

THE STATE  
OF THE WORLD'S  
**FOREST GENETIC RESOURCES**  
**COUNTRY REPORT**  
**EGYPT**

This country report is prepared as a contribution to the FAO publication, The Report on the State of the World's Forest Genetic Resources. The content and the structure are in accordance with the recommendations and guidelines given by FAO in the document Guidelines for Preparation of Country Reports for the State of the World's Forest Genetic Resources (2010). These guidelines set out recommendations for the objective, scope and structure of the country reports. Countries were requested to consider the current state of knowledge of forest genetic diversity, including:

- Between and within species diversity
- List of priority species; their roles and values and importance
- List of threatened/endangered species
- Threats, opportunities and challenges for the conservation, use and development of forest genetic resources

These reports were submitted to FAO as official government documents. The report is presented on [www.fao.org/documents](http://www.fao.org/documents) as supportive and contextual information to be used in conjunction with other documentation on world forest genetic resources.

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**Forest Genetic Resources**  
**Country Report Egypt**

by

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## Abbreviations & Acronyms

AD	Arbor Day
ARC	Agricultural Research Centre
BC	Biodiversity Conservation
BG	Botanic Garden
bn <sup>3</sup>	Billion Cubic Meters
CAAE	Central Administration for Afforestation & Environment
CBD	Convention on Biological Diversity
CC	Climate Change
CITES	Convention on International Trade on Endangered Species of Wild Flora & Fauna
CSO	Civil Society Organization
DFT	Department of Forest Trees
EEPA	Egyptian Environment Protection Agency
FA	Faculty of Agriculture
FGR	Forest Genetic Resources
FRA	FAO Global Forest Resources Assessment
FS	Food Security
FWTD	Forests & Wood Technology Department
GB	Gene Bank
GDP	Gross Domestic Product
GR	Genetic Resources
GRC	Genetic Resources Conservation
ha	Hectare
HRI	Horticulture Research Institute
IPR	Intellectual Property Rights

ITPGRFA	International Treaty for Plant Genetic Resources for Food & Agriculture
JICA	Japan International Cooperation Agency
LD	Land Degradation
MALR	Ministry of Agriculture & Land Reform
masl	Meters above sea level
MIWR	Ministry of Irrigation & Water Resources
MHNCs	Ministry of Housing & New Community Settlements
NCS	Nature Conservation Sector
NGB	National Gene Bank
NGO	Non-governmental Organization
NR	Natural Resources
NWFPs	Non-wood Forest Products
PA	Protected Area
PRD	Palm Research Department
PRS	Palm Research Centre
PvA	Poverty Alleviation
Ramsar	The Convention on Wetlands of International Importance especially as Waterfowl Habitat
SFM	Sustainable Forest Management
SME	State Ministry for the Environment
TG	Technical Guidelines
TK	Traditional Knowledge
1 <sup>ry</sup> TSW	Primary level Treated Sewage Water
TSW	Treated Sewage Water
U o A	University of Alexandria
WED	World Environment Day

## Executive Summary

- Due to the location of Egypt in the arid zone with scarce rainfall, the total forest area is 147145 hectares (ha). There are no primary forests. Naturally regenerating forests are 1999 ha spread over two locations; Gebel Elba (19600 ha) and mangroves on the Red Sea Coast (390 ha). Plantation forests are 127155 ha of which 42000 ha are of date palms, 5000 ha of decorative/ornamental palms, Reforestation area 40055 ha and Afforestation area 87100 ha.
- Forest administration systems are either government or private. The Government owns the natural forests and some plantation forests together with trees planted around roads and highways and parks. The gross area is 53045 ha. The private sector owns some plantation forests together with agro-forestry systems in and outside agricultural fields with an area of 94100 ha.
- Interest in forest conservation & management intensified during the past decade. Afforested area increased from 59000 ha (FRA 2000) to 147145 ha, where:
  - Central Administration for Afforestation & Environment (CAAE) established some 24 forests all over Egypt irrigated with Treated Sewage Water (TSW) (FRA 2010),
  - Gene Banks increased to three,
  - Natural Protected Areas (PA) increased from 21 to 30,
  - Forest tree nurseries and seedlings produced increased,
  - New species were introduced for trial, most important of which is Jojoba (*Simmondsia chinensis*) and *Jatropha curcas* for bio-oil production,
  - Interest in roadside planting increased together with establishment of botanic gardens,
  - Becoming party to all International & Regional Treaties of relevance to forests and the environment,
- Forest resources of Egypt can only meet a small fraction of the current requirements for forest products. The balance is imported. The total growing stock in forests of Egypt (trees & shrubs excluding palms) is 8 million m<sup>3</sup> a total biomass of 14 million tons.
- Natural mangroves are made up of two species: *Avicinnia marina* and *Rhizophora mucronata*.
- Gebel Elba natural forests are made up of several shrub species such as: *Acacia saligna*, *Prosopis juliflora*, *Dracaena argun*, and Dry ombet tree.

- For forest plantations Egypt depends on fast growing species introduced during the last two centuries such as *Casuarina*, *Eucalyptus*, *Populus* spp, *Taxodium* spp and *Khaya senegalensis*. This is in addition to indigenous species known for thousands of years such as *Acacia* spp., *Salix* spp., *Cupressus* spp., *Dalbergia* spp., and others.
- Together with the aforementioned species some multipurpose trees are planted around and inside farms that provide shade and timber for farmers such as Berries (*Morus alba* and *M. Nigra*), *Ficus sycamorus* and *Ziziphus spin-christi*.
- Of the trees planted for industrial wood there are *Casuarinas* pp, *Eucalyptus* spp., *Taxodium* spp., and *Dalbergia* spp.
- Trees used in windbreaks are *Casuarina*, *Eucalyptus* and *Acacia* spp. As for sand dune stabilization trees and shrubs such as *Taxodium* spp., and *Acacia* spp., are used.
- Other trees are used for planting on canal and drain sides and the Nile Banks such as *Salix* spp., *Populus* spp., and *Eucalyptus* spp.
- Outside cities and towns and around highways such trees as *Eucalyptus* & *Casuarina* are used. Inside cities, on road sides and in parks such trees and shrubs as Poinciana (*Delonix regia*), *Jacaranda*, *Cassia nodosa* and *Ficus* spp., are used.
- Many varieties of date palms (*Phoenix dactylifera*) are planted such as Zaghlol, El hayani, El samany and Amlat together with ornamental Phoenix such as *Caryota mitis*, *Latania lantaroides*, *Washingtonia* spp., and *Livistona* spp.
- Many trees have been indigenous in Egypt for thousands of years such as *Balanites aegyptiaca*, *Ceratonia siliqua*, *Morus alba* and *M. Nigra*, *Moringa peregrina*, *Salix mucronata*, *Salvadora persica*, *Tamarix nilotica*, *Ziziphus spina-christi*, *Cupressus sempervirens*, Mangroves and many sorts of *Phoenix dactylifera*.
- Through evaluation of the state of trees & shrubs of Egypt, it was revealed that some nine indigenous species are threatened with extinction in natural Egyptian Environs of which seven are in Sinai and two in the Eastern Desert. The causative dangers are excessive grazing and wood pillage. The endangered species are: *Silene schimperiana*, *Fagonia taeckholmiana*, *Helianthemum schweinforthii*, *Pterocephalus arabicus*, *Rosa arabica*, *Thymus decussatus*, *Phlomis aurea*, *Anarrhinum pubescens*, and *Kickxia macilenta*.
- In addition there are extinct or very rare terrestrial trees & shrubs in Egyptian environs enumerated at 142 types categorized under the red List such as: *Ephedra foeminea*, *E. sinaica*, *Juniprus phoenicea*, *Medemia argun*, *Dracaena ombet*, *Rosa arabica*, *Phlomis aurea*, *Pterocephalus arabicus*
- There is no system in Egypt for documentation of forest tree propagation. Seeds of trees & shrubs are collected from around forest tree nursery without following the



principles of selection of elite mother trees or documenting the seeds collected. This is brought about by the multitude of institutions involved in tree planting affiliated to so many ministries. Consequently it is difficult to know the origin of seeds or cuttings.

- The State formulated strategies and programmes for *in-situ* and *ex-situ* genetic resources conservation (GRC). Strategies for *in-situ* conservation include the establishment of natural protectorates for conservation of endangered trees & shrubs and attempts to propagate them in their very natural domains. Strategies for *ex-situ* GRC encompass planting of extensive areas of them, establishment of gene banks (GB) nurseries, botanic gardens (BG) and herbaria.
- Programmes for *in-situ* conservation are restricted to natural protectorates such as:
  - Rehabilitation of Mangroves in the Red Sea Coast for *A. Marina* and *R. Mucronata*,
  - Rehabilitation of Heglig (*Balanites aegyptiaca*),
  - Rehabilitation of *A. raddiana* and *A. tortilis*,
  - Rehabilitation of Sarh (*Maerua crassifolia*),
  - Rehabilitation of *Ziziphus spina-christi*,
  - Rehabilitation of Argun Palm ( *Medemia argun*)
- There are major obstacles for GRC programmes *in-situ* such as shortage of sufficient financial resources, expansiveness of protectorates, lack of adequate supervision facilities, lack of awareness amongst local populations, lack of adequate training for technicians, lack of machinery and equipment for field work, lack of participation of individuals and Civil Society Organizations (CSO) together with inadequate protection legislation.
- There are some priorities for *in-situ* conservation activities in the future like: Enhancing institutional capacities through capacity building, enhancement of scientific and technical capacities through provision of necessary equipment and increase of legislative powers through promulgation of protective laws, availing of financial resources, mobilization of cooperation efforts between government institutions, Non-Governmental Organizations (NGOs) & individuals and increase of local people participation and enhancement of their awareness and sharing of benefits together with regional and international integration and benefitting of external experiences.
- Of the tree species conserved ex-situ and with their genetic resources (GR) in GB there are: *Afrocarpus gracilior*, *Agathis robusta*, *Dimocarpus longan*, *Ficus asperma*, *F. racemosa*, *F. spragueana*, *Phyllanthus emblica*, *Bontia daphnoides*, *Eugenia supra-axillaris* spring , *Tamarindus indica* , *Ceiba pentandra*, *Podocarpus elongates* .

- Trees that are conserved within farms and agro-forestry systems include *Eucalyptus camaldulensis*, *Casuarina glauca* and *C. cunninghamiana*, *Acacia saligna* and *Phoenix dactylifera*.
- The major obstacles for improvement of *ex-situ* conservation include shortage of financial resources and equipment, urban sprawl, population concentration and appreciation of land value.
- Priorities for *ex-situ* conservation activities in the future include provision of financial resources or external assistance, enhancement of scientific & technical capabilities, enhancement of institutional technical abilities, increase of research & trials together with involvement of private sector (PS) and NGOs in tree-planting, establishment of private parks and increase of regional & international cooperation.
- There are no precise data on quantities of seeds transported globally but there are some data on species introduced during recent years on *ad hoc* basis, largely through CAAE of the Ministry of Agriculture & Land Reform (MALR) for the sake of obtaining larger timber growth together with investors who own farms for Jojoba or Jatropha for bio-oil production. Most salient of these seeds are those of Mahogany (*Khaya senegalensis*), Neem (*Azadirachta indica*), *Albizia jalbriessin*, *Pinus halepensis*, *P. brutia*, *P. Pinea*, *P. pyramidalis*, *Ginkgo biloba*, *Jatropha curcas*, *Simmondsia chinensis* and *Populus spp.*
- As for on-going improvement programmes, there is only one such programme for production of bio-oil from Jatropha between CAAE in cooperation with the Japanese International Cooperation Agency (JICA) for the genetic improvement of wild Jatropha growing in Egypt originally imported from India with the objective of generating a variety with high oil yielding seeds and increased seeds produced.
- There are no forest tree orchards in Egypt.
- There are no data bases for tree breeding programmes in Egypt within tree or forest planting specialized agencies. There were, however some phased out programmes in Forests & Wood Technology Department (FWTD) of the Faculty of Agriculture (FA) of the University of Alexandria (UoA) like “Casuarina Improvement in Egypt” for attaining high growth & wood production carried out during the 1970s together with various trials for seed sources from abroad which included *Eucalyptus*, *Casuarina* and *Acacia spp.*
- All trees already growing in Egypt can provide propagation material such as seeds, cuttings or tissue, but that should not be done before undertaking a selection programme for elite mother trees; a thing that never happened before.
- Species of which seeds can be obtained include: *Eucalyptus*, *Casuarina* (two species) *Acacias*, *Albizia*, *Dalbergia sisso*, Neem (*Azadirachta indica*), *Ceratonia*, *Melia*

*azedarach*, *Taxodium*, *Khaya senegalensis*, *Cupressus spp.*, *Morus spp.*, *Poinciana*, *Jacaranda*, *Terminalia*.

- There are some species where root cuttings can be obtained such as *Tamarix*, *Populus*, and *Salix*. There are species where aerial layers can be made such as *Ficus spp.*, particularly *F. nitida*.
- As yet there is no National Forest Programme (nfp) for Egypt.
- There are various institutions concerned with Forest Genetic Resources (FGR) conservation and use which include:
  - CAAE of MALR. This is a government entity mandated to plant forests, establish forest tree nurseries (FTNs), import seeds, enter into agreements/treaties and establish BGs,
  - Ministry of Housing & New Community Settlements (MHNCS): Line ministry responsible for forest establishment irrigated with TSW,
  - Ministry of Haulage & Transport: Line ministry concerned with planting of trees, wind breaks and trees around roads,
  - Ministry of Irrigation & Water Resources (MIWR): Line ministry concerned with planting trees along canals & drainage systems,
  - Nature Conservation Sector (NCS) -Egyptian Environmental Protection Agency (EEPA- State Ministry for the Environment (SME): Government entity, concerned with conservation/preservation of forest resources, establishment of FTNs, propagation of endangered flowering plants, establishment & supervision of Nature Protectorates, holding & signing of treaties & environmental protection,
  - National Gene Bank (NGB)- Agricultural Research Centre (ARC)- MALR: Government entity, responsible for preservation of FGR, establishment of FTNs & green houses for propagation of endangered species (ES) and establishment of Herbaria,
  - Tree lovers Association. Private entity, mandated to plant date palms. Has information activities for encouraging tree planting & care in Cairo,
  - Private Sector (PS): Concerned with planting of date palms and establishment of nurseries for the purpose, establishment of agro-forestry systems in private holdings, planting of trees around and inside homes and establishment of parks /gardens,
  - FWTD- FA UoA: Governmental higher education entity, mandated to provide higher education, conduct research & training, undertaking of consultancies, sale of improved seedlings,

- **Municipalities & Localities:** Parts of local councils, Ministry of Local Development: Line Ministry concerned with planting of trees in roads inside towns and establishment of parks,
- **Date Palm Research Division, Horticulture Research Institute, MALR:** Government entity mandated to research date palms,
- A positive change of attitude took place within government and private sectors over the past decade in support of FGR with increasing finance for the programme.
- There is no particular budget for research on GR and there is no ratio of forest budget earmarked for GR. There are however, research activities undertaken in the context of the activities of FWTD- FA UoA, Forest Tree Research and Palm Research in the context of activities of Horticulture Research Institute (HRI) of MALR.
- FGR curricula are covered in FWTD- FA UoA in the context of B. Sc, M. Sc & Ph.D. programmes.
- Requirements & priorities for Research, Education & Training include:
  - the establishment of equipped laboratories,
  - exchange of experiences between researchers,
  - formulation of long-term research programmes,
  - consolidation of cooperation and coordination between agencies concerned with forests,
  - establishment of consultative coordination institution for research from universities, PS and NGOs for formulation of a national strategy & plan for research in the forestry sphere,
  - identification of real needs,
  - improvement of forestry education through valuation of institutional needs, regular training programme for forest personnel
  - Financial support for research, education & training.
- Legislations & Regulations of relevance to FGR are embedded in various laws produced by MALR and SME concerning PAs, Environmental Protection, Public Roads, tree-planting on their sides & greeneries. Such legislations and others embody permission to plant trees and prohibition of cutting thereof in an environmental framework in the first instance.
- There is dire need in Egypt for development of FGR conservation legislations in respect of improving legislations and their effectiveness, improvement of reporting

requirements and consideration of non-adherence penalties and establishment of systems which target GR and strengthening of cooperation between national authorities concerned with FGR together with the establishment of a permanent institute for conservation & management of FGR,

- There are no particular awareness programmes for FGR and shortage in general education on GR and their importance. There are short-comings from the side of tree planting authorities in Egypt in elevating the understanding of community individuals of Sustainable Forest Management (SFM) and conservation of biological diversity (BD) and economic & environmental values of forests. There are activities of limited impact such as celebration of Arbor Day (AD), celebration of World Environment Day (WED) and activities of NGOs for awareness raising on tree planting.
- Therefore Egypt is in need for raising awareness through preparing data & strategy targeting FGR together with improving access to relevant information and strengthening of training & education on them and improving concepts of benefits & values of FGR.
- Egypt signed and ratified a number of regional & international treaties of relevance to FGR especially the Convention on Biological Diversity (CBD) and Convention on International Trade in Endangered Species of Wild Flora & Fauna (CITES). These two conventions had an effective role on increasing the number of PA in the country and on all endangered flora & fauna including trees & shrubs, birds, animals, marine or other. PAs are now 30 with a total area of 142000km<sup>2</sup> which make up 15% of the total area of Egypt; a matter that helped conserve FGR *in-situ* particularly the endangered ones that are being rehabilitated.
- There are in place cooperation activities between Egypt and a number of countries most of which concentrate on importing seeds of new species or that are similar to what is there for trials to increase wood, fruit or bio-oil production. It's imperative to consolidate and widen such cooperation to encompass a wider number of countries and a bigger number of introduced species and following-up of their growth and generate implementable recommendations afterwards.
- A Regional Network is underway which includes Algeria, Egypt, Morocco & Tunisia concerned with rejuvenation of forests in these countries using TSW in support of small farmers and people with special needs. Its activities include exchange of information and laying down of Technical Guidelines (TG) and building of joint data bases. The network includes such tree species as Poplars, *Salix* and others.
- On the whole Egypt is in need of strengthening:
  - international cooperation and networks to understand the state of biodiversity *in* and *ex-situ* conservation,
  - the use of FGR,

- research, education & training,
  - management of data bases, early warning and
  - Elevation of public awareness.
- There are no systems in Egypt for access to and sharing of benefits from FGR but there are authentic traditions in mountain and desert areas which have for ever positively impacted BD & GRC. Of late however, these norms have been overlooked in view of population pressures, increased excessive grazing, and wood pillage together with tourism and trade activities which all lead to degeneration of some resources. In general, understanding the principles of equitable sharing of benefits accruing from the use of FGR faces a horde of difficulties. A system is being implemented inside PAs which does not allow the utilization of GR except after referring to NCS in EEPA together with recognition of the right of indigenous population in benefit sharing.
  - There is no legislation in Egypt which limits access to and movement of FGR in and outside the country.
  - Work is underway to envisage a modality for protection of cultural & social heritage of local communities through protection of intellectual property rights (IPR), where current information indicates continuous decrease of traditional knowledge (TK), especially in and among recent generations who are keen to acquire modern knowledge and abandon traditional heritage.
  - There is no mechanism in Egypt for benefit-sharing but there exist authentic traditional norms in conservation of resources from the one end and from the other it is not allowed to utilize any of the GR with reference to the NPS of EEPA in the context of recognition of local population's right in benefit-sharing.
  - Many of the planted trees in Egypt assume an important role in achievement of food security (FS) and poverty alleviation (PvA). For instance, *Eucalyptus* and *Casuarina* indirectly increase crop production when used as wind breaks besides wood production. *Acacia* and *Tamarix* tree species are used as wind breaks and in sand dune stabilization, wood, charcoal & fuel wood production. Mulberry, *Ficus sycamores* and *Ziziphus* are used for wood and fruit production together with Jojoba & *Jatropha* for oil, fuel and fodder production. There also exist a number of productive date palms besides the use of palm fronds in particle board production.

## Introduction

Egypt occupies the North Eastern corner of Africa between Lat. 22 to 30°N and Long. 25 to 37°E. The total area of the country is 1 002 000 km<sup>2</sup> (99 545 000 ha), of which 3% is arable land. The country can be divided into four main physiographic units: The Western Desert with an area of 680 000km<sup>2</sup>; Nile Valley & Delta with 33 000km<sup>2</sup>; Eastern Desert with an area of 221 000km<sup>2</sup> and Sinai Peninsula with 61000km<sup>2</sup>. The State is divisible into three main climatic zones: The Mediterranean, the Desert and Semi-Desert. The south of the country is characterized with extremely dry climate in which summer temperature reaches 42°C and 13°C in winter. On the Mediterranean coast the summer temperature attains a maximum of 30°C and 18.5°C in winter. Total rainfall is extremely low and falls in winter, mostly in December & January. The annual average for the country is 10mm and varies between 150mm in winter, 24mm in Cairo whereas in the south of the country the annual average is 1.5mm. Relative Humidity is high in the north and decreased southwards. Therefore, aridity and evaporation are the determinant factors in distribution and growth of vegetative cover.

The total population of Egypt is 81.527 million (FRA 2010), mostly concentrated in the Nile Valley & Delta.

- Total forest area of Egypt is 147145 ha (of which 42000ha planted with date palms and 5000 ha with ornamental palms). There are no primary forests in Egypt and forests are either naturally or artificially regenerated. The former is with a total area of 19990 ha and exist in tow locations: Gebel Elba in the South East with an area of 19600 ha and Mangroves on the Red Sea Coast with an area of 390 ha. Plantation forests have an area of 127155 ha of which 40055 ha for reforestation while afforestation area is 87100 ha.
- The growing stock in Egyptian forests (trees & shrubs only) is about 8 million m<sup>3</sup> (FRA 2009) with a biomass of 14 million tons. This tiny compared to the growing national needs. These forests & trees yield fuel wood to the tune of 17 059 000m<sup>3</sup> which is totally consumed. The round industrial wood production is 268 000m<sup>3</sup> while consumption amounts to 384 000m<sup>3</sup> with a deficit of 116 000m<sup>3</sup> that has to be imported. Sawn wood production is 2000m<sup>3</sup> while consumption amounts to 1 465 000m<sup>3</sup> with a deficit of 1 463 000m<sup>3</sup> that needs to be imported. Total production of wood boards is 56 000m<sup>3</sup> while consumption is 419 000m<sup>3</sup> with a deficit of 363 000m<sup>3</sup> that is annually imported. Total pulpwood production is 120 000m<sup>3</sup> whereas consumption is 225 000m<sup>3</sup> leaving a deficit of 105 000m<sup>3</sup> for imports. Production of paper and hard board is 460 000m<sup>3</sup> while consumption is 1 161 000m<sup>3</sup> leaving a gap of 701 000m<sup>3</sup> to be bridged through imports.

In view of the arid climate of Egypt and scanty rainfall, natural forests are rare and are concentrated in Gebel Elba, an elevated area in the extreme south east of the country where rain falls. Natural forests are constituted of *Parkinsonia spp*, *Prosopis spp*, *Acacia saligna*, *A. nilotica*, *A. farnesiana*, *Dracaena ombet* and others. Mangroves exist in small scattered stands along the Red Sea Coast, of two species: *Avicinnia marina* and *Rhizophora mucronata*.





As for planted trees and forests, they are plantation forests, agro-forestry systems, public utilities and private or government farms. CAAE, the government authority responsible for afforestation in Egypt and affiliated to MALR reverted to the establishment of 24 forest plantations distributed all over the country and irrigated with primary level (1<sup>ry</sup>) TSW. They are planted with fast-growing multipurpose trees & shrubs together with *Jatropha curcas* introduced during the last decade for bio-oil production. The most important trees planted in these forests are: *Eucalyptus camaldulensis*, *Casuarina cunninghamiana*, *C. glauca*, *Dalbergia sisso*, *Khaya senegalensis*, *Taxodium distichum*, *Cupressus sempervirens*, *Pinus halepensis*, *P. Palustris*, *Melia azedarach*, *Azadirachta indica* and others. There are also date palm (*Phoenix dactylifera*) groves distributed all over the country, most important varieties of which are Elhayani, Zaghlol, Elsamany, Bent Aisha, Elaraby, Amhat and Elghazaly.

There are plantations of ornamental palms, most important of which are *Caryota mitis*, *Latania lontaroides*, *Washingtonia spp*, *Sabal* and others.

There are also trees in agro-forestry systems in the form of windbreaks around farms and scattered trees inside farms and on canal banks. Most important tree mix used in these tree formations is: *Eucalyptus camaldulensis*, *Casuarina cunninghamiana*, *C. glauca*, *Cupressus sempervirens*, *Acacia saligna*, *Tamarix aphylla*. Inside farms there are shade and fruit trees such as *Morus spp*, *Ficus sycamorus* and *Ziziphus spina-christi*. On canal banks there is *Populous alba*, *P. nigra*, *Salix salsaf* and *S. babylonica*. Over and above these there is tree planting for public and private utilities around schemes, buildings, by road sides, in parks, in and around homesteads. Most important of these are *Eucalyptus camaldulensis*, *Casuarina cunninghamiana*, *C. glauca*, *Cupressus sempervirens*, *Pinus halepensis*, *P. palustris*, *Delonix regia*, *Jacaranda mimosifolia*, *Ficus spp.*, *Cassia nodosa* and others besides date and ornamental palms.

Forest administration systems in Egypt are government or private. Natural forests are government owned and managed while plantation forests are partly government and partly private. Trees planted in wind breaks in or outside farmlands (agro-forests) are generally privately owned. Trees planted around streets & highways and in public parks are all public. This is why the public sector owns some 941 000ha of forests and tree formations.

In view of the scarcity of rains or complete lack thereof, tree planting as forest plantations is too expensive for individuals or PS. This is brought about by the high cost of irrigation and high land value. The public sector (government) owns land and 1<sup>ry</sup> TSW and therefore establishes forest plantations for environmental and economic purposes in that order. Of late some investors planted Jojoba (*Simmondsia chinensis*) and *Jatropha curcas* to produce bio-oil which is considered economically viable.

The PS and most individuals in Egypt plant trees in agro-forestry systems irrigated with fresh water beside crops. Individuals make a living primarily from crops and supplement it from tree wood, fruit or fodder. Tree seedling nurseries are found all over the country. They are either government or private. These nurseries depend for seeds from nearby mother trees or clonal root cuttings in the case of Poplars, *Salix* and *Tamarix* or from aerial layering in the case of

*Ficus spp.* Some farmers produce their own in-house seedlings. Some investors import seed for their holdings such as *Jatropha* and Jojoba.

CAAE sometimes import improved seeds from abroad for improvement of trial under Egyptian conditions.

In general seed collection and tree selection for cuttings or clones does not follow sound scientific methods or procedures. No elite or positive trees are selected. The entire activity is done on *ad hoc* basis depending on convenience and ease of access to the resources.

During the last 10 years the government and private sector expressed growing interest on forests and trees but still in an inadequate and unsatisfactory manner for the forestry sector to meet national needs in economic or environmental terms. There is still no national strategy for afforestation or forest planting. CAAE is still part of MALR and not an autonomous entity to receive an autonomous budget instead of a small fraction of that of MALR. There are so many line ministries and institutions involved in tree planting without coordination between them coupled with shortage of trained forestry specialists. In spite of that the forest plantation area has increased from 59 000ha (FRA 2000) to 147145 ha during the last decade. During the same period GBs increased to three and PA increased from 21 to 30. Seeds of a number of trees/shrub species have been imported, most important of which *Jatropha curcas* and Jojoba (*Simmondsia chinensis*). The number of forest tree nurseries has increased as the number of seedlings produced. There is growing interest about BGs together with interest in threatened/endangered tree species such as Mangroves stands of which were enhanced through donor-assisted projects. Road side planting was enhanced and CAAE and SME entered into all contemporary treaties related to forests and the environment at large.

There are several reasons for this increase in interest in the forestry sector most important of which is the increase in amounts of I<sup>ry</sup> TSW and difficulties in disposing of it. Establishing forest plantations irrigated with I<sup>ry</sup> TSW is a way of safely disposing of it. Another factor is the rising demand for industrial wood, fuel wood and charcoal together with their prices all coupled with local and global concern about forests and appreciation of their economic & environmental values particularly for mitigation of climate change (CC). Of late other forest values assumed importance e.g. energy, medicines industries and others.

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## Introduction on the State & Forestry Sector

### 1. Major Forest Characteristics & Tree Resource Management Systems:

The total area of forests in Egypt is 147145 ha. (In FRA 2010 report the area was 100145 ha. The area planted with date palms of 42000 ha was added together with that planted with ornamental palm of 5000 ha).

- There are no primary forests,
- Naturally regenerating forests total 19990 ha and are found in two locations:
  - a. Gebel Elba in the extreme south east of the country with an area of 19600 ha,
  - b. Mangrove Forests on the Red Sea Coast with an area of 390 ha.
- Plantation forests total 127155 ha divisible into:
  - a. Reforestation with an area of 40055 ha,
  - b. Afforestation with an area of 87100 ha.

### 2. Administration Systems:

1. Natural forests (Gebel Elba and Mangroves) are owned and managed by government,
2. Planted forests are divided into forests belonging to and are managed by government and other private plantations owned and managed by their owners,
3. Trees planted as windbreaks around farms including agro-forests and on canal and drains sides, around and inside homesteads are considered private and managed as such,
4. Trees planted on sides of roads & highways and in public parks & gardens are publicly owned and managed.

**Table 1. Forest characteristics & areas (FRA)**

Main Characteristics	Area (ha)
Primary Forests	-
Naturally Regenerating Forests	19990
Planted Forests	127155
Reforested Areas	40055
Afforested areas	87100

(In FRA 2010 the total forest area was 100145 to which was added 42000 ha planted with date palms and 5000 ha planted with ornamental palms to bring the total forest area to 147145 ha)

### 3. Forest Ownership in Egypt

The PS (individuals) owns an area of 94100 ha while the public sector (government) owns an area of 53045 ha.

**Table 2. Forest ownership (FRA)**

Forest ownership	Area (ha)
Public	53045
Private	94100
Other	-

### 4. Trends in forest conservation & management over the past decade

1. The planted forest have increased from 59 000 ha (FRA 2000) to 147145 ha,
2. Increase in GBs for preservation of seeds and GRs,
3. Increase in PAs especially the ones with endangered tree/shrub species from 21 to 30,
4. New species were introduced such as Jojoba and Jatropha for production of bio-oil,
5. Increased interest in tree planting along roads & highways,
6. Increase in numbers of FTN and produced seedlings,
7. Increased concern about BGs,
8. Increased concern about endangered trees like Mangroves and others in PAs,
9. Active participation in all regional & international conventions/treaties of relevance to forests, trees and the environment.

### 5. The Driving Forces for that are related to :

1. Increase in quantities of 1<sup>o</sup>ry level TSW and associated difficulties in disposal thereof and the notion of its use to irrigate forest plantations,
2. The global tendency to grow trees to mitigate green house effects (global warming),
3. Rise in prices of timber, fuel wood and charcoal,
4. Elevated awareness about economic and environmental values of forests & trees,
5. Increase in value of other non-wood forest products (NWFPs).

### 6. Roles played by forest resources in meeting current needs for forest products:

- Plantation forests in Egypt according to FRA 2009 are 67000 ha,
- The growing stock in Egyptian forests (trees & shrubs excluding palms) is about 8 million m<sup>3</sup> (FRA 2009),
- Biomass is 14 million tons,
- Total fuel wood production is 17 059 000m<sup>3</sup> which is totally consumed,
- Industrial round wood production is 268 000m<sup>3</sup> while consumption amounts to 384 000m<sup>3</sup> with a deficit of 116 000m<sup>3</sup> that has to be imported,
- Sawn wood production is 2000m<sup>3</sup> while consumption amounts to 1 465 000m<sup>3</sup> with a deficit of 1 463 000m<sup>3</sup> that needs to be imported,
- Total production of wood boards is 56 000m<sup>3</sup> while consumption is 419 000m<sup>3</sup> with a deficit of 363 000m<sup>3</sup> that is annually imported,
- Total pulpwood production is 120 000m<sup>3</sup> whereas consumption is 225 000m<sup>3</sup> leaving a deficit of 105 000m<sup>3</sup> for imports,
- Production of paper and hard board is 460 000m<sup>3</sup> while consumption is 1 161 000m<sup>3</sup> leaving a gap of 701 000m<sup>3</sup> to be bridged through imports.
- The forestry sector of Egypt employs some 21 000 workers representing 0.1% of total work force,
- The sector contributes \$ 296 million representing 0.3% of total GDP

**Table 3. Main forest Categories and major tree types**

Main Forest Category	Area (Tree cover)	Main Tree Types	
		Trees	Other Types
1. Naturally Regenerated Forests:	19990		
A. Mangroves	390		<i>Avicennia marina</i> <i>Rhizophora mucronata</i>
B. Gebel Elba forests	19600	<i>Dracaena argun</i> Dry ombet tree	

		<i>Acacia saligna</i> <i>Prosopis juliflora</i> <i>Parkinsonia aculeata</i> <i>Acacia nilotica</i> <i>Acacia farnesiana</i>	
2. Planted Forests & Trees	12755		
A. Planted Forests			
A.1. Trees		<i>Eucalyptus camaldulensis</i> , <i>Casuarina glauca</i> <i>C. cunninghamiana</i> , <i>Khaya senegalensis</i> , <i>Dalbergia sissoo</i> , <i>Simmondsia chinensis</i> <i>Jatropha curcas</i> , <i>Cupressus sempervirens</i> , <i>Pinus halepensis</i> , <i>P. palustris</i> , <i>Taxodium distichum</i> , <i>Acacia saligna</i> , <i>Azadirachta indica</i> , <i>Leucaena leucocephala</i>	
B. Palms	47000		<i>Phoenix dactylifera</i>
B.1. Date palms	42000		Elhayani Zaghlol Elsamany Amhat Bent Aisha Elaraby Elsewy Elomary Eleglany Maghal Elbarkawy Albentemoda Elgendela Elghazaly Others





Utilities( Around schemes, homesteads, on road/highway, parks/gardens)  D.1. Trees		<i>C. cunninghamiana</i> <i>Acacia saligna</i> <i>Cupressus sempervirens</i> <i>Pinus palustris</i> <i>P. halapensis</i> <i>Ficus spp.</i> <i>Delonix regia</i> <i>Melia azedarach</i> <i>Jacaranda mimosifolia</i> <i>Cassia nodosa</i> <i>Zizyphus spina-christi</i>	
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## 7. Forests Trees & Woody Plants

Table 4. Priority species

Priority Types			Justification for priority
Scientific name	Trees (T)  Other (O)	Indigenous (N)  Exotic (E)	
<i>Casuarina cunninghamiana</i>  <i>C. glauca</i>	T	E	1. multipurpose, 2. Suitable for various terrestrial ecosystems & climatic zones in Egypt, 3. Fast growing, 4. Tolerates drought, salinity and other nutrient deficiencies, 5. Successfully used as windbreaks, shelterbelts and for fixation of mobile dunes, 6. Successful in roads in big cities as noise absorbents to reduce noise pollution, 7. Tannin produced from bark is used in tanning of hides, 8. Wood is durable and dense (~ 680kg/m <sup>3</sup> ). Due to tree branching nature, branch wood is used in agricultural implements, charcoal making

			and as raw material for making of particle & fibre boards, pulp and packaging industries.
<i>Eucalyptus camaldulensis</i>	T	E	<ol style="list-style-type: none"> <li>1. Multipurpose,</li> <li>2. Suitable for various terrestrial ecosystems &amp; climatic zones in Egypt,</li> <li>3. Fast growing,</li> <li>4. Successfully planted in open arid areas as wind breaks,</li> <li>5. Planted on road sides and canal banks to stabilize banks and stopping erosion</li> <li>6. Favoured for environmental considerations in bio-drainage for disposal of TSW in view of high transpiration rate,</li> <li>7. Wood is brick red in colour, dense, or irregular fibre arrangement and used in manufacture of particle board, cellulosic derivatives in charcoal making due to high calorific value.</li> </ol>
<i>Acacia saligna</i>	T	N	<ol style="list-style-type: none"> <li>1. Multipurpose,</li> <li>2. Used in sand dune fixation, soil amelioration and as windbreaks,</li> <li>3. Tannin material extracted from bark is used in tanning,</li> <li>4. Leaves &amp; twigs are used as fodder for livestock,</li> <li>5. Flowers are utilized in bee-keeping for honey production,</li> <li>6. Wood is used as firewood and charcoal making.</li> </ol>
<i>Cupressus sempervirens</i>	T	N+E	<ol style="list-style-type: none"> <li>1. Used in windbreaks and in forestation of dry lime soils,</li> <li>2. Planted as ornamental and background to</li> </ol>

			<p>disguise construction faults,</p> <p>3. Planted on roadsides and as decorative avenue tree,</p> <p>4. Wood is homogeneous, white/yellowish with brown heartwood, median in mechanical properties, durable, used in furniture-making, as boat masts and in various construction purposes.</p>
<i>Khaya senegalensis</i>	T	E	<p>1.Planted on canal sides and in public parks,</p> <p>2. Wood is good, dense, and resistant to bio-deterioration factors and goes into many industries like plywood, musical instruments, joinery and construction.</p>
<i>Tamarix aphylla</i>	T	N	<p>1. Planted in windbreaks and for sand dune stabilization,</p> <p>2. Used in arresting sheet &amp; gulley erosion,</p> <p>3. Planted in wide avenues as shade tree,</p> <p>4. Wood is white/yellowish and goes into furniture, making, agricultural implements, charcoal-making and as fire wood.</p>
<i>Simmondsia chilensis</i>	T	E	<p>1. Suitable for dry sandy sites and arrests erosion,</p> <p>2. Seeds are sources of bio-oil and cake good for fodder for livestock,</p> <p>3. Wood suitable for firewood and for charcoal-making</p>
<i>Jatropha curcas</i>	T	N+E	<p>1. Suitable for dry sandy sites and arrests erosion,</p> <p>2. Seeds are sources of bio-oil and cake good for fodder for livestock,</p> <p>3. Wood suitable for firewood and for charcoal-making</p>
<i>Ficus nitida</i> <i>Ficus spp.</i>	T	N+E	<p>1. Tree amiable for trimming/shaping for architectural designs in greenery,</p> <p>2. Used as live hedges in parks &amp; gardens,</p>

			<p>3. Planted on road/highway sides for their tolerance of air pollution,</p> <p>4. Used as potted plants,</p> <p>5. Wood lemon yellow, of median density, of limited economic value other than firewood or charcoal.</p>
<p><i>Salix safsaf</i></p> <p><i>S. babylonica</i></p>	T	N	<p>1. Very fast growing,</p> <p>2. Very useful for stabilizing canal sides and arresting erosion &amp; soil collapse,</p> <p>Used in bio-drainage,</p> <p>4. Wood is used in making plywood, match sticks and for pulping.</p>
<p><i>Taxodium distichum</i></p>	T	E	<p>1. Used as an ornamental tree,</p> <p>2. Some of the best in plantation forests irrigated with TSW,</p> <p>3. Wood is good, dense, durable and suitable for construction, plywood, and furniture.</p>
<p>Mangroves</p> <p>(<i>Avicennia marina</i></p> <p><i>Rhizophora mucronata</i>)</p>	O	N	<p>1. One of the important natural tree formations in Egypt,</p> <p>2. Avails suitable environment for marine life,</p> <p>3. Bee-keeping on flowers,</p> <p>4. Wood used as fuel wood.</p>
<p><i>Phoenix dactylifera</i></p>	O	N	<p>1. The most common fruit in Egypt, growing all over the country</p> <p>2. Has many varieties of soft and hard dates,</p> <p>3. Tolerates variable soils and climates and deficiencies in nutrients,</p> <p>4. Give fruits of high nutritive value,</p> <p>6. Fronds are used in packaging, particle board and as fuel wood.</p>

## 8. Other Major forest and other trees actively managed for human welfare

Table 5. Currently used forest trees in Egypt

Scientific name	Indigenous (N) Exotic (E)	Current uses	Administration	Managed area
<i>Eucalyptus camaldulensis</i>	E	1,2,4,5,6,8 (Bio-drainage)	Plantation, agro-forests, roadside planting.	-
<i>Casuarina cunninghamiana</i> <i>C. glauca</i>	E	1,5	Plantation, agro-forests, roadside planting.	-
<i>Acacia saligna</i>	N	3,4,5	Plantation, agro-forests, roadside planting.	-
<i>Kahya senegalensis</i>	E	1	Plantations	-
<i>Taxodium distichum</i>	E	1	Plantations	-
<i>Dalbergia sisso</i>	N	1	Plantations	-
<i>Cupressus sempervirens</i>	N+E	1	Plantations	-
<i>Simmondsia chilensis</i>	E	3,4 (bio-oil)	Farms	-
<i>Jatropha curcas</i>	N+E	3,4 (bio-oil)	Farms	-
<i>Salix safsaf</i> <i>S. babylonica</i>	N	4,5	Agro-forests	-
<i>Populus alba</i> <i>P. nigra, P. euphratica</i>	E	1,4,5	Agro-forests	-
<i>Mangroves</i> <i>Avicennia marina</i> <i>Rhizophora mucronata</i>	N	3,4	Natural forests	390 ha

<i>Phoenix dactylifera</i>	N	3,4,5	Agro-forests	42000ha
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## 9. Forest and other tree species effectively managed for environmental services

**Table 6. Main forest & other tree types which provide environmental services and social values**

Scientific name	Indigenous (N)-Exotic (E)	Environ. services/S.values
<i>Eucalyptus camaldulensis</i>	E	1
<i>Casuarina cunninghamiana, C. galuaca</i>	E	1
<i>Acacia saligna</i>	N	1
<i>Tamarix aphylla</i>	N	1
<i>Salix safsaf, S. babylonica</i>	E	1
<i>Populus alba, P. Nigra, P.euphratica</i>	E	1
<i>Ficus spp.</i>	E+N	5
<i>Delonix regia</i>	E	5
<i>Jacaranda mimosifolia</i>	E	5
<i>Cassia nodosa</i>	E	5
<i>Bauhinia alba, B.purpurea</i>	E	5
<i>Ficus sycamorus</i>	N	4
<i>Cupressus sempervirens</i>	E+N	5
<i>Ziziphus spina-christi</i>	N	6
Ornamental palms	E	5

- ✓ All planted trees provide general environmental services like absorbing air pollutants, sequestering carbon, producing shade & oxygen and conservation of BD.

## 10. Indigenous trees & shrubs in Egypt

<i>Acacia albida</i>	<i>F. salicifolia</i>
<i>A. asak</i>	<i>F.sycamorus</i>
<i>A. ehrenbergiana</i>	<i>Hyphaene thebaica</i>
<i>A. farnesiana</i>	<i>Ipomoea carnea</i>
<i>A.laeta</i>	<i>Limoniastrum monopetalum</i>
<i>A. nilotica</i>	<i>Medemia argun</i>
<i>A.seyal</i>	<i>Mimusops laurifolia</i>
<i>A. tortilis</i>	<i>Moringa peregrina</i>
<i>Atriplex halimus</i>	<i>Morus alba</i>
<i>A. nummularia</i>	<i>M. nigra</i>
<i>Balanites aegyptiaca</i>	<i>M. rubra</i>
<i>Cappris spinosa</i>	<i>Nicotiana glauca</i>
<i>Ceratonia siliqua</i>	<i>Phoenix dactylifera</i>
<i>Cordia myxa</i>	<i>Prosopis farcta</i>
<i>C. sinensis</i>	<i>Salix babylonica</i>
<i>Cupressus alternifolia</i>	<i>S. mucronata</i>
<i>C. papyrus</i>	<i>S. tetrasperma</i>
<i>C. sempervirens</i>	<i>Salvadora persica</i>
<i>Dichrostyachys cinerea</i>	<i>Solenostemma argel</i>
<i>Dodonaea viscosa</i>	<i>Styrax officinalis</i>
<i>Ephedra alata</i>	<i>Tamarix nilotica</i>
<i>Ficus carica</i>	<i>Ziziphus spina-christi</i>

## 11. Forest and other tree species listed as endangered/threatened

Table. 7. Forest & other trees threatened in all or part of their distribution range

Scientific name	Area Nat. Distr.	Average trees/ha	Ratio of Nat. Distr.	Distr. in country	Threat	Threat category		
						H	M	L
<i>Silene shimperiana</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Fagonia taeckholminiana</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Helianthemum arabicus</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Rosa arabica</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Thymus decussates</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Phlomis urea</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Anarrhinum pubescens</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>Kickxia macilenta</i>	-	<150	100%	L	15+13 fuel wood, excessive grazing	X		
<i>E. camaldulensis</i>	-	1665	50%	W	11			X
<i>C. sempervirens</i>	-	1665	50%	W	11			X
<i>Populus alba</i>	-	1665	50%	R				X



<i>P. nigra</i>	-	1665	50%	R	11			X
<i>P. euphratica</i>	-	1665	50%	R	11			X
Mangroves	-	10 000	100%	L		X		
<i>Phoenix dactylifera</i>	-	600	100%	W		X		

## 12. Regular assessment of threatened/endangered species in Egypt

- Yes there is a regular assessment for the threatened species since they fall within PAs and BGs which are managed by specialized technicians. There is no such regular assessment for species outside PAs.

## 13. List of trees for which there is no sufficient information to ascertain if endangered or not

- There might be a threat to some of the tree species from pests & diseases particularly trees in agro-forestry systems where there is no adequate know-how to ascertain if there is a threat or not.

## 14. System for documentation of propagation material

-None

## 15. Determination of propagation material for forest types

At the moment it is possible to determine quantities of seeds used whether local or indigenous. Seeds are largely collected from nearby mature trees but on adhoc basis rather than through selection of plus or elite mother trees and it therefore difficult to know the origin of seeds.

**Table 8.A. Annual production of seeds and current status of determination of propagation material for forest trees and main other trees.**

Type		Quantity	From	From	Genetically
Scientific name	N/E	Used kg	Authen. sources	Tested sources	improved
<i>Eucalyptus camaldulensis</i>	E	47	-	-	-
<i>Casuarina glauca</i>	E	56	-	-	-
<i>K. senegalensis</i>	E	38	-	-	-
<i>Acacia saligna</i>	N	53	-	-	-
<i>Cupressus sempervirens</i>	E	17	-	-	-

<i>Taxodium distichum</i>	E	18	-	-	-
<i>Dalbergia sisso</i>	E	2	-	-	-
<i>Simmondsia chinensis</i>	E	102	-	-	-
<i>Jatropha curcas</i>	E	42	-	-	-
<i>Delonix regia</i>	E	13	-	-	-
<i>Jacaranda mimosifolia</i>	E	6	-	-	-
<i>Pinus halepensis, palustris</i>	E	5	-	-	-
<i>Albizzia lebbek</i>	E	5	-	--	-
<i>Melia azedarach</i>	E	27	-	-	-
<i>Azadirachta indica</i>	E	28	-	-	-
<i>Ziziphus spina-christi</i>	E	12	-	-	-
Others	E+N	57	-	-	-

**Table 8.B. Annual number of seedlings and other vegetative propagation material**

Species		seedlings					
Scientific names	E/ N	No. Raised (000)	Authentic sources	Tested sources	Vegetative Propagation	Stem cuttings	Other
<i>Casuarina glauca</i>	E	132					
<i>E. camaldulensis</i>	E	800					
<i>Acacia saligna</i>	N	64					
<i>C.sempervirens</i>	E	200					
<i>Taxodium distichum</i>	E	85					
<i>Simmondsia chinensis</i>	E	140					
<i>Jatropha curcas</i>	E	160					
<i>Dalbergia sisso</i>	E	40					

<i>Khaya senegalensis</i>	E	96					
<i>Populus alba</i>	E					7500	
<i>Salix babylonica</i>	E					4800	
<i>Tamarix aphylla</i>	N					9700	
Ficus spp.	E					118000	
Others	E+ N	1099					
<i>Phoenix dactylifera</i>	N					664000	

## 16. Characterization of forest trees

-None

### Table 9. Forest tree species of which genetic variation has been assessed.

-None

## 17. Assembly of information on FGR

This is underway, through information required for FRA on:

1. Forest area, types, wood volume and biomass,
2. Associated products: Fire wood, timber, industrial round wood, sawn wood, wood boards, pulp & paper, paper & paper boards.

## 19. Formulation of Strategy or programme for GRC

-Yes.

This is done through:

**First:** *In-situ* conservation programmes which include:

1. PAs which number 30 covering an area of 42374km<sup>2</sup> representing 15% of the country's area and encompasses most ecosystems and natural resources (NR). There is however, a number of PAs which are concerned with tree & shrubs only. These include 7-16 PAs. They are also concerned with other NR such as plants, birds, fish, corals and other living organisms. Of the trees/shrubs which receive particular attention in PAs: Palms, Acacias, Tamarix, Dom, Mangroves, Junipers, Prosopis, Parkinsonia and others.

2. Establishment of tree nurseries inside PAs and propagation of endangered species like Mangroves,

3. Conduct of trials and improvement research *in-situ*.

**Second:** *Ex-situ* conservation of GR which include:

1. Planting extensive areas with trees irrigated with TSW,

2. Establishment of tree nurseries, raising seedlings and sale thereof,

3. Seed storage in seed or gene banks particularly of endangered species,

4. Pest & disease control, 5. Trials on genetic improvement especially introduced GRs,

6. Establishment of BGs for preservation of plant resources,

7. Conduct of trials on *ex-situ* improvement,

8. Establishment of Herbaria.

**19. Analysis of FGR conservation assessment.**

- Did not take place.

**20. Ratio of indigenous & other forest tree species conserved in-situ and ratio of endangered species.**

- There is no accurate data.

**Table 10. Targeted forest tree species encompassed in programmes/units of *in-situ* conservation**

Scientific name	Objective	Stands or sites conserved	Total area
<i>Avicennia marina</i>	Rehabilitation	-	-
<i>Rhizophora mucronata</i>	Rehabilitation	-	-
<i>Acacia raddiana</i>	Rehabilitation	-	-
<i>A. tortilis</i>	Rehabilitation	-	-
<i>Balanites aegyptiaca</i>	Rehabilitation	-	-
<i>Maerua crassifolia</i>	Rehabilitation	-	-
<i>Ziziphus spina-christi</i>	Rehabilitation	-	-
<i>Medemia argun</i>	Rehabilitation	-	-

## **21. Major obstacles for programmes of *in-situ* conservation of GR**

1. Shortage of financial resources,
2. Expansiveness of PAs and lack of sufficient observation equipment,
3. Lack of awareness amongst communities living within conservation sites,
4. Shortage of sufficient training for staff,
5. Lack of machinery & equipment for field work,
6. Lack of participation by local population,
7. Inadequacy of protective legislation.

## **22. Priorities for future *in-situ* conservation activities**

1. Consolidation of institutional capacities through capacity building,
2. Enhancement of technical & scientific abilities through provision of necessary equipment,
3. Enhancement of legislative abilities through promulgation of legislation to conserve resources,
4. Provision of necessary financial resources,
5. Enhancement of executive abilities,
6. Mobilization of cooperation and efforts between government institutions, CSOs and individuals,
7. Participation by local populations & CSOs,
8. Integration of efforts by regional & international organizations in implementing international treaties/conventions,
9. Inclusion of these treaties/conventions in nfps,
10. Awareness raising of individuals and inhabitants of areas surrounding PAs through information media (viewable, readable, heard).

## **23. Other information related to *in-situ* conservation in Egypt**

-Note Annex 2.

## **24. List of species conserved in farms in the context of agro-forestry systems**

1. *Eucalyptus camaldulensis*, 2. *Casuarina glauca* & *C. cunninghamiana*, 3. *Acacia saligna*, 4. *Populus alba* & *P. nigra*, 5. *Salix safsaf* & *S. babylonica*. 6. *Phoenix dactylifera*.

**25. Forest tree species encompassed by *ex-situ* programmes/units.**

*Afrocarpus gracilior*, *Agathis robusta*, *Bontia daphnoides*, *Ceiba pentandra*, *Dimocarpus longan*, *Eugenia super axillaris* spring, *Ficus asperma*, *F. racemosa*, *F. spraguei*, *Podocarpus elongatus*, *Phyllanthus emblica*, *Tamarindus indica*.

**Table 11. *Ex-situ* Conservation**

- No precise data available

**26. Major obstacles for improvement of *ex-situ* GRC**

1. Shortage of financial resources,
2. Urban sprawl, population concentration and rising land value in and outside cities and towns,
3. Weakness in institutional capacities,
4. Shortage in facilities & equipment,
5. Shortage of training of specialized personnel,
6. Difficulties in collecting GR from mountainous and desert areas,
7. Many seeds have inherent problems and require pre-germination treatment.

**27. Priorities for future *ex-situ* conservation activities**

1. Availing financial resources ( from government or global sources),
2. Elevation of technical & scientific capabilities through capacity building,
3. Increase of institutional technical abilities through capacity building,
4. Conduct research & trials,
5. Increase participation of PS, SCOs & individuals in tree planting & establishment of private gardens,
6. Enhance regional & international cooperation in this respect.

**28. Other information regarding *ex-situ* GRC.**

See annexes 3, 4 &5.

**29. Quantities of seeds exchanged**

- There is no accurate data on seed quantities annually exchanged but there is data on introduced species on *ad hoc* basis during recent years.

**Table 12. Seeds & vegetative propagation material annually exchanged**

Species		Seed (Kg)		Cloning material		Seedlings		Purpose
Scientific name	E/ N	Exp.	Import	Exp.	Import.	Exp.	Import.	
<i>Jatropha curcas</i>	E		✓					Bio-oil
<i>Diospyros kaki</i>	E		✓					Fruit
<i>Khaya senegalensis</i>	E		✓					Wood growth
<i>Populus spp.</i>	E				✓			Wood growth
<i>Azadirachta indica</i>	E		✓					Wood growth
<i>Ginkgo biloba</i>	E		✓					Wood growth
<i>Albizia julibrissin</i>	E		✓					Wood growth
<i>Simmondsia chinensis</i>	E		✓					Bio-oil
<i>Pinus halepensis</i>	E		✓					Wood growth
<i>P. brutia</i>	E		✓					Wood growth
<i>P. pinea</i>	E		✓					Seeds
<i>P. pyramidales</i>	E		✓					Wood growth

### 30. Species subjected to tree improvement programmes

A pilot programme is currently being activated for production of bio-oil from *Jatropha* through cooperation with JICA. The project commences its activities with trials to improve wild *Jatropha* found in Egypt and originally introduced from India with the objective of producing a variety with high oil content in seeds together with increase in seed quantity.

**Table 13. Forest improvement programmes**

Species		Improvement objective					
Scientific names	N/E	Wood	Pulp	Energy	MP	NWFPs	Other

<i>Jatropha curcas</i>	E			✓			Bio-oil & fodder
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### 31. Data/information on species used in improvement programmes

- The trials have just started, hence there is no available date to relate.

**Table 14. Data/information on species used in improvement programmes**

Species		Plus tree	Trial origin		Veg. Prop. trials		Testing/labelling product		
Scientific name	N/E		Trials	Origin			Sources tested	S.T.	S.T.
<i>Jatropha curcas</i>	E		1	1	Number	Fam.			

### Table 15. Seed Orchards

- None in Egypt

### 32. Data base on tree breeding programme

- There are no data bases on tree breeding programmes in Egypt, particularly in executive institutions (line ministries in charge of afforestation). There are however phased out programmes in FWTD-FA-Uo A such as *Casuarina* improvement programme in Egypt with the objective of maximizing wood production.

### 33. List of species that can provide quantities of improved seeds, pollen, reproductive tissue and/or other propagation material on demand.

That can be done after surveying/evaluating available trees, conduct of a programme to select plus mother trees of which GR can be taken

Table 16. Available propagation material

Scientific name	product	Available for national purposes		Available for global purposes	
		Commercial	Research	Commercial	Research
<i>Acacia saligna</i>	Seeds			✓	
<i>Albizzia lebbek</i>	Seeds			✓	
<i>Azadirachta indica</i>	Seeds			✓	
<i>Bauhinia alba</i>	Seeds	✓	✓	✓	✓
<i>B. purpurea</i>	Seeds	✓	✓	✓	✓



<i>C. cunninghamiana</i>	Seeds	✓	✓	✓	✓
<i>C. galauca</i>	Seeds	✓	✓	✓	✓
<i>Ceratonia siliqua</i>	Seeds	✓	✓	✓	✓
<i>C. sempervirens</i>	Seeds	✓	✓	✓	✓
<i>Dalberia sisso</i>	Seeds	✓	✓	✓	✓
<i>Delonix regia</i>	Seeds	✓	✓	✓	✓
<i>E. camaldulensis</i>	Seeds	✓	✓	✓	✓
<i>E. citriodora</i>	Seeds	✓	✓	✓	✓
<i>Ficus benghalensis</i>	Cuttings	✓	✓	✓	✓
<i>F. benjamina</i>	Cuttings	✓	✓	✓	✓
<i>F. elastica</i>	Cuttings	✓	✓	✓	✓
<i>F. eriobotroides</i>	Cuttings	✓	✓	✓	✓
<i>F. pandurata</i>	Cuttings	✓	✓	✓	✓
<i>F. parasitica</i>	Cuttings	✓	✓	✓	✓
<i>F. religiosa</i>	Cuttings	✓	✓	✓	✓
<i>Jacaranda mimosifolia</i>	Seeds	✓	✓	✓	✓
<i>Khaya senegalensis</i>	Seeds	✓	✓	-	-
<i>Melia Azedarach</i>	Seeds	✓	✓	-	-
<i>Morus alba</i>	Seeds	✓	✓	✓	✓
<i>M. nigra</i>	Seeds	✓	✓	✓	✓
<i>Populus alba</i>	Cuttings	✓	✓	-	-
<i>P. euphratica</i>	Cuttings	✓	✓	-	-
<i>P. nigra</i>	Cuttings	✓	✓	-	-

<i>Salix babylonica</i>	Cuttings	✓	✓	✓	✓
<i>S. salsaf</i>	Cuttings	✓	✓	✓	✓
<i>Schinus molle</i>	Seeds	✓	✓	-	-
<i>S. terebinthifolius</i>	Seeds	✓	✓	-	-
<i>Tamarix aphylla</i>	Cuttings	✓	✓	✓	✓
<i>Taxodium distichum</i>	Seeds	✓	✓	✓	✓
Tipuana speciosa	Seeds	✓	✓	✓	✓

### 34. There is no nfp in Egypt

**Table 17. List of institutions concerned with FGR conservation & use**

Institution	Type	Activities/Programmes	Communication coordinates
1. Central Administration for Afforestation & Environment. Ministry of Agriculture & Land Reform	Gov.	1. Establishment of plantation forests, 2. Establishment of FTN sale of seedlings, 3. Import seeds, 4. Sign treaties and conventions, 5. Establish and manage BGs	Sharia Nadi Said, Dokki, Giza, Cairo
2. Ministry of Housing & New Community Settlements	Gov.	Planting forests irrigated with TSW	No1, Ismail Abaza St. Lazoghly, Cairo. Tel. 27921440 Fax. 27921423
3. Ministry of Haulage & Transport	Gov.	Planting windbreaks on roads/highways	105, Sahrria Gasr Ainie, Garden City, Cairo. Tel. 7955567
4. Ministry of Irrigation & Water Resources	Gov.	Planting trees on canal & drain sides	Sharia Jamal Abdel Nasir, Warrag, Nr. Rowd Al Farag Bridge, Giza. Tel. 35449470, Fax.

			35449470
5. Nature Conservation Sector, Environment Affairs Agency, State Ministry of Environmental Affairs	Gov.	1. Preservation & conservation of forest resources, 2. Establishment of FTN and propagation of endangered species, 3. Establish & manage PAs, 4. Sign environmental treaties	30, Egypt-Hulwan Agr. Rd., Maadi, Cairo.  Tel. (202) 25271391,  Fax. (202) 20280931  P.O.Box 11728 E-mail: <a href="http://WWW.ecaa.gov.eg">WWW.ecaa.gov.eg</a>
6. National Gene Bank, Agricultural Research Centre, Ministry of Agriculture & Land Reform	Gov.	1.Preservation of seeds and GR of trees & shrubs, 2. Establish FTN for propagation of degraded species, 3. Establish Herbaria	9, Sharia Cairo University, Giza, Cairo. Tel. (2020) 35693359,  Telfax. (2020) 35603240. E-mail: info@ngb.gov.org
7. Tree Lovers Association	Private	1.Advocay and Information activities towards the cause of planting and caring for trees in Cairo	
8. Private Sector	Private	1.Propagation of palms (date & Ornamental), 2. Establish nurseries & sell seedlings,3. Plant agro-forests, 4. Plant trees in and around farms & homesteads.	
9. Department of Forestry & Wood Technology, Faculty of Agriculture, University of Alexandria.	Gov.	1. Education, 2. Research, 3. Training, 4. Consultancies, 5.Sell improved seedlings.	Sharia Aflaton, Shatby. Alexandria,Tel. (203) 5924391,Fax. (203) 5922780

10. Department of Forest Trees (DFT), Horticulture Research Institute, Ministry of Agriculture & Land Reform	Gov.	1. Research, 2. Sale of improved seedlings.	Sharia Cairo University, P.O.Box 12619
11. Municipalities & Localities (Part of local councils in Provinces), Ministry of Local Development.	Gov.	1. Planting of trees in roads in towns, 2. Establish parks & gardens	
12. Palm Research Department (PRD)	Gov.	Research	Sharia Cairo University, P.O.Box 12619

**35. Establishment of national coordination mechanisms to encompass institutions or national programmes for FGR**

- Did not materialize

**36. Trends in support of HR over the past decade**

- Yes, attitudes have changed positively,

- Increase finance for the programme.

**37. Estimation of budget earmarked for researching FGR and as a ratio to total forestry budget**

- No special budget is earmarked for research of FGR and no portion of forest budget goes towards FGR. Research is conducted by default within activities of FWTD-FA-U o A, Department of Forest Trees of HRI and PRD of HRI, both of MALR.

**38. Curricula of FGR.**

These are covered by FWTD-FA-U o A at Bachelor, Masters and PhD levels.

**39. Needs and priorities of Research, Education & Training**

1. Establishment of well equipped laboratory,

2. Exchange of experiences between researchers in Egypt with their counterparts in developed countries in this respect through exchange visits, joint research and participation in scientific gatherings,

3. Provision of basic information/data with emphasis on SFM, GRC together with processing of locally grown timber,

4. Consolidation and improvement of coordination between various agencies involved in forestry activities & tree planting for the purpose,
5. Need for long term research programme that includes priorities of SF, FGR conservation, processing of local timber and direction of more focus towards carbon sequestration activities & NWFPs,
6. Establishment of consultative cooperation body for research in which are representatives of universities, research institutes, government administrations, PS and NGOs for formulation of National Strategy & Work Plan on Research according to needs,
7. Improvement of forestry education through conduct of manpower assessment survey & needs Assessment and incorporation of that in curricula,
8. Tying education to research,
9. Necessity of conducting periodic on-job training for field personnel,
10. Training should encompass personnel in government institutions, PS & individuals,
11. Provision of economic support for education, research & training.

#### **40. GRC Legislations**

The following legislation exists and is in force:

1. Law No. 102 for 1983 on Protected Areas,
2. Article 59 of Law No.4 for 1994 on Nature Conservation,
3. Law No. 140 for 1956 on Public Roads and Trees Planted Around Them,
4. Law No. 53 for 1966 on Agriculture,
5. Law No. 84 for 1968 on Public Roads,
6. Law No. 59 on Vegetation Associations.

Most of these Acts/Laws embody provisions encouraging tree planting and prohibiting cutting thereof.

#### **41. Legislative framework for strategies & programmes of FGR Conservation**

-There is no such framework as such, but some provisions are embodied in legislative framework for environmental protection.

Table 18. Needs for Development of FGR Legislation

Needs	Priority			
	Not applied	Low	Medium	High
Improvement of FGR legislation			✓	
Improvement of reporting requirements			✓	
Consideration of non-abiding penalties			✓	
Establishment of FGR mechanisms			✓	
Strengthen cooperation between national institutions involved in FGR			✓	

#### 42. Initiation of special awareness programme on FGR

-There is no such programme. There is evident lack of concern for natural resources & their importance in general education. Blame is levelled on forest administrations for failure to elevate public understanding of SFM through for instance publicizing the effects of tree planting, their rational use & conservation on BD and on direct and indirect economic values of forests. There are however, some activities of limited impact e.g.:

1. Annual celebration of Arbor (Tree) Day when trees are planted, pamphlets/brochures/posters is issue together with radio/TV programmes & press coverage,
2. Celebration of WED,
3. NGO, CSOs concerned about tree planting established such associations as ‘Tree Lovers Association’ that takes care of tree planting in cities, with focus on their diversity together with issue of brochures on the subject.

Table 19. Awareness Raising Needs

Needs	Priority			
	Not applied	Low	Medium	High
Preparation of Info Package on FGR				✓
Preparation of FGR Strategy				✓

Improvement of access to information on FGR				✓
Strengthening education & training on FGR				✓
Improvement of concept of FGR benefits & values				✓
Other (specify)	-	-	-	-

#### 43. Impact of International Conventions/Treaties on FGRC

Egypt signed and ratified a number of regional and international obligations related to SFM. Egypt is party to the following:

1. CBD, 2. IFCCC & Kyoto Protocol,
3. UN Convention to Combat Desertification (CCD),
4. Ramsar Convention on Wetlands,
5. World Heritage Convention,
6. CITES, 7. Convention on Migratory Species,
8. International Timber Trade Organization

CITES & CBD were signed by EEPA on 16/2/78 and 6/9/1992 respectively. These two conventions had a tangible positive benefit on increase of PAs in Egypt and on all endangered living organisms including trees, shrubs, birds, mammals; marine or terrestrial. The number of PAs reached 30 with a total area of 42000km<sup>2</sup> representing 15% of the country area which positively impacted *in-situ* FGRC.

#### 44. Current International Cooperation

There are a number of activities on cooperation between Egypt and a number of countries mostly centred round trials of introduced species from similar provenances to Egypt particularly tree species with high wood, bio-oil or fruit production potential. This cooperation is administered by CAAE of MALR and counterparts in cooperating countries.

This cooperation needs to be consolidated and widened to include other countries. The introduced species need to be monitored & followed-up to assess the achievement of objectives for which they were introduced. There is need to further diversify introduced species.

**Table 20. Glimpse of Activities& Outcome of Networks**

Network	Activities	Species
Rejuvenation of forests in Algeria, Egypt, Morocco & Tunisia using TSW in support of small holders & farmers	-Exchange of information, - Laying down of guidelines, - Joint data bases	<i>Populus alba</i> , <i>P. nigra</i> , <i>P. euphratica</i> , <i>Salix safsaf</i> , <i>S. babylonica</i>

**Table 21. Needs for International Cooperation & Networking**

Needs	Not applies	Low	Medium	High
Understanding the state of diversity			✓	
Supporting management & <i>in-situ</i> conservation			✓	
Supporting management & <i>ex-situ</i> conservation			✓	
Enhancing utilization of FGRs				✓
Supporting Education & Training				✓
Enhance Legislation				✓
Support data base management & early warning about FGR				✓
Raise Public Awareness			✓	
Any other priorities (specify)			✓	

#### **45. Systems for Access to & Sharing of Benefits from FGR**

- There is no such system in Egypt.

There are however authentic traditions in mountain and desert areas which have for ever positively impacted BD & GRC. Of late however, these norms have been overlooked in view of



population pressures, increased excessive grazing, and wood pillage together with tourism and trade activities which all lead to degeneration of some resources. In general, understanding the principles of equitable sharing of benefits accruing from the use of FGR faces a horde of difficulties.

A system is being implemented inside PAs which does not allow the utilization of GR except after referring to NCS in EEPA together with recognition of the right of indigenous population in benefit sharing.

#### **46. Presence of Legislation to Restrict Access to GR.**

-None

#### **47. Modalities for Recognition of Intellectual Property Rights on FGR**

- None before.

Work is underway to envisage a modality for protection of cultural & social heritage of local communities through protection of intellectual property rights (IPR), where current information indicates continuous decrease of traditional knowledge especially in and among recent generations who are keen to acquire modern knowledge and abandon traditional heritage.

#### **48. Mechanisms for Sharing of Benefits Accruing from Utilization of FGR**

\_ There are mechanisms for particular sites. For instance natural mangrove stands on the Red Sea Coast (originally government ownership) were on the verge deterioration as a result of continuous excessive grazing & wood cutting. Through popular awareness raising and involvement of people in responsibility there are now in place several mechanisms for benefit sharing:

1. Conservation of existing mangrove stands is one of the responsibilities of local population besides government authorities,
2. Planting of seeds & transplanting of seedlings to increase the extent of mangrove stands in their vicinity,
3. Restriction and organization of grazing especially on young plants,
4. Restriction & organization of wood collection,
5. Orientation towards new economic pre occupations relevant to fishing, tourism & forestation,
6. Establishment of wild bee hives based on mangrove flowers,
7. Involvement of local population in most activities of management plans to maximize and access economic returns from Mangroves with the concept that participation is key to sustainable management.

**Table 22. Trees & Other Woody Plants Crucial for Achievement of Food Security (FS) & Poverty Alleviation (PvA)**

Species		Utilization for securing Food Security (FS)	Utilization for Poverty Alleviation (PvA)
Scientific name	N/E		
<i>Casuarina glauca</i> & <i>C.cunninghamiana</i>	E	- Increase agricultural production when used as wind breaks, - Wood production	- Increase agricultural production when used as wind breaks, - Wood production
<i>Eucalyptus camaldulensis</i>	E	Increase agricultural production when used as wind breaks, - Wood production	Increase agricultural production when used as wind breaks, - Wood production
<i>Acacia saligna</i>	N	- Fuel wood, windbreaks, sand dune fixation, -Leaves & fruit as fodder	Fuelwood, windbreaks, sand dune fixation, -Leaves & fruit as fodder
<i>Tamarix aphylla</i>	N	- Wind breaks, sand dune fixation, - Stops sand encroachment on farms and human settlements	- Wind breaks, sand dune fixation, - Stops sand encroachment on farms and human settlements
<i>Morus alba</i>	N	Fruit, wood, leaves for feeding silk worms	Fruit, wood, leaves for feeding silk worms
<i>Ficus sycamorus</i>	N	Fruit, wood	Fruit, wood
<i>Ziziphus spina-christi</i>	N	Fruit, wood	Fruit, wood
<i>Simmondsia chinensis</i>	E	Bio-oil, fuel wood, fodder	Bio-oil, fuel wood, fodder
<i>Jatropha curcas</i>	E	Bio-oil, fuel wood, fodder	Bio-oil, fuel wood, fodder
<i>Phoenix dactylifera</i>	N	Fruit, fronds used in making particle board & packaging	Fruit, fronds used in making particle board & packaging
<i>Mangroves</i>	N	Fuel wood, fodder, fisheries, bee-honey production	Fuel wood, fodder, fisheries, bee-honey production

## References:

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6. FAO (2005). **State of World Forests.**
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Annex 1.

## **Forests Irrigated with Primary Level Treated Sewage Water**

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## Introduction

Egypt started since 1995 establishing plantation forests irrigated with 1°ry TSW as a safe modality to dispose of sewage water (SW) emanating from urban and industrial centres. In 2000 1°ry TSW was 6.3 billion cubic meters (bm<sup>3</sup>). It is expected to reach 8.3 bm<sup>3</sup> in 2017.

Disposal of such water is a great hazard to humans & the environment. Previously it was disposed of in fresh and saline water bodies (rivers & sea). Forests are rare in Egypt in view of the arid nature and lack of rainfall. There is growing demand for forest trees as a source of wood and NWFPs. The environmental role of forests cannot be belittled in sequestering carbon, reduction of Green House Gases besides generation of oxygen, air purification and all other services as windbreaks, sand dune stabilization and rehabilitation of degraded lands (DL).

CAAE of MALR established 24 forest plantations of different areas in various locations across the country. They are mostly drip irrigated using 1°ry TSW, so that trees benefit from nutrients and water does not trickle down to the water table.

Various trees already grown in Egypt were used together with introduced others such as *Jatropha* for bio-oil production. The following is list of such forests.

Table. Annex 1.1.Plantation Forests irrigated with 1°ry TSW in Egypt

n.	Forest	Location	Province	Area feddan	Date allocated	Planted area fedd	Tree species	Daily avail. water m <sup>3</sup>	Future area fedd.
1	Kharjah	Khrajah	New Valley	200	2003	200	1,2,3,4	18 000	150
2	Rashdah	Dakhlah	New Valley	25		25	1,2,4,5	2000	
3	Paris	Paris	New Valley	60		50	5	2000	
4	Moot	Dakhlah	New Valley	1000	2002	350	6,7	20 000	650
5	W. Allaghi	Aswan	New Valley	550	2002	120	5	26 000	1185
6	Bellanah	Aswan	New Valley	1235	2002	120	5	5 000	80
7	Nasr	Aswan	New	100	2000	20	5	8 000	500

	Nubia		Valley						
8	Edfo	Edfo	Aswan		***	300	5	36 000	
9	Luxor	Luxor	Luxor	143	1997	143	5,1,8,6	36 000	1741
10	New Luxor	Luxor	Luxor	1741	2003	600	5,6	26 000	1000
11	Gina	Salihya	Gina			200	5	23 000	207
12	Sohag West	Awlad Uzaz	Sohag	267	2003	267	5	2 000	
13	Alkoolah	Akhmim	Sohag	400	2000	400	6	3 000	
14	Asuit	West Tanneries	Asuit	40	2003	40	5	1 500	
15	Wasti	Wasti	B.Swaif	498	2001	300	1,2	30 000	198
16	Alsuff	Alsuff	Giza	500	2000	200	5,9	✓	300
17	Sadat	Sadat	Manofya	700		700	1,9,10,11	18 000	
18	Jamasa	Jamasa	Daghalya	200	2000	100	1,9	20 000	100
19	AlTour	AlTour	S. Sinai	205		205	9,1,2,12,14	3 500	
20	Jaradah	Ariesh	N. Sinai	200	2002	100	2,10,9	20 000	100
21	Hurgada	Hurgada	Red Sea	205	2003	205	2,6,9	23 000	
22	Sarabium	F.Centre	Ismailia	600	1997	600	9,10,5,13	96 000	
23	Matrouh	M.City	Matrouh	2055	2006	350	9,10,2	50 000	150
24	Gous	Gous	Gina	1170	2000	300	2,1,5	80 000	50

✓ :Drain Canal, \*\*\*:Committee minutes; 1.Eucalyptus, 2.Casuarina, 3. Neem, 4. Terminalia, 5. Khaya senegalensis, 6. Jatropha, 7. Jojoba, 8. Morus spp., 9. Cupressus, 10. Pinus, 11. Dalbergia sisso, 12. Pritchardia, 13. Conocarpus, 14. Palm



Annex 2.

## Protected Areas

A Way of Conserving Forest Genetic Resources *in-situ*

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B. Main Vegetation Zones & Types in Egypt

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## **A. Introduction**

Plant and terrestrial trees are some of the most important biological resources with which natural habitats of Egypt teem and which have not been equitably tapped. More than 2000 terrestrial plants thrive in Egypt, including 60 endemic species not to be encountered anywhere else. The country encompasses a number of habitats which accommodate many plant communities such as mountains, plains, slopes, sand dunes & sheets, wetlands, fresh and saline waters, rain-fed and irrigated agricultural land.

In terms of plants Egypt is classified under four plant zones: Transitional Region of Mediterranean Desert; Saharo Sindian Region; Transitional Irano-Turanian Species Distribution Centre and Sahilian Transitional Region. The diversity of genetic resources in plants & terrestrial trees in Egypt is currently under many threats which render it fragile and prone to degradation at alarming rates. These threats include climatic changes, mismanagement, excessive grazing and wood pillage from local residents and visitors, which all require national resolve to conserve and sustain these resources.

## **B. Main Vegetation Zones & Types.**

Egypt occupies an area of some one million square kilometres, of which 92% is desert. The balance of 8% is arable land restricted to the Nile Valley and some oases in the Western Desert.

Egypt, lies at the northeast corner of Africa at the junction of four bio geographical regions, Irano-Turanian, Mediterranean, Saharo-Sindian and Afro tropical. At the same time it is at the centre of the great Saharo-Sindian desert belt that runs from Morocco on the northwest corner of Africa to the high, cold deserts of central Asia. Egypt is bounded on the north and east by two largely enclosed seas, the Mediterranean Sea and the Red Sea. This unique position is enhanced by the circumstance that it is divided by the Nile, the longest river in the world. Most of Egypt is either arid or hyper arid; however, due to its very varied eco-zones, the country is home to a wide diversity of terrestrial habitats and fauna and flora, which although relatively low in species numbers and with few endemics, is extremely varied in composition.

Egypt can be divided into four bioclimatic zones:

- a). Eastern Desert, an area which is hyper arid with moderate winter, hot summer and very little rainfall,
- b). South Sinai, which is also hyper arid but with relatively cold winter and rainfall not exceeding 30 mm/annum,
- c). Northern Coast, along the Mediterranean, dry with rainfall in excess of 100mm/annum,
- d). The Semi-Sahilian Belt & Wetland (Nile Valley & Delta), where winter is mild, summer hot and dry and rainfall 30-100 mm/annum.

Biodiversity of Egypt is characterized by several facts most salient of which are desert environment, geographic location and varied climate. The River Nile contributed to the unique diversity of flora & fauna. This stark contrast between water and drought exists in a few locations in the world. Also there are some environs and types on the very edge of their geographic distribution such as Mangroves on the Red Sea and *Dracaena ombet* and are therefore considered fragile environs of high ecological value.



Mangroves on the Red Sea

A number of plants distributed in Egyptian desert have the ability to germinate, flourish, flower and produce seeds in a short period during the rare rains. Seeds remain in the sand for periods of years before it rains for them to resume their life cycle. Gebel Elba accommodates a large number of plants. Sinai too accommodates quite a number of wild plants with 19 endemic species; most of them are of great medicinal value.

As for the terrestrial environment of Egypt outside the Nile Delta, it is generally considered one of the most hyper arid regions with bare desert that does not entertain rain for decades. Some rains do fall on the Northern Coast and the Sinai Mount and in the south eastern corner where mist condenses on Gebel Elba to yield the Egyptian example of unique endangered ecosystem- the Mist Forest of the Red Sea where *Dracaena ombet* thrives on the limit of its geographic distribution.

The presence of the great River has helped to a great extent in improving the BD status. It set distinctive niches of fresh water and wet lands of importance to migratory birds across Egypt and to those which winter in it. The same is true for other migratory animals. Over and above

there is a high species endemism in view of the aridity of North Africa during the past five millennia. That lead to the partition of environs and what is left is secluded areas inhabited by plants and animals as is the case in the Western Desert oases and Sinai Mountains. Gebel Elba is an example of high BD and endemic species.



**The Nile @ Aswan**



**View of a valley in W. Allagi Protectorate**

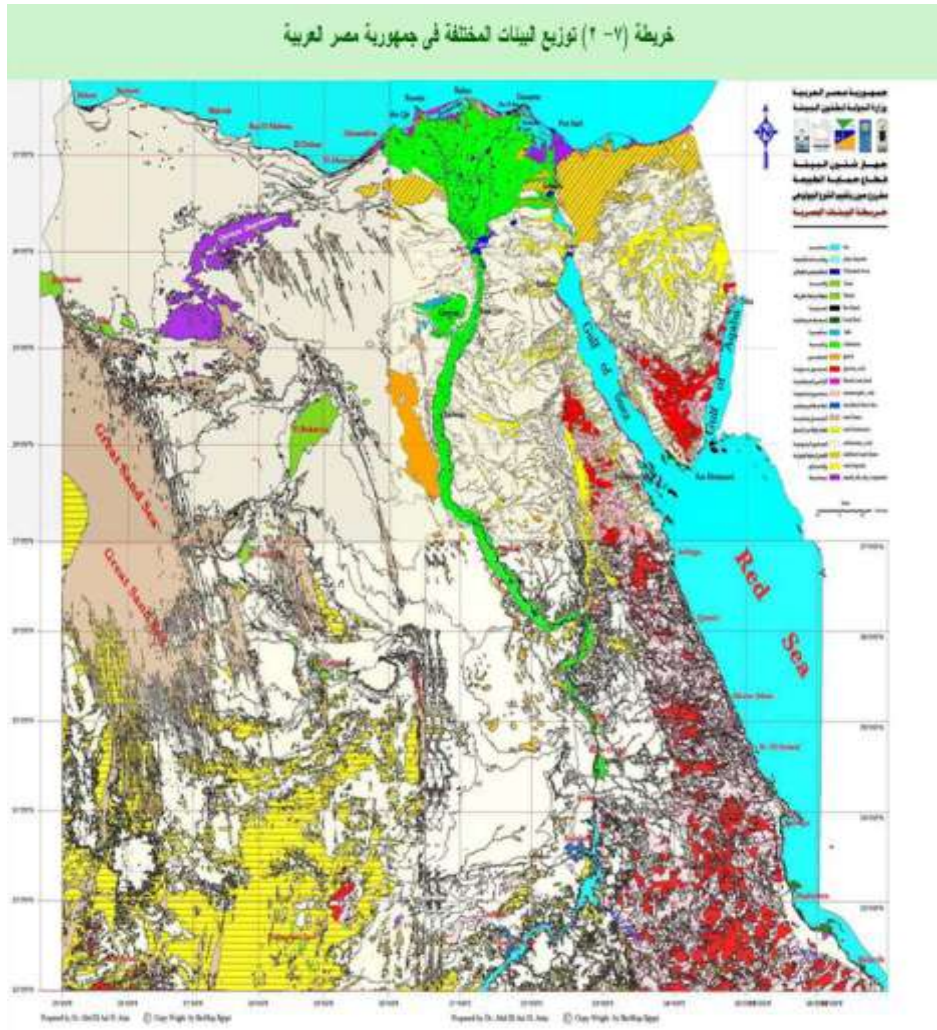
The NCS of EEPA has recently compiled a map of Egyptian Environs from data available in:

1. Satellite Imageries,
2. High Frequency Radar Topographic maps,
3. Geographic map of Egypt Scale 1: 250 000,
4. Relief map of Egypt scale 1: 250 000.

The environ interpretation was based on data available from S. Imageries such as land use, water surfaces, agricultural land, oases and lakes. The geological maps availed rock formations, sand dunes, valleys and mountains.

## 2. Vegetation Types & in-situ conservation

Wild plants in Egypt are well studied and documented in a number of available reference books, theses and research & scientific reports. The Flora of Egypt contains 2121 Taxa. Tentative Red List cites 450 species representing some 25% of total flora. The NCS of EEPA has during the past few years and in collaboration with Egyptian Research Institutions and Associations undertook a number of national surveys of wild plants. Some 1775 plants have been documented: 279 species in N. Sinai; 472 in S. Sinai; 328 in Northern Coast; 66 in Halaib Area; 250 in Western Desert and 280 in Eastern Desert, which all indicate a decreasing trend due to various threats.



Distribution of environs in Egypt (EEPA 2008)

20 vegetative zones have been delineated and are considered to be the richest in wild plants in the country, half of which is found in the Mediterranean Region (Shaltout *et al* 2011). Ten of these zones fall within the Mediterranean zone and five contain species endemic to Egypt or species of restricted distribution.

The main vegetation zones of Egypt ( see map) consist of five Coastal Lakes; Lime Stone Mountains in N. Sinai; Depressions and Highlands in Amed Protectorate; Maghara (Cave ) Oasis, Western Mediterranean Coastal Sand Dunes and Salloum Plateau on the Libyan border. A number of important endangered species are scattered in these zones such as *Juniperus phoenicea* found in Halal Mount in N. Sinai. The St. Catherine montane area in S. Sinai is considered one of the richest vegetative zones in flowering plants in Egypt where it contains some 500 species of vascular plants and 50% of endemic *spp* . in Egypt.





*Hyphaene thebiaca*

The Arid and Sub-humid areas cover most of the surface area of Egypt (92%), where there are varied habitats. The Western Desert (681 000km<sup>2</sup>) is a tropical plateau in most parts ( most salient of which is Gilf Kebir Plateau and Awainat Mount) and with many depressions (Ghattarah, Siwa, Fayoum) and parallel series of sand dunes (Great Sea of Sand). The Eastern Desert (223 000km<sup>2</sup>) is a rocky plateau with backbone (the Red Sea Littoral) and a few valleys. The Sinai Peninsula (61 000km<sup>2</sup>) is a large mass of basement formations with ragged heights (Gebel St. Catherine), valleys and some oases (Fairan).

Wadi Al Gimal Protectorate is considered one example of arid area of Egypt teeming with wild plant & tree species. The ecosystem of Wadi Al Gimal is still fairly virgin compared to similar ecosystems. It has many fresh and salt marshes, coastal plains and high mountains considered to be a main source of GRs. Some 140 plant species belonging to 46 Families and 70 Genera of which 55 types are permanent and 15 semi-permanent. The plant content of the Protectorate is of great importance to the local population where some 125 species of range/grazing importance have been recorded such as (*Acacia raddiana*), 32 species are used in traditional medicine such as (*Balanites aegyptiaca*, *Salvadora persica*), 30 species of culinary value such as (*Ziziphus spin-christi*), 11 species as fuel source such as *Tamarix spp.* and 8 species used in domestic furniture, implements and housing (*A.raddiana* and *Phoenix spp.*).

The montane areas of Egypt are distinguished by unique biodiversity particularly plants in view of variations in dry habitats and temperature ranges such as mountain tops, crevasses, slopes, desert plains, mountain valleys, meadows and caves. Some 600 plant species have been recorded in Egypt. For instance, in the early 1990s some 540 species have been recorded in Sinai Mountains with a large proportion in St. Catherine Mount (14 species), Gebel Sirbal (41 species). These include most of the endemic species and are found in high altitudes (1500-2000 m) which in effect are an extension to West Asian Alpine Mountains. Of the endemic species there is *Rosa arabica*, *Phlomis aurea*, and others (51 species) and which are considered in danger of extinction. During the last few years some 472 species have been



Fig. (Annex 2.1.). Salient Vegetation Zones of Egypt

- |  |                    |                         |                     |
|--|--------------------|-------------------------|---------------------|
| 1. North Sinai Mountains                     | 2. Bordwail Lake   | 3. Manzalla Lake        | 4. Barlus lake      |
| 5. Edcao Lake ,                              | 6. Mariot Lake,    | 7. Ameen Protectorate , | 8. Maghara Oasis    |
| 9. Coastal Sand-dunes Western Mediterranean, | 10. Salloum Area,  | 11. Rayyan Valley,      |                     |
| 12. St. Katherine,                           | 13. Nabeg,         | 14. Hurgada ,           | 15. Camels Valley,  |
| 16. Dungal and Dinaigeel Oases,              |                    |                         |                     |
| 17. Naser Lake ,                             | 18. Allagi Valley, | 19. Saluga & Ghazal,    | 20. Halaib Triangle |

Recorded in St. Catherine out of 540 i.e. there is a loss of some 70 species. 20 years ago, some 41 species have been recorded in Gilf Kebir and 71 in Gebel Awainat particularly in Karkour, Salh and Hurra villages. Last year only 31 species have been recorded.



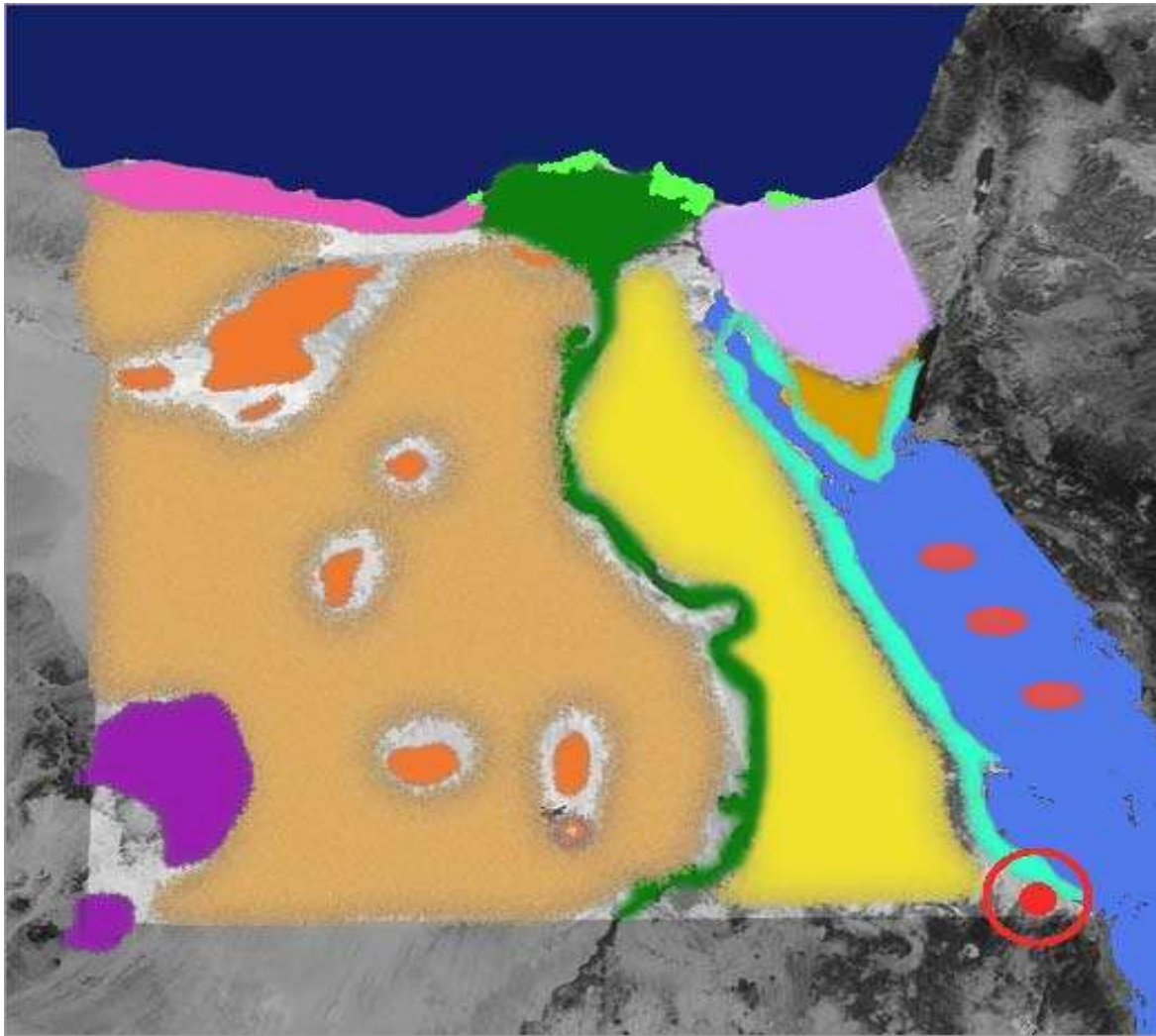
***Balanites aegyptiaca* & *Acacia tortilis* in Gebel Elba Protectorate**

Fig. Annex (2.2). Depicts habitats, distribution & types of wild plants in Egypt, where it was possible to organize the country into 14 ecosystems, each of which accommodates its particular characteristic species.

Through the assessment of endemic tree & shrubs and the endangered ones in natural environment of Egypt, it was possible to identify (9) endemic species (7) of which are in Sinai Peninsula and (2) in Eastern Desert (Abdel Ghani & Fahmi 1994). Some (10) tree/shrub species are classified as extinct. See Table (Annex. 2.1). Studies have also affirmed that some (142) species fall under the Red List i.e. either extinct or very rare. These included *Ephedra sinaica* in N. Sinai, *Ephedra foliate* in St. Catherine Mount in S. Sinai & Red Sea Littoral, *Juniperus Phoenicia* in N. Sinai, *Medemia argun* in Nubia Desert, *Dracaena ombet* in Gebel Elba together with *Rosa arabica*, *Phlomis aurea*, *Pterocephalus arabicus* in St. Catherine and many other endangered species (Abdel Ghani El Haddad *et al* 1992).



Fig. Annex (2.1.) Main Environs/Habitats of Egypt



Gebel Elba	Mountains and Wadis of the Eastern Desert	Red Sea Littoral Habitats
Red Sea Islands	Red Sea Marine Habitats	Central and North Sinai
Mediterranean Wetlands	Mountains and Wadis of the Eastern Desert	The Nile Valley and Delta
Gebel Uweinat and Gifl Kebir	Sands and Dunes of the Western Desert	Western Desert Depressions and Oases
Western Desert Mediterranean Coast	Mediterranean Marine Habitats	

**Table Annex (2.1). Trees & Shrubs Endemic to Egypt**

n.	Species	Arabic Name	Where to be found
1.	<i>Silene schimperiana</i>	وسبى	S. Sinai (St. Catherine Protectorate)
2.	<i>Fagoia taekhlomiana</i>	حلاوة- شكاة	Eastern Desert (East Cairo)
3.	<i>Helianthemum schweinfurthii</i>	جديم	Eastern Desert (Jallala Desert)
4.	<i>Pterocarpus arabicus</i>	صفيرة	S. Sinai (St. Catherine Protectorate)
5.	<i>Rosa arabica</i>	الورد العربى	S. Sinai (St. Catherine Protectorate)
6.	<i>Thymus decussatus</i>	زعترا	S. Sinai (St. Catherine Protectorate)
7.	<i>Phlomis aurea</i>	عورور	S. Sinai (St. Catherine Protectorate)
8.	<i>Anarrhinum pubescens</i>	رفيعة	S. Sinai (St. Catherine Protectorate)
9.	<i>Kickxia macilenta</i>	حلاوة	S. Sinai (St. Catherine Protectorate)

**Table Annex (2.2). Extinct or very Rare Wild Trees & Shrubs in Egypt**

n.	Species	Arabic Name	Where to be found
1.	<i>Carnulacu ehrenbergii</i>	حاد	Gebel Elba Protectorate (Red Sea)
2.	<i>Anagyris foetida</i>	حب الملوك	Natural Protectorates Sinai
3.	<i>Zygophyllum fabago</i>		Wadi Digla Protectorate (S. Sinai), Ariesh (N. Sinai)
4.	<i>Teucrium brevifolium</i>		North Coast Mediterranean
5.	<i>Rhus coriaria</i>		St. Catherine Protectorate (S. Sinai)
6.	<i>Grewia villosa</i>	ديوال	Gebel Elba Protectorate (Red Sea)
7.	<i>Pavonia kotschyi</i>	إكفالييت	Gebel Elba Protectorate (Red Sea)
8.	<i>Leucas inflata</i>		St. Catherine Protectorate (S. Sinai) Gebel Elba Protectorate (Red Sea)
9.	<i>Dichrostachys cinerea</i>		Nile Banks-Nubia
10.	<i>Medemia argun</i>	عرجون	Wadi Allagi Protectorate (Nubia Desert)

*In-situ* Protection. The Arab Republic of Egypt had during the past two decades accorded special consideration for natural resources protection issues. It laid down regulations and legislation to protect National Heritage & Environment and conservation of natural resources for the benefit of current and future generations. Law 102 of 1983 was promulgated as regards Natural Protectorates. This was immediately followed by the declaration of the first natural protectorate (Ras Mohamed National Protectorate in S. Sinai). Declaration of other PAs followed to reach 30 in 2012 with an area equivalent to 15% of the total area of the country (note map). That area represents various unique and rare ecosystems. It is envisaged in the context the National Strategy for Biodiversity Conservation approved in 1997 to bring the number of PAs to 40 representing 17% of the total area of the country.



***Acacia raddiana* and *Salvadora persica*- Wadi Allagi Protectorate- Aswan**

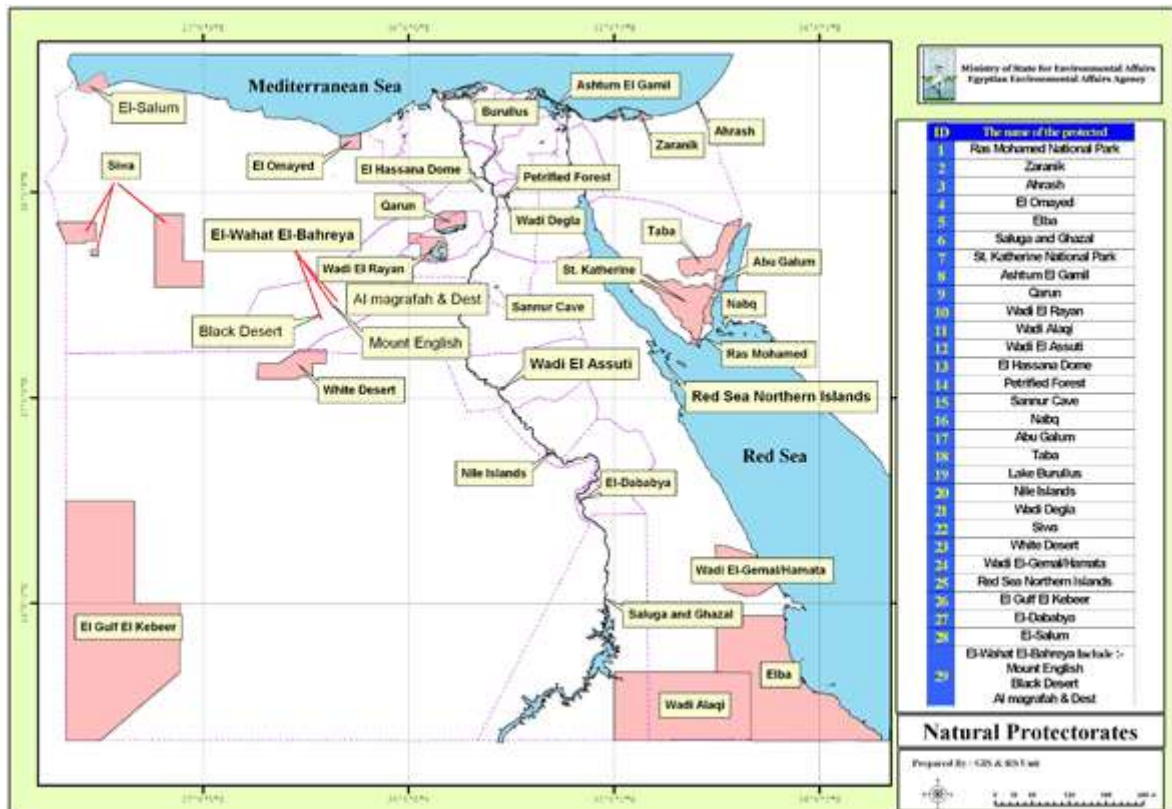
The PAs of Egypt accommodate about 1100 plant species (54% of the Flora of Egypt). Protectorates of Gebel Elaba, Al Ameed, St. Catherine, Al Allagi, Saluga & Ghazal, Nebeg and Abu Jaloum are considered some of the most important biodiversity areas in the country. For instance, out of 61 plant species endemic to Egypt, St. Catherine Protectorate contains 33 species together with 4 species found in other protectorates. This means that Protectorate on its own conserves in-situ 61% of endemic plant species of Egypt. There is thus dire need to undertake a detailed study to accurately map the important plants distributed in Egypt which have not been constituted as PAs such as the areas of *Juniperus phoenicea* on Halal Mount and Maghara in N. Sinai.





Mangroves on the Red Sea Coast

Protected Areas of Egypt



**Table . (Annex 2.3.). Protected Areas Declared in the Context of Act 102 of 1983 on Protected Areas**

n	Protectorate	Date Declared	Type/Function	Area km <sup>2</sup>
1	Ras Mohamed , Tairan & Sanafeer Islands	1983	Natural Heritage	850
2	Zaraneeg & Bordwail Marshes	1985	Wetlands & Bird Sanctuary	230
3	Ahrash (Bushes)	1985	Natural Resources Development	8
4	Ameed Natural Protectorate	1986	Desert/Biosphere	700
5	Elba	1986	National Park	35600
6	Salougah & Ghazal	1986	Wetlands & Scenery	0.5
7	St. Catherine	1988	International Heritage	4250
8	Ashtom Gameel	1988	Wetlands & Bird Sanctuary	180
9	Garoun	1989	Wetlands	1385
10	Wadi Rayaan	1989	National Natural Monument	1759
11	Wadi Al Allagi	1989	Desert/Biosphere	30000
12	Wadi Al Assuiti	1989	Propagation/ Multipurpose	35
13	Gubat Al Hassana	1989	Geological	1
14	Fossilized Forest	1989	Geological	7
15	Wadi Snor Cave	1992	Geological & National Monument	12
16	Nebeg	1992	Multipurpose	600
17	Abu Jaloum	1992	Natural Scenery	500
18	Taba	1998	Desert & Natural Heritage	3595
19	Barlus	1998	Wetlands	460
20	Nile Islands (144)	1998	Wetlands	160

21	Wadi Digla	1999	Desert lands	60
22	Siwa	2002	Desert & Civilization Heritage	7800
23	White Desert	2002	Desert lands	3010
24	Wadi Gimal-Hamata	2003	Desert lands	7450
25	Northern Red Sea Islands	2006	Resources Development	1991
26	Gilf Kebir	2007	National Cultural Park	48523
27	Dabbabiya	2007	Geological	1
28	Salloum	2010	Marine	383
29	Marine Oases	2010	Natural Monument	109
30	Gebel Kamil Meteor	2012	Geological	20

### C. Repair & Rehabilitation of Protected Areas

#### 1. Rehabilitation Programme for Mangroves on the Red Sea

The Red Sea Marine environ is one of the most important ecosystem accorded focussed attention by NCS. The ecosystem was studied by a number of prominent academicians and researchers from universities & research centres, experts from MALR and environment researchers. The output is substantial information & data on Mangroves in terms of types, distribution, areas, associated biota, density, primary production, tree biology, socio-economic status of human population living in the vicinity, their activities & impact on the resource and successful reforestation recently undertaken.

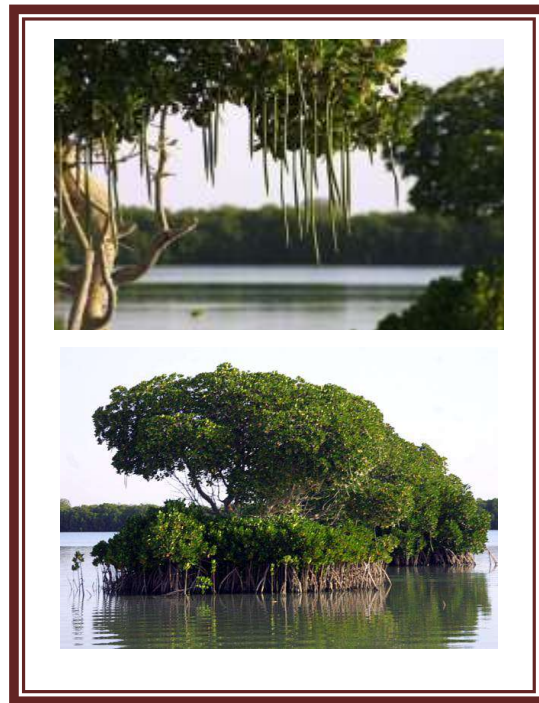
Two species of Mangrove grow on the Red Sea Coast of Egypt: *Rhizophora mucronata* and *Avicennia marina*. The latter is more prevalent, where 28 stands have been recorded along the Red Sea & Gulf of Aqaba in Ras Mohamed & Nebeg Protectorates, Mingar Islands, Gaisoum, Wadi Gimal, Hamata & South Safaja coast. *R. Mucronata* is found in southern areas of Shalatin and Elba Protectorate.

Studies using S.Imageries and ground truthing indicated that the total area of Mangrove ecosystem has reached 700 ha by the end of 2007 compared to 525 ha in 2002. This is due to the stoppage of encroachment on and protection accorded to the resource together with planting thereof whereby 50 feddans have been restocked with some 50 000 seedlings of both species besides establishment of nurseries in Nebeg, Safaja, Wadi Gimal and Shalatin.

Many socio-economic studies were undertaken to explore the modalities of utilization of Mangroves, characteristics of local population, their traditions, their awareness of Mangrove values, education, social status, services rendered by local authorities, and TK on Mangroves.

Many recommendations have been posed in support of rehabilitation and conservation of Mangroves in Egypt:

- Review by government and approval of implementation of Mangrove



rehabilitation/conservation after the end of project,

- Completion of socio-economic studies
- Planting of more trees as one activity in adaptation to CC.
- Future projects should be oriented towards job creation opportunities, investment, non-traditional thinking about mangrove management and involvement of local population in all management plan activities.

## 2. Propagation & Rehabilitation of Sayal (*Acacia raddiana* and *A. tortilis*) in PAs

Many sayal species occur in arid and sub-humid areas of Egypt. They have however suffered a great deal from the vagaries of drought and ill-practices by local population in the course of their cutting thereof for fuel wood and other habitat destruction activities.

NCS endeavoured to replant the species through support from scientific and local community. NCS summoned a study team to inventory Sayal occurrence, density and phenology. The team also studied the chemical characteristics and biology of soil suitable for Sayal propagation together with water requirements. Some areas were fenced in St. Catherine, Amed and Wadi Al Allagi Protectorates. The PA wardens encouraged local population to plant trees around their homesteads. They also encouraged local communities to collect seeds and pre-treat them through passing via digestive track of goats. The wardens also established FTNs . Local populations were encouraged to fence emerging transplants against grazing.

Sayal rehabilitation programme achieved great success in many PAs. During the past decade some 60 000 seedlings were transplanted in St. Catherine, Zaraneeg, Amed, Wadi Al Allagi and Wadi Gimal Protectorates.

### 3. Heglig (*Balanites aegyptiaca*) Propagation Trials.

The presence of Heglig trees (Sugar dates) is believed to be an indicator of the presence of ground water where they exist. They are also considered of high nutritive and medicinal value by local populations. Through the rehabilitation programme of wild plants, some 200 trees were planted from seedlings in Wadi El Gimal Protectorate Red Sea Province, with an establishment rate of 76%. More trees are being planted.



Soil preparation for Sayal planting St.Catherine



Rehabilitation of Sayal St. Catherine





Heglig @Wadi Gimal Protectorate



Heglig seedlings

#### 4. Sarh Tree (*Maerua crassifolia*)

Sarh is a long-lived tree characteristic of Wadi El Gimal-Hamata Protectorate, renowned for its environmental, browsing and nutritive values. Livestock and wildlife such as gazelle and rabbits feed on the leaves, flowers and fruits. The tree also provides thick shade for animals during the hot summer days. The tree thrives in mountain valleys with ground water. Some 100 seeds were sown with only 15% emergence. Further attempts to propagate the tree are underway.



Sarh (*Maerua crassifolia*)



*Ziziphus spin-christi* seedlings

#### 5. Arabian Sidr (*Ziziphus spina-chrisrti*).

Sidr is a rare and long-lived tree in Wadi el Gimal- Hamata Protectorate. There are only two specimens in Wadi Al Hoss. This is due to excessive grazing. Sidr is considered a blessed tree, with sweet fruit (Nebeg-Desert Apple), the size of olives. 150 seeds were sown in green house in Protectorate with 66% emergence. More propagation trials are underway.

## 6. Replanting & Rehabilitation Programme of Endangered Trees & Plants in Wadi Al Allagi Protectorate

According to inventory studies undertaken by task force, Argon Palms (*Medemia argun*) were enumerated. *M. argun* is a native of Nubia Desert (S.Egypt & N.Sudan). It is classified as critically endangered with only 32 specimen plants naturally growing in Egypt.

In view of its historic value and critical situation some germination trials were conducted to establish the tree *ex-situ* by South of the Valley University. A programme is underway to conserve the palm *in-situ* in Wadi Al Allagi Protectorate.

Some 245 Heglig (*Balanites aegyptiaca*) seedlings were raised in the green house of the Protectorate with the objective of transplanting in the villages of the Protectorate.

86 seedlings of Dom Palms (*Hyphaene thebaica*) and 36 Argon Palms (*M. argun*) were transplanted. Local people were being supported through establishment of seven small farms. A total of 120 Ziziphus seedlings were transplanted. It is envisaged to transplant 1050 seedlings of the aforementioned trees.



Small farm in support of local population



Argon Palm (*M. argun*)

## D. Research Programmes & Case Studies

### 1. Study of Ombet trees (*Dracaena ombet*) in Gebel Elba Protectorate as an example of Impact of Climate Change (CC) on Biodiversity

Studies were undertaken over the past 10 years in Gebel Elba- Red Sea Province on Ombet trees. The greatly endangered tree is facing further pressures that are continuously reducing its numbers. 60% of trees were lost from its distribution range between heights 450-850 meters above sea level (masl). Some 1000 trees were recorded with 400 fully labelled. The dangers to which the tree is subjected are attributed to CC indicated in:

1. Rise in temperature by 3°C since 1961,
2. Sharp drop in Relative Humidity and Rainfall compared to prevailing conditions before. Rainfall was 400mm/annum in the past reduced to 50-100 mm/annum at present.,



*Draccaena ombet*

3. Total lack of rainfall 1996-2001 and very little precipitation 2001-2008,
4. Ombet trees on heights 450-850 masl were subjected to severe drought manifested in leaf fall and mortality of 20% of tree population. There are no indications of recovery. This is coupled with decrease of stands from 10 to 8 and shrinkage of their area from 23.8 to 19.0 km<sup>2</sup>,
5. Disappearance of tree and shrinkage of density by 51% towards in lower heights of G. Elba indicating a trend of shifting to upper heights better endowed with moist air.

## **2. Dynamics of Forest Tree Stands in Wadi Al Allagi Protectorate**

Wadi Al Allagi Protectorate is considered a good example of biodiversity in the Eastern Desert. It was studied for more than a quarter century. Studies indicated heavy rainfall during rainy seasons of 1980s and early 1990s. Plant species inventoried increased from 89 in 1989 to 139 in 1996. The area then witnessed a period of reduced rainfall and a spell of drought. During the period 2000-2006 only 98 plant species were noted ( 3 of which for the first time). There is an evident loss of 40% of plant species. To make matter worse demand for medicinal plants and wood for charcoal rose sharply during the period. In view of all that the Protectorate started to implement a rehabilitation programme for Sayal (*A.raddiana*), Heglig (*B.aegyptiaca*) and Kharoub (*Faidherbia albida* syn. *Acaica albida*).



112 sites were selected representing plant distribution ranges to study the dynamics of forest tree stands. It was evident that each of Sayal, Heglig and Usher (*Calotropis procera*) have a (J) - shaped degraded distribution, where old derelict trees dominate over young ones. This indicates non-vitality and inability to regenerate. The trees tend to grow vertically due to intensive side browsing. Trees like *Faidherbia*, *Salvadora persica*, *Tamarix aphylla*, *A. raddiana* and *Ziziphus spina-christi* are rare with no age gradation or young regeneration. In terms of dominance & degradation, *A.raddiana*, *A. tortilis*, *Calotropis procera*, *Leptadenia pyrotechnica*, *Faidherbia albida* and *Ziziphus spina-christi* represent 22.3, 12.5, 8.0, 11.6, 5.4 and <1% respectively.

These tree species are greatly degraded with no young regeneration. The only exception was *A. chrenbergiana* with (65%) dominance.



**Inventory & mensuration**



**Mesquite felling**

### **3. Case Study of Mesquite (*Prosopis juliflora*), an Alien Invasive Species in Gebel Elba Protectorate**

Mesquite was introduced by local communities in Halaib Area in the 1980s for agricultural purposes and a source of fuel wood. It spread rapidly afterwards particularly after a period of heavy rainfall in 1996. The success of Mesquite as an invasive species is attributed to its prolific seeding ability. According to some sources, it is able to produce some 60 million seeds/ha /annum. Water plays an important factor in its spread especially during floods. Livestock are perhaps the most important factor in Mesquite spread after feeding on pods. Camels walking along the Egyptian Sudanese border spread the seeds over 1000 kilometres. In this area three species of Mesquite are believed to exist, the most invasive of which is concentrated around Halaib. Mesquite represents a serious threat to biodiversity in PAs in Gebel Elba and negatively impacts the ecosystem, watershed & hydrology. It has a secondary effect of forming dense thickets which disperses livestock to seek forage elsewhere and hence cause intensive grazing in other areas. Mesquite spread in all habitats from salt marshes on the Red Sea Coast in the East to desert plains in the West. It constitutes 40% of tree stands in Halaib Area.

## **E. Legislation & International Conventions for Conservation of Nature Biological & Diversity**

### **I. Egyptian Laws on Nature Protection:**

Many Acts/Laws on environmental protection have been promulgated:

1. Agriculture Act No. 53 of 1966, embodying articles (117, 118,119) which provide for protection of biodiversity, wildlife & their habitat,
2. The provisions of Law 102 of 1993 concerning natural protectorates promulgated by the State to protect areas of importance (Natural Protectorates). The Law prohibits the construction of any buildings or practice of any activity insides PAs except after approval of competent authority (EEPA). The law provides for the punishment for violators with financial fines or imprisonment,
3. Environment Law No. 4 of 1994 amended by Law No. 9 of 2000 where it provides in some articles prohibition of hunting, killing, capturing of birds, or wildlife specified by the executive regulations, transport thereof, or moving around with them, offer for sale, alive or dead as it prohibits destruction of bird nests or eggs. The executive regulations specify the areas where the provisions of the law apply and the terms of hunting licences and the administrative authorities responsible for law enforcement.

### **II. Regional and International Treaties Related to Protection of Nature & Biodiversity**

Egypt joined a number of regional and international conventions related to the protection of nature & biodiversity:

1. The African Convention for the Conservation of Nature & Natural Resources (Algeria 1969),
2. The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar),
3. The World Heritage Convention for the Protection of the World Cultural & Natural Heritage (UNESCO 1972),
4. CITES (1973),
5. Convention on Protection of Mediterranean from Pollution (Barcelona 1972),
6. Regional Convention for Conservation of the Red Sea & Gulf of Aden (PERSGA 1992),
7. Protocol Concerning Mediterranean Specially Protected Areas (Barcelona 1972),
8. CBD (Rio de Janeiro 1992),
9. IFCCC (Rio de Janeiro 1992),
10. CCD (1994).

Egypt also joined the Bio safety Protocol in 2003 and prepared National Legislation for Bio safety. Egypt actively participated in gatherings of the aforementioned treaties/conventions, submitted national reports and participated in technical and other committees thereof. Egypt had a prominent role in some of these treaties particularly CBD. Many national committees have been summoned such as National Committee for Sustainable Development; National Committee for Ramsar & Conservation of Biodiversity and National Committee for Implementation of CITES.

#### **F. Threats and Reduction of Pressures Resulting from Loss & Degradation of Natural Habitats**

Addressing threats to wildlife (overgrazing, wood pillage, and poaching, invasive alien species) is considered one of the most difficult tasks. Conservation of natural habitats is one of the big challenges in Egypt, entrusted to many authorities. The recently enacted establishment of the National Centre for Utilization of Government Lands might perhaps alleviate some of the pressures resulting from loss of habitats, changes of functions of land use & degradation thereof and unsustainable use of water. That does not lessen the importance of coordination between all parties concerned and concerted work towards integrating biodiversity concepts and its conservation into their programmes. This is needed hand in hand with awareness raising of local populations and their encouragement to protect wildlife & plants and conserve their habitats. This requires an enormous task in future.



**Wood cutting**



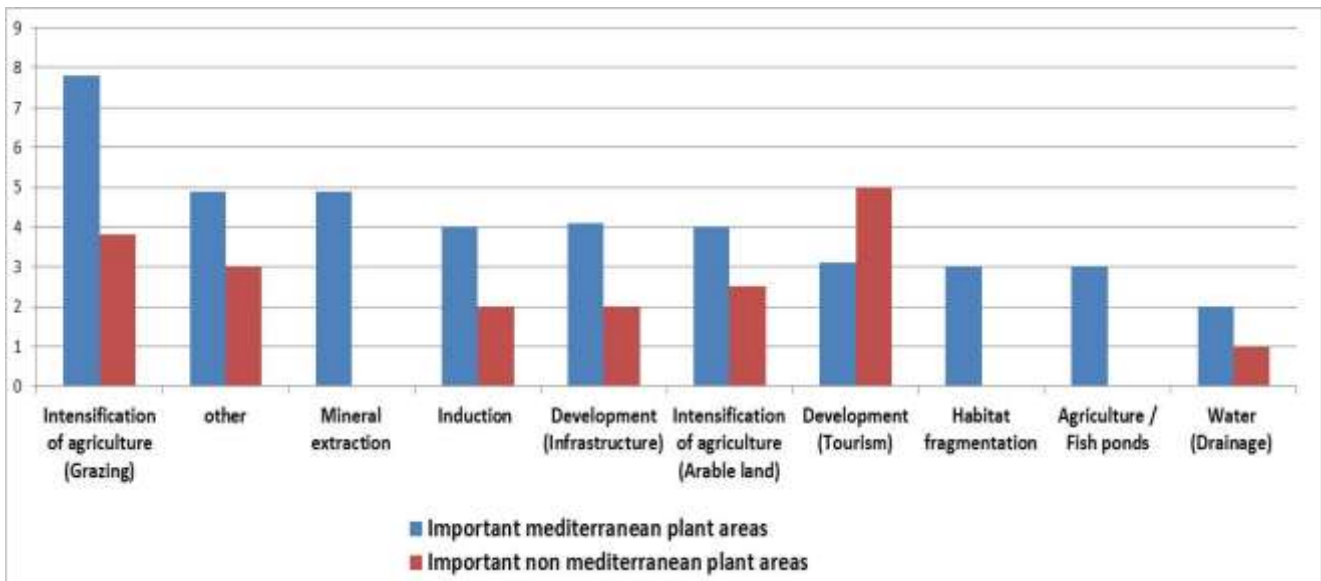
**Overgrazing**

Land Degradation (LD) refers to the occurrence of changes in organic and inorganic components that affect the natural balance between them which leads to reduction of land productivity or its total loss. LD is a complicated process caused by many natural, chemical & biological factors. Global studies assert that the main causes of LD are overgrazing (causes 34% of degradation), deforestation (29%) and other non-agricultural activities (about 1%). LD in Arid and Semi-arid areas is referred to as 'Desertification'. It is estimated that 30% of studied areas have been desertified to some degree or another.

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Traditional norms in inhabited montane areas in Egypt used to positively impact biodiversity as they oblige local population to conserve plants against excessive utilization. But, as a result of increase in human activities on mountain slopes and foothill, particularly urbanization and tourism, traditional originality was overlooked and traded for immediate material gains. A great deal of vegetation was destroyed as a result of safari vehicle traffic, increasing trade in endangered wildlife, appearance of invasive alien species, increase in wood removals, overgrazing and neglect of original tradition.

Implementation of successful programmes such as rehabilitation of natural habitats ( Sayal, Mangrove) and endangered species (Propagation of medicinal plants) is an important pillar and objective of National Strategy (Conservation of biodiversity, wetlands, Deserts..Etc). In spite of the efforts excreted to implement programmes of conservation & rehabilitation of habitats and rare wildlife, these habitats still face a hoard of pressures and dangers, hence more efforts are needed together with mobilization of means and wider national participation.



Threats to important vegetation zones of Egypt ( Shaltout *et al* (2011))

## **G. Protection of Social & Cultural Diversity for Local Communities, Enhancement of genetic Resources & Equitable Sharing of Benefits accruing form Genetic Resources Utilization.**

Egypt appreciates the importance of biodiversity conservation for raising the living standards of local communities which often depend primarily on biodiversity resources. Special efforts are focussed on BC that supports sustainable livelihoods, food security and medicine for the poor.

Cultural & Social Diversity of local population is conserved through protection of their TK & Practices after gathering information on uses of more than 200 medicinal plants & trees. Experiences & TK of local communities in many PAs have been documented. A study and a documentary film were prepared on cultural heritage in PAs. Work in underway to envisage means for protection of social & cultural heritage of local communities through protection of IPR since current information indicate continuous withering of TK particularly within recent generations keen to acquire modern knowledge and abandon traditional heritage. IPRs of local communities in biodiversity are one of the principles of State policy and principal bases in management of PAs and protection of rights of local population. Achievement of this concept requires efforts beyond currently available means and there is aspiration for realization in future.

Egypt accords special importance to the promotion of conservation of genetic diversity which deals with her agricultural resources & productivity together with wildlife (fauna & flora). This is reflected in the establishment of gene genetic resources bank in MALR, protection of GR in GBs, encouragement of local communities to conserve GR in-situ. Yet more procedures are required, a matter that is beyond the current means of NCS.

A plan is underway to activate a National Strategy for Preservation, Classification, Protection & Utilization of GR in Egypt. In the context of implementation of National Action Plan for the Environment, two legislations have been prepared on bio-safety and Organization of Access to GR in the country. Work in underway to promulgate the two legislations. Inspire of the fact that the realization of this objective faces considerable, particularly the understanding & acceptance of the concept of fair & equitable sharing of benefits accruing from the utilization of GR and overcoming of technical ,administrative and legal obstacles to implement an all encompassing legislation consistent with international norms, as was stated in Johannesburg Summit and endorsed by the General Assembly of the United Nations for crystallization and preparation of Global Regulation in this respect. Egypt assures the implementation of this objective in PAs, where no GR is used without reference to NCS in EEPA.

## **H. Future Vision**

The desert covers 95% of the area of Egypt. In spite of this vastness, available information in inadequate on ecosystems within, means of their sustainability, economic vision for their management and supporting studies for propagation of wildlife (fauna & flora). In this respect NCS of EEPA advocates a future vision summarized in the following points:

1. Work towards activation of scientific research systems in PAs in support of propagation of wild plants that have an environmental & economic return which is reflected on the socio-



economic status of local communities. The Medicinal Plants Project in St. Catherine is a case in mind,

2. Focus on ecosystem services and economic benefits and contribution of wild plant species in addressing socio-economic challenges particularly in aspects of provision of food, fodder & environmental tourism,
3. Achievement of sustainable development for PAs and support to socio-economic development,
4. Capacity building in institutional, technical, legislative and executive aspects of nature conservation,
5. Enhancement of BC through improvement of situation for endangered species, restoration of extinct species and enhancement of sustainable utilization of BD,
6. Addressing threats on BD through alleviation of pressures resulting from loss of habitat, degradation and non-sustainable utilization, control of threats from alien invasive species and addressing the challenges BD resulting from CC,
7. Conservation of goods & services derived from BD in support of human welfare through retention of ecosystem ability to produce goods & services and support to livelihoods,
8. Preservation of social & cultural diversity of communities through protection of knowledge, innovations, traditional practices and protection of local community rights particularly as regards their knowledge, innovations & traditional practices,
8. Secure fair & equitable sharing of benefits accruing from the utilization of GR through ensuring that all transfers of GR are consistent with BD and relevant international treaties.

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## Annex 3

### Gene Banks

National Gene Bank, one way to Preserve Forest Genetic Resources  
*ex-situ*

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## **Introduction**

In view of increasing danger of disappearance and loss of Genetic Resources (GR) particularly in recent times, rational management of GR is considered a better guard against poverty and food insecurity. Exploration, collection, evaluation/assessment and conservation of GR plants, animals or microorganisms are vital activities, necessary for sustainable agricultural development for present and future generations.

### **Establishment of National Gene Bank in Egypt:**

1. In spite of the establishment of Genetic Resources Department in NRC during the 1980s, no tangible return for GR was felt. Time is crucial in GR programmes. Any resources lost cannot be restored,

2. In spite of promulgation of several legislations and international conventions for biodiversity conservation such as CBD, International Treaty for Plant Genetic Resources for Food & Agriculture (ITPGRFA), issued by FAO, adoption of an effective national programme for GRC was delayed unduly,

3. Therefore, Ministerial Decree No. 1920 for 2003 was issued to establish the National Gene Bank (NGB) with the purpose of:

3.1. Conservation of national wealth of GR, plant or animal *in* or *ex-situ*,

3.2. Improve the productivity of agricultural crops by providing the required GR which contains stress tolerance gene markers and rendering them available for breeding & other research programmes,

3.3. Enhance cooperation between NGB and other concerned institutions such as research centre, universities and PS organizations,

3.4. Support international cooperation by the implementation of regional and international treaties/conventions which regulate the maintenance & utilization of GR & biodiversity,

3.5. NGB affiliated to MALR shall preserve agricultural and wild GR for sustainable use through exploration, collection, characterization, evaluation and documentation of GR,

3.6. NGB has research and technical capabilities for preservation of plant GR, in-situ, on-farm and ex-situ in its various chambers,

3.7. NGB is the national focal point for ITPGRFA and represents MALR in all international organizations concerned with GR.

### **Objectives of NGB**

1. Conservation & maintenance of GR in Egypt and maintenance of reasonable environmental and biological balance in fulfilment of Egypt's commitments stated in relative international conventions,

2. Provision & exchange of sufficient & adequate combinations of GR with research programmes and with those concerned with GRs.

### **Mission of NGB**

1. Formulate integrated work plans for GR management in collaboration with concerned authorities, institutions and other stake holders,
2. Inventory /taking stock and maintenance of GRs in the country,
3. *In* or *ex-situ* Conservation & maintenance of GR,
4. Encourage rational utilization of GR and fair & equitable sharing of benefits accruing from their utilization,
5. Encourage easy access to and exchange of sufficient and adequate genetic contributions with researchers and those involved in GRs,
6. Genetic characterization of breeds and local races and follow-up status of races & cultivars for protection from extinction,
7. Maintain/up-keep in good condition specimens of breeds of superior & desirable characters for future use in research, agricultural or food production to address problems of food or medicinal deficit,
8. Establish information system and data base for early warning on loss of GRs,
9. Widen awareness about importance of GR for food and agriculture,
10. Pose recommendations for regulation and urge promulgation of legislations that activate GRC,
11. Follow-up and implement international commitments by Egypt towards international conventions related to GRs,
12. Draw & implement research & extension programme for GRC and explore possibilities of their deployment to improve agricultural breeds of economic value in collaboration with other research programmes.

### **Expected Output**

1. Prevention of extinction or erosion of GR,
2. Contribution to increased productivity and accomplishment of food security through conservation of genetic variation and utilization of local and wild breeds related to cultivars in use in acclimatization and stress tolerance,

3. Availing easy access to information,
4. Enhanced cooperation in exchange of GR between Egypt and other countries in the context of conventions which regulate exchange and benefit sharing,
5. Contribution to enforcement of IPRs legislation in a manner that reserve sovereign rights over GR.

### **Organization of the NGB**

NGB is organized into four major departments related to the NGB activities:

1. Field Crop,
2. Horticultural Crops,
3. Animal GR,
4. Agriculture-related micro-organisms.

NGB is composed of the following Sections and Laboratories which deal with plant Genetic Resources:

#### **1. Section Plant Genetic Resources Conservation:**

NGB was designed to accommodate more than 200 000 accessions in the long term together with construction of two green houses for conservation and propagation of GR that are difficult to propagate or store in the form of true seeds:

A: Maintenance of true seeds which include:

- A1. Temporary storage (+5C°),
- A.2. Active collection- medium duration storage (-5C°),
- A.3. Base & core collection- long duration storage (-20C°).

B: Tissue Culture Conservation (for vegetatively propagated GR, animal cells or tissues):

- B.1. Medium duration conservation (+17C°),
- B.2. Long duration conservation in Liquid Nitrogen (-196C°),

C. In-situ Conservation:

- C.1. some fruit crops, ornamental plants and date palms,
- C.2. Animal Breeds.

There are specimens of seeds of trees, shrubs and rare & endangered plants that were collected and stored for conservation and propagation of some seeds, cuttings & seedlings in NGB green houses such as:

*Acacia nilotica, Acer negundo, Aleurites moluccana, Cordia sinensis, Joannesia princeps, Lawsonia alba.*

## **2. Seed Testing & Viability Section:**

- 2.1. Seed viability testing,
- 2.2. Regeneration & maintenance of GR,
- 2.3. Preparation of seeds for storage.

## **3. Taxonomy Section:**

- 3.1. Collection of GR through exploration missions,
- 3.2. Coordination with PAs in SME,
- 3.3. Assessment & collection of wild relatives of plants and participation in study of utilization of such plants.

## **4. Physiology Lab.**

- 4.1. Evaluation of environmental stress,
- 4.2. Evaluation of susceptibility to plant diseases and pests.

## **5. Molecular Genetics Lab.**

- 5.1. Identification of GR,
- 5.2. Fingerprinting & mapping of GR,
- 5.3. Identification of gene markers responsible for stress tolerance and quality attributes.

## **6. Cytogenetic Lab.**

- 6.1. Study different field and agronomic cytotetically related to agronomic and morphological characteristics to conclude degree of genetic stability,
- 6.2. Investigate the chromosomal maps of wild plants and land races which can be utilized in different breeding programmes,

## **7. Quality Attributes & Chemical Analysis Lab.**

- 7.1. Assessment of technological & nutritive quality,
- 7.2. Chemical analysis,

### 7.3. Active ingredients of economic importance.

#### 8. NBG Farm & Green Houses

8.1. Regeneration of GR in the farm,

8.2. Conservation of some horticultural crops & plants that require special conditions.

Some of the important plants, trees & shrubs in the farm:

*Afrocarpus garciliior*, *Agathis robusta*, *Dimocarpus longan*, *Ficus aspirma*, *F. racemosa*, *F. Sprague*, *Phyllanthus emblica*, *Bontia daphnoides*, *Eugenia super-axillaris*, *Terminalia indica*, *Ceiba pentandra*, *Podocarpus elongatus*.

### 9. Documentation & Information Section

9.1. Data base preparation for plant, animal and micro-organism GR according to international norms,

9.2. Provide plant & animal breeders with required basic information for development of new plant varieties and animal breeds.

## Gene Banks in Egypt

BGs in Egypt include:

1. National Gene Bank affiliated to Agricultural Research Centre of MALR. Concerned with plant GR wild and cultivated, animal GR together with agriculture-related micro-organisms,

2. Egyptian Deserts Gene Bank affiliated to Desert Research Centre of MALR and is concerned with wild plants. Established in 1997 in Sheikh Zoaid in N. Sinai. Concerned with collection of germplasm for trees, shrubs and others in desert & mountain areas in Sinai Peninsula,

The bank has two chambers with -4C° and -20C°, and includes:

1. Nursery,

2. Botanic Garden.

Of the important trees and shrubs in the Bank:

*Moringa peregrina*, *Capparis sinaica*, *C. spinosa*, *Salvia officinalis*, *Thymus vulgaris*, *Balanites aegyptiaca*, *Urginea maritime* and *Origanum syriacum*.

3. Genetic Resources Section of Field Crops Research Centre, Agricultural Research Centre, MALR. Concerned with field crops



**Annex 4**

**Botanic Gardens in Egypt**  
**An Important means of Forest Genetic Resources Conservation**

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## Botanic Gardens in Egypt

### An Important means of Forest Genetic Resources Conservation

Egypt houses some 2121 plant species distributed all over the country in various settings, ecosystems and niches. Most of these plants, indigenous or exotic are represented in botanic gardens (BG).

The most renowned BGs in Greater Cairo include:

**Table (Annex 4.1). Botanic Gardens of greater Cairo**

1	Ghanatir Khayreiya Gardens	2	Mohamed Ali Palace Gardens
3	Ezbekiya Gardens	4	Fish Gardens
5	Zohriya gardens	6	Orman Botanic Gardens
7	Giza Zoo Gardens	8	Hurriya Gardens
9	Andalus Gardens	10	Japanese Gardens
11	Manial Palace & Museum Gardens	12	Agricultural Museum Gardens

The most renowned BGs in Alexandria include:

1. Antoniadis Garden,
2. Al-Nozha Gardens,
3. Shallalat (Falls) Gardens,
4. Faculty of Science, Alexandria University Botanic Garden.

First: Orman Gardens, Giza Province.

Orman is the Turkish word for Forest. Located on the west bank of the Nile and occupying an area of 28 Feddans (11.67 ha), Orman Gardens were established in 1875 during the era of Khedive Ismail. The Gardens were designed by French Architect Del Chavley and Senior Egyptian Gardner Ibrahim Hamouda. The Gardens are affiliated to CAAE off MALR.

The Gardens contain a herbarium building with more than 7000 specimens, a Gene Bank and a rocker garden 1.5 feddans with succulents and many cactus species. There is a pond with water and marsh-plants among, which are found the two most famous plants on ancient Egypt Papyrus and Lotus. There is also a rose garden 2 feddans and rare species of Ficus, Palm, Bamboo and Conifers. Below is a list of pants in Orman Botanic Garden:

Table (Annex 4.2) Plants in Orman Botanic Garden, Giza, Cairo.

Family: <i>Acanthaceae</i>					
1	<i>Acanthus spinosus</i>	2	<i>Anisacanthus virgularis</i>	3	<i>Barleria cristata</i>
4	<i>Barleria prionotis</i>	5	<i>Eranthemum pulchellum</i>	6	<i>Justicia adhatoda</i>
7	<i>Justicia brandegeana</i>	8	<i>Justicia specigera</i>	9	<i>Pachystachys lutea</i>
10	<i>Pseuderanthemum atropurpurea</i>	11	<i>Ruellia brittoniana</i>	12	<i>Ruellia tuberosa</i>
13	<i>Ruttaya fruticosa</i>	14	<i>Strobilanthes dyerianus</i>	15	<i>Thunbergia erecta</i>
16	<i>Thunbergia grandiflora</i>				
Family: <i>Aceraceae</i>					
1	<i>Agave americana</i>	2	<i>Agave marginata</i> var. <i>marginata</i>	3	<i>Agave marginata</i> cv. <i>Medio Picta</i>
4	<i>Agave Americana</i> cv. <i>Striata</i>	5	<i>Agave angustifolia</i>	6	<i>Agave angustifolia</i> var. <i>marginata</i>
7	<i>Agave attenuate</i>	8	<i>Agave desmettiana</i>	9	<i>Agave ferox</i>
10	<i>Agave filifera</i>	11	<i>Agave fronzosinii</i>	12	<i>Agave ghiesbreghtii</i>
13	<i>Agave heteracantha</i>	14	<i>Agave kerchovei</i>	15	<i>Agave lophantha</i>
16	<i>Agave lophantha poselgeri</i>	17	<i>Agave lophantha poselgeri</i>	18	<i>Agave micracantha</i>
19	<i>Agave parvijlora</i>	20	<i>Agave sisalana</i>	21	<i>Agave striata</i>
22	<i>Agave triangularis</i>	23	<i>Agave victoria regina</i>	24	<i>Agave weberi</i>
25	<i>Beaucarnea recurvata</i>	26	<i>Cordyline indiviso</i>	27	<i>Cordyline terminalis</i>
28	<i>Cordyline terminalis</i> 'red edge'	29	<i>Dracaena deremensis</i>	30	<i>Dracaena deremensis</i> 'Compacta'
31	<i>Dracaena draco</i>	32	<i>Dracaena fragrans</i>	33	<i>Dracaena fragrans</i> cv. <i>Massangeana</i>
34	<i>Dracaena marginata</i>	35	<i>Dracaena marginata</i> cv. <i>Tricolor</i>	36	<i>Dracaena reflexa</i>

37	<i>Furcraea foetida</i> = <i>F. gigantea</i>	38	<i>Furcraea foetida</i> var. <i>Mediopicta</i>	39	<i>Furcraea selloa</i>
40	<i>Furcraea selloa marginata</i>	41	<i>Nolina longifolia</i>	42	<i>Phormium Tenax</i>
43	<i>Sansevieria cylindrica</i>	44	<i>Sansevieria trifasciata</i>	45	<i>Sansevieria trifasciata</i> cv. <i>Laurentii</i>
46	<i>Sansevieria trifasciata</i> cv. <i>Hahnii</i>	47	<i>Sansevieria trifasciata</i> cv. <i>Golden Hahnii</i>	48	<i>Sansevieria cylindrica</i> cv. <i>Skyline</i>
49	<i>Sansevieria gracilis</i>	50	<i>Yucca aloifolia</i>	51	<i>Yucca desmettiana</i>
52	<i>Yucca elephantipes</i>	53	<i>Yucca filamentosa</i>	54	<i>Yucca gloriosa</i>
55	<i>Yucca recurvifolia</i>				
<b>Family: Aizoaceae</b>					
1	<i>Aptenia cordifolia</i>	2	<i>Carpobrotus edulis</i>	3	<i>Faucaria tuberculosa</i>
4	<i>Glottiphyllum linguiforme</i>	5	<i>Lampranthus aureus</i>	6	<i>Lampranthus spectabilis</i>
7	<i>Oscularia caulescens</i>				
<b>Family: Aloaceae</b>					
1	<i>Aloe arborescens</i>	2	<i>Aloe barbadensis</i>	3	<i>Aloe brevifolia</i>
4	<i>Aloe camperi</i>	5	<i>Aloe ciliaris</i>	6	<i>Aloe ferox</i>
7	<i>Aloe juvenna</i>	8	<i>Aloe grandidentata</i>	9	<i>Aloe marlothii</i>
10	<i>Aloe melanacantha</i>	11	<i>Aloe nitriiformis</i>	12	<i>Aloe saponaria</i>
13	<i>Aloe spinosissima</i>	14	<i>Alos sp.</i>	15	<i>Aloe striata</i>
15	<i>Aloe variegata</i>	17	<i>Gasteria bicolor</i>	18	<i>Gasteria disticha</i> = <i>G. lingua</i>
19	<i>Gasteria maculata</i>	20	<i>Gasteria verrucosa</i>	21	<i>Haworthia attenuata</i>
22	<i>Haworthia coarctata</i>	23	<i>Haworthia cymbiformis</i>	24	<i>Haworthia fasciata</i>
25	<i>Haworthia fasciata</i>				
<b>Family: Amaryllidaceae</b>					
1	<i>Agapanthus praecox</i>	2	<i>Clivia miniata</i>	3	<i>Crinum asiaticum</i>

4	<i>Crinum bulbispermum</i>	5	<i>Crinum moorei</i>	6	<i>Hippeastrum vittatum</i>
7	<i>Tulipia violacea</i>				
<b>Family: Anacardiaceae</b>					
1	<i>Harpephyllum caffrum</i>	2	<i>Mangifera indica</i>	3	<i>Pistachia chinensis</i>
4	<i>Pleiogynum ceraciferum</i>	5	<i>Schinus molle</i>	6	<i>Schinus polygamus</i>
7	<i>Schinus terebinthifolia</i>	8	<i>Spondias cytherea</i>	9	<i>Spondias purpurea</i>
<b>Family: Annonaceae</b>					
1	<i>Annona cherimola</i>	2	<i>Annona glabra</i>	3	<i>Annona muricata</i>
4	<i>Miliusa roxburghiana</i>	5	<i>Polyalthea longifolia</i>	6	<i>Polyalthea longifolia</i> var. <i>Pendula</i>
<b>Family: Apocynaceae</b>					
1	<i>Acokanthera oblongifolia</i>	2	<i>Adenium obesum</i>	3	<i>Alstonia scholaris</i>
4	<i>Beaumontia grandiflora</i>	5	<i>Carissa carandas</i>	6	<i>Carissa macrocarpa</i>
7	<i>Carissa macrocarpa</i> cv. <i>Horizontalis</i>	8	<i>Nerium oleander</i>	9	<i>Ochrosia elliptica</i>
10	<i>Pachypodium lamerei</i>	11	<i>Plumeria rubra</i>	12	<i>Tabernaemontana ivaricata</i>
13	<i>Thevetia peruviana</i>	14	<i>Trachelospermum jasminoides</i>	15	<i>Vinca major</i>
<b>Family : Araceae</b>					
1	<i>Aglaonema crispum</i> <i>'Silver Queen'</i>	2	<i>Aglaonema modestum</i>	3	<i>Aglaonema pseudobracteatum</i>
4	<i>Aglaonema 'Silver King'</i>	5	<i>Alocasia macrorrhiza</i>	6	<i>Caladium hortulanum</i>
7	<i>Dieffenbachia amoena</i>	8	<i>Dieffenbachia 'Tropic snow'</i>	9	<i>Dieffenbachia maculata</i> ( <i>picta</i> )
10	<i>Dieffenbachia 'Camilla'</i>	11	<i>Dieffenbachia 'Exotic Perfection'</i>	12	<i>Dieffenbachia 'Candida'</i>
13	<i>Epipremnum aureum</i>	14	<i>Monstera deliciosa</i>	15	<i>Nephtytis afwzelii</i>

16	<i>Philodendron bipinnatifida</i>	17	<i>Philodendron hastatum</i>	18	<i>Philodendron panduraeforme</i>
19	<i>Philodendron "Red Emerald"</i>	20	<i>Philodendron Ascandens</i>	21	<i>Spathiphyllum commutatum</i>
22	<i>Syngonium podopyllum</i>	23	<i>Xanthosoma violeceum</i>	24	<i>Zamioculus zamiifolia</i>
<b>Family: Araliaceae</b>					
1	<i>Hedera canariensis</i>	2	<i>Hedera helix</i>	3	<i>Meryta denhamii</i>
4	<i>Polyscias guilfoylei</i>	5	<i>Polyscias scutellaria cv. Balfourii</i>	6	<i>Schefflera actinophylla</i>
7	<i>Schefflera elegantissima "Castor"</i>	8	<i>Schefflera Kerchoveana</i>	9	<i>Sciadophyllum pulchrum</i>
10	<i>Tetrapanax papyrifer</i>				
<b>Family: Araucariaceae</b>					
1	<i>Araucaria robusta</i>	2	<i>Araucaria bidwillii</i>	3	<i>Araucaria excels</i>
<b>Family: Aristolochiaceae</b>					
1	<i>Aristolochia littoralis</i>				
<b>Family: Asclepiadaceae</b>					
1	<i>Calotropis procera</i>	2	<i>Caralluma acutangula</i>	3	<i>Cryptostegia grandiflora</i>
4	<i>Hoya carnosa</i>	5	<i>Huernia zebrine</i>	6	<i>Stapelia hirsuta</i>
7	<i>Stephanotis floribunda</i>				
<b>Family: Asphodelaceae</b>					
1	<i>Bulbine caulescens</i>				
<b>Family: Aspleniaceae</b>					
1	<i>Cyrtomium falcatum</i>				
<b>Family: Balanitaceae</b>					
1	<i>Balanites aegyptiaca</i>				
<b>Family: Basellaceae</b>					
1	<i>Anredera baselloides</i>				

<b>Family: <i>Begoniaceae</i></b>					
1	<i>Begonia cucullata</i> var. <i>Hooked</i>				
<b>Family: <i>Bignoniaceae</i></b>					
1	<i>Amphilophium</i> <i>paniculata</i>	2	<i>Campsis radicans</i>	3	<i>Catalpa bignonioides</i>
4	<i>Clytostoma binatum</i>	5	<i>Jacaranda mimosifolia</i>	6	<i>Kigelia africana</i>
7	<i>Macfadynea unguis-cati</i>	8	<i>Markhamia lutea</i>	9	<i>Millingtonia hortensis</i>
10	<i>Oroxylum indicum</i>	11	<i>Parmentiera cereifera</i>	12	<i>Parmentiera edulis</i>
13	<i>Paulonia tomentosa</i>	14	<i>Podranea ricasoliana</i>	15	<i>Pyrostegia venusta</i>
16	<i>Rademarchera ignea</i>	17	<i>Spathodea campanulata</i>	18	<i>Tabebuia argentea</i>
19	<i>Tabebuia pallida</i>	20	<i>Tabebuia rosea</i>	21	<i>Tecoma stans</i>
22	<i>Tecomaria capensis</i>				
<b>Family: <i>Bixaceae</i></b>					
1	<i>Bixa orellana</i>				
<b>Family: <i>Bombacaceae</i></b>					
1	<i>Adansonia digitata</i>	2	<i>Bombax ceiba</i>	3	<i>Ceiba pentandra</i>
4	<i>Chorisia crispiflora</i>	5	<i>Pachira aquatica</i>	6	<i>Pseudobombax ellipticum</i>
<b>Family: <i>Boraginaceae</i></b>					
1	<i>Cordia myxa</i>	2	<i>Cordia sebestena</i>	3	<i>Cordia sinensis</i>
4	<i>Ehretia ovalifolia</i>	5	<i>Ehretia wallichiana</i>		
<b>Family: <i>Bromeliaceae</i></b>					
1	<i>Aechmea fasciata</i>				
<b>Family: <i>Buxaceae</i></b>					
1	<i>Buxus sempervirens</i>				
<b>Family: <i>Cactaceae</i></b>					
1	<i>Aporocactus</i> <i>flagelliformis</i>	2	<i>Astrophytum myriostigma</i>	3	<i>Astrophytum ornatum</i>

4	<i>Cephalocereus chrysanthus</i>	5	<i>Cephalocereus senilis</i>	6	<i>Cereus jamacaru</i>
7	<i>Cereus jamacarus</i>	8	<i>Cereus peruvianus</i> ' <i>Monstrosus</i> '	9	<i>Cereus repandus</i>
10	<i>Cleistocactus baumannii</i>	11	<i>Cleistocactus strausii</i>	12	<i>Cleistocactus winteri</i>
13	<i>Coryphanta elephantidens</i>	14	<i>Coryphanta longimama</i>	15	<i>Cryptocereus anthonyanus</i>
16	<i>Echinocactus grusonii</i>	17	<i>Echinocactus grusonii</i> cv. <i>Alba</i>	18	<i>Echinocactus platyacanthus</i>
19	<i>Echinofosulocactus crispatus</i>	20	<i>Echinofosulocactus zacatecasensis</i>	21	<i>Echinopsis oxygona</i>
22	<i>Epiphyllum hybrida</i>	23	<i>Epiphyllum anguliger</i>	24	<i>Espostoa lanata</i>
25	<i>Espostoa melanostelon</i>	26	<i>Epiphyllum hybrid</i>	27	<i>Ferocactus glauscens</i>
28	<i>Ferocactus hamatacanthus</i>	29	<i>Ferocactus histrix</i>	30	<i>Ferocactus latispinus</i>
31	<i>Ferocactus setispinus</i>	32	<i>Ferocactus pilosus</i> = <i>F. stainesii</i>	34	<i>Ferocactus wislizenii</i>
35	<i>Gymnocalycium mihanovichii</i>	36	<i>Harrisia bonplandii</i>	37	<i>Hylocereus undatus</i>
38	<i>Hylocereus triangularis</i>	39	<i>Lobivia sylvestris</i>	40	<i>Mammillaria albilanata</i>
41	<i>Mammillaria compressa</i>	42	<i>Mammillaria elongata</i>	43	<i>Mammillaria longimama</i>
44	<i>Myrtillocactus geometrizans</i>	45	<i>Opuntia brasiliensis</i>	46	<i>Opuntia dejecta</i>
47	<i>Opuntia cylindrica</i>	48	<i>Opuntia dillenii</i>	49	<i>Opuntia ficus-indica</i>
50	<i>Opuntia fulgida</i>	51	<i>Opuntia inermis</i>	52	<i>Opuntia leucotricha</i>
53	<i>Opuntia linguiformis</i> = <i>O. lindheimeri</i>	53	<i>Opuntia macrocentra</i>	54	<i>Opuntia microdasys</i>
55	<i>Opuntia pltaecantha</i>	56	<i>Opuntia subulata</i>	57	<i>Opuntia tomentosa</i>
58	<i>Opuntia vulgaris</i>	58	<i>Oreocereus celsianus</i>	59	<i>Oreocereus trollii</i>



62	<i>Pachycereus marginatus</i>	63	<i>Pachycereus pringlei</i>	64	<i>Pereskia aculeata</i>
65	<i>Schlumbergera truncata</i>	66	<i>Stenocereus beneckeii</i>	67	<i>Stenocereus eruca</i>
68	<i>stetsonia coryne</i>	69	<i>Trichocereus sp.</i>		
<b>Family: Calycanthaceae</b>					
1	<i>Chimonanthus praecox</i>				
<b>Family: Cannaceae</b>					
1	<i>Canna indica</i>	2	<i>Canna x generalis</i>	3	<i>Canna x generalis cv. Tropical Rose</i>
4	<i>Canna x generalis cv. Striata</i>				
<b>Family: Caprifoliaceae</b>					
1	<i>Abelia chinensis</i>	2	<i>Lonicera japonica</i>	3	<i>Lonicera sempervirens</i>
4	<i>Sambucus nigra</i>	5	<i>Viburnum tinus</i>		
			<b>Family: Caricaceae</b>		
1	<i>Carica papaya</i>				
<b>Family: Caryophyllaceae</b>					
1	<i>Dianthus chinensis</i>				
			<b>Family: Casuarinaceae</b>		
1	<i>Casuarina stricta</i>	2	<i>Casuarina suberosa</i>		
			<b>Family: Celastraceae</b>		
1	<i>Euonymus japonicus</i>				
<b>Family: Cephalotaxaceae</b>					
1	<i>Cephalotaxus fortunei</i>				
<b>Family: Comretaceae</b>					
1	<i>Anogeissus latifolia</i>	2	<i>Conocarpus erectus</i>	3	<i>Quisqualis indica</i>
4	<i>Terminalia arjuna</i>	5	<i>Terminalia bentzoe</i>	6	<i>Terminalia catappa</i>

7	<i>Terminalia muelleri</i>	8	<i>Terminalia sp.</i>		
<b>Family: Commelinaceae</b>					
1	<i>Tradescantia spathacea</i>	2	<i>Tradescantia pallida</i>	3	<i>Tradescantia fluminensis</i>
4	<i>Tradescantia fluminensis</i>	5	<i>Tradescantia pendula</i>		
<b>Family: Compositae</b>					
1	<i>Ageratum houstonianum</i>	2	<i>Argyranthemum frutesces</i>	3	<i>Bellis perennis</i>
4	<i>Calendula officinalis</i>	5	<i>Centaurea cineraria</i>	6	<i>Chrysanthemum coronarium</i>
7	<i>Chrysanthemum x morifolium</i>	8	<i>Chrysanthemum parthenium</i>	9	<i>Coreopsis lanceolata</i>
10	<i>Euryops pectinatus</i>	11	<i>Euryops virgineus</i>	12	<i>Farfugium japonicum</i>
13	<i>Felicia amelloides</i>	14	<i>Gaillardia pulchella</i>	14	<i>Gazania rigens</i>
16	<i>Gerbera jamesonii</i>	17	<i>Montanoa bipinnatifida</i>	18	<i>Osteospermum ecklonis</i>
19	<i>Pseudogynoxys chenopodioides</i>	20	<i>Senecio cineraria</i>	21	<i>Senecio petasitis</i>
22	<i>Senecio fulgens</i>	23	<i>Senecio rowleyanus</i>	24	<i>Senecio serpens</i>
25	<i>Senecio stapeliiformis</i>	26	<i>Tagetes patula</i>	27	<i>Sphagneticola trilobata</i>
<b>Family: Convolvulaceae</b>					
1	<i>Argyreia nervosa</i>	2	<i>Argyreia splendens</i>	3	<i>Jacquemontia pentantha</i>
4	<i>Ipomoea fistulosa</i>	5	<i>Ipomoea tricolor</i>	6	<i>Merremia dissecta</i>
<b>Family: Crassulaceae</b>					
1	<i>Adromiscus cooperi</i>	2	<i>Aeonium arboreum</i>	3	<i>Cotyledon orbiculata</i>
4	<i>Cotyledon ladysmithiensis</i>	5	<i>Cotyledon tomentosa</i>	6	<i>Crassula arborescens</i>
7	<i>Crassula oblique</i>	8	<i>Crassula ovata</i> = <i>C. argentea</i>	9	<i>Echeveria elegans</i>
10	<i>Kalanchoe beharensis</i>	11	<i>Kalanchoe blossfeldiana</i>	12	<i>Kalanchoe daigremontana</i>

13	<i>Kalanchoe fedtschenkoi</i>	14	<i>Kalanchoe laciniata</i>	15	<i>Kalanchoe longijlora</i>
16	<i>Kalanchoe marmorata</i>	17	<i>Kalanchoe pinnata</i>	18	<i>Kalanchoe rosei</i>
19	<i>Kalanchoe thyrsijlora</i>	20	<i>Kalanchoe tomentosa</i>	21	<i>Kalanchoe tubijlora</i>
22	<i>Kalanchoe velutina</i>				
<b>Fam: Cruciferae</b>					
1	<i>Mathiola incana</i>	2	<i>Lobularia maritime</i>		
<b>Family: Cucurbitaceae</b>					
1	<i>Luffa aegyptiaca</i>				
<b>Family: Cupressaceae</b>					
1	<i>Chamaecyparis lawsoniana</i>	2	<i>Cupressus arizonica</i>	3	<i>Cupressus lusitanica</i>
4	<i>Cupressus macrocarpa</i>	5	<i>Cupressus sempervirens</i>	6	<i>Cupressus sempervirens cv. pyramidalis</i>
7	<i>Cupressus sempervirens cv. Striata</i>	8	<i>Juniperus sp.</i>	9	<i>Platycladus orientalis</i>
10	<i>Tetraclinis articulate</i>				
<b>Family: Cycadaceae</b>					
1	<i>Cycas bedomei</i>	2	<i>Cycas circinalis</i>	3	<i>Cycas revoluta</i>
<b>Family: Cyperaceae</b>					
1	<i>Cyperus alternifolius</i>	2	<i>Cyperus papyrus</i>		
<b>Family: Davalliaceae</b>					
1	<i>Neplrolepis exaltata</i>				
<b>Family: Dilleniaceae</b>					
1	<i>Dillenia indica</i>				
<b>Family: Ebenaceae</b>					
1	<i>Diospyros kaki</i>	2	<i>Euclea pseudebenum</i>		
<b>Family: Eleagnaceae</b>					

1	<i>Eleagnus macrophylla</i>				
<b>Family: <i>Euphorbiaceae</i></b>					
1	<i>Acalypha wielkesiana</i>	2	<i>Acalypha wielkesiana</i> cv. <i>Macrophylla</i>	3	<i>Acalypha wielkesiana</i> var. <i>hoffmaniana</i>
4	<i>Acalypha wielkesiana</i> var. <i>hoffmaniana</i>	5	<i>Antidesma bunius</i>	6	<i>Breynia nivosa</i>
7	<i>Breynia nivosa</i> cv. <i>Rosopicta</i>	8	<i>Codiaeum variegatum</i>	9	<i>Euphorbia pulcherrima</i>
10	<i>Euphorbia abyssinica</i>	11	<i>Euphorbia canariensis</i>	12	<i>Euphorbia cooperi</i>
13	<i>Euphorbia caput-medusa</i>	14	<i>Euphorbia corulescens</i>	15	<i>Euphorbia grandicornis</i>
16	<i>Euphorbia horridus</i>	17	<i>Euphorbia ingens</i>	18	<i>Euphorbia lactea</i>
19	<i>Euphorbia lactea</i> 'Cristata	20	<i>Euphorbia mammillaris</i>	21	<i>Euphorbia milii</i>
22	<i>Euphorbia neglecta</i>	23	<i>Euphorbia nubica</i>	24	<i>Euphorbia obesa</i>
25	<i>Euphorbia pseudocactus</i>	26	<i>Euphorbia royleana</i>	27	<i>Euphorbia stenoclada</i>
28	<i>Euphorbia trigona</i>	29	<i>Euphorbia tirucalli</i>	30	<i>Hura crepitans</i>
31	<i>Jatropha curcas</i>	32	<i>Jatropha integerrima</i>	33	<i>Jatropha multifida</i>
34	<i>Joannesia princeps</i>	35	<i>Manihot esculenta</i>	36	<i>Pedilanthus tithymaloides</i>
37	<i>Pedilanthus tithymaloides</i> cv. <i>Variegata</i>	38	<i>Phyllanthus angustifolius</i>	39	<i>Putranjiva roxburghii</i>
40	<i>Synadenium compacta</i>	41	<i>Synadenium grantii</i>		
<b>Family: <i>Fagaceae</i></b>					
1	<i>Quercus ilex</i>	2	<i>Quercus robur</i>	3	<i>Quercus suber</i>
<b>Family: <i>Flacourtiaceae</i></b>					
1	<i>Dovyalis caffra</i>	2	<i>Flacourtia rukam</i>	3	<i>Oncuba spinosa</i>
<b>Family: <i>Geraniaceae</i></b>					

1	<i>Pelargonium graveolens</i>	2	<i>Pelargonium x hortorum</i>	3	<i>Pelargonium zonal</i>
<b>Family: <i>Ginkgoaceae</i></b>					
1	<i>Ginkgo biloba</i>				
<b>Family: <i>Gramineae</i></b>					
1	<i>Bambusa glaucescens</i>	2	<i>Bambusa vulgaris</i>	3	<i>Cortaderia selloana</i>
4	<i>Dendrocalamus giganteus</i>	5	<i>Dendrocalamus strictus</i>	6	<i>Pennisetum setaceum</i>
7	<i>Phyllostachys aurea</i>	8	<i>Phyllostachys bambusoides</i>		
<b>Family: <i>Guttiferae</i></b>					
1	<i>Clusea major</i>	2	<i>Garcinia dulcis</i>		
<b>Family: <i>Hamamelidaceae</i></b>					
1	<i>Liquidambar striaciflua</i>				
<b>Family: <i>Hydrangeaceae</i></b>					
1	<i>Philladelphus virginialis</i>				
<b>Family: <i>Hydrophyllaceae</i></b>					
1	<i>Wigandia caracasana</i>				
<b>Family: <i>Hypoxidaceae</i></b>					
1	<i>Curculigo capitulata</i>				
<b>Family: <i>Iridaceae</i></b>					
1	<i>Iris pseudacorus</i>				
<b>Family: <i>Juglandaceae</i></b>					
1	<i>Carya illinoensis</i>				
<b>Family: <i>Labiatae</i></b>					
1	<i>Ocimum basilicum</i>	2	<i>Ocimum gratissima</i>	3	<i>Origanum majorana</i>
4	<i>Plectranthus australis</i>	5	<i>Plectranthus amboinicus</i>	6	<i>Rosmarinus officinalis</i>

7	<i>Salvia farinacea</i>	8	<i>Salvia splendens</i>	9	<i>Solenostemon scutellaroides</i>
10	<i>Thymus capitatus</i>				
<b>Family: Lauraceae</b>					
1	<i>Cinnamomum glanduliferum</i>	2	<i>Cinnamomum camphora</i>	3	<i>Cinnamomum zelanicum</i>
4	<i>Laurus nobilis</i>	5	<i>Lindera benzoin</i>	6	<i>Persea americana</i>
<b>Family: Leeaceae</b>					
1	<i>Leea coccinea</i>				
<b>Family: Leguminosae</b>					
1	<i>Acacia albida</i>	2	<i>Acacia arabica</i>	3	<i>Acacia farnesiana</i>
4	<i>Acacia saligna</i>	5	<i>Aeschynomene elaphroxylon</i>	6	<i>A denan thera pavonina</i>
7	<i>Albizzia procera</i>	8	<i>Albizzia julibrissin</i>	9	<i>Albizzia lebbek</i>
10	<i>Albizzia lophuntha</i>	11	<i>Albizia stipulata</i>	12	<i>Amorpha fruticosa</i>
13	<i>Bauhinia galpinii</i>	14	<i>Bauhinia hookeri</i>	15	<i>Bauhinia variegata</i> var. <i>candida</i>
16	<i>Bauhinia racemosa</i>	17	<i>Bauhinia retusa</i>	18	<i>Butea monosperma</i>
19	<i>Caesalpinia ferrae</i>	20	<i>Caesalpinia gilliesii</i>	21	<i>Caesalpinia pulcherrima</i>
22	<i>Caesalpinia spinosa</i>	23	<i>Calliandra haematocephala</i>	24	<i>Cassia brewesteri</i>
25	<i>Cassia fistula</i>	26	<i>Cassia nodosa</i>	27	<i>Cassia renigera</i>
28	<i>Cassia roxburghii</i>	29	<i>Ceratonia siliqua</i>	30	<i>Cercis chinensis</i>
31	<i>Colvillea racemosa</i>	32	<i>Crotalaria madurensis</i>	33	<i>Dalbergia sissoo</i>
34	<i>Delonix regia</i>	35	<i>Derris elliptica</i>	36	<i>Dichrostachys cineria</i>
37	<i>Enterolobium timbova</i>	38	<i>Erythrina caffra</i>	39	<i>Erythrina corallodendrum</i>
40	<i>Erythrina crista-galli</i>	41	<i>Erythrina near poeppigiana</i>	42	<i>Genista monosperma</i>
43	<i>Gleditsia aquatica</i>	44	<i>Gleditsia caspica</i>	45	<i>Gleditsia triacanthos</i>

46	<i>Haematoxylon campechianum</i>	47	<i>Lablab purpureus</i>	58	<i>Leucaena leucocephala</i>
49	<i>Lonchocarpus speciosus</i>	50	<i>Parkinsonia aculeata</i>	51	<i>Peltophorum africanum</i>
51	<i>Pithecellobium dulce</i>	53	<i>Pithecellobium sp.</i>	54	<i>Pongamia pinnata</i>
55	<i>Prosopis juliflora</i>	56	<i>Pterocarpus dalbergoides</i>	57	<i>Pterocarpus indica</i>
58	<i>Robinia pseudacacia</i>	59	<i>Saraca cauliflora</i>	60	<i>Saraca indica</i>
61	<i>Schotia brachypetala</i>	62	<i>Senna alata</i>	63	<i>Senna artemisoides</i>
64	<i>Senna bicapsularis</i>	65	<i>Senna occidentalis</i>	66	<i>Senna surattensis</i>
67	<i>Sophora japonica</i>	68	<i>Sophora secundiflora</i>	69	<i>Tamarindus indica</i>
70	<i>Tipuana tipu</i>	71	<i>Wisteria sinensis</i>		
<b>Family: <i>Liliaceae</i></b>					
1	<i>Asparagus densiflorus</i>	2	<i>Asparagus densiflora cv. Myers</i>	3	<i>Asparagus plumosus</i>
4	<i>Aspidistra elatior = A. lurida</i>	5	<i>Chlorophytum comosum</i>	6	<i>Hemerocallis fulva</i>
7	<i>Hemerocallis lilio-asphodelus</i>	8	<i>Ruscus aculeatus</i>		
<b>Family: <i>Loganiaceae</i></b>					
1	<i>Buddleia asiatica</i>	2	<i>Buddleia hybrida</i>	3	<i>Strychnos nux-vomica</i>
<b>Family: <i>Lythraceae</i></b>					
1	<i>Heimia myrtifolia</i>	2	<i>Lagerstroemia indica</i>	3	<i>Lagerstroemia speciosa</i>
3	<i>Lagerstroemia tomentosa</i>				
<b>Family : <i>Magnoliaceae</i></b>					
1	<i>Magnolia grandiflora</i>				
<b>Family: <i>Malpighiaceae</i></b>					
1	<i>Bunchosia armeniaca</i>	2	<i>Hiptage madablota</i>	3	<i>Malpighia glabra</i>
<b>Family: <i>Malvaceae</i></b>					

1	<i>Alcea rosea</i>	2	<i>Abutilon hirtum</i>	3	<i>Abutilon x hybridum</i>
4	<i>Abutilon indicum</i>	5	<i>Anisodentea capensis</i>	6	<i>Hibiscus rosa- sinensis</i>
7	<i>Hibiscus rosa- sinensis</i> cv. Cooperi	8	<i>Hibiscus rosa- sinensis</i> cv. Fiji Pink	9	<i>Hibiscus syriacus</i>
10	<i>Hibiscus syriacus</i> cv. Coelestis	11	<i>Hibiscus tiliacaea</i>	12	<i>Malvaviscus arborea</i>
13	<i>Lagunaria patersonii</i>	14	<i>Thespesia populnea</i>		
<b>Family: Marantaceae</b>					
1	<i>Calathea insignis</i>	2	<i>Calathea makoyana</i>	3	<i>Calathea zebrina</i>
4	<i>Maranta leuconeura</i>				
<b>Family: Meliaceae</b>					
1	<i>Aphanamixis polystachya</i>	2	<i>Cedrela toona</i>	3	<i>Khaya senegalensis</i>
4	<i>Azadirachta indica</i>	5	<i>Melia azedrach</i>	6	<i>Swietenia mahogani</i>
7	<i>Swietenia macrophylla</i>				
<b>Family: Moraceae</b>					
1	<i>Artocarpus heterophyllus</i>	2	<i>Artocarpus altilis</i>	3	<i>Ficus afzelii</i>
4	<i>Ficus auriculata</i>	5	<i>Ficus aspera</i>	6	<i>Ficus asperima</i>
7	<i>Ficus benghalensis</i>	8	<i>Ficus benjamina</i>	9	<i>Ficus benjamina</i> Nuda'
10	<i>Ficus benjamina</i> 'Variegata'	11	<i>Ficus binnendijkii</i>	12	<i>Ficus binnendijkii</i> cv. <i>Variegata</i>
13	<i>Ficus cunninghamii</i>	14	<i>Ficus cyathistipula</i>	15	<i>Picus elastica</i>
16	<i>Ficus elastica</i> cv. Decora	17	<i>Ficus elastica</i> cv. <i>Variegata</i>	18	<i>Ficus gibbosa</i>
19	<i>Ficus hispida</i>	20	<i>Ficus infectoria</i> = <i>F. virens</i>	21	<i>Ficus Lyrata</i>
22	<i>Ficus macrophylla</i>	23	<i>Ficus microcarpa nitida</i> <i>Hawai</i>	24	<i>Ficus mysorensis</i>



25	<i>Ficus platyphylla</i>	26	<i>Ficus pseudosycomorus</i>	27	<i>Ficus pumila</i>
28	<i>Ficus pyriformis</i>	29	<i>Ficus racemosa</i>	30	<i>Ficus religiosa</i>
31	<i>Ficus retusa</i>	32	<i>Ficus spearguns</i>	33	<i>Ficus sycomorus</i>
34	<i>Ficus trijuja</i>	35	<i>Madura pomifera</i>	36	<i>Morus alba</i>
37	<i>Morus macroura</i>	38	<i>Morus nigra</i>		
<b>Family: <i>Moringaceae</i></b>					
1	<i>Moringa peregrina</i>	2	<i>Moringa oleifera</i>		
<b>Family: <i>Myoporaceae</i></b>					
1	<i>Bontia daphnoides</i>	2	<i>Eremophila maculata cv. Aurea</i>	3	<i>Myoporum laetum</i>
<b>Family: <i>Myrsinaceae</i></b>					
1	<i>Ardisia crenata</i>				
<b>Family: <i>Myrtaceae</i></b>					
1	<i>Beaufortia sparsa</i>	2	<i>Callistemon rigidus</i>	3	<i>Callistemon citrinus</i>
4	<i>Callistemon subulata</i>	5	<i>Calothamnus quadrifidus</i>	6	<i>Eucalyptus camaldulensis</i>
7	<i>Eugenia edulis = Myrciaria edulis</i>	8	<i>Eugenia jambolana = Syzygium cuminii</i>	9	<i>Eugenia jambos = Silygium jambos</i>
10	<i>Eugenia supraxillaris</i>	11	<i>Eugenia uniflora</i>	12	<i>Feijoa sellowiana</i>
13	<i>Melaleuca ericifolia</i>	14	<i>Myrtus communis</i>	15	<i>Pimenta racemosa</i>
16	<i>Psidium guajava</i>				
<b>Family: <i>Nandinaceae</i></b>					
1	<i>Nandina domestica</i>				
<b>Family: <i>Nelumbonaceae</i></b>					
1	<i>Nelumbo nucifera</i>				
<b>Family: <i>Nyctaginaceae</i></b>					
1	<i>Bougainvillea glabra</i>	2	<i>Bougainvillea spectabilis</i>	3	<i>Bougainvillea 'Miss But'</i>

4	<i>Mirabilis jalapa</i>				
<b>Family: <i>Nymphaeaceae</i></b>					
1	<i>Nymphaea caerulea</i>				
<b>Family: <i>Oleaceae</i></b>					
1	<i>Fraxinus velutina</i>	2	<i>Jasminum azoricum</i>	3	<i>Jasminum grandiflorum</i>
4	<i>Jasminum humil</i>	5	<i>Jasminum multiflorum</i>	6	<i>Jasminum mesnyi</i>
7	<i>Jasminum primulinum</i>	8	<i>Jasminum sambac</i>	9	<i>Ligustrum ovalifolium</i>
10	<i>Olea europea</i>				
<b>Family: <i>Oxalidaceae</i></b>					
1	<i>Averrhoa carambola</i>				
<b>Family: <i>Arecaceae</i></b>					
1	<i>Acrocomia aculeata</i>	2	<i>Archontophoenix alexandrae</i>	3	<i>Archontophoenix cunninghamiana</i>
4	<i>Arenga engeleri</i>	5	<i>Arenga pinnata</i>	6	<i>Attalae sp.</i>
7	<i>Bactris sp.</i>	8	<i>Bismarkia nobilis</i>	9	<i>Borassus flabellifer</i>
10	<i>Brahea armata</i>	11	<i>Butia capitata</i>	12	<i>Calamus rotang</i>
13	<i>Carpentaria acuminata</i>	14	<i>Caryota mitis</i>	15	<i>Caryota urens</i>
16	<i>Chamaerops humilis</i>	17	<i>Chamaedorea elegans</i>	18	<i>Chamaedorea microspadix</i>
19	<i>Chamaedorea seifrezii</i>	20	<i>Cocos nucifera</i>	21	<i>Copernicia prunifera</i>
22	<i>Dypsis lutescens</i>	23	<i>Dypsis decari</i>	24	<i>Eloeis guineensis</i>
25	<i>Hyophorbe verschaffeltii</i>	26	<i>Hyophorbe lagenicaulis</i>	27	<i>Hyphane thebaica</i>
28	<i>Latania lontaroides</i>	29	<i>Licuala grandis</i>	30	<i>Livistona australis</i>
31	<i>Livistona chinensis</i>				
<b>Family: <i>Passifloraceae</i></b>					
1	<i>Passiflora bryonioides</i>	2	<i>Passiflora caerulea</i>	3	<i>Passiflora edulis</i>
4	<i>Passiflora suberosa</i>				

<b>Family: <i>Phytolacaceae</i></b>					
1	<i>Phytolacca dioica</i>	2	<i>Rivina humilis</i>		
<b>Family: <i>Pinaceae</i></b>					
1	<i>Pinus brutia</i>	2	<i>Pinus canariensis</i>	3	<i>Pinus eldarica</i>
4	<i>Pinus halepensis</i>	5	<i>Pinus pinea</i>		<i>Pinus roxburghii</i>
<b>Family: <i>Piperaceae</i></b>					
1	<i>Peperomia obtusifolia</i>	2	<i>Peperomia obtusifolia</i> cv. Variegata	3	<i>Piper nigrum</i>
<b>Famil: <i>Pittosporaceae</i>+</b>					
1	<i>Hymenosporum flavum</i>	2	<i>Pittosporum tobira</i>	3	<i>Pittosporum tobira</i> Val'. <i>nana</i>
4	<i>Pittosporum tobira</i> var. <i>variegata</i>				
<b>Famil: <i>Platanaceae</i></b>					
1	<i>Platanus orientalis</i>				
<b>Family: <i>Plumbaginaceae</i></b>					
1	<i>Plumbago auriculata</i>	2	<i>Plumbago auriculata</i> var. <i>alba</i>		
<b>Family: <i>Podocarpaceae</i></b>					
1	<i>Afrocarpus gracilior</i>	2	<i>Podocarpus elongatus</i>	3	<i>Podocarpus macrophyllus</i>
4	<i>Podocarpus</i> sp.				
<b>Family: <i>Polemoniaceae</i></b>					
1	<i>Phlox drumondii</i>				
<b>Family: <i>Polygalaceae</i></b>					
1.	<i>Polygala x dalmaisiana</i>				
<b>Family : <i>Polygonaceae</i></b>					
1	<i>Antigonum leptopus</i>	2	<i>Coccoloba peltata</i>	3	<i>Coccoloba uvifera</i>
4	<i>Ruprechtia polystachya</i>	5	<i>Ruprechtia salicifolia</i>		

<b>Family: <i>Portulacaceae</i></b>					
1	<i>Portulacaria afra</i>	2	<i>Portulacaria afra cv. Variegata</i>		
<b>Family: <i>Protaceae</i></b>					
1	<i>Grevillea robusta</i>	2	<i>Macadania integrifolia</i>	3	<i>Stenocarpus sinuata</i>
<b>Familv : <i>Punicaceae</i></b>					
1	<i>Punica granatum</i>				
<b>Family: <i>Rhamnaceae</i></b>					
1	<i>Hovenia dulcis</i>	2	<i>Rhamnus alternus</i>	3	<i>Rhamnus catharticus</i>
4	<i>Ziziphus jujuba</i>	5	<i>Ziziphus spina-christi</i>		
<b>Family: <i>Rosaceae</i></b>					
1	<i>Cotoneaster lacteus</i>	2	<i>Cotoneaster pannosus</i>	3	<i>Cydonia oblonga</i>
4	<i>Eriobotrya japonica</i>	5	<i>Marcetella caudata</i>	6	<i>Prunus armeniaca</i>
7	<i>Prunus persica</i>	8	<i>Prunus sp.</i>	9	<i>Pyracantha fortuneana</i>
10	<i>Pyrus calleryana</i>	11	<i>Rhaphiolepis umbellata</i>	12	<i>Rosa banksiae</i>
13	<i>Rosa banksia cv. Lutea</i>	14	<i>Spirea vanhouttei</i>		
<b>Familv : <i>Rubiaceae</i></b>					
1	<i>Coffea arabica</i>	2	<i>Gardenia augusta</i>	3	<i>Gardenia thunbergia</i>
4	<i>Gardenia latifolia</i>	5	<i>Hamelia patens</i>	6	<i>Ixora undulata</i>
7	<i>Ixora coccinea</i>	8	<i>Ixora ribon</i>	9	<i>Pentas lanceolata</i>
10	<i>Vangueria infaustia</i>				
<b>Family: <i>Rutaceae</i></b>					
1	<i>Aegle marmelos</i>	2	<i>Casimiroa edulis</i>	3	<i>Citrus aurantifolia</i>
4	<i>Citrus aurantium</i>	5	<i>Citrus margarita</i>	6	<i>Glycosmis pentaphylla</i>
7	<i>Murraya paniculata</i>	8	<i>Ruta graveolens</i>	9	<i>Severinia buxifolia</i>
<b>Family: <i>Salicaceae</i></b>					

	<i>Salix babylonica</i>		<i>Salix salsaf</i> = <i>S. subserrata</i>		<i>Salix tetrasperma</i>
<b>Family: <i>Salvadoraceae</i></b>					
1	<i>Salvadora persica</i>				
<b>Family: <i>Sapindaceae</i></b>					
1	<i>Alectron tomentosum</i>	2	<i>Cardiospermum halicacabum</i>	3	<i>Dodonaea viscosa</i>
4	<i>Dimocarpus longan</i>	5	<i>Harpullia pendula</i>	6	<i>Koelreuteria elegans</i> = <i>K. henryi</i>
7	<i>Koelreuteria paniculata</i>	8	<i>Sapindus saponaria</i>	9	<i>Sapindus sp.</i>
<b>Family: <i>Sapotaceae</i></b>					
1	<i>Chrysophyllum cainito</i>	2	<i>Chrysophyllum oliviforme</i>	3	<i>Madhuca longifolia</i>
4	<i>Manilkara zapata</i>	5	<i>Mimusops caffra</i>	6	<i>Mimusops elengi</i>
7	<i>Mimusops laurifolia</i>				
<b>Family: <i>Saxifragaceae</i></b>					
1	<i>Deutzia scabra</i>				
<b>Family: <i>Scrophulariaceae</i></b>					
1	<i>Antirrhinum majus</i>	2	<i>Leucophyllum frutescens</i> cv. Green Cloud	3	<i>Rusellia juncea</i>
<b>Family: <i>Simaroubiaceae</i></b>					
1	<i>Ailanthus altissima</i>				
<b>Family: <i>Solanaceae</i></b>					
1	<i>Browallia speciosa</i>	2	<i>Brugmansia suaveolens</i>	3	<i>Cestrum diurnum</i>
4	<i>Cestrum elegans</i>	5	<i>Cestrum nocturnum</i>	6	<i>Cestrum parqui</i>
7	<i>Cestrum purpureum</i>	8	<i>Iochroma cyaneum</i>	9	<i>Solandra grandiflora</i>
10	<i>Solanum rantonnetii</i>	11	<i>Solanum seaforthianum</i>	12	<i>Petunia hybrida</i>
<b>Family: <i>Sterculiaceae</i></b>					

1	<i>Brachychiton acerifolius</i>	2	<i>Brachychiton australis</i> = <i>B. trichosiphon</i>	3	<i>Brachychiton discolor</i> = <i>B. lurida</i>
4	<i>Brachychiton populneus</i>	5	<i>Brachychiton rupestris</i>	6	<i>Dombeya tiliacea</i>
7	<i>Dombeya burgessiae</i>	8	<i>Firmiana simplex</i>	9	<i>Pterospermum acerifolium</i>
10	<i>Sterculia foetida</i>				
<b>Family: <i>Strelitziaceae</i></b>					
1	<i>Ravenala madagasariensis</i>	2	<i>Strelitzia nicolai</i>	3	<i>Strelitzia reginae</i>
<b>Family: <i>Tamaricaceae</i></b>					
1	<i>Tamarix niotica</i>				
<b>Family: <i>Taxodiaceae</i></b>					
1	<i>Sequoia sempervirens</i>	2	<i>Taxodium distichum</i>	3	<i>Taxodium distichum</i> var. <i>Pendens</i>
<b>Family: <i>Tropaeolaceae</i></b>					
1	<i>Tropaeolum majus</i>				
<b>Family: <i>Ulmaceae</i></b>					
1	<i>Celtis australis</i>	2	<i>Celtis occidentalis</i>	3	<i>Ulmus parvifolia</i>
4	<i>Ulmus pumila</i>	5	<i>Holoptelea integrifolia</i>		
<b>Family: <i>Urticaceae</i></b>					
1	<i>Pilea eadierei</i>				
<b>Family: <i>Verbenaceae</i></b>					
1	<i>Caryopteris mastacanthus</i>	2	<i>Citharexylum quadrangularis</i>	3	<i>Clerodendron bungei</i>
4	<i>Clerodendron inerme</i>	5	<i>Clerodendron indicum</i>	6	<i>Clerodendrum philippinum</i>
7	<i>Clerodendron x speciosum</i>	8	<i>Clerodendron speciosissimum</i>	9	<i>Clerodendron splendens</i>
10	<i>Clerodendrum thomsonia</i>	11	<i>Duranta erecta</i>	12	<i>Duranta erecta</i> cv. <i>Variegata</i>

13	<i>Duranta lorentzii</i>	14	<i>Gmelina arborea</i>	15	<i>Gmelina philippinum</i>
16	<i>Lantana camara</i>	17	<i>Lantana camara cv. Drap</i>	18	<i>Lantana camara cv. (Spreading Sunset)</i>
19	<i>Lantana montevidensis</i>	20	<i>Nyctanthes arbor-tristis</i>	21	<i>Phyla nodiflora</i>
22	<i>Tectona grandis</i>	23	<i>Verbena bipinnatifida</i>	24	<i>Verbena x hybrida</i>
25	<i>Vitex agnus castus</i>	26	<i>Vitex trifolia</i>	27	<i>Vitex trifolia cv. purpurea</i>
<b>Family: <i>Violaceae</i></b>					
1	<i>Viola odorata</i>	2	<i>Viola tricolor</i>		
<b>Family: <i>Vitaceae</i></b>					
1	<i>Cissus rhombifolia</i>	2	<i>Cissus rotundifolia</i>		
<b>Family: <i>Zamiaceae</i></b>					
1	<i>Dioon edule</i>	2	<i>Dion edule var. rio-verdi</i>	3	<i>Dioon spinulosum</i>
4	<i>Encephalartos gratus</i>	5	<i>Encephalartos lebomboensis</i>	6	<i>Encephalartos ferox</i>
7	<i>Encephalartos natalensis</i>	8	<i>Encephalartos princips</i>	9	<i>Encephalartos sclavoi</i>
10	<i>Encephalartos sudanensis</i>	11	<i>Encephalartos villosus</i>	12	<i>Zamia jisheri</i>
<b>Family: <i>Zingiberaceae</i></b>					
1	<i>Alpinia afficinarum</i>	2	<i>Alpinia zerumbet</i>	3	<i>Hedychium coronarium</i>
4	<i>Hedychium gardneianum</i>		<i>Zingiber officinalis</i>		
<b>Family: <i>Zygophyllaceae</i></b>					
1	<i>Guaiacan sanctum</i>				

## Second: Aswan Botanic Garden

The Botanic Garden is located on an island in the Nile opposite Aswan Town.

The garden houses a unique collection of tropical & sub-tropical plants. This is why it is considered an important research centre in Egypt and of the rare BGs in the world. Being in a Nile island renders it a tourist attraction.

The garden contains a museum for terrestrial & aquatic life together with a herbarium & library.

Below is a list of plants in Aswan BG:

Species	Family	Species	Family	Family	Family
<b>A</b>					
<i>Beira affray</i>	<i>Bixaceae</i>	<i>Abero gardneri</i>	<i>Bixaceae</i>	<i>Ansonia sebutaris</i>	
<i>Acado aneura</i>	<i>Fabaceae</i>	<i>Acacia arabica</i>	<i>Leguminosae</i>	<i>Acacia longifolia</i>	<i>Leguminosae</i>
<i>Acacia modesto</i>	<i>Fabaceae</i>	<i>Acacia sundra</i>	<i>Fabaceae</i>	<i>Acalypha godseffiana</i>	<i>Euphorbiaceae</i>
<i>Acer negundo</i>	<i>Aceraceae</i>	<i>Across sapota</i>	<i>Sapotaceae</i>	<i>Adenanthera pavonina</i>	<i>Fabaceae</i>
<i>Adhatoda vasica</i>	<i>Acanthaceae</i>	<i>Albizzia procera</i>	<i>Leguminosae</i>	<i>Albizzia sp.</i>	<i>Leguminosae</i>
<i>Alstonia scholaris</i>	<i>Apocynaceae</i>	<i>Aleurites fordii</i>	<i>Euphorbiaceae</i>	<i>Aleurites triloba</i>	<i>Euphorbiaceae</i>
<i>Anacardium occidentale</i>	<i>Anacardiaceae</i>	<i>Annona cherimola</i>	<i>Annonaceae</i>	<i>Annona montana</i>	<i>Annonaceae</i>
<i>Anona squamosa</i>	<i>Annonaceae</i>	<i>Antiaris africana</i>	<i>Moraceae</i>	<i>Antidesma leptopus</i>	<i>Phyllanthaceae</i>
<i>Antigonon leptopus</i>	<i>Polygonaceae</i>	<i>Aphana mixis rohituca</i>	<i>Meliaceae</i>	<i>Aralia monstrosa</i>	<i>Araliaceae</i>
<i>Areca Catechu</i>	<i>Arecaceae</i>	<i>Areca lutescens</i>	<i>Arecaceae</i>	<i>Arecastrum romanzoffiana</i>	<i>Arecaceae</i>
<i>Arenga pinnata</i>	<i>Arecaceae</i>	<i>Arizona sideroxylon</i>	<i>Sapotaceae</i>	<i>Artocarpus incisa</i>	<i>Moraceae</i>
<i>Artocarpus Integrifolia</i>	<i>Moraceae</i>	<i>Artocarpus sp.</i>	<i>Moraceae</i>	<i>Asparagus decumbens</i>	<i>Asparagaceae</i>
<i>Atalaya hemiglauca</i>	<i>Sapindaceae</i>	<i>Averrhoa carambola</i>	<i>Oxalidaceae</i>	<i>Azadirachta indica</i>	<i>Meliaceae</i>
<b>B</b>					
<i>Balanites aegyptiaca</i>	<i>Zygophyllaceae</i>	<i>Bassia latifolia</i>	<i>Sapotaceae</i>	<i>Barleria cristata</i>	<i>Acanthaceae</i>
<i>Bauhinia variegata</i>	<i>Fabaceae</i>	<i>Bauhinia hookeri</i>	<i>Fabaceae</i>	<i>Bauhinia jenningesii</i>	<i>Fabaceae</i>
<i>Bauhinia purpurea</i>	<i>Fabaceae</i>	<i>Bignonia purpurea</i>	<i>Bignoniaceae</i>	<i>Bixa orellana</i>	<i>Bixaceae</i>
<i>Bombax malabaricum</i>	<i>Bombacaceae</i>	<i>Bontia daphnoides</i>	<i>Myoporaceae</i>	<i>Borassus flabelliformis</i>	<i>Palmaceae</i>
<i>Bougainvillea miss but.</i>	<i>Nyctaginaceae</i>	<i>Bougainvillea spectabilis</i>	<i>Nyctaginaceae</i>	<i>Bougainvillea spectabilis var. lateritia</i>	<i>Nyctaginaceae</i>
<i>Bougainvillea sanderiana</i>	<i>Nyctaginaceae</i>	<i>Brahea sp.</i>	<i>Palmaceae</i>	<b>Buddleia asiatica</b>	<i>Scrophulariaceae</i>
<i>Buddleia lindleyana</i>	<i>Scrophulariaceae</i>	<i>Buddleia madagascariensis</i>	<i>Buddleiaceae</i>	<i>Buddleia lycioides</i>	<i>Scrophulariaceae</i>
<i>Butea frondosa</i>	<i>Fabaceae</i>				
<b>C</b>					
<i>Caesalpinia</i>	<i>Fabaceae</i>	<i>Caesalpinia</i>	<i>Fabaceae</i>	<i>Caesalpinia</i>	<i>Fabaceae</i>



<i>caffra</i>		<i>pulcherrima</i>		<i>seberian</i>	
<i>Calamus indica</i>	<i>Palmaceae</i>	<i>Calamus rattan</i>	<i>Arecaceae</i>	<i>Calycanthus floridus</i>	<i>Calycanthaceae</i>
<i>Callicarpa macrophylla</i>	<i>Verbenaceae</i>	<i>Callistemon lanceolatus</i>	<i>Myrtaceae</i>	<i>Callistemon speciosus</i>	<i>Myrtaceae</i>
<i>Calophyllum calaba</i>	<i>Calophyllaceae</i>	<i>Capparis zeylanica</i>	<i>Capparaceae</i>	<i>Carica papaya</i>	<i>Caricaceae</i>
<i>Cairoteris masta coilbis</i>	<i>Verbenaceae</i>	<i>Corissa Carandas</i>	<i>Cyclanthaceae</i>	<i>Caryota mitis</i>	<i>Apocynaceae</i>
<i>Casimiroa edulis</i>	<i>Palmaceae</i>	<i>Cassia artemisioides</i>	<i>Leguminosae</i>	<i>Cassia bicapsularis</i>	<i>Leguminosae</i>
<i>Cassia fistula</i>	<i>Leguminosae</i>	<i>Cassia javanica</i>	<i>Leguminosae</i>	<i>Cassia multijuga</i>	
<i>Cassia nodosa</i>	<i>Leguminosae</i>	<i>Cassia siamea</i>	<i>Leguminosae</i>	<i>Cassia spectabilis</i>	<i>Leguminosae</i>
<i>Casuarina glauca</i>	<i>Casuarinaceae</i>	<i>Catalpa speciosa</i>	<i>Bignoniaceae</i>	<i>Catalpa sp.</i>	<i>Bignoniaceae</i>
<i>Catha edulis</i>	<i>Celastraceae</i>	<i>Cedrela toona</i>	<i>Meliaceae</i>	<i>Celtis australis</i>	<i>Ulmaceae</i>
<i>Celtis romnitalis</i>	<i>Ulmaceae</i>	<i>Cepholotaxus drupacea</i>	<i>Cephalotaxaceae</i>	<i>Ceratonia siliqua</i>	<i>Leguminosae</i>
<i>Chamaerops humilis</i>	<i>Palmaceae</i>	<i>Chimonanthus fragrans</i>	<i>Calycanthaceae</i>	<i>Chorisia crispiflora</i>	<i>Bombacaceae</i>
<i>Chorisia speciosa</i>	<i>Bombacaceae</i>	<i>Chrysobalanus icaco</i>	<i>Chrysobalanaceae</i>	<i>Chrysophyllum cainito</i>	<i>Sapotaceae</i>
<i>Chrysophyllum monospyrum</i>	<i>Sapotaceae</i>	<i>Chrysophyllum diviforme</i>	<i>Sapotaceae</i>	<i>Cinnamomum camphora</i>	<i>Lauraceae</i>
<i>Cinnamomum glanduliferum</i>	<i>Lauraceae</i>	<i>Citharexylum quadrangulare</i>	<i>Verbenaceae</i>	<i>Citrus aurantium</i>	<i>Rutaceae</i>
<i>Citrus limonia</i>	<i>Rutaceae</i>	<i>Clerodendrum colebrookianum</i>	<i>Lamiaceae</i>	<i>Clerodendrum fallax</i>	<i>Lamiaceae</i>
<i>Clerodendrum siphonanthus</i>	<i>Lamiaceae</i>	<i>Cocos campestris</i>	<i>Arecaceae</i>	<i>Cocos nucifera</i>	<i>Arecaceae</i>
<i>Cocos capitata</i>	<i>Palmaceae</i>	<i>Cocos romanzoffiana</i>	<i>Palmaceae</i>	<i>Codiaeum caudatum</i>	<i>Araceae</i>
<i>Coffea arabica</i>	<i>Rubiaceae.</i>	<i>Cola acuminata</i>	<i>Sterculiaceae</i>	<i>Convolvulus floridus</i>	<i>Convolvulaceae</i>
<i>Copernicia cerifera</i>	<i>Palmaceae</i>	<i>Cordia obliqua</i>	<i>Boraginaceae</i>	<i>Cordia alba</i>	<i>Boraginaceae</i>
<i>Cordia aqua</i>	<i>Boraginaceae</i>	<i>Cordia gharat</i>	<i>Boraginaceae</i>	<i>Cordia myxa</i>	<i>Boraginaceae</i>
<i>Corpha elata</i>	<i>Palmaceae</i>	<i>Creptostegia grandiflora</i>	<i>Asclepiadaceae</i>	<i>Crescentia escarlata</i>	<i>Lythraceae</i>
<i>Croton tiglium</i>	<i>Euphorbiaceae</i>	<i>Cycas circinalis</i>	<i>Cycadaceae</i>	<i>Cycas revoluta</i>	<i>Cycadaceae</i>
<i>Cupresus sempervirens</i>	<i>Coniferae</i>				
<b>D</b>					
<i>Daedalacanthus sp</i>	<i>Acanthaceae</i>	<i>Dalbergia slsso</i>	<i>Leguminosae</i>	<i>Dalbergia sp</i>	<i>Leguminosae</i>
<i>Derris elliptica</i>	<i>Leguminosae</i>	<i>Derris robusta</i>	<i>Leguminosae</i>	<i>Deutzia scabra</i>	<i>Hydrangeaceae</i>
<i>Dianthus barbatus</i>	<i>Caryophyllaceae</i>	<i>Dillenia indica</i>	<i>Dilleniaceae</i>	<i>Diospyros chloroxylon</i>	<i>Ebenaceae</i>
<i>Diospyros</i>	<i>Ebenaceae</i>	<i>Diospyros</i>	<i>Ebenaceae</i>	<i>Diospyros sp</i>	<i>Ebenaceae</i>

<i>ebenum</i>		<i>montana</i>			
<i>Dracaena gracilis</i>	<i>Liliaceae</i>	<i>Dracaena sp</i>	<i>Liliaceae</i>		
<b>E</b>					
<i>Ehretia sp</i>	<i>Boragiaceae</i>	<i>Elaeagnus argentea</i>	<i>Elaeagnaceae</i>	<i>Elaeagnus sp</i>	<i>Elaeagnaceae</i>
<i>Elaeis guineensis</i>	<i>Arecaceae</i>	<i>Enterolobium tspp.</i>	<i>Fabaceae</i>	<i>Eranthemum nervosum</i>	<i>Acanthaceae</i>
<i>Eranthemum nigrum</i>	<i>Acanthaceae</i>	<i>Eriobotrya japonica</i>	<i>Rosaceae</i>	<i>Eriodenderon spp</i>	<i>Bombacaceae</i>
<i>Erythroxylum coca</i>	<i>Erythroxylaceae</i>	<i>Eucalyptus citriodora</i>	<i>Myrtaceae</i>	<i>Eucalyptus rosnata</i>	<i>Myrtaceae</i>
<i>Euclea pseudoebanus</i>	<i>Myrtaceae</i>	<i>Eugenia spp.</i>	<i>Myrtaceae</i>	<i>Eugenia edulis</i>	<i>Myrtaceae</i>
<i>Eugenia jambolana</i>	<i>Myrtaceae</i>	<i>Eugenia javanica</i>	<i>Myrtaceae</i>	<i>Eugenia rosea</i>	<i>Myrtaceae</i>
<i>Eugenia supraxillaris</i>	<i>Myrtaceae</i>	<i>Eugenia uniflora</i>	<i>Myrtaceae</i>	<i>Eugenia sp</i>	<i>Myrtaceae</i>
<b>F</b>					
<i>Feijoa sellowaina</i>	<i>Myrtaceae</i>	<i>Ficus asprina</i>	<i>Myrtaceae</i>	<i>Ficus benghalensis</i>	<i>Myrtaceae</i>
<i>Ficus benjamena</i>	<i>Myrtaceae</i>	<i>Ficus carica</i>	<i>Myrtaceae</i>	<i>Ficus cycamorus</i>	<i>Myrtaceae</i>
<i>Ficus elastica</i>	<i>Myrtaceae</i>	<i>Ficus spp.</i>	<i>Myrtaceae</i>	<i>Ficus hispida</i>	<i>Myrtaceae</i>
<i>Ficus falcata</i>	<i>Myrtaceae</i>	<i>Ficus lyrata</i>	<i>Myrtaceae</i>	<i>Ficus mysorensis</i>	<i>Myrtaceae</i>
<i>Ficus nitida</i>	<i>Myrtaceae</i>	<i>Ficus pamlata</i>	<i>Myrtaceae</i>	<i>Ficus platypoda</i>	<i>Myrtaceae</i>
<i>Ficus pyriformis</i>	<i>Myrtaceae</i>	<i>Ficus religiosa</i>	<i>Myrtaceae</i>	<i>Ficus repens</i>	<i>Myrtaceae</i>
<i>Ficus peruana</i>	<i>Myrtaceae</i>	<i>Ficus trijuga</i>	<i>Myrtaceae</i>	<i>Ficus tsiela</i>	<i>Myrtaceae</i>
<i>Flacourtia cataphracta</i>	<i>Flacourtiaceae</i>	<i>Flacourtia indica</i>	<i>Flacourtiaceae</i>		
<b>G</b>					
<i>Garcinia dulcis</i>	<i>Clusiaceae</i>	<i>Gardenia latifolia</i>	<i>Rubtaceae</i>	<i>Glycosmis pentaphylla</i>	<i>Rutaceae</i>
<i>Grewia asiatica</i>	<i>Malvaceae</i>	<i>Guazuma tomentosa</i>	<i>Sterculceae</i>	<i>Galphimia glauca</i>	<i>Malpighiaceae</i>
<b>H</b>					
<i>Haematoxylum campechianum</i>	<i>Fabaceae</i>	<i>Hamelia patens</i>	<i>Rubiaceae</i>	<i>Hura crepitans</i>	<i>Euphorbiaceae</i>
<i>Hibiscus rosa sinensis</i>	<i>Malvaceae</i>	<i>Hibiscus schizopetalus</i>	<i>Malvaceae</i>	<i>Matvaviscus spp</i>	<i>Malvaceae</i>
<i>Mutabilis rose</i>	<i>Roscaeae</i>	<i>Hymenaea courbaril</i>	<i>Fabaceae</i>	<i>Hymenosporum sp</i>	<i>Pittosporaceae</i>
<i>Hyophorbe verschaffeltii</i>	<i>Arecaceae</i>				
<b>I</b>					
<i>Antidesma</i>	<i>Phyllanthaceae</i>	<i>Ipomoea</i>	<i>Convolvulaceae</i>	<i>Ilex</i>	<i>Aquifoliaceae</i>

<i>bunius</i>		<i>palmata</i>		<i>paraguariensis</i>	
<i>Ixora coccinea</i>	<i>Rubiaceae</i>	<i>Ixora portinari</i>	<i>Rubiaceae</i>	<i>Ixora undulata</i>	<i>Rubiaceae</i>
<b>J</b>					
<i>Jacaranda ovalifolia</i>	<i>Bigoniaceae</i>	<i>Jasminum grandiflorum</i>	<i>Oleaceae</i>	<i>Jasminum multiflorum</i>	<i>Oleaceae</i>
<i>Josminum sambac</i>	<i>Oleaceae</i>	<i>Jatropha curcas</i>	<i>Euphorbiaceae</i>	<i>Joannesia princeps</i>	<i>Euphorbiaceae</i>
<b>K</b>					
<i>Kentia belmoreana</i>	<i>Arecaceae</i>	<i>Khaya sengalensis</i>	<i>Meliaceae</i>	<i>Kigelia pinnata</i>	<i>Bignoniaceae</i>
<b>L</b>					
<i>lagerstromia indica</i>	<i>Lytheraceae</i>	<i>lantana camara</i>	<i>Verbenaceae</i>	<i>Latania borbonica</i>	<i>Palmaceae</i>
<i>Latania rubra</i>	<i>Arecaceae</i>	<i>Leucaena glauca</i>	<i>Leguminosae</i>	<i>Leptadenia pyrotechnica</i>	<i>Apocynaceae</i>
<i>Livistona chinensis</i>	<i>Arecaceae</i>	<i>Livistona humilis</i>	<i>Palmaceae</i>	<i>Lonchocarpus speciosus</i>	<i>Fabaceae</i>
<b>M</b>					
		<i>Maclura pomifera</i>	<i>Moraceae</i>	<i>Magnolia grandiflora</i>	<i>Magnoliaceae</i>
<i>Malpighia punctata</i>	<i>Meliaceae</i>	<i>Malvaviscus mollis</i>	<i>Malvaceae</i>	<i>Mangifera indica</i>	<i>Anacardiaceae</i>
<i>Manihot esculenta</i>	<i>Euphorbiaceae</i>	<i>Markhamia platycalyx</i>	<i>Bignoniaceae</i>	<i>Mascarenhasia elastica</i>	<i>Apocynaceae</i>
<i>Melaleuca armillaris</i>	<i>Myrtaceae</i>	<i>Melaleuca azadriachta</i>	<i>Myrtaceae</i>	<i>Melaleuca leucadendron</i>	<i>Myrtaceae</i>
<i>Melaleuca spp.</i>	<i>Myrtaceae</i>	<i>Melaleuca pinifolia</i>	<i>Myrtaceae</i>	<i>Melaleuca stephaloides</i>	<i>Myrtaceae</i>
<i>Melia azedarach</i>	<i>Myrtaceae</i>	<i>Mimusops caffra</i>	<i>Spotaceae</i>	<i>Mimusops chenperli</i>	
<i>Mimusops elengi</i>	<i>Spotaceae</i>	<i>Moringa pterygosperma</i>	<i>Moringaceae</i>	<i>Morus Musa nigra</i>	<i>Moraceae</i>
<i>Morus sp</i>	<i>Moraceae</i>	<i>Mussaenda spp</i>	<i>Rubiaceae</i>	<i>Murraya exotica</i>	<i>Rutaceae</i>
<b>N</b>					
<i>Nandina domestica</i>	<i>Berberidaceae</i>	<i>Nephelium longana</i>	<i>Sapindaceae</i>	<i>Nephelium tomentosa</i>	<i>Sapindaceae</i>
<i>Nerium oleander</i>	<i>Apocynaceae</i>	<i>Nolia recurvata</i>	<i>Asparagaceae</i>	<i>Nyctanthes arbor-tritis</i>	<i>Verbenaceae</i>
<b>O</b>					
<i>Ochrosia elliptica</i>	<i>Apocynaceae</i>	<i>Olea chrysophylla</i>	<i>Oleaceae</i>	<i>Oncoba spinosa</i>	<i>Salicaceae</i>
<b>P</b>					
<i>Pachira excels</i>	<i>Bombaceae</i>	<i>Parkinsonia aculeata</i>	<i>Fabaceae</i>	<i>Peltophorum voglianum</i>	<i>Leguminosae</i>
<i>Penias indica</i>	<i>Lauraceae</i>	<i>Pisco altissima</i>	<i>Palmaceae</i>	<i>Phoenix canariensis</i>	<i>Arecaeae</i>
<i>Phoenix</i>	<i>Palmaceae</i>	<i>Phoenix</i>	<i>Palmaceae</i>	<i>Phoenix spp.</i>	<i>Palmaceae</i>

<i>dactylifera</i>		<i>roebelenii</i>			
<i>Phyllanthus atropurpureus</i>	<i>Phyllanthaceae</i>	<i>Phyllanthus emblica</i>	<i>Phyllanthaceae</i>	<i>Pimenta acris</i>	<i>Myrtaceae</i>
<i>Pistacia terebinthus</i>	<i>Anacardiaceae</i>	<i>Pistacia vera</i>	<i>Anacardiaceae</i>	<i>Pistacia sp</i>	<i>Anacardiaceae</i>
<i>Piptadenia sp</i>	<i>Fabaceae</i>	<i>Pittosporum tobira</i>	<i>Pittosporoaceae</i>	<i>Plumeria Alba</i>	<i>Apocynaceae</i>
<i>Plumeria japonica</i>	<i>Apocynaceae</i>	<i>Plumeria jasminoides</i>	<i>Apocynaceae</i>	<i>Podocarpus neriifolia</i>	<i>Podocarpaceae</i>
<i>Poinciana regia</i>	<i>Leguminosae</i>	<i>Poivrea densiflora</i>	<i>Comberitaceae</i>		
<i>Polyalthia longifolia</i>	<i>Annoniaceae</i>	<i>Pongamia glabra</i>	<i>Verbanaceae</i>	<i>Premna pubescens</i>	<i>Verbinaceae</i>
<i>Prichardia officana</i>	<i>Myrtaceae</i>	<i>Psidium cattleianum</i>	<i>Myrtaceae</i>	<i>Psidium guajava</i>	<i>Myrtaceae</i>
<i>Pterocarpus indicus</i>	<i>Fabaceae</i>	<i>Pterospermum acerifolium</i>	<i>Sterculiaceae</i>	<i>Puncia granatum</i>	<i>Punicaceae</i>
<i>Putranjiva roxburghii</i>	<i>Putranjivaceae.</i>	<i>Euphorbiaceae</i>			
<b>Q</b>					
<i>Quisqualis Indica</i>		<i>Combortaceae</i>			
<b>R</b>					
<i>Robinia pseudoacacia</i>	<i>Fabaceae</i>	<i>Rosa banksia</i>	<i>Rosaceae</i>	<i>Roystonio regia</i>	<i>Arecaceae</i>
<i>Rhamnus tinctoria</i>	<i>Rhamnaceae</i>	<i>Rhapis flabelliformis</i>	<i>Arecaceae</i>	<i>Rhus laurina</i>	<i>Anocardiaceae</i>
<i>Rhus verniciflua</i>	<i>Anocardiaceae</i>	<i>Russelia equisetiformis</i>		<i>Scorophulariaceae</i>	
<b>S</b>					
<i>Sabal spp.</i>	<i>Arecaceae</i>	<i>Sabal spp.</i>	<i>Arecaceae</i>	<i>Sabal palmetto</i>	<i>Arecaceae</i>
<i>Salvadora persica</i>	<i>Salvadoraceae</i>	<i>Sambucus nigra</i>	<i>Adoxaceae</i>	<i>Sanchezia longifolia</i>	<i>Acanthaceae</i>
<i>Santalum album</i>	<i>Santalaceae</i>	<i>saraca cauliflora</i>	<i>Fabaceae</i>	<i>Saraca indica</i>	<i>Fabaceae</i>
<i>Schinus dependes</i>	<i>Anacardiaceae</i>	<i>Schinus molle</i>	<i>Anacardiaceae</i>	<i>Solanum macranthum</i>	<i>Solanaceae</i>
<i>Solanum rantonnetii</i>	<i>Solanaceae</i>	<i>Saphora secundiflora</i>	<i>Fabaceae</i>	<i>Spathodea nilotica</i>	<i>Bigoniaceae</i>
<i>Spirea cantoniensis</i>	<i>Rosaceae</i>	<i>Spondias dulcis</i>	<i>Anacardiaceae</i>	<i>Spondias mangifera</i>	<i>Anacardiaceae</i>
<i>spondios speciosa</i>	<i>Anacardlaceae</i>	<i>Stenocarpus stenoptera</i>	<i>Orchidaceae</i>	<i>Sterculia acerifolia</i>	<i>Sterculiaceae</i>
<i>Sterculia diversifolia</i>	<i>Sterculiaceae</i>	<i>Sterculia foetida</i>	<i>Sterculiaceae</i>	<i>sterculia rupestris</i>	<i>Sterculiaceae</i>
<i>Sterculia supra</i>	<i>Sterculiaceae</i>	<i>Sterculia trichophora</i>	<i>Sterculiaceae</i>	<i>Sterlitzia augusta</i>	<i>Strelitziaceae</i>
<i>Strychnos nux vomica</i>	<i>Loganiaceae</i>	<i>Swietenia macrophylla</i>	<i>Meliaceae</i>		

		<i>mahogani</i>			
<b>T</b>					
<i>Tabebuia guayacan</i>	<i>Bigoniaceae</i>	<i>Tabebuia pentaphylla</i>	<i>Bigoniaceae</i>	<i>Tabebuia spectabilis</i>	<i>Bigoniaceae</i>
<i>Tabernaemontana coronaria</i>	<i>Apocynaceae</i>	<i>Tamarindus Indica</i>	<i>Leguminosae</i>	<i>Tacoma argentea</i>	<i>Bigoniaceae</i>
<i>Tecoma capensis</i>	<i>Bigoniaceae</i>	<i>Tecoma chrysostricha</i>	<i>Bigoniaceae</i>	<i>Tecoma grandiflora</i>	<i>Bigoniaceae</i>
<i>Tecoma grandis</i>	<i>Bigoniaceae</i>	<i>Tecoma stans</i>	<i>Bigoniaceae</i>	<i>Tectona grandis</i>	<i>Verbenaceae</i>
<i>Tectona grandiflora</i>	<i>Verbenaceae</i>	<i>Terminalia arjuna</i>	<i>Verbenaceae</i>	<i>Terminalia australis</i>	<i>Verbenaceae</i>
<i>Terminalia belerica</i>	<i>Verbenaceae</i>	<i>Terminalia catappa</i>	<i>Verbenaceae</i>	<i>Thebroa cacao</i>	<i>Verbenaceae</i>
<i>Thevetia neriiifolia</i>	<i>Apocynaceae</i>	<i>Thrinax barbadensis</i>	<i>Areaceae</i>	<i>Thrinax elegans</i>	<i>Areaceae</i>
<i>Thuja orientalis</i>	<i>Cupressaceae</i>				
<b>V</b>					
<i>Vitex agnus castus</i>	<i>Verbinaceae</i>	<i>Vitex agnus guava</i>	<i>Verbinaceae</i>		
<b>W</b>					
<i>Washingtonia filifera</i>		<i>Areaceae</i>			
<b>X</b>					
<i>Xylosma longifolia</i>		<i>Salicaceae</i>			

## Annex 5

### Herbaria One way of Conserveing Plant Genetic Resources ex-situ

Eng. Theresa Labib  
Orman Gardens

## Herbaria

Herbaria provide a valuable & permanent record for plant lifecycle and are thus considered a scientific museums and infinite banks with enormous amounts of primary data. They are considered one of the most important means of conserving plant types in general and plant genetic resources in particular in environs like Egypt as so many plants are endangered.

### **First: Renowned Herbaria in Egypt that are Registered Globally:**

1. Flora/ Plant Taxonomy Herbarium of National Research Centre, Ministry of Agriculture & Land Reclamation, Dokki. It houses some 320 000 plant specimens (CIAM),
2. Botany Department Herbarium, Faculty of Science, Cairo University. It houses some 250 000 plant specimens (CAI),
3. National Centre for Research Herbarium (CAICR),
4. Botany Department Herbarium, Faculty of Science, South of the Valley University (ASW),
5. Botany Department Herbarium, Faculty of Science, Ein Shams University (CAIA),
6. Desert Research Centre Herbarium, Matariya, Cairo (CAIH),
7. Botany Department Herbarium, Faculty of Science, Tanta University (TANTE).

### **Second: Unregistered Herbaria in Botanic Gardens:**

1. Orman Garden Herbarium. It houses some 7000 plant specimens,
2. Gezira Botanic Garden Herbarium, Aswan with some 1000 plant specimens.

### **Third: Herbaria of Scientific Authorities:**

1. Sheikh Zaid Herbarium,
2. Faculty of Science Herbarium, Assiut University,
3. Gene Bank Herbarium,
4. National Centre for Research Herbarium,
5. Faculty of Science Herbarium, Mansoura University,
6. Faculty of Science Herbarium, Alexandria University,
7. Faculty of Science Herbarium, Suez Canal University, Ismailiya,
8. St. Catherine Herbarium.

### **Fourth: Amateur/Enthusiast Herbaria:**

1. Dr. Ramiz Herbarium,
2. Dr. Lutfi Boulus, Herbarium,

3. Botanic Project Hebarium,

4. Mazhar Private Botanic Garden Herbarium.