salts are found in the Delta and Fayium . Alkaline land lies all around the lower edges of the Delta from Alexandrdia in the west to beyond the Suez Canal in the east and also in certain districts of Upper Egypt , where basin irrigation has been changed into perennial one . Seepages near the banks of the high level canals in another cause of increasing soil salinity . Salt affected lands are also present arround the northern lakes of the Nile Delta and along the deltaic Mediterranean coastal land .

FLORISTIC COMPOSITION

The floristic elements of the Nile Region of Egyt represents about 30% of of the total number of the flora of Egypt . About 130 species of these plants never recorded elsewher in Egypt . Of the total number of these floristic elements , 149 species are present in the Nile valley , 291 speciees in the Nile Delta and 64 species characteriz e the Nile Fayium . Therophytes represent 59. 4% of the total number followed by the hydrophytes (9. 8%) , hemicryptophytes (9%) , chamaephytes (8. 6%) , geophytes (6.9%) , nanophanerophytes (2.9%) , Parasites (2 .6 %) and microphaneropytes (1.8%) . Apart from *Opuntia Ficus - indica* (family Cactaceae) which is usually cultivated as fence plant and for its edible fruit , no stem succulent are present in the Nile Region of Egypt . Also , megaphanerophytes , and epiphytes are absent The percentage of the hydropytes and helophytes (9 . 8%) is , however, the relatively higher than in the floristic elements of the other regions of Egypt .

The Nile region of Egypt comprises a number of habitats that are formed and / or greatly influenced by the water of the River Nile , These are : a) The Aquatic Habitat , b) The Swampy Habitat , c) the Canal Bank Habitat d) The Cultivated Lands e) The Northern Lakes f) The Man - Made Lakes and g) The Nile Islands The natural vegetation of these habitats are of ecological interest , they include certain floristic elements never recorded elsewhere in the other regions of Egypt .

The coastal area of the Nile Region of Egypt is a natural extension of the Mediterranean coastal land of Egypt . The following is a report about the flora of the different habitats of the Nile Region of Egypt .

I THE DELTAIC MEDITERREAN COAST

The deltaic Mdeiterranean cooast of Egypt (the middle section of the Mediterranean coast) extends for about 180 km from Abu Qir to port Said with a width in a NS direction for an average of 15 km from the sea . It is dotted with cities , villages and summer resorts such as Rashid , Baltim , Gamasah , Ezbit El - Burg, Kafr El-Batikh , Ras El - Bar , Damietta , etc .

The climate of this coast is a semi - arid one with total annual rainfall = 69 - 160 mm ,mean maximum temperature = 27. 9^{O} C , mean minimum temperature = 14. 3oC , relative humidity = 60 - 74% , evapora-

tion rate = 3.8 - ll. l mms / Piche .

Unlike the western and eastern sections , the midddle section of the Mediterranean coast of Egypt is not only affected by the Sea water but it is also affected by the waters of the northern lakes and the Damietta and Rosetta Branches of the River Nile . The plant cover of the deltaic Mediterrranean coastal land is organized into sealandward zones (habitats) that vary in domination and floristic compostition which will be studied in Baltim coast as sample area of this coast .

Baltim is a summer resort belongs to Kafr El - Seikh Governate . Its coastal area copmrises 6 successive zones (habitats) : beach zone , sand sheet zone , Gebel El - Nargis zone , zone of salt marshes , zone of palm trees - sand dunes and zone of the swamps .

The beach is a narrrow strip of sand with a width varies between 100 - 200 m . It is practically barren of vegetation except of some dry remains of sea weeds and marine algae . The second zone is also narrow with sandy substratum dominated by *Silene succulenta* associate with *Cakile matitima , Cynodon dactylon , Polygonum equisetiforme , Alhagi maurorum , Melilotus indica , Erodium hirtum , Cyperus capitatus , Acacia saligna , Paspalidium geminatum , Dactyloctenium aegyptium , Lippia nodiflora , Ricinus communis (semi - wild) , Senecio desfontainei Mesembryanthemum crystallinum , Parapholis marginata, Launaea angustifolia , Polypogon maritimus , Emex spinosus , Amaranthus sp . , Salsola kali , Malva parviflora , Ifloga spicata, Cutandia memphitica , Lotus halophilus , Euphorbia sp .* etc . *Figs (Ficus carica) and water melon (Citrullus vulgaris)* are cultivated by the nativs in this zone .

Gebel El - Nargis sand dunes occupy the third zone of Baltim coast . They have two slopes : north facing and south facing , both are dominated by *Silene succulenta* . The floristic composion of these dunes include : *Lolium rigidum , Phoenix dactylifera* (semi - wild) , *Alhagi maurorum , Melilotus indica , Erodium hirtum , Lycopersicum esculentum , Cynodon dactylon , Desmostachya bipinnata , Imperata cylindrica , Polygonum equisetiforme , Ipomaea stolonifera , Pancratium arabicum , Stipagrostis ciliaris , Echinops spinosissimus , Salsola kali , Ifloga spicata , Bromus rubens , Cakile maritima , Rumex pictus , Plantago indica , Malva pareviflora , Ononis serrata , Pseudorlaya pumila , Carthamus glaucus , Polypogon monspeliensis , Daucus bicolor , Cyperus capitatus and the cultivated plants : Ficus carica , Vitis vinife-*

ra and Citrullus vulgaris . The fourth zone is a salt marsh habitat dominated by Arthrocnemum glaucum with Halocnemum strobilaceum as abundant associate species . The other plants of this zone are : Cressa cretica , Zygophyllum aegyptium , Frankenia revoluta , Sporobolus spicatus , Cyperus conglomeratus , Limonium pruinosum , Limoniastrum monopetalum , Cynodon dactylon , Polygonum equisetiform , Spergularia sp. , Moltkiopsis ciliats , Aetheorhiza sp . , Lippia nodiflora , Reichardia tingitana , Mesembryantemum crystallinum , Chenopodium sp . etc .

The fifth zone is another zone of huge sand dunes dominated by the semi - wild palm trees *Phoenix dactylifera* (zone of palms) . In the depressed areas within these dunes the underground water is exposed forming local swampy habitat where*Typha domingensis* predominates . In the saline patches of the runnels within these dunes there are societies dominated by *Arthrocnemum glaucum , Schoenus nigricans , Sporobolus viginicus , Imperta cylindrica* and *Zygophyllum aegyptium* . The other societies of the palm dunes include : *Pancratium arabicum* (abundant) , *Erodium hirtum Alhagi maurorum , Cyperus capitatus , Desnmostachya bipinnata , Rumex pictus , Ononis serrata , Pseudorlaya pumila , Launaea angustifolia , Malva pariflora , Sinapis arvensis , Adonis dentatus , Lobularia libyca , Plantago* sp . etc .

The innermost zone is a depression which receives the drainage water seeped from the cultivated lands of Baltim villages and from lake Burullus . *Typha domingensis* is the dominant reed of these swamps associated with : *Phragmites australis*. In the saline banks of these swamps grow : *Juncus rigidus , J . acutus , Cyperus conglomeratus , Cressa cretica , Suaeda pruiosa , Tamarix tetragyna , Halimione portulacoides , Inula crithmoides , Mesembryanthemum crystallinum , Frankenia revoluta . , Polygonum equisetiform* etc.

II THE AQUTIC HABITAT

In Egypt , where the climate is warm during most of the year the aquatic flora (the hydrophytes) of the River Nile and its irrigation and drainage canals are well developed . The establishment of Aswan High Dam (1965) controls to great extent the flow of water in the River Nile and its Damietta and Rosetta Branches which resulted in a better penetration of light (due to the great reduction in silt) and reduction in rate of water flow . Such new conditions enhance the growth of the hydro-

phytes of both types : suberged and floating . even , new water weeds e . g . *Myriophyllum spicatum* started to appear .

The aquatic plants of the Nile System of Egypt comprises 35 species belonging to 19 genera and 15 families as follows.

1. Family Araceae

Pistia stratiotes : Free floating weed present only in the calm and stagnant water canals of Faraskur (20 km south of Damitta) absence elsewhere in Egypt

2. Family Ceratophyllaceae

Ceratophyllum demersum is very common and dangerous submerged weed . *C . submersum* and C . *muricatum* are rare in Egypt .

3. Family Haloragidadceae

Myriophyllum spicatum has been recently recorded invading the River Nile System , never seen before the establishent of Aswan high Dam . It is a submerged weed .

4. Family Hydrocharitaceae

To this family belongs three submerged plants , namely :

Ottelia alismoides , Elodea canadensis and Vallisneria spiralis .

5. Family Lemnaceae

This family comprises a group of very small foating water plants without distinct stem and leaves but with tiny leaf - like fronds forming green masses on the surface of stagnant waters . In the Nile system there are 6 species belonging to 3 genera namely : *Spirodela punctata , S . polyrrhiza . Lemna gibba , L .minor , L. perpusilla* and *Wollfia hyalina* .

6. Family lentibulariaceae

Utricularia inflexa floating plant with finely dissected leaves carrying bladders in which small animals are caught (insectivorours water weed) It ususally grows in the rice fields of the Nile Delta .

7. Family Marseliaceae

Marselia aegyptiaca is an aquatic fern common in all waters of the Nile System of Egypt . *Marselia capensis* is rare and present only in the Nile Delta .

8. Family Najadaceae

Najas spp . are submerged water plants. N. pectinatus , N. minor and N.graminea are very rare in the Nile Delta , absent from other prats of the Nile System . N.armata is common in the Nile delta and Fayium

9. Family Nymphaeaceae

Nymphaea coerulea (blue water Lily) and N. louts (White water Lily) are the sacred water lilies of the ancient Egyptians . They are floating plands common in the Nile Delta , rare or absent in the Nile valley .

10. Family Onangaraceae

Jussiaea repens very rare free floating weed .

11. Family Pontederiaceae

The genus *Eichhornia* includes free floating plants that occur in Egypt in two species : *E.crassipes* and *E.azurea* . The second is very rare and grows (cultivated) in the gardens of Cairo , it causes no trouble . *E.crassipes* , on the other hand , is the most dangerous water weed in Egypt (water Hyacinth or Ward El - Nil) .

12. Family Potamogetonaceae

Potamogeton spp . are submerged weed and include :

(i) *P.crispus* very common .

(ii) *p. pictinatus* very common .

(iii) *P.nodosus* common

(iv) *P.perfoliatus* rare (in Nile Nubia only) All *Potamogeton* spp . are dangerous hydophytes .

13. Family Ranunculaceae

Ranunculus saniculifolius , R.rionii , R.trichophyllus and *R.sphaerospermus* are rare in the Nile Delta absent from Upper Egypt .

14. Family Ruppiaceae

Ruppia maritima v ar . *spiralis , R.maritima var . rostrata* are submerged hydrophytes .

15. Family Zannichelliaceae

Zannichellia Palustris is very common water weed in all water bodies of Nubia and Lake Nasser .

III THE SWAMPY HABITAT

The weeds of the swampy habitat are emmersed plants with roots , rhizomes and lower parts of their aerial shoots are under water . These incude *Phragmites australis* the most serious and very common reed in Egypt . It belongs to grass family Gramineae . *Typha domingensis* (Typhaceae) is anothe dangerous reed very common in Egypt .

The other swampy plants comprise the following : *Echinochloa stagginum , E.crus - galli , Paspalidium geminatum , Polypogon monspeliensis , Diplacahne fusca* etc . (Gramineae) , *Polygonum salicifolium , P . senegalensis* , (Polygonaceae) , *Veronica anagallis - aquatica* (Schrophulariaceae), *Cyperus articulatus , C . longus , C. difformis , Scirpus litoralis* , (Cyperaceae) *Juncus subulatus* (Juncaceae) etc . Cyperus Papyrus was very common is the Nile Delta swamps during ancient time. Its culms were used is making papers . Nowadays it is eleminated from the swampy habitats of Egypt . Few individuals are growing in Orman Garden of Cairo .

IV CANAL BANK HABITAT

These include cultivated and naturally growing trees , shrubs , undrshrubs and herbs . The important species are :

a) Cultivated plants .

Ficus sycomors, Morus alba , M. nigra , Acacia nilotica , Melia azederach , Parkensonia aculeata , Salix safsaf , S. babylionica , Zizyphus spina - cristi , Casuarina equisetifolia , Dalbergia sisso , Eucalyptus rostrata , E.citriodora , Ricinus communis , Opuntia ficus - indica etc .

b) Wild Plants

Tamarix arborea , Conyza dioscoridis , Desmostachya bipinnata , Imperata cylindrica, Inula crithmoides , Suaeda vermiculata . Arthrocnemum glaucum , Arundo donax , Alhagi maurorum , Dichanthium annulatum , Panicum maximum , Kochia indica , Mentha silvestris , Lip-

pia nodiflora , Silybum marianum , Sphaeranthus suaveolens , Canna indica , Saccharum spontaneum , Cyperus laevigatus , Trifolium resupinatum , Nitraria retusa , Ambrosia maritima , Andropogon annularis , Urospermum picroides , Halimione portulacoides , Glinus lotoides , Ethulia conyzoides , Verbena supian etc .

V. WEEDS OF THE CULTIVATED LANDS

Weed flora of the cultivated lands of Egypt are mainly ephemeral , and annual herbs . Perennial herbs , undershrubs and shrubs may also be presemt . These weeds are associated with the summer and winter crops . Weeds of common occurrence in winter crops are : *Melilotus indicus , Cynodon dactylon, Sonchus oleraaceus, Chenopodium murale , Trifolium resupinatum , Anagallis arvensis , Chenopodium album , Brassica nigra, Polypogon monspeliensis , Vicia calcarata , Malva pariflora , Emex spinosus , Solanum nigrum , Polygonum equisetiforme , Xanthium brasillicum , Urochloa reptans , Cichorium pumilum, Dactyloctenium aegypticum , Eragrostis pilosa ,* etc .

The weeds of summer crops include . *Echinochloa colonum , Cynodon dactylon, Portulaca oleracea , Convolvulus arvensis , Cyperus rotundus , Sonchus , oleraceus , Solanum nigrum , Xanthium spinosum , Silene rubelaa , Amaranthus chlorostachys , Beta vulgaris , Rumex dentatus , Ammi majus , Euphorbia peplus , Plantago lagopus , Lotus corniculatus and Reichardia orientalis* .

VI . THE NOTHERN LAKES

The northern lakes of the Nile Delta namely : Lake Manzala , Lake Burullus and Lake Idku are located very close to the Mediterranean Sea . They are separated from it by strip of land that are very narrow in several places and in the same time are connected with the sea through outlets (straits) .

Lake Manzala is the largest (= 300,000 feddans) . It lies between the Mediterranean sea to the north , the Suez Canal to the east , the damietta Branch and the povinces of Sharkiya and Dakahlya to the west . Thus , lake Manzala serves 5 provinces of Egypt namely : Ismaillia , Port Said , Damietta , Sharkiya and Dakhaliya . It is shallow lake with depth not exceed one meter . It is characted by a large number of Islands (about 1022) .

The plant life of Lake Manzala comprises halophytic elements that

grow mainly on the shores of the islands . These include 26 species belonging to ll families as follows : *Artrocnemum glaucum, Atriplex farinosa , Halimione portulacoides , Halocnemum strobilaceum , Halopeplis perfoliata , Salicornia fruticosa , S.herbaces , Salsola kali , S.longifolia, Suaeda pruinosa , S.salsa S.vermiculata and S.vera (chenopodiaceae), Arundo donax, Phragmites australis and Sporobolus spicatus* (gramieae) , *Cressa cretica* (convolvulaceae) *Cistanche Phelypaea* (orobanchaceae) *Cyperus Laevigatus* (Cyperaceae) , *Inula crithmoides* (compositae) , *Juncus rigidus* (Juncaceae) , *Tamarix aphylla* (tamaricaceae), *Typha domingensis (Typhaceae) and Zygophyllum album* (Zygophyllaceae) .

Fresh water hydrophytes namely : *Eichhornia crassipes . Potamogeton crispus , P.petinatus , Lemna spp., Ceratophyllum demersum* are present in the water of the lake .

VII MAN MADE LAKE

The construction of Aswan High Dam in the most southern part of Egypt resulted in the formation of a huge man made lake : High Dam Lake : mean depth - 24.8 m, mean width = 18 Km .

The shore - line vegetation comprises the following floristic elements : *Tamarix nilotica , Hyoscyamus muticus , Phragmites australis , Salsola baryosma , Francoeuria crispa , Citrullus colocyunthis , Fagonia arabica , Glinus lotoides , Heliotropium supinum , Rumex dentatus, Echium raumolfii , Portulaca oleracea , Pulicaria undulata , Senecio aegyptus , Calotropis procera , Morettia philaena* etc . The shallow waters along the shore line is the habitat of some water plants e.g *Potamogeton trichoides , Najas minor , N.armata, Portamogeton nodusus,Zanichellia palustris , Ceratophyllum demersum* etc .

VIII THE NILE ISLANDS

The Nile at Aswan north of the High Dam is interrupted by abotut 30 uninhabited granite islands e.g. Duns islans , Burbur Island, Gezel Island etc . The submerged land of these islands is usually occupied by aquatic flora e.g *Ceratophylum demersum* and *Potamogeton crispis* . In the partly submerged land *Phragmites australis, Polygonum senegalensis , Panicum repens* and *Cyperus* spp . *Typha domingensis , Veronica anagallis-aquatic* etc grow . The meadow-grass habitat of these island is

co-dominated by *Cyperus longus* and panicum repens . The floristion composition : *Cyperus mundtii, Cynodon dactylon , Sesbania sesban , Lotus arabicus , Cyperus rotundus , Tamarix nilotica, Trigonella hamosa, Mimosa Pigra, Salix subserrata, Cajanus Cajan , Saccharum spontaneum , Senecio aegyptus , Gnaphalium luteo-album, Sonchus oleraceus , Plantago major , Trigonella , hamosa , Leptadenia pyrotechinca, Francoeuria crispa* etc.

PLANTS OF GARDENS AND STREET TREES

- *Duranta plumieri (Verbenaceae)*
- *Clerodendron inerme (Verbenaceae)*
- *Lantana camara (Verbenaceae)*
- *Bougainvillea glabra (Nyctaginaceae)*
- *Schinus terebinthifolius (Anacardiaceae)*
- *Rosa involucrata (Rosaceae)*
- *Myoporum acuminatum (Myoporaceae)*
- *Ipomoea palmata (Convolvulaceae) sit el-Husn and Ipomoea tricolor.*
- *Jasminum gradiflorum (Oleaceae) , J.sambac and J.primulinum Known " Foll " .*
- *Hibiscus rosa-sinensis (Malvaceae)*
- *Lawsonia inermis (Lythraceae) .*
- *Callistemon lanceolatus (Myrtaceae)*
- *Nerium oleander (Apocynaceae)*
- *Plumbago capensis (Plumbaginaceae)*
- *Plumeria acutifolia (Apocynaceae) Jasmin Hindy*
- *Plumeria acutifolia (Bignoniaceae)*
- *Vitex agnus castus (Verbenaceae) Kaff Mariam*
- *Datura arborea (Solanaceae)*
- *Euphorbia pulcherrima (Euphorbiaceae) Bint El-Onsul*
- *Myrtus communis (Myrtaceae)*
- *Opuntia ficus-indica (Cactaceae)*
- *Aloe vera (Liliaceae)*
- *Agave americana (Agavaceae)*
- *Amaryllis vittata (Amaryllidaceae)*
- *Anemone coronaria (Ranunculaceae)*
- *Canna indica (Cannaceae)*
- *Dahlia variabilis (Compositae)*
- *Gladiolus gandavensis (Iridaceae)*
- *Iris xiphium (Iridaceae)*
- *Narcissus tazetta (Amaryllidaceae)*

- *Ranunculus asiaticus (Ranuculaceae)*
- *Oxalis cernua (Oxalidaceae)*
- *Albizzia lebbekh (Leguminosae , Dakn elBasha)*
- *Acacia fornesiana (Leguminosae)*
- *Cassia artemisioides (Leguminosae)*
- *Cassia disymobtrya (Leguminosae)*
- *Hemerocallis flova (Liliaceae)*
- *Pelargonium graveolens (Geraniaceae) Etr*
- *Viola odorata (Violaceae) -Beneffig*
- *Centaurea moschata (Compositae , Anber Baladi)*
- *Cheiranthus cheiri (Cruciferae , Mantour Asfar)*
- *Lathyrus odoratus (Leguminosae - Bissila Zohour)*
- *Matthiola incana (Cruciferae , Mantour)*
- *Thuja orientalis (Coniferae)*
- *Vinca rosa (Verbenaceae, Al-Wenka)*
- *Adiantum capillus-veneris (Fern, Adiantaceae)*
- *Thevetia peruviana (Apocynaceae)*

Important Egyptian Crops And Vegetables

A. Cereals (Gramineae)

1-	*Hordeum vulgare*	١ـ شعير
2-	*Oryza sativa*	٢ـ زرز
3-	*Saccharum officinarum*	٣ـ قصب السكر
4-	*Sorghum durra*	٤ـ ذرة رفيعة
5-	*Triticum vulgare*	٥ـ قمح هندى
6-	*T. durum*	٦ـ قمح ذكر
7-	*T. pyramidale*	٧ـ قمح بلدى
8-	*Zea mays*	٨ـ ذرة شامى

B. Crops of Leguminosae

1-	*Arachis hypogaea*	١ـ فول سودانى
2-	*Cicer arietinum*	٢ـ حمص
3-	*Dolichos lablab*	٣ـ لبلاب
4-	*Lathyrus sativus*	٤ـ جلبان
5-	*Lens esculenta*	٥ـ عدس
6-	*Lupinus termis*	٦ـ ترمس
7-	*Medicago sativa*	٧ـ برسيم حجازى
8-	*Phaseolus vulgaris*	٨ـ فاصوليا
9-	*Pisum sativum*	٩ـ بسلة
10-	*Trifolium alexandrinum*	١٠ـ برسيم بلدى
11-	*Trigonella foenum - graecum*	١١ـ حلبة
12-	*Faba vulgaris (Vicia faba)*	١٢ـ فول
13-	*Vigna sienensis*	١٣ـ لوبيا

c. Vegetables of Liliaceae

1-	*Allium cepa*	١ـ بصل
2-	*A. kurrat*	٢ـ كرات بلدى
3-	*A. porrum*	٣ـ كرات أبو شوشة
4-	*A. sativum*	٤ـ ثوم

D. Vegetables of Cucurbitaceae

1-	*Citrullus vulgaris*	١ـ بطيخ
2-	*Cucurbita pepo*	٢ـ كوسة
3-	*Cucumis melo*	٣ـ شمام (قاون)
4-	*Cucumis sativus*	٤ـ خيار
5-	*Citrullus vulgaris v. colocynthoides*	٥ـ لب أسمر

E. Vegetables of Umbelliferae

1-	*Anethum graveolens*	١ـ شبت
2-	*Apium graveolens*	٢ـ كرفس
3-	*Carum carvi*	٣ـ كراوية
4-	*Coriandrum sativum*	٤ـ كزبرة
5-	*Cuminum sativum*	٥ـ كمون
6-	*Petroselinum sativum*	٦ـ بقدونس
7-	*Foeniculum v ulgare*	٧ـ شمر
8-	*Pimpeniella anisum*	٨ـ ينسون

F. Species of Labiatae

1-	*Origanum majorana*	١ـ بردقوش
2-	*Mentha sativa*	٢ـ نعناع
3-	*Rosmarinus officinalis*	٣ـ حص لبان
4-	*Ocimum basilicum*	٤ـ ريحان

G. Species of Pedaliaceae

Sesamum indicum سمسم

H. Root crops

1-	*Beta vulgaris (chenopodiaceae)*	١ـ بنجر
2-	*Brassica rapa (Cruciferae)*	٢ـ لفت
3-	*Colocasia antiquorum (Araceae)*	٣ـ قلقاس
4-	*Cyperus esculentus (Cyperaceae)*	٤ـ حب العزيز
5-	*Daucus boissieri (Umbelliferae)*	٥ـ جزر بلدى

6-	*Helianthus tuberosus (Compositae)*	٦ـ طرطوفة
7-	*Raphanus sativus v.aegyptiacus (Cruciferae)*	٧ـ فجل
8-	*Solanum tuberosum (Solanaceae)*	٨ـ بطاطس
	F. Fruits Used As Vegetables	
1-	*Capsicum annuum (Selanaceae)*	١ـ فلفل
2-	*C. frutescens (Solanaceae)*	٢ـ شطة
3-	*Solanum Lycopersicum (Solanaceae)*	٣ـ طماطم
4-	*S. menlongena (Solanaceae)*	٤ـ باذنجان
5-	*Hibiscus esuculentus (Malvaceae)*	٥ـ باميا
	1. Inflorescence as Vegetables	
	Cynara scolymus (Compositae)	خرشوف
	Brassica oleraceae v.botrytis (Cruciferae)	قرنبيط
	J. Shoots As Vegetables	
1-	*Asparagus officinalis (Liliaceae)*	كشك ألماظ
2-	*K. Leaves As Vegetables*	
3-	*Spinacia oleraceae (Chenopodiceae)*	١ـ سبانخ
4-	*Beta vulgaris v. Cicla (Chenopodiaceae)*	٢ـ سلق
5-	*Portulaca oleraceae (Portulacaceae)*	٣ـ رجلة
6-	*Malva parviflora (Malvaceae)*	٤ـ خبيزة
7-	*Corchorus olitorius (Tiliaceae)*	٥ـ ملوخية
8-	*Brassica oleraceae V. capitata (Crucifere)*	٦ـ كرنب
9-	*Cichorium endivia (compositae)*	٧ـ شيكوريا
10-	*Lactuca sativa (compositae)*	٨ـ خص
11-	*Eruca Sativa (Cruciferae)*	٩ـ جرجير
	L. Oil , Textile and dye Plants	
1-	*Agave americana* (Amaryllidaceae)	١ـ سيسال
2-	*Carthamus tinctorius (Compositae)*	٢ـ قرطم
3-	*Gossypium barbadense (Malvaceae)*	٣ـ قطن

4-	*Lawsonia inermis (Lytheraceae)*	٤ـ تمرحنة
5-	*Olea europaea (Oleaceae)*	٥ـ زيتون
6-	*Ricinus communis (Euphorbiaceae)*	٦ـ خروع
7-	*Linum usitatissimum (Linaceae)*	٧ـ كتان

NOTES ON SOME CROPS AND VEGETABLES

The Egyptian Cazzar Baladi *Daucus Boissieri* is only found in Egypt , not in other countries , Also , the Egyptian *Allium kurrat* is cultivated mainly in Egypt and to very small extent in Palestine and Pharaonic times .

The most common used " Libb Asmar " , the brown - small one is obtained from *Citrullus vulgaris v. colocynthoides* . It is a small bitter water - melon , some what larger than Handal *(Citrullus colocynthis)* and it is grown on a small scale in Upper Egypte . The main bulk of it , however , is imported from Sudan .

The white figl represents a variety only found in Egypt , *Raphanus sativus v.agyptiacus* . It is unknown outside Egypt.

All the numerous cucmbers and melons grown in Egypt are also unknown outside the country . Most of them are of very ancient cultivation and have been cultivated since pharaonic times . e . g Clay moddels of Faqqos over 4000 years olds are Kept in Agricultural Museum of Cairo . Also , the typical pointed Abdelllawi melons are depicted in a tomb at Saqqara from old Empire : 4500 Years ago .

Karafs , *Apium graveolens* was the emblem of sorrow in Ancient Egypt . It was used in funeral garlands to decorate the mummies . It was also planted on tombs .

Flax , *Linum usitatissimum* , was the most important textile plant in Ancient Egypt . All mummy warppings are made out of lines (flax fibre) . Cotton of late introduction .

The oldest cotton fabrices in Egypt were discovered lately by Prof . Greiss . He found cotton thread in some embroideries from the Monastery of Phoebammon West of luxor , dating from the 4 th century A.D.

Among the oldest Known foodstaff in Egypt is Habb El - Aziz , *Cyperus esculentus* , which has been found in the intestines of the prehistoric mumies . Also , husks of barley and libb was found in the mummies .

Onions have always been connected with superstition not only in Egypt , but all over the civilized world . It was the custom in Ancient Egypt to place one or more onions inside the cavity of the body at the embalning of the dead . Ramses II has an onion in the left armpit and

Ramses II had anions placed as a sort of artificial eyes . The onion has as ascriped protective properties . The custom among the fallahin of today to suspend a bundle of onions above the doors as a protection certainly originated from ancient traditions .

Henna . *Lawsonia inermis* , has been found in mummy garlands . It has been cultivated since the most ancient times . The same with Qortom : *Carthamus tinctorius.*

Khass , *Lactuca sativa* , was the symbol of fertility in Ancient Egypt and the God of fertility , is often depicted with a khass in his hand always representing the same variety with very long leaves that is still cultivated in Egypt .

Hordeum and *Triticum* have been cultivated in Egypt suince prehistoric times , of *Hordeum* the same species as tody , *H. vulgare* . of *Triticum* other species , *T. dicoccum* , which is no more grown in the country .

Dura Shami , *Zea mays* , comes from America , Egypt got it shortly after the Turkish conquest in 1517 . Dura Baladi ., Dura rafia , *Sorghum durra* , probably comes from Central Africa . It was not known during Pharaonic time .

Orz , Ruzz , *Oryza sativa* , is late . It was introduced during the time of Caliphs .

Qassab el - Sukkar , *Saccharum officinarum* , has been cultivated in India since remote trimes and became known to the Europeans during the expedition of Alexander , 127 B . C . It was introduced to Egypt during the Caliphate of Omar , 634 - 644 A . D .

Corchorus olitorius , Melokhia , is a native of India although widely naturalized in the tropices and also in Egypt . In other countries it is grown mainly for its fibre " Jute " .

Mustared , Khardal is obtained from two plants of Cruciferae *Sinapis alba* , the seeds of which yield white mustard , and *Brassica nigra*, the source of the blak mustard , The latter is called in Arabic *kaber* and often occurs as a weed in the fields . Its yellow flowers are sold by the florists as a cut - flower for their sweet smell .

A very peculiar plant is *Arachis hypogaea* , Peanut or Fool Sudani . Its Yellow papilionaceous flowers are almost sessil . After flowering the pedicel elongates and carries the young fruits beneath the ground

where it matures into the reticulated indehiscent pod . Hence its name hypogaea (meaning subterranean or underground) .

N . B .

sativus = Cultivated

esculentus = edible

vulgaris = common

Officinalis = of medicinal use

Oleraceus = vegetable garden herb used in Cooking

tuberosus = tuberous

tinctorius = of dyes

annuus = annual

Olitorius = belonging to vegetable gardens or gardeners

PHARAONIC PLANTS

PHARAONIC PLANTS

Egypt is the only country in the world where we have remains of ancient " tomb plants " . At the excavations of archaeological sites , one frequently finds fruits or vegetables or ornamental flowers placed with the mummy to serve him as food or pleasure in the hereafter . Due to the dry and hot climate these plants have remained intact even after an elapse of 5,000 years or more . If they are soaked in hot water , they get soft and could be examined morphologicaly and anatomically like any recent material . Such plants are of utmost importance for tracing the history of our present crops and vegetables . They give witnnes about Egypt's connections in olden days with various countries and they throw light upon the most different fields of Egyptian culture .

In the beginning , Egyptologists paid but little attention to the ancient plant remains . They were thrown away as rubbish , But in the beginning of last century , J. Passalacqua got the idea of making a little collection of about 20 tomb plants which he submittted to Prof. Kunth in Germany for detrmination (1926) . Kunth's publication about them arose a great interest , and soon other botanists involved themselves in this field . Mention may be made of Prof . F. Unger in Vienna , who got the bright idea of dissolving ancient mud brickls from accurately dated monuments in water and collect the embedded plant remains. He worked on bricks from Lahum at Fayum etc . and succeeded to identify quite a number of different plants .

The most important of all ressearches on pharaonic plants was made towards the end of last centucy by Prof , Georg Schweinfurth . Because of his thorough knowledge of the modern Egyptian flora he succeeded in identifying plants where anybody else would have failed . Often a leaf or a stem fragment or a single seed was all material at his disposal , and yet he succeeded to name it . He listed about 250 different species , and in addition prepared a " Pharaonic herbraium " , unique in its kinds , where every plant fixed on the sheets is about 3 - 4 , 000 years old . This herbarium is at present exhibited in the Agricultural Museumof Cario and constitutes one of the most precious things kept in that museum .

The following are some plants commonly used in different purposes

by the ancient Egyptians during the prehistoric (Pharaonic) periods .

- *Nymphaea* lotus and *N.coerula* , Nymphalaceae , the sacred flowers (water Lilies) .

- *Hordeum vulgare* , *Triticum dicoccum* , *Panicum* spp . etc ., (gramineae) , cereals .

- Palms : *Phoenix dactylifera* (data) , *Hyphaene thebaica* (dom) and *Medemia argun* (argune) , palmae .

- Gemmeiz : *Ficus sycomore* , moraceae .

The sycomore was the tree of love God , Hathor . The young people were used to meet under a sycomore tree to receive the blessings of Hathor to their love .

- Oil was obtained from the seeds of e.g *Olea europaea , (oleaceae) Linum usitatissimum , (Linaceae) , Ricinus communis , Euphorbiaceae , Carthamus tincatorius and Lactuca sativa , (compositae)* .

- Drugs were obtained from : *Papaver somniferum* (papaveraceae) , *Hyosyamus muticus* (Sakaran) , Solanceae) , *Cassia fistula* , (leguminosae) , *Calotropis procera* (Asclepiadaceae) , Citrullus colocynthis (cucurbitaceae) *Anastatica hierochuntica* (cruciferae) .

- Linen was made from the flex : *Linum usitatissimum* .

- Mummy backets were made from *Ceruana pratensis* (compositae)

- Wine was made from *Vitis vinifera* (vitaceae) .

- Leguminous foods were including : *Lens esculenta , Lupinus termis , Lathyrus sativus , Vicia faba , Cicer arietinum* .

- *Allium* spp . *(A.cepa , A.kurrat A.sativum)* (cruciferae) , were popular foods .

- Papyrus (Burdy) , *Cyperus papyrus* was one of the most famous plants in ancient Egypt . It was sacred plant and the symbol of Lower Egypt . It was used for making boats , baskets etc . but its main use was for manufacturing paper .

- *juncus rigidus , J. acutus* etc . , family juncaceae, were used in making baskets , pens , sandals etc .

- *Cyperus esculentus* , Habb el aziz , is the oldest known food stuff in Egypt . It has been found in the intestines of prehistoric mummies .

DRUG PLANTS

DRUG PLANTS

Since ancient days Egypt has been famous for its pharmacognosy. There has been found several papyrus documents dealing with drugs, and Egypt has two gods of Medical Science. One was Amenhotpe, son of Hapu and the otherImhotep. The most famous was the latter. He was originally prime minister to Pharaoh Zoser, physician, architect, and builder of the Step Pyramid at Saqqara, which dates from the 3rd Dynasty, c.3000 B.C. He was later declared the God of Medical Science and as such was adopted also by the Greeks who called him "Aesculapios".

During the Greek period, c.2000 years ago, there were many famous herbalists dealing with the drug plants of Egypt.

THEOPHRASTOS from Lesbos (d.285 B.C.). He wrote a famous "Enquiry into Plants" which has given us many valuable information about the plant drugs at that period.

DIOSCORIDES was another famous Greek herbalist. His "Materia Medica" appeared in 78 A.D. The Islamic world got acquainted with it when a copy was presented to Abdel Rahman III in Spain by the Roman Emperor in 948 A.D., who sent the monk Nicholas to explain it to the learned world.In A.D. 512 a Byzantine illustrated his book with drawings. These are among the oldest known botanical illustrations, and they have given us the key to which plants the Greek names refer. This valuable manuscript is kept in Vienna.

CALENOS : of Pergamos (Asia Minor) (120-200 A.D.) and ORIBASIUS, physician to the Roman Emperor, c. 390 A.D.. are two other famous herbalists who have publications from this early period on medicinal plants .

During the early Islamic period we have several great names among oriental herbalists . In the beginning the Christian physicians were the leading, :

THIYADUO : (d. 708 A.D.) and **HUNAIN BEN ISHA**) (809-877 A.D.) . The latter wrote about 100 original books and 150 translations . He is especially known for his translations of Galenos and Disocrides into Arabic .

From the 10 th cent . onwards the Muslim scholars started leading . Among the most famous of this century are :

RAZI or **RAZES** (865 - 925 A.D.), a persian muslim who lived in Rayy in Persia, and who together with Ibn Sina are considered the greatest physicain of the Islamic world. He is the author of not less than 250 books on various subjects, among which 20 volumes on Therapeutics .

From the 10th century are also known IBN GULCUL, Hispano - Moorish physicain of the Caliph Hisham II in Cordoba . And Al MAGUSI (d. 994), Persian-Muslim physician who worte a fine encyclopdia on Medicine , in Arabic called " The Royal" (El-Malaki), later translated into Latin .

From the 11th certury two great scientists should be remembered :

IBN SINA : (980 - 1036), Persian Muslim and among the greates physicians and philosophers of the Islamic world . He wrote a work on medicine with a section on drugs, that has been reprinted in Arabic in modern times .

El - BIRUNI : (963 - 1048), a Muslim at the court of the Sultans of Afghanistan, is considered the most original of all Islamic scientists . He worte an important Materia Medica with plant names in various oriental languages .

In the 12th cent ., there are several outstanding scientists . . The following should be remembered :

MATIMONIDES : (1135 - 1204), from Cordoba. He went to Morocco, later to Egypt as physician to Sultan and his sons . He wrote a book in poisons etc. which was edited in 1940 by M. Meyrhof .

EL IDRISI : (1100 - 1166), a Muslium prince and famous geographer, who lived as a refugee at the court of the Norman Kings of Sicily . Wrote a phaemacognosy " The Universal Collection " , of which a part has recently been discovered in Istanbul .

AHMAD EL GHAFIQI : (d. 1164), from Andalusia, physician, excellent scholar, the most important of all Islamic phramacognosists. Wrote a book on simple drugs gased on own observations and also with quotations from all pharmacological authors at his time . The original book is lost , but an abbreviated copy was found in Cairo and has been puplished by M. Meyerhof and G.P. Sobhy .

In the 13th cent . the most important scholar is :

IBN EL BEITAR : (d. 1248), from Malaga. Travelled in North Africa, died in Damascus, has written a large phamacopoeia in Arabic which has been translated into several European languages . He was considered the greates Islamic phar-macognosist until it was discovered recently that his book is copied almost entirely from that of El-Ghafiqi .

The phamacopoeias used at present by the Egyptian Attareen .

IBN Sina : (980 - 1036) , see above .

KOHEN EL-ATTAR . Worte in 1245 " The management of the shop " in 25 chapters . Reprinted in numerous editions and still frequently used .

DAWUD OMAR EL ANTAKI : (d. 1599). Wrote a " Memorandum for intelligent people " with a list of drugs and medical terms . Reprinted in numerous editions and much favour among Oriental druggists .

There is a modern Egyptian Pharmacopoeia, huge book printed at Cairo University by the Faculty of Pharmacy . This is employed by the modern drug shops in Cairo and deals with the ordinary official drugs, sold in th internationl market . This pharmacopoeia is not yet known by the Attareen who prefer their old traditional books .

SOME COMMON DRUGS ON SALE AT THE ATTAREEN

About 250 drugs are found on sale . Many of then have certainly no value but are merely connected with superstition and ancient traditions . Some of them , however , may have great value . In the Egyption research laboratories investigations of the native drugs is getting on at present in order to discover whether they contain any active principles or not .

During these investigations, the active principle of the seeds of e.g. *Ammi majus* was discovered . The discovery led to the inclusion of the plant in European Pharmacopoeias.

A few of the most well - known drugs on sale at the Attareen are enumerated here .

For fever :

CINCHONA CALISAYA : (Rubiaceae), Qishr el kina , the bark. Exists in red, brown and yellow varieties, the brown is considered the best .

For headache :

ECBALLIUM ELATERIUM : (Cucurbitaceae), Faqus al Homar, the root.

Purges : *RICINUS COMMUNIS* (Euphorbiaceae), Kharwa, oil from the seeds . *CASSIA ACUTIFOLIA* (Leguminosae), Senna mekky, leaves, legumes .

SOLENOSTEMMA ARGEL : (Asclepiadaceae), Argel, leaves used for the falsification of the true senna .

CASSIA FISTULA : (Leguminosae), Khiar shanbar, the pulp of the legume .

BRYONIA CRETICA and B. DIOICA (Cucurbitaceae) , Laeba morra, root .

TAMARINDUS INDICA : (Leguminosae), Tamr hindy, pulp of legume .

CITRULLUS COLOCYNTHS : (Cucurbitaceae), Handhal, the fruit

Refreshing drinks :

HIBISCUS SABADARIFFA : (Malvaceae) Karkade, calyx and fruits .

ORCHID : (Orchidaceae), Sahleb, the tuberous root .

SALVIA TRILOBA : (Labiatae) and PULICARIA UNDULATA (Compositae); Shy gebl, the leaves a good tea .

ROSA GALLICA : (Rosaceae), Zirr ward, the flowers. Also used in sweets and in outward application for eye diseases .

THYMUS CAPITATUS : (Labiatae), Zater, for scenting tea and as chest medicine .

TAMARINDUS INDICA, See above .

Vermifuge :

CHENOPDIUM AMEROSIOIDES : (Chenopodiaceae) , Nitnah. An

oil extracted from the plant used for Ancylostomiases .

ARTEMISIA HERBA - ALBA : (Compositae), Shih, the whole plant .

LUPINUS TERMIS : (Leguminosea) , Tirmis, the seed .

Toothbrushes, Toothpicks :

SALVADORA PERSICA : (Salvadoracea) , Meswak. Branches used as toothbrushes .

AMMI VISNAGA : (Umbelliferae) , khilla . Umbelrays used as toothpicks .

For washings :

SAPONARIA OFFICINALIS , GYPSOPHILA ROKEJEKA & SILENE SUCCULENTA : (all Caryophyllacea) Erq halawa, the roots .

GNAPHALIUM LUTEO - ALBUM and G. PULVINATUM : (Compositae) , Sabonetel afrit . The whole plant is put in bath water at Sham en-Nessim .

Also known as Ghara Ajub .

For chest diseases :

ADIANTUM CAPILLUS - VENERIS : (Polypodiaceae), Kuzbaret et bir, the leaves .

GLYCYRRHIZA GLABRA : (Leguminosae) , Erq souss, the roots

ALTHAEA OFFICINALIS : (Malvaceae), khattmiya, root and flowers .

PUNICA GRANATUM : (Punicaceae) , Qishr roman, bark and flowers .

ZINGIBER OFFICINALE : (Zangabil) , and ALPINIA OFFICINARUM . khlingan (both Zingiberaceae) , roots in hot syrup for cold .

For fattening :

GLOSSOSTEMON BRUGUIERI : (Sterculiaceae), Moghat, the root .

COLCHICUM RITCHII : (Moringaceae). Habb el bann, the seed an oil from it.

PISTACIA LENTISCUS : (Anacardiaceae), Habba khardra, the fruit .

Diuretic and for bladder stones :

AMMI VISNAGA : (Umbelliferae); khilla , the seeds .

ZEA MAYS : (Gramineae), Shawashi ed-dura, the styles .

DAUCUS CAROTA : (Umbelliferae), Bizr gazar, the seeds .

PIPER CUBEBA : (Piperaceae) , kababa hindi or kababa sini, the fruits .

It also enters in the native spice Bohar .

Toxic mixtures :

DATURA SUAVEOLENS : (Solanaceae) , Tatura . Also smoked for asthma and bronchitis , the whole plant .

PEGANUM HARMALA : (Zygophyllaceae), Bizr harmal, the seeds and capsules. Vomitive, diuretic , somniferous , sudorigic, emmenagogue .

URGINEA MARITIMA : (Liliaceae) Habb el far, Basal el onsul .

The dried sliced bulbs a rat poison. Also expectorant, cardiac. The seeds used for aphrodisiac purpose .

SEMESCAPUS ANACARDIUM : (Anacardiaceae), Baladher. The resin inside the shell of the fruit for intoxication . Also corrosive for warts, tubers .

HYOSCYAMUS MUTICUS : (Solanaceae) , Sakaran . The leave and seeds are smoken mixed with tobacco for asthma . Narcotic , seeds . Also carminative , diuretic , emmenagogue , powdered in honey for leprosy , etc . Important constituent for intoxïcating prepartions .

For Evil Eye And Protective Purpose :

ABRUS PRECATORIUS : (Leguminosae), Ain el afrit, the red seed with black spot resembles an eye . It is used powdered , dry for eye diseases ; Shishm ahmar , Also enters in the incense Bokhur .

Protective are also ALOE, Sabara, ALLIUM, Bassal, and TRITICUM , Baraqa el qamh . Also all sorts of incence are frequently used for evil spirits .

For dyes :

RUBIA TINCTORUM and *R. CORDIFOLIUM* : (Rubiaceae) , Foua, red dye, root . Also tonic , especially after child's birth .

CARTHAMUS TINCTORIUS : (Compositae), Osfur, flowers a yellow dye .

ALKANNA TENCTORIA : (Boraginaceae), Rigl el hammama . Root gives red dye .

LAWSONIA INERMIS : (Lythraceae), Henna . The powdered leaves yield a brown-red colour .

CURCUKA LONGA : (Zingiberaceae), Oruq sofr. Root yellow dye, also diuretic ,

For tanning :

ACACIA ARABICA (Leguminosae) , Qarad , the pods . Decoction of seeds also for diarrhoea and in poultice for wounds .

Emmenagogue and various other purposes :

ANASTATCA HIEROCHUNTICA (Cruciferae) , Kaff Mariam , the whole plant used in connection with child's birth .

ROSMARINUS OFFICINALIS (Labiatae) , Hassalban , the whole plant . Outward in frictions and fumigation . Inward as a tonic , stimulant , especially for epileptic and paralytc dieseaes .

IRIS FLORENTINA (Iridaceae) Qormet el banaffseg . The rhizome in applications , linments , cataplasms . It is irritant , incisive , detersive . Also used for perfume .

ALOE SUCCOTRINA (Liliaceae) , Sabr murr of Sabr soqottry . The gum eaten or smoked Drastic , heating , detersive .

BALSAMODENRON sp . (Burseraceae) , Mourr hegazi . The gum stimulant , astringent , expectorant , balsamic , antispasmodic , etc

Bark Condiments :

CINNAMOMUM ZEYLANICUM (Lauraceae) , Qirfa .

C. CASSIA (Lauraceae) , Salikha .

Root condiments :

ZINGIBER OFFICINALE , Zangabil or Ganzabil ,see above .

ALPINIA OFFICINARUM (Zingiberacesae) , Kholingan .

CURCUMA ZERUMBER (Zingiberaceae) , Zoronbad .

Seed condiments :

NIGELLA SATIVA (Ranunculaceae) , Habba soda , Habbet el baraqa .

SESAMUM INDICUM (Pedaliaceae) , Simsim .

FOENICULUM VULCARE (Umbelliferae) , Shammar.

CORIANDRUM SATIVUM , (Umbelliferae) Kozbara

CARUM CARVI (Umbelliferae) , Karawy .

MYRISTICA FRAGRANS (Myristicaceae) , Goz el tib,.

ELETTARIA MAJOR (Zingiberaceae) , Habbahann habashy .

E.CARDAMOMUM (Zingiberaceae) , Habbahann .

LINUM USTATISSIMUM (Linaceae) , Bizr Kittan . In poultice for wounds , Plasters .

EXPLANTION OF PHARMACOLOGICAL TERMS :

Purge , Purgative for cleaning the bowel . Same as laxative .

Vermifuge : expelling intestinal worms .

Astringent : binding together

Diuretice , exciting discharge of durin .

Diaphoretic , exciting perspiration .

Detersive , cleaning .

Expectorant , promoting ejection from chest or lungs by spitting .

Antispasmodic , remedy for spasms .

Drastic , acting very strongly, especially about purgatices .

Vomitive or Emetic , causing vomiting .

Stimulant , causing rapid increase of vital energy .

Sudorific , as diaphoretic .

Tonic , serving to invigorate .

Cardiac , heart - stimulating.

Incisive , Sharp .

Corrosive , to corrode , destroy gradually .

Somniferous , inducing sleep .

Narcotic , the same .

Aphrodisiac ,producing sexual desire .

Emmenagogue , Promoting menstruation .

Concerning medicinal plants it is of importance to study how their active principles change with various soil and climatic conditions Our common *Hyoscyamus muticus* from the desert , looses much of its alkaloids when grown under irrgation . Datura - species that are grown in Egypt , loose certain of their alkaloids which they possess when grown in other countries .

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