

Full Length Research Paper

The floristic composition of some historical botanical gardens in the metropolitan of Cairo, Egypt

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In this article, we studied the historical background of six major historical botanic gardens that were established by the Khedive Ismail (1863 - 1879) in the second half of 19th century in Cairo city, and report their floristic composition. These gardens were Zohriya, Aquarium, Ezbekiya, The Zoo, Orman and Horreya. In addition, the present status of these six gardens was addressed in particular, area, land use, landscape architecture and the taxonomic diversity of the plants growing in each garden. The distribution patterns of the recorded species were also presented using the multivariate analysis techniques (classification and ordination). An updated annotated list of cultivated species in these gardens will be provided.

Key words: Cultivated plants, urban flora, botanical and historical gardens, national parks, Egypt.

INTRODUCTION

Horticulture and botanic gardens in Egypt in the 19th century

Since the reign of Mohammed Ali (1805 - 1844), the subject of introduction and acclimatization of new plants received much attention in Egypt. His famous son Ibrahim Pasha made a garden at Rodah where many of the ornamental trees, now largely cultivated in the country, were introduced for the first time. However, the development of the modern European style of horticulture in Cairo gardens commenced during the reign of the Khedive Ismail (1863 – 1879). His period was remarkable in the history of Egypt for the creation of several large experimental gardens and public parks (El-Sheshtawy, 1969).

The present study aims primarily to compare and document the variation in the floristic diversity of six historical botanic gardens constructed by the orders of Khedive Ismail in the metropolitan Cairo city, namely:

Zohriya, Aquarium (Fishes), Ezbekiya, The Zoo, Orman and Horreya. In addition, the history and the present status of each of the studied garden including landmarks, landscape architecture and structure is also presented. An annotated list of the floristic composition of each garden is also provided.

Few studies were focused on the historical gardens and parks in Egypt; amongst others, Wittig et al. (1985), Nath (1990), Ivanova and Ivanova (1992) and Ignatieva and Konechnaya (2004). The oldest and most important contribution was that of Clot Bey (1840) "*Aperçu Général sur L'Egypte*". Clot Bey enumerated the cultivated plants that were grown at the time of both Mohamed Ali and Ibrahim Pasha. He presented also the design and architecture of Shubra and Roda Island gardens, and reported the foreign plants introduced into these gardens. In addition, a full account of the economic potentialities and origin of these plants was presented. Moreover, the numbers of native trees, foreign trees, the natural fruit trees, the recently introduced foreign fruit trees, graminaceous plants, non graminaceous plants, vegetables and leguminous

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plants, fibre plants, dye plants, ornamental plants, useful plants, landscaping and ornamental plants, and wild plants were also recorded.

In his account, *"Studi Scientifici Sull'Egitto e Sue adiacenze compresa la penisola dell' Arabia Petrea"*, Figari (1865) classified the cultivated plants into 6 main groups: cereals (16), fodder (4), vegetables and salads (54), economic (31), trees (69) and ornamentals (234). Within each group, the plants were delimited according to their families, and each species was given Latin name, Arabic name, vernacular name, as well as full description, origin, propagation methods and uses.

Delchevalerie; the chief gardener at the time of Khedive Ismail; published a number of accounts that dealt with the cultivated plants in Egypt. Among the most important, Delchevalerie (1870) published *"Plantes Tropicales Utiles, Officinales et Industrielles"* suggesting the plants, which can be introduced into Egypt and can grow below 30°C. The list comprised 96 species that have a potential value such as being aromatic, textile, medicinal, resin, gum and dyes producing plants. In his account *"Flore exotique du jardin d'acclimation de ghézireh et des domaines de son altesse le Khédive"*, Delchevalerie (1871) outlined the history of horticulture and agriculture in ancient Egypt, and in the reign of Mohamed Ali, he demonstrated a legend of the floristic taxa found in the experimental gardens at Gezireh west of Cairo. The contribution by Delchevalerie (1899) *"Les Promenades et Les Jardins du Caire"* that was later translated into Arabic by Shabatei, in 1924; presented the history and floristic composition of taxa in many gardens e.g., Giza and Gezirah; Hussein Kamel garden at Giza; Shubra garden north of Cairo; Qubba garden east of Cairo; Roda Island and Ezbekiya gardens. Besides, a general catalogue included 4000 species of annuals and perennials cultivated in the fields and gardens of Khedivial palaces at the 19th century were also presented. At that time, Ascherson and Schweinfurth (1887) also enumerated the entire plant species (wild and cultivated) in their famous work *"Illustration de la flore d'Egypte"*. Muschler (1912) appended 310 species belonging to 81 families of the most frequent cultivated and garden plants in Egypt. Täckholm and Drar (1941, 1950, 1954, 1969) published four monumental volumes that covered the entire wild and cultivated plant families of monocotyledons in Egypt, but their attempt to complete the entire flora of Egypt was stopped abruptly with the death of M. Drar in 1964 and Täckholm in 1978.

In her first valuable contributions, Bircher (1960) presented a handbook for gardening in Egypt and the subtropics including a brief account on the historical development of the gardens. She described and classified about 2000 species grown in the gardens of El-Saff about 50 km south of Cairo, giving the origin and verna-

cular name for each species. In addition, she made a list of plants viewed from different points such as their characters and utility, as well as a monthly calendar recording approximate dates of flowering, sprouting, fruiting and shedding of leaves. Recently, Khalifa (1995) described the different styles of botanical gardens in Egypt, he mentioned the important 15 gardens in Cairo, 7 gardens in Alexandria as well the Plant Island at Aswan and described how the plant taxa influenced in the landscape of gardens. He also summarized their history, area and floristic composition. Bircher (1998) updated the English version of the original work of Delchevalerie *"Les Plantes Exotiques Cultivées en Egypte"* and added notes concern the country of origin for each species, economic importance and history of its cultivation especially in El-Saff botanic gardens. The list comprised about 600 species belonging to 331 genera and 112 families of seed plants. More recently, Labib et al. (2003) updated and revised the cultivated gymnosperms growing at the Orman botanic garden. A documentary study on the Ezbekiya garden (Mohamed, 2004) including its site, area, history and floristic composition was published. Diwan et al. (2004) published in Arabic a review entitled *"Plant Atlas of Botanical Gardens in Cairo and Giza"* giving a historical overview on ten gardens. On the other hand, Farahat (2005) studied the vegetation-environment relationships in El-Qanatir Public Park (constructed at the end of the 19th century south of Nile Delta, about 24 km north of Cairo). He recorded 112 ornamental species; trees and shrubs have the highest contribution (80 species), followed by climbers (9), palms (8), succulent and spiny plants (6), perennial and annual plants (4) and finally conifers (4).

Cairo: past and present

Cairo, the capital of Egypt, is the largest city in the Middle East and Africa. Officially speaking, Cairo was founded in 969 AD, yet parts of the metropolis date back to the time of the Pharaohs. It is at least twice as old as Paris, 7 times as old as Berlin, and 15 times as old as New York City. In the 19th century, Khedive Ismail (1863 – 1879) constructed what is now considered the city center of Cairo. The old city was neglected and gradually fallen into disrepair. By the turn of the 20th century, most commercial activities moved into modern Cairo (Ali, 1998). Today, the metropolitan Cairo is made up of the historical Cairo, the city of Giza, the islands Gezira and El-Roda, and regions in Qalubiyah, north of Cairo proper. Today, Cairo covers an area of almost 300 km² and is expanding further in the east and south directions. Figure 1 shows the increase in the total area of Cairo since 860 AD to the year 2000. Its total area was increased more than 1000 times in about 1140 years.

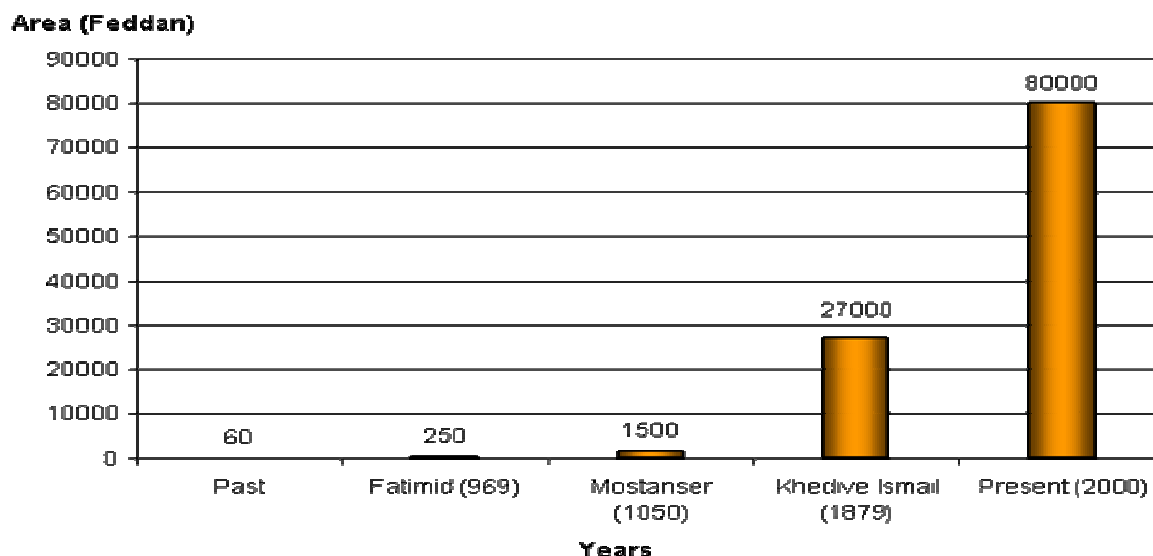


Figure 1. Diagram illustrating the increase in the area of Cairo during the last millennium.

Cairo botanical gardens in the 19th century

The first botanic garden in Egypt was established during the time of Mohamed Ali at Abu Za'abal near Khanka (north east suburb of Cairo), and was later transferred to the Qasr Al-Ainy Hospital (El-Hetta, 1950). At his time also a garden of about 60 Acres (1Acre=1Feddan) was established around his palace at Shubra (north suburb of Cairo). Not only did Mohamed Ali seek the cultivation of trees and gardens, but he also tried to extent the area of cultivation by encouraging the reclamation of lands. He ordered to cultivate 16,000,000 trees in the Nile Delta region (Draper, 1898). We are indebted to Ibrahim Pasha in the propagation and distribution of plants throughout the country as more than 5,000,000 ornamental and fruit trees were cultivated (Drar, 1923). Not only the Roda Island was utilized as an experimental ground for acclimatization and propagation of plants but also was considered a public park. Under the auspice of Khedive Ismail Pasha (1863 – 1879); whose deep interest and devoted love for the promotion of horticultural knowledge in Egypt, innumerable plants were brought from Europe and America. The opening of the Suez Canal in 17th November 1869 had also greatly facilitated the import of a vast arboreal wealth in the form of seeds or live plants from the Far East. During the reign of Khedive Ismail the six gardens dealt with in this article were established. More gardens were also constructed in the second half of the 18th century. Available information about some historical botanic gardens in Egypt during the 19th century and the early beginning of the 20th century is summarized

in Table 1. This information includes the year of establishment, total area (in Feddans), and the gardeners who established these gardens.

MATERIALS AND METHODS

Field work and data collection

For the purposes of this study, several visits were made between 2004 and 2006 to the six gardens Zohriya, Aquarium, Ezbekiya, The Zoo, Orman, and Horreya. For each studied garden, the present floristic status has been described in terms of species presence/absence, and the general distribution of these species among the six gardens is documented. Taxonomic diversity and growth forms in each garden have been also estimated and graphically compared. Voucher specimens for most of the recorded taxa have been identified and checked at the herbaria of Cairo University (CAI) and the Orman garden where duplicates were preserved and kept. Systematic and nomenclatural revisions of the recorded taxa have been carried out by the aid of GRIN (Germplasm Resources Information Network), Huxley et al. (1992), Bailey and Bailey (1976), Hooker and Jackson (1893).

Available information such as area, year of establishment, species composition and landmarks for each of the studied gardens was obtained from several sources. Historical documents, photos as well as travelers' books, that were designed and drawn at different periods were obtained from Dar El-Kotob (the Book House), National Documents House, and the Egyptian Geographical Society. Recent data including maps, photos and satellite images, for the gardens, have been downloaded using the Google Earth Software and comparisons were made to show how much changes had occurred to these gardens during the last 130 years. It is hoped that the appended checklist of the floristic composition of these botanical gardens is significant for any future studies in conserving national parks and gardens.

Table 1. Summary of the available information on the major historical botanic gardens that were established in Cairo during the 19th and the early beginning of the 20th centuries.

No	Garden's Name	Year of Establishment	Ordered by	Gardeners	Total old area (Feddans)
1	Shubra	1806	Mohamed Ali Pasha	Turkish, Greek gardeners, Trial & Bové	70
2	Roda island	1830	Khedive Ibrahim	Trial, Bové (1829) & Maccullock	40
3	El-Qanatir	1834	Mohamed Ali Pasha	Draper	120
4	Zohriya	1868	Khedive Ismail	Des Champs Delchevalerie & Gaby	49
5	Ezbekiya	1872	Khedive Ismail	Des Champs, Delchevalerie & Stamm	20
6	Orman	1873	Khedive Ismail	French gardeners	95
7	Aquarium	1871	Khedive Ismail	---	10
8	The Zoo	1890	Khedive Tawfik	Des Champs & Delchevalerie	50
9	Prince Mohamed Ali	1901	Prince Moh. Ali	---	14.4
11	Japanese	1919-1922	King Fouad I	----	10
12	Andalus	1929	King Fouad I	----	2.25

Data analysis

A data matrix was constructed based on a binary presence-absence codes for 968 species in the studied six gardens. The data was processed by multivariate analysis using Multivariate Statistical Package MVSP for Windows, version 3.1 (Kovack, 1999). For the classification of gardens, cluster analysis using minimum variance as agglomeration criterion (Orloci, 1978) was applied to squared Euclidean distance dissimilarity matrix. The obtained groups were represented in a dendrogram. In order to reveal possible intrinsic patterns, garden ordination with Principal Coordinates Analysis (PCoA) was preferred using the product-moment correlation as a coefficient. We preferred PCoA than a PCA (Principal Components Analysis) because the former performs better on data sets with missing data (Rohlf, 1972). Gardens that are more similar in vegetation structure (species composition and abundance) were depicted as being closer together in the diagram. Species richness (alpha diversity) was calculated as the total number of species in each garden. All the statistical analyses were carried out using SPSS for windows version 10.0.

RESULTS AND DISCUSSION

The Zohriya garden (Zoh)

History and structure: The Zohriya (in Arabic= Vase or flower vessel) garden was established in the southern side of the Gezira island with a total area of 49 Feddans in order to supply the Khedivial palaces and nurseries with sufficient plants and flowers. Delchevalerie (1870)

established in this garden the first station for acclimatization of plants and where special attention was paid for propagation of tropical fruits such as the bread tree, the sapodilla plum and the mango. The last station was created in 1876, and was divided into 4 main sections (fruit trees, vegetables, ornamentals and experimental stations). The plants that constituted these 4 sections were furthermore grouped under 60 sub-classes. A large number of foliage plants such as palms, cycads, *Aralia* and *Dracaena* that were introduced from India, America and Australia were also grown in suitable accommodations. In 1917 this garden was affiliated to the Ministry of Agriculture to be a station for acclimatization and propagation of plants as well as a place for horticultural exhibitions.

Landmarks and floral composition

The garden is divided into six quarters: the Mango, the Quercus, the Cupressus, the Cassia, the Chorisia and the administration. Its current area has been reduced from 49 Feddans to only eight Feddans (Figures 2, 3 and 4). It contains 13 green houses for plant acclimatization, eleven of which date back to the time of its establishment with many coral reefs inside. The roses, were also a fascinating landmark of this garden.

This garden is rich with many species taxa and con-



Figure 2. Historical map of Gezira Island showing the proportion of gardens and green lands. Plan Général de la ville du Caire et des environs, Scale 1/10.000, 1897.



Figure 3. A map showing the Location of the three major gardens of the Gezira Island, published by the Survey of Egypt, Scale 1/10.000, 1929.



Figure 4. Satellite image of the Gezira gardens showing the present status of the gardens in Gezira Island, Google Earth.

tains many rare and uncommon plants (Abbass, 1929). Our study revealed that a total of 358 species are recorded in this garden and belong to 86 families and 250 genera of the seed plants. In general, the most species-rich families are Leguminosae (40 species), Palmae (30), Moraceae (17), Araliaceae (15) and Bignoniaceae (15), Myrtaceae (12) and Araceae (12), Anacardiaceae (10), Acanthaceae (10), Apocynaceae and Verbenaceae (10). Fifty one families contain only 1-2 species, among them Adiantaceae, Aloaceae, Salicaceae, Simaroubiaceae and Ulmaceae. Seven families: Aspleniaceae, Betulaceae, Hamamelidaceae, Ochnaceae, Polypodiaceae, Ranunculaceae and Theaceae are represented only in this garden. The genera that contain the most number of species are *Ficus* (13), *Clerodendrum* (7), *Dracaena* and *Schefflera* (5 for each), *Senna*, *Livistona*, *Jasminum*, *Terminalia*, *Justicia* and *Pistachia* (4 for each). It is noted that 240 genera contain 1-3 species only, examples of these species are: *Syzygium*, *Ligustrum*, *Chamaedorea*, *Howea*, *Sabal*, *Acanthus*, *Barleria*, *Sanchesia* and *Nolina* were recorded.

Twelve growth forms have been observed in this garden. Trees, shrubs, climbers, palms and perennial herbs are the most common growth form. Altogether 139 trees belonging to 37 families have been recorded; the most common are Leguminosae (29 species), Moraceae (17 species), Myrtaceae and Anacardiaceae (10 species). Twenty-six families comprised the main bulk of the 84 recorded shrubs; Araliaceae (11 species), Leguminosae (9 species), Acanthaceae (8 species) and Rubiaceae (7 species). Climbers are among the characteristic features of the Zohriya gar-

den; they include 34 species or 10% of the total recorded species and belong to 19 families and 26 genera. The palm trees are comprised of 30 species representing 20 genera; the most important are: *Livistona* (4 species), *Sabal* (3 species), *Phoenix*, *Washingtonia*, *Roystonea* and *Chamaedorea* (2 species). Nineteen perennial herbs belonging to 13 families have been recorded, of which three belong to each of Liliaceae and Compositae and two species to each of Labiatae and Zingiberaceae. It is to be noted that, among the rare ferns: *Pteris cretica*, *Polypodium vulgare* and *Phanerophlebia falcata* were recorded in the Zohriya garden.

The Aquarium (Fishes) garden (Aqu)

History and structure

The Aquarium (Fishes) garden was established in 1871 on 10 Feddans of the Khedive's Ismail private property on the western side of the Gezira island (Figures 2 and 3). The grottos were constructed by the well known Italian specialists: De Combaz and Dumilieu. In the early 1900's, Captain Stanley Flower constructed the Fishes Garden; as he added aquariums in the old grottos of the garden, it became home of a rare collection of African fishes and reptiles. It was one of the only gardens created in the 19th century that was actually designed to be a public park.

Landmarks and floral composition

The rocky feature of its design and its rounded shape surrounded by Pine, Casuarina and Palm trees are very remarkable. The Fishes garden (now 9.5 Feddans; Figure 4) was rehabilitated and reconstructed in 2000; damaged parts were rebuilt while retaining all original features.

A total of 95 species were recorded in the Aquarium belonging to 37 families and 68 genera of seed plants. Generally, the most species-rich families are Palmae (13 species), Moraceae (12 species), Agavaceae (8 species), Leguminosae (7 species), Euphorbiaceae and Verbenaceae (5 species each), and Apocynaceae (4 species), Cupressaceae and Pinaceae (3 species each). Twenty-eight families are represented by 1-2 species; amongst others, these families include Acanthaceae, Aloaceae, Anacardiaceae, Araceae, Araucariaceae, Bignoniaceae, Bombacaceae, Cannaceae, Geraniaceae, Labiatae, Lytharaceae, Meliaceae, Punicaceae, Sapindaceae and Sterculiaceae. The genera most rich in species are *Ficus* (10 species), *Agave* (4 species), *Furcraea*, *Pinus* and *Sabal* (3 species each). Nine genera

are represented by included only two species; these are: *Justicia*, *Cupressus*, *Acalypha*, *Erythrina*, *Bougainvillea*, *Caryota*, *Phoenix*, *Washingtonia* and *Brachychiton*.

Ten different growth forms have been observed in the Aquarium. Trees, shrubs, palms, succulents and conifers are among the well-represented forms. Thirty-four trees belonging to 15 families are found; of which 12 species belong to the Moraceae and five species to the Leguminosae. In the mean time, 16 species of shrubs are recorded; these represent eight families, mostly represented by Verbenaceae, Apocynaceae and Euphorbiaceae. Palms also are of remarkable contribution to the floristic diversity of this peculiar garden; 13 palm-trees or 14% of the total recorded species are found in this garden belonging to eight genera of the Palmae. These include three species of *Sabal* and two species of each of *Phoenix*, *Washingtonia* and *Caryota*. On the other hand, succulent species were represented by eleven species belonging to three families; of which Agavaceae contributed with eight species of *Agave* (4 species), *Furcraea* (3 species) and *Sansevieria* (one species). Altogether seven species contributed mostly to the gymnosperm collection in this garden, these include three species of each of Cupressaceae and Pinaceae and one species of Araucariaceae (*Araucaria bidwillii*).

The Ezbekiya garden (Ezb)

History and structure

On his return from Paris in 1868, the Khedive Ismail instructed M. Barillet DeChamps; a French landscape gardener; to reconstruct the Ezbekiya garden on the style of Paris parks. For this reason, the Ezbekiya garden resembled the octagonal shape of 'Parc Monceau' (Andariah, 1933) with its four gates (Figures 5 and 6). This garden was formerly a lake dug by Prince Azbak in 1475. When Mohamed Ali became a ruler of Egypt, he ordered Burhan Bey to transform Ezbekiya and its lake into a park (Osman, 1933). With the help of Delchevalerie, the garden was ready in 1872.

Landmarks and floral composition

The total area of the Ezbekiya garden at the time of its reconstruction was 20 Feddans but now it has reduced to 10.6 Feddans, and becomes irregular in shape (Figure 6). Its main landmarks include an artificial Grotto with water falls, a small mountain cultivated with *Agave* and some cacti, the marble fountain decorated with botanical motifs, the water from the fountain runs in a short canal ending with a small lake. At its left side there is a Royal rest topped by an iron ancient crown. At the western side,

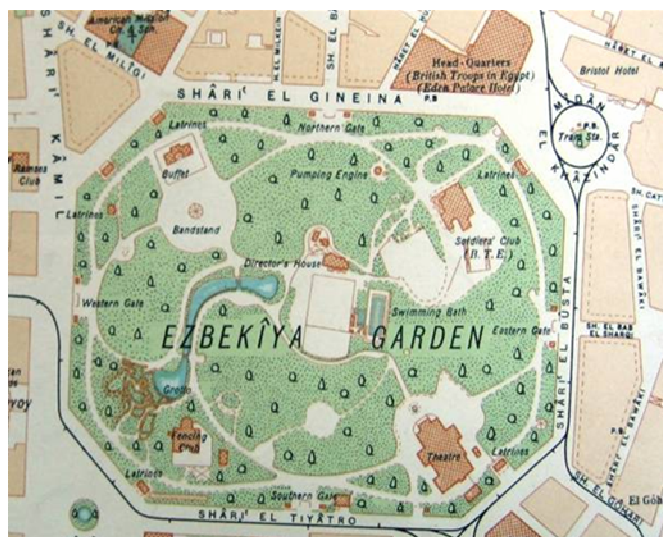


Figure 5. Historical map shows the structure and landmarks of Ezbekiya garden, published by the Survey of Egypt, Scale 1/5.000, 1927.



Figure 6. A satellite image of the Ezbekiya garden shows the decrease in its area

the remains of the mounds and caves, which are planted nowadays with succulent and desert plants are found. There is also a music kiosk established at the same place of the ancient one (Mohamed, 2004). The Ezbekiya garden has low species diversity compared with the other gardens. A total of 114 species belonging to 37 families and 68 genera of seed plants have been recorded in this garden. In general, the most species-rich families are Moraceae (17 species), Palmae and Leguminosae (13 species each), Agavaceae (9 species), Verbenaceae (6

species), Euphorbiaceae (5 species), Bignoniaceae, (4 species), Pinaceae, Anacardiaceae and Malvaceae (3 species each). However, 27 families are represented by 1-2 species; amongst others, these families include Bombacaceae, Oleaceae, Myrtaceae, Labiatae, Lythraceae, and Rutaceae. The genera represented by high number of species were: *Ficus* (16 species), *Phoenix* and *Agave* (4 species each), *Pinus* and *Euphorbia* (3 species each), *Hibiscus*, *Washingtonia*, *Prunus*, *Citrus* and *Brachychiton* (2 species each). Eight different growth forms have been observed for the plants cultivated in the Ezbekiya garden. Trees, shrubs, palms, succulents, perennial herbs and climbers were among the well-represented forms. The recorded 54 trees represent 47% of the total recorded species, and belong to 16 families; of which the most common are Moraceae (17 species), Leguminosae (11 species), Bignoniaceae (4 species) and Anacardiaceae (3 species). Thirteen palm-tree species belonging to 8 genera of the Palmae are found in this garden e.g., *Hyphaena*, *Livistona*, *Phoenix*, *Rhapis* and *Roystonea*. Eight climbers and perennial herbs are also recorded the Ezbekiya garden.

The Zoo garden (Zoo)

History and structure

The Zoo is located near the west bank of the river Nile, its northern side facing the Orman garden and overlooks Cairo University. This place was formerly occupied by a small house and a garden that belonged Said Pasha, but was demolished after Khedive Ismail built the palatial residence, which with its courts and annexes covered an area of 6 Feddans. Ismail had wished to open this garden on the occasion of the inauguration of the Suez Canal in 1869, but that was not possible. The palace was finished in 1875, but the garden was not completed. The completion of the work was entrusted to Delchevalerie who had several European assistants, in addition to the chief Egyptian native gardener Ibrahim Hamooda. In 1890, during the reign of Khedive Tawfik, about 50 Feddans were taken from the Giza Khedivial Gardens (200 Feddans) to establish the Zoo (Flower, 1903). With the construction of the Cairo University Street in 1938, another 29 Feddans were added to its area that reached 80 Feddans (El-Tarabily, 2003) (Figures 7 and 8).

Landmarks and floral composition

The garden is characterized by its natural style, with its distinguished landmarks and sites, its walks are paved with colored pebbles looking like sugar coated almonds laid out in Arabesque and Roman mosaic. The garden is



Figure 7. Historical map showing the Giza gardens before splitting into the Zoo and the Orman gardens, published by the Survey of Egypt, Scale 1/10,000, 1929.



Figure 8. A satellite image showing the present status of the Zoo and the Orman gardens. Note Cairo University Street between the two gardens

divided into three parts with their peculiar landmarks: (1) The Northern part (The Haremlik) with the Haremlik lake, the marble fountain, the Cactus garden, the Tea island, the Band mark, a part of the gate of Haremlik palace, the Grotto of creativity created by De Combaz (1873 - 1875), the Citadel Grotto created by Sipoz in 1867 and decorated with various statues of extinct Fayum rhinoceros, crocodiles and birds, it is surrounded by a lake where we can see Blue Lotus; (2) The Southern part (The Selamlik) with the Selamlik lake, a Cactus garden, the Sham'idan Grotto created by Sipoz in 1869, The Chinese kiosks, The Pagoda (Japanese kiosk), The Royal rest, the two artificial hills cultivated by a forest of *Quercus*, *Casuarina* and Pine connected together by an old and seldom suspended pedestrian bridge built by Gustave Alexandre Eiffel, and brought to Cairo when Khedive Ismail visited the Paris Exhibition, the Animal Museum (1906), in addition to other three grottos; and (3) The part of Orman garden that was added in 1938.

A total of 325 species representing 68 families and 220 genera of vascular plants have been recorded in the Zoo gardens. In general, the most species-rich families are Leguminosae (47 species), Moraceae (20 species), Euphorbiaceae (16 species), Palmae (15 species), Big-

noniaceae (13 species), Anacardiaceae and Myrtaceae (12 species each), Verbenaceae and Agavaceae (10 species each). Thirty-six families comprised only 1-2 species, the most common of these families are: Aceraceae, Adiantaceae and Aloaceae. The genera richest in species are *Ficus* (18 species), *Euphorbia*, *Albizia* and *Terminalia* (6 species each), *Acacia* and *Cordia* (5 species each), *Pistacia*, *Schinus*, *Aloe* and *Annona* (4 species each).

Thirteen different growth forms are noticed in this garden that range between trees and perennial herbs. Trees, shrubs, succulents, palms and climbers are among the well-represented forms. Trees represent one of the most prominent features of this garden, where 187 species belonging to 38 families have been recorded. The most common families include Leguminosae (38 species), Moraceae (20 species), Myrtaceae and Anacardiaceae (12 species each), Bignoniaceae and Meliaceae (6 species each). Tree of *Pithecellobium dulce* (Leguminosae) was found only in this garden. On the other hand, shrubs in this garden are represented by 55 species belonging to 25 families, among the most rich families are leguminosae (8 species), Verbenaceae (5 species), Acanthaceae and Anacardiaceae (4 species

each). Succulent plants are represented by 22 species belonging to seven families, amongst them Euphorbiaceae (7 species), Agavaceae (6 species) and Aloaceae (2 species). *Euphorbia* comprised the largest number of species (6 species). *Aloe* is ranked second, and represented by four species. Palms were also of remarkable contribution to the floristic diversity of this peculiar garden. Fifteen palm-tree species representing 11 genera of the Palmae, these include two species of each of *Livistona*, *Phoenix*, *Washingtonia* and *Caryota*.

The Orman garden (Orm)

History and structure

The Orman gardens was a part of the Giza gardens (200 Feddans), established in 1873, characterized by its natural style and covered an area of about 95.2 Feddans for supplying the Khedival palaces with vegetables and fruits introduced from the Sicily Island, 10.000 Citrus trees were cultivated there (Delchevalrie, 1899). In 1919, the Ministry of Agriculture converted the Orman garden into a botanical garden known at that time as the "Lemon Garden" of a total area reaching 58 Feddans. Recently, the area of this garden has been diminished to 28 Feddans as 28 other Feddans were given to the Zoo garden, Cairo University and its street, Authority of the Survey of Egypt and the Giza Security Department (Figures 7 and 8).

Landmarks and floral composition

Among the major and conspicuous landmarks of this garden are the rocky garden (1.5 Feddans) containing 200 species of *Cactus* and succulents belonging to 11 families, the rose garden (2 Feddans), the water pond containing water plants such as: *Cyperus papyrus*, *Nelumbo nucifera*, *Nymphaea caerulea* and *Aeschynomene elaphroxylon*. It also includes a herbarium containing King Farouk I private collections of wild and medicinal plants, fifteen green houses and seed exchange unit. The plants are cultivated in the garden in 12 sections, e.g.: *Strelitzia*, *Ficus* and *Roses*.

The Orman garden is the most diversified and species rich among the studied botanical gardens. A total of 835 representing 115 families and 434 genera of the seed plants. The families that comprises high number of species are Cactaceae (74 species), Leguminosae (68 species), Agavaceae (55 species), Palmae (54 species), Euphorbiaceae (41 species), Moraceae (37 species), Aloaceae (25 species), Crassulaceae (21 species), Bignoniaceae (20 species)

and Verbenaceae (20 species). In addition 57 families comprise 1-2 species; amongst others, these families include Guttiferae, Magnoliaceae, Podocarpaceae and Vitaceae. There is a suite of 24 families represented only in this garden, amongst others, these include Asphodelaceae, Berberidaceae, Cephalotaxaceae, Ginkgoaceae, Myrsinaceae, and Nymphaeaceae. The genera richest in species are *Ficus* (31 species), *Agave* and *Euphorbia* (23 species each), *Opuntia* (21 species), *Aloe* (15 species), *Kalanchoa* (11 species), *Ferocactus*, *Clerodendrum*, *Yucca* and *Erythrina* (8 species each), and *Cupressus* (6 species).

Fourteen different growth forms were observed in the Orman garden, trees, succulents, shrubs, cacti, climbers and perennial herbs are among the well-represented forms. Trees are represented with 250 species belonging to 45 families, Leguminosae, Moraceae, Bignoniaceae, Myrtaceae, Sapotaceae and Anacardiaceae are the families with high number of species. Cold region trees, for instance, include *Pinus canariensis*, *Sequoia sempervirens* and *Cephalotaxus fortunei*. Tropical region trees such as *Khaya*, *Tectona*, *Spathodea*, *Tabebuia*, *Bixa*, *Euclea* and *Antidesma* are also grown in this garden. According to their uses, trees of this garden can be organized into the following categories: (a) Fibre trees such as *Ceiba pentandra* (Kapok tree), from which kapok fiber is used in protecting devices against break and *Bombax ceiba* (Red silk-cotton tree); its cotton is used for stuffing pillows and its inner bark yields a fiber used in making ropes, as well the fiber of *Adansonia digitata*. (b) Oil trees such as *Jatropha curcas* (Petroleum tree), in which the seed oil can be used in soap industry. The seeds of *Aleurites moluccana* (candle-nut or varnish tree) have a high percentages of oil used in making margarine, candle and grease industry (Haggag, 1931). (c) Medicinal tree plants such as *Pimenta racemosa* (rum-tree), its leaves and bark can be used as spices. The oil extracted from the leaves is used in the industry of perfumes (Marei 1970). The dyes extracted from *Bixa orellana* (annatto- rouge tree) are used in expulsion of insects, coloring of butter, cheese and some textiles. The extraction of leaves and roots are used in curing from epilepsy and dysentery diseases. The volatile oil that is extracted from *Cinnamomum camphora* (camphor tree) consists of important substances such as camphor, eugenoide and terpinole that used as disinfected material, and in ointments industry. (d). Tropical fruit trees include some genera such as *Casimiroa*, *Artocarpus*, *Spondias*, *Carica*, *Persea*, *Diospyros*, *Hyphaena*, *Eugenia* and *Macadamia*. The rare *Atrocarpus heterophyllus* (Jake fruit) is a multi-purpose tree. Its wood is solid, shining and resistant to insects. It is used in

building of houses and furniture, the wood of old roots is also used in sculpture. The powder of wood can be used in dyeing of clothes. The fruits are well-tasteful and contain many vitamins and mineral elements. *Eugenia uniflora* (Surinam cherry) is another rare tree which its fruits can be used in jelly and jam manufacture. The extraction of leaves is used to kill insects. (e) Woody trees include genera such as *Tectona*, *Khaya*, *Euclea*, *Dalbergia*, *Tipuana*, *Cassia*, *Terminalia*, *Eucalyptus*, *Taxodium*, *Acrocomia*, *Euphorbia*, *Cordia*, *Bauhinia*, *Ulmus*, *Pterocarpus*, *Grevillea* and *Quercus*.

The section of succulent plants is remarkable and peculiar, and represents one of the most prominent features of this garden. Twelve families comprise the succulent plants with 140 species: Agavaceae (45 species), Euphorbiaceae (28 species), Aloaceae (25 species), Crassulaceae (21 species) and Aizoaceae (7 species). *Euphorbia* and *Agave* are the largest genera of succulent plants (23 species).

The floristic diversity among shrubs is noticeable: Shrubs comprise 137 species or 16% of the total recorded species, they belong to 41 families, the most common of which are Verbenaceae (15 species), Leguminosae (14 species), Araliaceae (11 species), Euphorbiaceae (9 species), Solanaceae and Malvaceae (8 species each) as well Rosaceae (7 species). The cactus section that covers an area of about 1.5 Feddans is among the characteristic features of the Orman botanic garden. It is interesting to note that 74 cactus species are recorded in this garden. The cacti are comprised of 24 genera were found, of which *Opuntia* includes the largest number of species (21 species) followed by *Ferocactus* (8 species). Other genera are represented by only 3 - 4 species; e.g. *Cleistocactus*, *Coryphantha* and *Mammillaria* (4 species each), *Cereus* and *Echinocactus* (3 species each).

Forty-seven climber plant species belonging to 24 families were recorded. The most rich families with regard to the number of climber species are Bignoniaceae (6 species), Oleaceae (5 species), Nyctaginaceae (4 species), Apocynaceae, Solanaceae and Convolvulaceae (3 species). Among the rare species of climbers in this garden are *Carrisa macrocarpa*, *Hoya carnosae*, *Anredera cordifolia*, *Hiptage madablota*, *Passiflora edulis*, *Asparagus setaceus* and *Aristolochia elegans* were observed. Among other common climbers *Antigonon leptopus*, *Argyreia nervosa*, *Bougainvillea glabra*, *Cardiospermum halicacabum*, *Clerodendrum splendens*, *Hedera helix* and *Lonicera japonica* were recorded. An equal number of species (47) of perennial herbs have been representing 19 families, that include: Compositae (11 species), Labiatae (6 species), Zingiberaceae (5 species), Lilia-

ceae (4 species) and Acanthaceae (3 species).

The Horreya garden (Hor)

History and structure

The Horreya garden is the third compartment of the Gezira Island, one of the last gardens established by Khedive Ismail in 1876. It is located between Kasr El Nil and Abbas Bridge with a total area of 28.7 Feddans (Figures 2 and 3). It was rehabilitated and reconstructed in 1999, opened to the public in 2001 with an area of 7 Feddans. As major parts were taken by: Cairo club (8 Feddans in 1936), Mokhtar Museum (0.06 Feddans in 1953), Presidential guards (11 Feddans in 1970) and finally Sheraton El Gezira Hotel (1 Feddan in 1989) (Figure 4).

Landmarks and floral composition

The style of the Horreya garden is combined of natural and formal styles. The steps and benches are decorated with fine and colorful mosaic, there are also a lot of statues belonging to Egyptian presidents and famous poets, and several kiosks. A forest of Pine, *Grevillea*, *Peltophorum*, *Ficus benghalensis* and *Ficus benjamina* trees can be also found. This is the least diversified among the six studied botanical gardens. A total of 62 species were recorded representing 29 families and 49 genera of the vascular plants. Generally, the most species-rich families are Moraceae (10 species), Leguminosae (7 species), Palmae (6 species), Myrtaceae (5 species) and Anacardiaceae (3 species). Twenty-three families are only represented by 1 - 2 species such as Bombacaceae, Cannaceae, Causarinaceae, Commelinaceae, Geraniaceae, Malvaceae, Labiatae, Rosaceae and Pinaceae. The most rich genera include were *Ficus* (9 species), *Cassia*, *Eucalyptus*, *Washingtonia*, *Citrus* and *Brachychiton* (2 species each). Trees, palms, perennial herbs, shrubs and conifers were among the well-represented eight growth forms. Thirty-nine trees belonging to 15 families have been found. Moraceae, Leguminosae, Myrtaceae and Anacardiaceae are the richest families with 10, 6, 5 and 3 species, respectively. Six palm-trees grow in this garden (10% of the total recorded species) and belong to five genera of the Palmae; these comprises two species of *Washingtonia* and one species of *Phoenix*, *Roystonea*, *Sabal* and *Syagrus*. Six species of perennial herbs are found in the Horreya botanical garden, these species belong to six families, Cannaceae, Commelinaceae, Compositae, Labiatae, Liliaceae and Zingiberaceae. As well four species of shrubs belonging

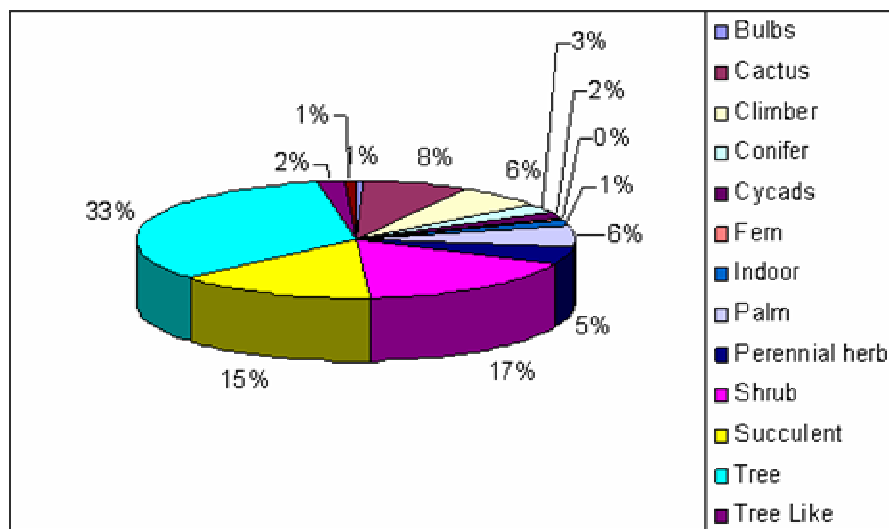


Figure 9. Distribution of the growth forms for the species recorded in the studied gardens

to four families: Malvaceae (2 species), Apocynaceae, Lythraceae and Sapotaceae (one species each).

General distribution patterns of species

The flora in the six studied gardens consists of 962 species of vascular plants that belong to 490 genera and 125 families (see Appendix). The most species-rich gardens is the Orman (835), followed by Zohriya (358) and the Zoo (325), while the lowest number is found in the Horreya garden (62). Generally, the most species-rich families are Leguminosae (86 species), Cactaceae (74), Palmae (56) and Euphorbiaceae (45), whereas Myrtaceae, Crassulaceae, Apocynaceae and Acanthaceae comprise the lowest number of species (21, 21, 18 and 17 species respectively). Species of 19 families (Anacardiaceae, Apocynaceae, Bignoniaceae, Compositae, Geraniaceae, Labiatae, Leguminosae, liliaceae, Lythraceae, Malvaceae, Moraceae, Myrtaceae, Palmae, Rutaceae and Sapindaceae) are widely distributed and represented in all the studied gardens. In the mean time 29 families are confined to either the Orman garden (24) or the Horreya (5). The genera most rich in species is *Ficus* (35 species), followed by *Euphorbia* (24), *Agave* (22), *Opuntia* (21), *Aloe* (16) and *Clerodendrum* (9). However, certain genera showed limited occurrence in a single garden, particularly in the Orman, examples of these genera include *Yucca*, *Sansevieria*, *Opuntia*, *Kalenchoa*, *Ferocactus* and *Epiphyllum*.

Our results revealed that each garden is characterized by a number of species that do not occur in the

others (Appendix). Four hundred species occur in Orman, 55 in Zohriya garden, 33 in the Zoo, three in Ezbekiya, and two in each of the Aquarium and Horreya.

Despite the lack of information on the old floristic composition of the studied botanical gardens, the available data of the previous studies throughout the 19th century can be observed in the Appendix (marked by asterisk). Altogether, 494 species of the recorded taxa represented the old records in these gardens, and distributed as follows: 245 in Zohriya, 65 in Aquarium, 77 in Ezbekiya, 220 in the Zoo, 314 in Orman and 40 in Horreya.

Figure 9 shows that trees are the dominant growth form for the plants in the examined gardens (36%), followed by shrubs (17%) and succulents (15%). The spatial distribution of these growth forms in the studied gardens is shown in Table 2. It is to be noted that all the recognized growth forms are represented in the Orman garden. Meanwhile climbers, conifers, palms, perennial herbs, shrubs, trees, and tree-like forms are recorded in all the studied gardens. Remarkably, cacti are confined to Orman garden and the Zoo. The highest number of cactus species (74) has been recorded in the Orman garden, as it includes the oldest and well preserved collection of cacti from all over the world. Only seven cacti have been found in common in the Orman garden and the Zoo. (e.g., *Cereus uruguayanus*, *Echinocactus grusonii*, *Opuntia dejecta* and *Cleistocactus winteri*). It is also of interest to note that, of the recorded 25 conifer species 15 species are found in common in the Orman and the Zohriya gardens. Ferns (5 species) have been found well-

Table 2. Distribution of the major growth forms in the studied gardens. Abbreviations of gardens names: Zoh=Zohriya, Aqu=Aquarium, Ezb=Ezbekiya, Orm=Orman and Hor=Horre

Life Form	Zoh	Aqu	Ezb	Zoo	Orm	Hor
Bulbs	2	0	0	0	5	0
Cactus	0	0	0	6	74	0
Climber	34	4	8	14	47	1
Conifer	15	7	4	1	25	3
Cycads	5	0	0	1	16	1
Fern	5	0	0	1	1	0
Indoor	11	1	0	4	13	0
Palm	30	13	13	15	54	6
Perennial herb	19	6	8	13	47	6
Shrub	84	16	14	55	137	5
Succulent	2	11	12	22	140	0
Tree	139	34	54	187	249	39
Tree-like	11	2	1	4	20	1
Water plant	1	1	0	2	7	0
Total number of species (present)	358	95	114	325	835	62
Total number of species (old)	245	265	77	220	314	40

Table 3. Simple matching similarity coefficients between the species composition in the studied gardens. For abbreviations, see Table 2.

Gardens	Zoh	Aqu	Ezb	Zoo	Orm
Zoh					
Aqu	0.54				
Ezb	0.56	0.86			
Zoo	0.70	0.62	0.66		
Orm	0.62	0.34	0.38	0.58	
Hor	0.51	0.86	0.87	0.62	0.31

represented in the Zohriya garden but are rarely found in other gardens, these are *Adiantum capillus-veneris*, *Pteris cretica*, *Polypodium vulgare*, *Nephrolepis exeltata* and *Cyrtomium falcatum*. The Orman and the Zohriya gardens share a considerable number of species (273) represented by different growth forms. These species include 30 palms, 11 indoor plants and two bulbs.

As expected, the Orman garden and the Zoo share 262 of the recorded species, amongst others, *Rhamnus cathartica*, *Opuntia dejecta*, *Cleistocactus strausii*, *Euphorbia abyssinica*, *Fraxinus angustifolia* and *Montanoa bipinnatifida*. This can be explained on a historical background as both gardens comprised together the Giza gardens before their splitting, and

the frequent exchange of species between them. The correlation coefficients between the species composition in both gardens is relatively low (Table 3).

Similarly, 229 species are common to the Orman and the Zohriya gardens and the Zoo. This may be due to the regular exchange of plants between these three gardens. However, no common species are found in the other three gardens (Ezbekiya, Aquarium and Horreya). The results given in Table 3 clearly show that the correlations between these three gardens is high.

The absence of plant exchange with other gardens may lead to a substantial reduction of the cultivated area. This may leads to the deterioration of our Egyptian historical botanical assets.

The cluster analysis of the data on the examined gar-

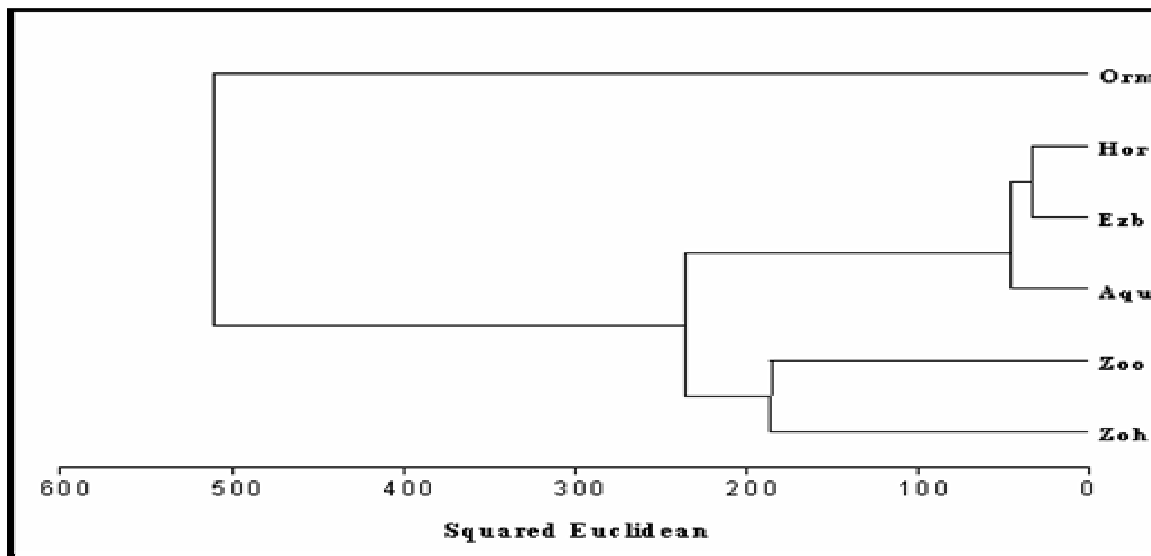


Figure 10. Cluster analysis dendrogram of the studied gardens

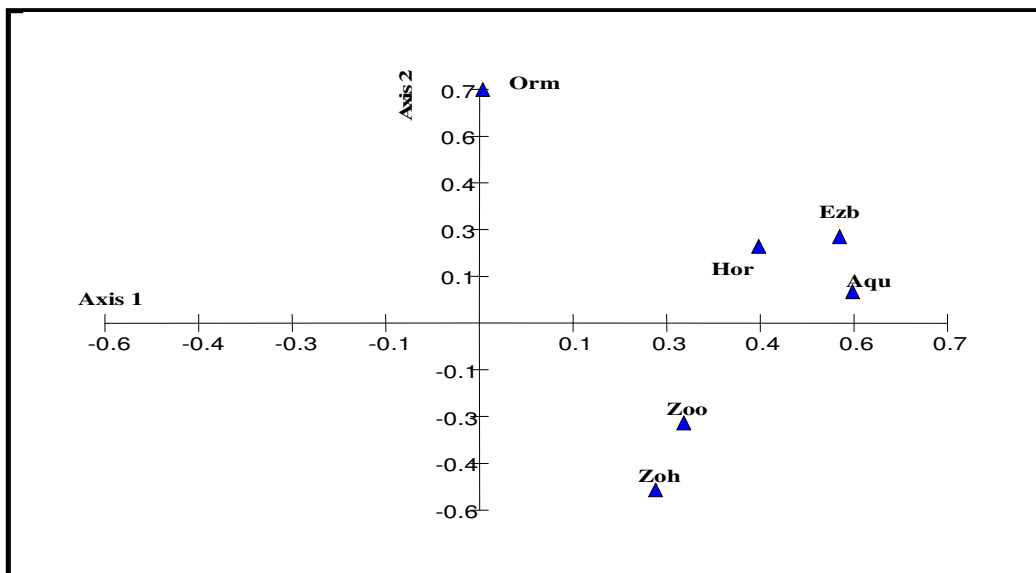


Figure 11. Principal Coordinates Analysis (PCoA) of the six gardens, with three groups clearly separated along axes 1 and 2.

dens (Figure 10), based on the frequency of species, clearly segregated the studied historical botanical gardens into 3 groups. The Orman garden is clearly separated from another two groups, one comprising the Horreya, the Ezbekiya and the Aquarium gardens and the other includes the Zohriya and the Zoo. This classification of the examined gardens is confirmed by the Principal Coordinate Analysis (PCoA; Figure 11).

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Appendix. Floristic composition of the six studied historical botanic gardens in Cairo city. * :old species still grown.

Family	Zoh	Aqu	Ezb	Zoo	Orm	Hor	Life Form
Acanthaceae							
<i>Acanthus mollis</i> L.*	+						Shrub
<i>Anisacanthus virgularis</i> Nees*				+	+		Shrub
<i>Barleria cristata</i> L.*	+			+	+		Shrub
<i>Eranthemum pulchellum</i> André*	+				+		Shrub
<i>Justicia adhatoda</i> L.	+	+	+	+	+		Shrub
<i>Justicia brandegeana</i> Wassh. & L.B. Sm.*	+						Shrub
<i>Justicia carnea</i> Lindl.*	+						Shrub
<i>Justicia ghiesbreghtiana</i> Lem.*	+	+		+	+		Shrub
<i>Pachystachys lutea</i> Nees*					+		Shrub
<i>Pseuderanthemum atropurpureum</i> L.H. Bail.*					+		Shrub
<i>Ruellia brittoniana</i> Leonard					+		Perennial herb
<i>Ruellia tuberosa</i> L.					+		Perennial herb
<i>Sanchesia speciosa</i> Leonard	+						Shrub
<i>Strobilanthes dyeramus</i> Mast.					+		Perennial herb
<i>Thunbergia erecta</i> (Benth.) Anderson					+		Climber
<i>Thunbergia grandiflora</i> (Roxb.ex Rott.)Roxb.*	+						Climber
<i>Thunbergia grandiflora</i> (Roxb.ex Rott.)Roxb. 'Alba'*	+						Climber
Aceraceae							
<i>Acer negundo</i> L.*				+	+		Tree
<i>Acer oblongum</i> Wallich ex DC.*				+	+		Tree
Adiantaceae							
<i>Adiantum capillus-veneris</i> L.	+			+			Fern
<i>Pteris cretica</i> L.	+						Fern
Agavaceae							
<i>Agave americana</i> L.*			+		+		Succulent
<i>Agave americana</i> L. 'Striata'		+		+	+		Succulent
<i>Agave americana</i> L.'Marginata'		+		+	+		Succulent
<i>Agave americana</i> L.'Medio picta'					+		Succulent
<i>Agave angustifolia</i> Haw.*		+	+	+	+		Succulent
<i>Agave angustifolia</i> Haw. 'Marginata'					+		Succulent
<i>Agave attenuata</i> Salm-Dyck.*					+		Succulent
<i>Agave celsii</i> Hook.*					+		Succulent
<i>Agave decipiens</i> Bak.					+		Succulent
<i>Agave desmettiana</i> Jacobi					+		Succulent
<i>Agave ferox</i> Koch.*		+	+		+		Succulent
<i>Agave filifera</i> Salm-Dyck.*					+		Succulent
<i>Agave franzosinii</i> Bak.					+		Succulent
<i>Agave heteracantha</i> Zucc.*					+		Succulent
<i>Agave lophantha</i> Schiede.					+		Succulent
<i>Agave lophantha</i> Schiede.'Poselgeri'					+		Succulent
<i>Agave macroacantha</i> Zucc.*					+		Succulent
<i>Agave micracantha</i> Salm-Dyck.					+		Succulent

Appendix. Contd.

<i>Agave parviflora</i> Torr.					+		Succulent
<i>Agave sisalana</i> Perr.ex Engelm			+		+		Succulent
<i>Agave striata</i> Zucc.					+		Succulent
<i>Agave victoria-reginae</i> T. Moore.					+		Succulent
<i>Agave weberi</i> Cels ex Poiss.					+		Succulent
<i>Cordyline indivisa</i> (Forst.) Steud.*			+*		+*		Tree like
<i>Cordyline terminalis</i> (L.) Kunth.*	+*			+*	+*		Tree like
<i>Cordyline terminalis</i> (L.) Kunth. 'Red edge'	+*			+*	+*		Tree like
<i>Dracaena deremensis</i> Engl.					+		Tree-like
<i>Dracaena deremensis</i> Engl. 'compacta'					+		Tree-like
<i>Dracaena draco</i> (L.) L.*	+*				+		Tree-like
<i>Dracaena fragrans</i> (L.) Ker-Gawl.	+				+		Tree-like
<i>Dracaena fragrans</i> (L.) Ker-Gawl. 'Massangeana'	+			+	+		Tree-like
<i>Dracaena marginata</i> Lam.	+				+		Tree-like
<i>Dracaena reflexa</i> (Decne.) Lam.	+			+	+		Shrub
<i>Furcraea foetida</i> (L.) Haw.		+		+	+		Succulent
<i>Furcraea foetida</i> (L.) Haw. 'Mediopicta'		+		+	+		Succulent
<i>Furcraea selloa</i> K.Koch.		+	+	+	+		Succulent
<i>Furcraea selloa</i> var. <i>marginata</i> Trel.					+		Succulent
<i>Nolina longifolia</i> (Schult.&Schult.f.)Hemsl.					+		Succulent
<i>Nolina recurvata</i> (Lem.) Hemsl.*					+*		Succulent
<i>Sansevieria cylindrica</i> Bojer.					+		Succulent
<i>Sansevieria ehrenbergii</i> Schweinf ex Bak.					+		Succulent
<i>Sansevieria guineensis</i> (L.) Willd.		+			+		Succulent
<i>Sansevieria trifasciata</i> Prain.			+		+		Succulent
<i>Sansevieria trifasciata</i> Prain. 'Hahnii'					+		Succulent
<i>Sansevieria trifasciata</i> Prain.'Golden Hahnii'					+		Succulent
<i>Sansevieria trifasciata</i> Prain. 'Laurentii'					+		Succulent
<i>Sansevieria trifasciata</i> Prain.'Silver Hahnii'					+		Succulent
<i>Yucca aloifolia</i> L.					+*		Succulent
<i>Yucca desmettiana</i> Bak.					+		Succulent
<i>Yucca elephantipes</i> Regel.			+		+		Succulent
<i>Yucca filamentosa</i> L.					+		Succulent
<i>Yucca filamentosa</i> L. 'Variegata'					+		Succulent
<i>Yucca glauca</i> Nutt ex J. Fraser					+		Succulent
<i>Yucca gloriosa</i> L.			+		+		Succulent
<i>Yucca recurvifolia</i> Salisb.					+		Succulent
Aizoaceae							
<i>Aptenia cordifolia</i> (L.f.) Schwantes					+	+	Succulent
<i>Carpobrotus edulis</i> (L.) L.Bol.					+	+	Succulent
<i>Faucaria tuberculosa</i> (Rolfe) Schwantes						+	Succulent
<i>Glottiphyllum linguiforme</i> (L.) N.E.Br.						+	Succulent
<i>Lampranthus aureus</i> (L.) N.E.Br.						+	Succulent
<i>Lampranthus spectabilis</i> (Haw.) N.E.Br.						+	Succulent
<i>Oscularia caulescens</i> (Mill.) Schwantes						+	Succulent

Appendix. Contd.

Aloaceae							
<i>Aloe arborescens</i> Mill.*				+	+		Succulent
<i>Aloe barbadensis</i> Mill.	+			+	+		Succulent
<i>Aloe brevifolia</i> Mill.					+		Succulent
<i>Aloe camperi</i> Schweinf.					+		Succulent
<i>Aloe ciliaris</i> Haw.					+		Succulent
<i>Aloe dichotoma</i> Masson.		+					Succulent
<i>Aloe ferox</i> Mill.					+		Succulent
<i>Aloe grandidentata</i> Salm-Dyck.					+		Succulent
<i>Aloe marlothii</i> A.Berger.					+		Succulent
<i>Aloe melanacantha</i> A.Berger.					+		Succulent
<i>Aloe mitriformis</i> Mill.				+	+		Succulent
<i>Aloe saponaria</i> (Ait.f.)Haw.					+		Succulent
<i>Aloe</i> sp.				+	+		Succulent
<i>Aloe spinosissima</i> Hort. ex A. Berger.					+		Succulent
<i>Aloe striata</i> Haw.					+		Succulent
<i>Aloe variegata</i> L.					+		Succulent
<i>Gasteria bicolor</i> Haw.					+		Succulent
<i>Gasteria disticha</i> (L.) Haw.					+		Succulent
<i>Gasteria liliputana</i> Poelln.					+		Succulent
<i>Gasteria verrucosa</i> Duval					+		Succulent
<i>Haworthia attenuata</i> Haw.					+		Succulent
<i>Haworthia coarctata</i> Haw.					+		Succulent
<i>Haworthia cymbiformis</i> (Haw.)Duval					+		Succulent
<i>Haworthia fasciata</i> (Willd.) Haw.					+		Succulent
<i>Haworthia limifolia</i> Marloth.					+		Succulent
<i>Haworthia reinwardtii</i> (Salm-Dyck.) Haw.					+		Succulent
Amaryllidaceae							
<i>Crinum amabile</i> Donn	+				+		Bulbs
<i>Crinum bulbispermum</i> (Burm.)Milne-Redh. & Schweick.	+				+		Bulbs
<i>Crinum moorei</i> Hook.f.					+		Bulbs
<i>Hippeastrum vittatum</i> (L'Hér.)Herb*					+		Bulbs
<i>Tulbaghia violacea</i> Harv.					+		Perennial herb
Anacardiaceae							
<i>Harpephyllum caffrum</i> Bernh.ex K.Krause*			+	+	+	+	Tree
<i>Lithrea brasiliensis</i> Marchand.*	+						Tree
<i>Mangifera indica</i> L.*	+	+	+		+	+	Tree
<i>Pistachia chinensis</i> Bunge*	+			+	+		Tree
<i>Pistachia khinjuk</i> Stocks*	+			+			Tree
<i>Pistachia lentiscus</i> L.*	+			+			Tree
<i>Pistacia</i> sp.	+			+			Tree
<i>Pleiogynium timoriense</i> (DC.)Leenh.*	+			+	+	+	Tree
<i>Schinus molle</i> L.*				+	+		Tree
<i>Schinus polygamus</i> (Cav.) Cabr.*				+	+		Tree

Appendix. Contd.

<i>Schinus terebinthifolius</i> Raddi.*	+	+	+	+			Tree
<i>Shinopsis balansea</i> Engl.*	+						Tree
<i>Shinopsis laurentzii</i> (Griseb.)Engl.*	+						Tree
<i>Spondias cytherea</i> Sonn.*				+	+		Tree
<i>Spondias mombin</i> L.*				+	+		Tree
Annonaceae							
<i>Annona cherimola</i> Mill.*				+	+		Tree
<i>Annona glabra</i> L.				+	+		Shrub
<i>Annona montana</i> Macfady*				+	+		Shrub
<i>Annona muricata</i> L.*				+	+		Shrub
<i>Miliusa roxburghii</i> (Wall.ex Griff.)Hook.f.&Thoms.				+	+		Tree
<i>Polyalthea longifolia</i> (Sonn.)Thw.*	+				+		Tree
<i>Polyalthea longifolia</i> (Sonn.)Thw. 'Pendula'					+		Tree
Apocynaceae							
<i>Acokanthera oblongifolia</i> (Hochst.) Codd.	+			+	+		Shrub
<i>Adenium obesum</i> (Forssk.) Roem. & Schult.					+		Succulent
<i>Alstonia scholaris</i> (L.)R.Br.*	+			+	+		Tree
<i>Beaumontia grandiflora</i> Wallich.	+				+		Climber
<i>Carissa carandas</i> L.				+	+		Shrub
<i>Carissa macrocarpa</i> (Ecklon) A.DC.					+		Climber
<i>Cerbera manghas</i> L.*	+						Tree
<i>Kopsia fruticosa</i> (Ker.-Gawl.) A.DC.*					+		Shrub
<i>Nerium oleander</i> L.*	+	+	+	+	+		Shrub
<i>Pachypodium lamerei</i> Drake					+		Succulent
<i>Plumeria rubra</i> L.*	+	+		+	+	+	Tree
<i>Plumeria rubra</i> L.'Acutifolia'					+		Tree
<i>Plumeria rubra</i> L.'Red'					+		Tree
<i>Tabernamontana coronaria</i> (Jacq.) Willd.*	+	+			+		Shrub
<i>Thevetia peruviana</i> (Pers.) K.Schum.	+	+	+	+	+	+	Shrub
<i>Trachelospermum jasminoides</i> (Lindl.)Lem.					+		Climber
<i>Wrightia coccinea</i> (Loddiges) Sims*	+			+			Tree
<i>Wrightia tomentosa</i> Roem. & Sch.*	+			+			Tree
Araceae							
<i>Aglaonema commutatum</i> Schott.	+				+		Indoor
<i>Alocasia macrorrhizos</i> (L.) G. Don.	+			+	+		Perennial herb
<i>Dieffenbachia amoena</i> Bull.	+				+		Indoor
<i>Dieffenbachia maculata</i> Lodd.' Exotica'	+				+		Indoor
<i>Epipremnum aureum</i> (Lind. & André) Bunting.	+			+	+		Indoor
<i>Monstera deliciosa</i> Liebm.	+			+	+		Indoor
<i>Nephtytis afzelii</i> Schott.	+	+		+	+		Indoor
<i>Philodendron bipinnatifidum</i> Endl.	+				+		Indoor
<i>Philodendron scandens</i> K.Koch. & Sello	+				+		Indoor
<i>Raphidophora decursiva</i> (Roxb.) Schott.	+						Climber
<i>Spathiphyllum commutatum</i> Schott.	+				+		Indoor
<i>Syngonium podophyllum</i> Schott.	+			+	+		Indoor

Appendix. Contd.

<i>Xanthosoma violaceum</i> Schott.					+		Perennial herb
<i>Zamioculcas zamiifolia</i> (Lodd.) Engl.					+		Indoor
Araliaceae							
<i>Hedera canariensis</i> Willd.*	+		+		+		Climber
<i>Hedera helix</i> L.	+		+	+			Climber
<i>Meryta denhamii</i> Seem.	+				+		Shrub
<i>Oreopanax capitatus</i> (Jacq.) Decne. & Planchon*	+			+			Tree
<i>Oreopanax guatemalensis</i> Decne. & Planchon*	+						Tree
<i>Polyscias balfouriana</i> (Sander ex André) L.H. Bail.	+				+		Shrub
<i>Polyscias fruticosa</i> (L.) Harms*	+				+		Shrub
<i>Polyscias guilfoylei</i> (W.Bull) L.H. Bail.	+				+		Shrub
<i>Polyscias paniculata</i> auct., non (DC.) Bak.					+		Shrub
<i>Schefflera actinophylla</i> (Endl.) Harms*	+				+		Shrub
<i>Schefflera arboricola</i> (Hayata) Merr.	+				+		Shrub
<i>Schefflera elegantissima</i> (Veitch ex Mast.) Lowry & Frodin	+				+		Shrub
<i>Schefflera elegantissima</i> (Veitch ex Mast) Lowry & Frodin 'Castor'	+				+		Shrub
<i>Schefflera Kerchoveana</i> (Veitch.ex W.Richards) Lowry & Frodin	+						Shrub
<i>Sciadophyllum pulchrum</i> Hort.*	+			+	+		Shrub
<i>Tetrapanax papyrifer</i> (Hook.) K.Koch.*	+				+		Shrub
Araucariaceae							
<i>Agathis robusta</i> (C.Moore ex F.Muell.)Bail.	+				+		Conifer
<i>Araucaria bidwillii</i> Hook.*	+	+		+	+		Conifer
<i>Araucaria cunninghamii</i> D.Don.*						+	Conifer
<i>Araucaria heterophylla</i> (Salisb.) Franco*	+				+		Conifer
Aristolochiaceae							
<i>Aristolochia littoralis</i> L.					+		Climber
Asclepiadaceae							
<i>Calotropis procera</i> (Ait.) Ait. f.				+	+		Succulent
<i>Caralluma europaea</i> (Guss.) N.E.Br.					+		Succulent
<i>Cryptostegia grandiflora</i> R.Br.*	+			+	+		Climber
<i>Hoya carnososa</i> (L.f.) R.Br.*					+		Succulent
<i>Huernia zebrina</i> N.E.Br.					+		Succulent
<i>Stapelia gigantea</i> N.E.Br.	+				+		Succulent
<i>Stephanotis floribunda</i> (R.Br.) Brongn.*					+		Climber
Asphodelaceae							
<i>Bulbine caulescens</i> L.					+		Succulent
Aspleniaceae							
<i>Cyrtomium falcatum</i> (L.f.) K.Presl.	+						Climber
Balanitaceae							
<i>Balanites aegyptiaca</i> (L.) Delile*				+	+		Tree
Basellaceae							
<i>Anredera cordifolia</i> (Ten.) Steenis*	+				+		Climber

Appendix. Contd.

Berberidaceae							
<i>Nandina domestica</i> Thunb.					+		Tree
Betulaceae							
<i>Alnus rugosa</i> (Duroi) Spreng.*	+	*					Tree
Bignoniaceae							
<i>Amphilophium paniculatum</i> (L.) HBK.	+				+		Climber
<i>Campsis capreolata</i> Hort.*	+	*					Climber
<i>Campsis radicans</i> (L.) Seem.*	+	*			+		Climber
<i>Catalpa bignonioides</i> Walter*	+	*		+	+		Tree
<i>Clytostoma binatum</i> (Thunb.) Sandrw	+			+	+		Climber
<i>Jacaranda mimosifolia</i> D.Don*	+	*	+	+	+	+	Tree
<i>Kigelia pinnata</i> (Jacq.)DC.*			+	+	+	+	Tree
<i>Macfadyena unguis-cati</i> (L.) A.Gentry.*				+	+		Climber
<i>Markhamia acuminata</i> Schum.ex Engl.					+		Tree
<i>Markhamia lutea</i> (Benth.)Schum.*	+	*	+		+		Tree
<i>Millingtonia hortensis</i> L.*				+			Tree
<i>Newbouldia laevis</i> (P.Beauv.)Seem.ex Bur.*	+	*					Tree
<i>Oroxylum indicum</i> (L.)Kurz.*				+	+		Tree
<i>Parmentiera cereifera</i> Seem.*	+	*					Tree
<i>Parmentiera edulis</i> DC.*					+		Tree
<i>Podranea ricasoliana</i> (Tanf.) Sprague					+		Climber
<i>Pyrostegia venusta</i> (Ker-Gawl.) Miers*				+	+		Climber
<i>Rademarchera ignea</i> (Kurz) Steen*				+	+		Tree
<i>Saritaea magnifica</i> (T.Sprague ex Steenis)Dug.	+						Climber
<i>Spathodea campanulata</i> Beauvois*			+	+	+		Tree
<i>Tabebuia argentea</i> (Bur. & K.Schum) Britt*	+	*			+		Tree
<i>Tabebuia guayacan</i> (Seem.)Hemsl.	+						Tree
<i>Tabebuia palmeri</i> Rose				+	+		Tree
<i>Tabebuia rosea</i> (Bertol) DC.	+				+		Tree
<i>Tecoma stans</i> (L.)Juss.ex HBK.*	+	+		+	+		Tree
<i>Tecomaria capensis</i> (Thunb.)Spach.*	+	*		+	+		Shrub
Bixaceae							
<i>Bixa orellana</i> L.*					+		Shrub
Bombacaceae							
<i>Adansonia digitata</i> L.*					+		Tree
<i>Bombax ceiba</i> L.*	+	+	+	+	+	+	Tree
<i>Ceiba pentandra</i> (L.) Gaertn.*				+	+		Tree
<i>Chorisia crispiflora</i> HBK*	+	*		+		+	Tree
<i>Chorisia insignis</i> Kunth.		+		+			Tree
<i>Chorisia speciosa</i> A.St.-Hil.*	+	*	+	+	+		Tree
<i>Pachira</i> sp.	+			+	+		Tree
Boraginaceae							
<i>Cordia africana</i> Lam.*				+			Tree
<i>Cordia dentata</i> Poir.*				+			Tree
<i>Cordia holestii</i> Girke*				+			Tree

Appendix. Contd.

<i>Cordia macleodii</i> Hook.f. & Thoms.*				+		Tree
<i>Cordia myxa</i> L.non Forssk.*	+		+	+		Tree
<i>Cordia sebestena</i> L.*					+	Shrub
<i>Cordia sinensis</i> Lam.			+		+	Tree
<i>Ehretia ovalifolia</i> Wight					+	Shrub
<i>Ehretia wallichiana</i> Hook.f.&Thoms.*				+	+	Tree
Bromeliaceae						
<i>Aechmea fasciata</i> (Lindl.)Bak.					+	Indoor
Buxaceae						
<i>Buxus sempervirens</i> L.					+	Shrub
Cactaceae						
<i>Astrophytum myriostigma</i> Lem.					+	Cactus
<i>Astrophytum ornatum</i> (DC.)Britt. & Rose.*					+	Cactus
<i>Cephalocereus senilis</i> (Haw.)Schum.*					+	Cactus
<i>Cereus jamacaru</i> DC.*					+	Cactus
<i>Cereus uruguayanus</i> Kiesling*				+	+	Cactus
<i>Cereus uruguayanus</i> Kiesling 'Monstrosus'					+	Cactus
<i>Cleistocactus azarensis</i> Card.					+	Cactus
<i>Cleistocactus baumannii</i> (Lem.)Lem.					+	Cactus
<i>Cleistocactus strausii</i> (Heese) Backeb.				+	+	Cactus
<i>Cleistocactus winteri</i> D.Hunt.				+	+	Cactus
<i>Coryphantha elephantidens</i> (Lem.)Lem.					+	Cactus
<i>Coryphantha pycnanantha</i> (Mart.) Lem.					+	Cactus
<i>Coryphantha reduncispina</i> Boedeker					+	Cactus
<i>Coryphantha</i> sp.					+	Cactus
<i>Cryptocereus anthonyanus</i> Alexand.					+	Cactus
<i>Echinocactus grusonii</i> Hildm.				+	+	Cactus
<i>Echinocactus grusonii</i> Hildm. 'Alba'					+	Cactus
<i>Echinocactus platyacanthus</i> Link & Otto.					+	Cactus
<i>Echinopsis chamaecereus</i> Friedrich & G.Rowley					+	Cactus
<i>Echinopsis oxygana</i> (Link) Zucc.					+	Cactus
<i>Epiphyllum anguliger</i> (Lem.) G.Don.					+	Cactus
<i>Epiphyllum hybrida</i> Hort.					+	Cactus
<i>Espositoa lanata</i> (Kunth) Britt. & Rose.					+	Cactus
<i>Espositoa melanostele</i> (Vaupel) Borg.					+	Cactus
<i>Ferocactus glaucescens</i> (DC.) Britt. & Rose <i>peninsulae</i> (F.A.Weber) Britt.& Rose					+	Cactus
<i>Ferocactus haematacanthus</i> (Salm-Dyck.) H.Bravo ex Backeb. & F. Kunth.					+	Cactus
<i>Ferocactus histrix</i> (DC.)G.Lindsay.					+	Cactus
<i>Ferocactus latispinus</i> (Haw.) Britt. & Rose					+	Cactus
<i>Ferocactus peninsulae</i> (F.A.Weber) Britt.& Rose					+	Cactus
<i>Ferocactus pottsii</i> (Salm-Dyck) Backeb.					+	Cactus
<i>Ferocactus robustus</i> (Otto ex Pfeiff.)Britt. & Rose					+	Cactus
<i>Ferocactus wislizenii</i> (Engelm.) Britt. & Rose					+	Cactus

Appendix. Contd.

<i>Hylocereus triangularis</i> (L.) Britt. & Rose					+		Cactus
<i>Hylocereus undatus</i> (Haw.) Britt. & Rose					+	+	Cactus
<i>Mammillaria compressa</i> DC.						+	Cactus
<i>Mammillaria elongata</i> DC.						+	Cactus
<i>Mammillaria longimamma</i> DC.						+	Cactus
<i>Mammillaria prolifera</i> (Mill.)Haw.						+	Cactus
<i>Melocactus ernestii</i> Vaupel.						+	Cactus
<i>Mytillocactus geometrizans</i> (Mart.ex Pfeiff.) Console*						+	Cactus
<i>Opuntia basilaris</i> Engelm. & Bigelow						+	Cactus
<i>Opuntia brasiliensis</i> (Willd.) Haw.						+	Cactus
<i>Opuntia cylindrica</i> (Lam.) DC.						+	Cactus
<i>Opuntia cylindrica</i> (Lam.) DC.'Cristata'						+	Cactus
<i>Opuntia dejecta</i> Salm-Dyck					+	+	Cactus
<i>Opuntia falcata</i> Ekman & Werderm.						+	Cactus
<i>Opuntia ficus-indica</i> (L.) Mill.*						+	Cactus
<i>Opuntia fulgida</i> Engelm.						+	Cactus
<i>Opuntia leucotricha</i> DC.						+	Cactus
<i>Opuntia lindheimeri</i> Engelm.						+	Cactus
<i>Opuntia macrocentra</i> Engelm.						+	Cactus
<i>Opuntia microdasys</i> (Lehm.) Pfeiff. 'Albispina'						+	Cactus
<i>Opuntia microdasys</i> (Lehm.)Pfeiff. 'Pallida'						+	Cactus
<i>Opuntia phaeacantha</i> Engelm.						+	Cactus
<i>Opuntia pilifera</i> F.A. Weber						+	Cactus
<i>Opuntia rufida</i> Engelm.						+	Cactus
<i>Opuntia stricta</i> Haw.						+	Cactus
<i>Opuntia subulata</i> (Muehlenpf.) Engelm						+	Cactus
<i>Opuntia tomentosa</i> Salm-Dyck						+	Cactus
<i>Opuntia tunicata</i> (Lehm.) Link & Otto						+	Cactus
<i>Opuntia vulgaris</i> Mill.*						+	Cactus
<i>Oreocereus celsianus</i> (Cels ex Salm –Dyck) Riccob.						+	Cactus
<i>Pachycereus marginatus</i> (DC.) Britt & Rose						+	Cactus
<i>Pachycereus pringlei</i> (S.Wats) Britt. & Rose						+	Cactus
<i>Pachycereus weberi</i> (J.Coult.) Backeb.						+	Cactus
<i>Pereskia aculeata</i> Mill.						+	Cactus
<i>Pilosocereus chrysacanthus</i> (F.A.C.Weber) Byles & Rowley						+	Cactus
<i>Stenocactus crispatus</i> (DC.) A. Berger ex A.W. Hill						+	Cactus
<i>Stenocactus multicostatus</i> (Hildm. ex Schum.) A. Berger. ex A.W. Hill						+	Cactus
<i>Stenocereus beneckeii</i> (Ehrenb.) F.Buxb.						+	Cactus
<i>Stenocereus eruca</i> (Brandg.) Gibson & Horak						+	Cactus
<i>Stetsonia coryne</i> (Salm-Dyck) Britt. & Rose						+	Cactus
<i>Thelocactus setispinus</i> (Engelm.) E.F.Anderson						+	Cactus
<i>Trichocereus</i> sp.						+	Cactus
Calycanthaceae							
<i>Chimonanthus praecox</i> (L.) Link.	+					+	Shrub

Appendix. Contd.

Cannaceae							
<i>Canna indica</i> L.*	+	+	+	+	+	+	Perennial herb
<i>Canna x generalis</i> L.H.Bail.*					+		Perennial herb
Capparidaceae							
<i>Crateva religiosa</i> Forst.f.	+			+			Tree
Caprifoliaceae							
<i>Abelia chinensis</i> R.Br.	+			+	+		Shrub
<i>Lonicera japonica</i> Thunb.				+	+		Climber
<i>Lonicera sempervirens</i> L.*			+		+		Climber
<i>Sambucus nigra</i> L.	+			+	+		Shrub
<i>Viburnum tinus</i> L.	+			+	+		Shrub
Caricaceae							
<i>Carica papaya</i> L.*	+	+			+		Tree-like
Casuarinaceae							
<i>Casuarina cunninghamiana</i> Miq.*		+	+		+	+	Tree
<i>Casuarina littoralis</i> Salisb.*					+		Tree
<i>Casuarina verticillata</i> Lam.*					+		Tree
Celastraceae							
<i>Euonymus japonica</i> Thunb.*					+		Tree
Cephalotaxaceae							
<i>Cephalotaxus fortunei</i> Hook.*					+		Conifer
Combretaceae							
<i>Anogeissus latifolia</i> (DC.)Wallich ex Guillemain & Perrottet				+	+		Tree
<i>Conocarpus erectus</i> L.					+		Tree
<i>Poivrea densiflora</i> L.*	+						Climber
<i>Quisqualis indica</i> L.*	+				+		Climber
<i>Terminalia angustifolia</i> Bedd.*					+		Tree
<i>Terminalia arjuna</i> (Roxb.) Wight&Arn.*	+		+	+	+		Tree
<i>Terminalia bellirica</i> (Gaertn.) Roxb.*	+			+	+	+	Tree
<i>Terminalia catappa</i> L.*					+		Tree
<i>Terminalia chebula</i> (Gaertn.) Retz.*				+			Tree
<i>Terminalia laxiflora</i> Engl.& Diels	+			+	+		Tree
<i>Terminalia muelleri</i> Benth.				+			Tree
<i>Terminalia myriocapa</i> Heurck & J.Muell.	+			+			Tree
Commelinaceae							
<i>Tradescantia pallida</i> (Rose) D.Hunt.'Purpurea'*	+	+	+	+	+	+	Perennial herb
<i>Tradescantia spathacea</i> Sw.					+		Perennial herb
Compositae							
<i>Argyranthemum frutescens</i> (L.) Schultz-Bip.				+	+		Perennial herb
<i>Centaurea cineraria</i> L.*			+	+	+		Perennial herb
<i>Dendranthema indicum</i> (L.)Des Moul.*	+	+	+	+	+	+	Perennial herb
<i>Euryops pectinatus</i> (L.) Cass.					+		Perennial herb
<i>Euryops virgineus</i> (L.f.) DC.					+		Perennial herb
<i>Farfugium japonicum</i> (L.) Kitam.*					+		Perennial herb
<i>Felicia amelloides</i> (L.) Voss.					+		Perennial herb

Appendix. Contd.

<i>Gerbera jamesonii</i> Bol. ex Adlam.	+				+	Perennial herb
<i>Kleinia fulgens</i> Hook.f.					+	Succulent
<i>Kleinia stapeliiformis</i> (E.Phillips) Stapf.					+	Succulent
<i>Montanoa bipinnatifida</i> (Kunth.) K.Koch.				+	+	Shrub
<i>Senecio cineraria</i> DC.*					+	Perennial herb
<i>Senecio petasitis</i> (Sims) DC.*	+	*			+	Perennial herb
<i>Wedelia trilobata</i> (L.) Hitch.					+	Perennial herb
Convolvulaceae						
<i>Argyreia nervosa</i> (Burm.f.) Bojer.	+				+	Climber
<i>Ipomoea cairica</i> (L.) Sweet.					+	Climber
<i>Ipomoea fistulosa</i> Mart. ex Choisy	+				+	Climber
<i>Ipomoea mauritiana</i> Jacq.					+	Shrub
<i>Ipomoea tricolor</i> Cav.				+		Climber
<i>Jacquemontia pentantha</i> (Jacq.)D.Don					+	Climber
<i>Porana paniculata</i> Roxb.*	+	*				Climber
Crassulaceae						
<i>Adromischus cooperi</i> (Bak.)A.Berger.					+	Succulent
<i>Aeonium arboreum</i> (L.)Webb. &Berth.					+	Succulent
<i>Aeonium arboreum</i> (L.)Webb.&Berth.'Atropurpureum'					+	Succulent
<i>Cotyledon ladysmithiensis</i> Poelln.					+	Succulent
<i>Cotyledon orbiculata</i> L.					+	Succulent
<i>Cotyledon tomentosa</i> Harv.					+	Succulent
<i>Crassula arborescens</i> (Mill.) Willd.					+	Succulent
<i>Crassula ovata</i> (Mill.) Druce					+	Succulent
<i>Crassula ovata</i> (Mill.) Druce 'Sunset'					+	Succulent
<i>Echeveria elegans</i> Rose					+	Succulent
<i>Kalanchoa beharensis</i> Drake					+	Succulent
<i>Kalanchoa blossfeldiana</i> Poelln.					+	Succulent
<i>Kalanchoa daigremontiana</i> Hamet & Perrier					+	Succulent
<i>Kalanchoa fedtschenkoi</i> Hamet & Perrier					+	Succulent
<i>Kalanchoa longiflora</i> Schlechtend					+	Succulent
<i>Kalanchoa marmorata</i> Bak.					+	Succulent
<i>Kalanchoa pinnata</i> (Lam.) Pers.					+	Succulent
<i>Kalanchoa</i> sp.					+	Succulent
<i>Kalanchoa tomentosa</i> Bak.					+	Succulent
<i>Kalanchoa tubiflora</i> (Harv.) Hamet				+	+	Succulent
<i>Kalanchoa velutina</i> Welv.					+	Succulent
Cucurbitaceae						
<i>Luffa cylindrica</i> (L.) M.Roem.*					+	Climber
Cupressaceae						
<i>Chamaecyparis lawsoniana</i> (Murray)Parl.*	+	*			+	Conifer
<i>Cupressus arizonica</i> Green.*	+	*			+	Conifer
<i>Cupressus lusitanica</i> Mill.*					+	Conifer
<i>Cupressus macrocarpa</i> Hartw. ex Gordon.*	+	*			+	Conifer
<i>Cupressus sempervirens</i> L.*	+	*			+	Conifer

Appendix. Contd.

<i>Cupressus sempervirens</i> L. 'Pyramidales'					+		Conifer
<i>Cupressus sempervirens</i> L. 'Stricta'					+		Conifer
<i>Juniperus</i> sp.					+		Conifer
<i>Platycladus orientalis</i> (L.f.) Franco*	+	+	+		+	+	Conifer
<i>Tetraclinis articulata</i> (Vahl) M.T.Mast*					+		Conifer
Cycadaceae							
<i>Cycas beddomei</i> Dyer.					+		Cycads
<i>Cycas circinalis</i> L.*	+				+	+	Cycads
<i>Cycas revoluta</i> Thunb.*	+				+	+	Cycads
Cyperaceae							
<i>Cyperus alternifolius</i> L.*	+				+	+	Water plant
<i>Cyperus papyrus</i> L.*					+	+	Water plant
Davalliaceae							
<i>Nephrolepis exaltata</i> (L.)Schott.	+				+		Fern
Dilleniaceae							
<i>Dillenia indica</i> L.*					+	+	Tree
Ebenaceae							
<i>Diospyros ebenum</i> J. König ex Retz.*	+						Tree
<i>Diospyros kaki</i> L.f.*						+	Tree
<i>Diospyros lotus</i> L.*					+	+	Tree
<i>Euclea pseudebenum</i> E.Meyer	+					+	Tree
Elaeagnaceae							
<i>Elaeagnus macrophylla</i> Thunb.*						+	Shrub
Euphorbiaceae							
<i>Acalypha wielkesiana</i> Muell. Arg.	+	+	+		+		Shrub
<i>Acalypha wielkesiana</i> Muell. Arg. 'Hoffmananna'						+	Shrub
<i>Acalypha wielkesiana</i> Muell. Arg. 'Macrophylla'	+	+			+	+	Shrub
<i>Aleurites moluccana</i> (L.) Willd.*					+	+	Tree
<i>Antidesma bunius</i> (L.) Spreng.*					+	+	Tree
<i>Bischofia javanica</i> Blume					+		Shrub
<i>Breynia nivosa</i> (W.G.Sm.) Small.	+				+	+	Shrub
<i>Codiaeum variegatum</i> (L.) Bl.	+	+				+	Shrub
<i>Euphorbia abyssinica</i> J.F.Gmel.*					+	+	Succulent
<i>Euphorbia canariensis</i> L.*						+	Succulent
<i>Euphorbia caput-medusae</i> L.'Minor'						+	Succulent
<i>Euphorbia coerulescens</i> Haw.*						+	Succulent
<i>Euphorbia cooperi</i> N.E.Br.						+	Succulent
<i>Euphorbia grandicornis</i> Goebel.						+	Succulent
<i>Euphorbia horrida</i> Boiss.						+	Succulent
<i>Euphorbia ingens</i> E.Mey.					+	+	Succulent
<i>Euphorbia lactea</i> Haw.			+		+	+	Succulent
<i>Euphorbia lactea</i> Haw. 'Cristata'						+	Succulent
<i>Euphorbia lactea</i> Haw. 'Monstrosa'		+			+	+	Succulent
<i>Euphorbia mamillaris</i> L.						+	Succulent
<i>Euphorbia mauritanica</i> L.						+	Succulent

Appendix. Contd.

<i>Euphorbia milii</i> Des Moul.*					+		Succulent
<i>Euphorbia neglecta</i> N.E.Br.					+		Succulent
<i>Euphorbia neriifolia</i> L.					+		Succulent
<i>Euphorbia nubica</i> N.E.Br.					+		Succulent
<i>Euphorbia obesa</i> Hook.f.			+	+	+		Succulent
<i>Euphorbia pseudocactus</i> A.Berger.					+		Succulent
<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch.					+		Succulent
<i>Euphorbia royleana</i> Boiss.			+		+		Succulent
<i>Euphorbia stenoclada</i> Baill. ssp. <i>stenoclada</i>					+		Succulent
<i>Euphorbia trigona</i> Mill.					+		Succulent
<i>Euphorbia x zigzag</i>				+			Succulent
<i>Jatropha curcas</i> L.*					+		Shrub
<i>Jatropha integerrima</i> Jacq.					+		Shrub
<i>Jatropha multifida</i> L.*					+		Shrub
<i>Joannesia principis</i> Vell.*	+			+	+		Tree
<i>Pedilanthus tithymaloides</i> (L.) Poit					+		Succulent
<i>Pedilanthus tithymaloides</i> (L.) Poit 'Variegata'					+		Succulent
<i>Phyllanthus angustifolius</i> (Sw.)Sw.					+		Shrub
<i>Phyllanthus emblica</i> L.*				+			Tree
<i>Putranjiva roxburghii</i> Wallich.*				+	+		Tree
<i>Sapium sebiferum</i> (L.)Roxb.*					+		Tree
<i>Synadenium compactum</i> var. <i>rubrum</i> S.Carter					+		Succulent
<i>Synadenium grantii</i> Hook.f.		+	+	+	+		Succulent
<i>Synadenium grantii</i> Hook.f. 'Rubra'					+		Succulent
Fagaceae							
<i>Quercus ilex</i> L.*					+		Tree
<i>Quercus incana</i> Bartram*					+		Tree
<i>Quercus robur</i> L.*	+			+	+		Tree
<i>Quercus suber</i> L.*					+		Tree
Flacourtiaceae							
<i>Dovyalis caffra</i> Warb.*				+	+		Tree
<i>Flacourtia indica</i> (Burm.f.)Merr.*	+						Tree
<i>Flacourtia jangomans</i> (Lour.) Rauschel*				+	+		Tree
<i>Flacourtia rukam</i> Zoll. & Moritzi*.					+		Tree
<i>Muntingia calabura</i> L.*				+			Shrub
<i>Oncoba spinosa</i> Forssk.*					+		Shrub
Geraniaceae							
<i>Pelargonium zonale</i> (L.) L'Her.*	+	+	+	+	+	+	Perennial herb
Ginkgoaceae							
<i>Ginkgo biloba</i> L.*					+		Conifer
Gramineae							
<i>Bambusa multiplex</i> Lour. Rausch.*					+		Tree-like
<i>Bambusa vulgaris</i> Schrader.ex Wendl.*		+			+		Tree-like
<i>Cortaderia selloana</i> (Schult. & Schult.f.)Asch. & Grabn.*	+				+		Perennial herb
<i>Dendrocalamus giganteus</i> Munro.*				+	+		Tree-like

Appendix. Contd.

<i>Dendrocalamus strictus</i> (Roxb.) Nees.*					+		Tree-like
<i>Pennisetum setaceum</i> (Forssk.)Chiov.					+		Perennial herb
<i>Phyllostachys aurea</i> (Carr.)A. & C. Riv.*					+		Tree-like
<i>Phyllostachys bambusoides</i> Sieb. & Zucc.*					+		Tree like
Guttiferae							
<i>Clusia rosea</i> Jacq.*	+						Shrub
<i>Garcinia dulcis</i> (Roxb.)Kurz.*					+		Shrub
Hamamelidaceae							
<i>Liquidambar styraciflua</i> L.*	+						Tree
Hydrangeaceae							
<i>Philadelphus x virginalis</i> Rehd.					+		Shrub
Iridaceae							
<i>Iris pseudacorus</i> L.					+		Water plant
Juglandaceae							
<i>Carya illinoensis</i> K.Koch.*					+		Tree
Labiatae							
<i>Origanum majorana</i> L.*					+		Perennial herb
<i>Rosmarinus officinalis</i> L.*	+				+		Perennial herb
<i>Salvia coccinea</i> Juss. ex J. Murr.*					+		Perennial herb
<i>Salvia farinacea</i> Benth.	+	+	+	+	+	+	Perennial herb
<i>Salvia splendens</i> Sellow ex Roem. & Schult.*					+		Perennial herb
<i>Solenostemon scutellarioides</i> (L.) Codd					+		Perennial herb
Lauraceae							
<i>Cinnamomum camphora</i> (L.)Sieb.*	+			+	+		Tree
<i>Cinnamomum glanduliferum</i> (Wallich) Meissn.*					+		Tree
<i>Cinnamomum zeylanicum</i> Blume*	+			+	+		Tree
<i>Laurus nobilis</i> L.*	+				+		Tree
<i>Persea americana</i> Mill.*	+				+		Tree
Leeaceae							
<i>Leea guineensis</i> G. Don.	+				+		Shrub
Leguminosae							
<i>Acacia farnesiana</i> (L.) Willd.*				+			Tree
<i>Acacia glaucophylla</i> Steud.*				+	+		Tree
<i>Acacia nilotica</i> (L.)Willd. ex Delile*	+			+	+		Tree
<i>Acacia nilotica</i> (L.)Willd. ex Delile ssp.tomentosa					+		Tree
<i>Acacia saligna</i> (Labill.) H.Wendl.*	+		+	+			Tree
<i>Acacia seyal</i> Delile*				+			Tree
<i>Acrocarpus fraxinifolius</i> Arn.*	+			+			Tree
<i>Adenantha pavonina</i> L.*	+			+			Tree
<i>Aeschynomene elaphroxylon</i> (Guill. et Perr.) Taub*					+		Water plant
<i>Albizia anthelminthica</i> A. Brogn*.	+			+			Tree
<i>Albizia julibrissin</i> Durazz.*				+	+		Tree
<i>Albizia lebbek</i> (L.) Benth				+	+		Tree
<i>Albizia lophantha</i> Benth.				+			Tree
<i>Albizia lucida</i> (Roxb.)Benth.*					+		Tree

Appendix. Contd.

<i>Albizia procera</i> (Roxb.) Benth.*				+	+		Tree
<i>Albizia stipulata</i> (Roxb.) L. H. Boivin.*				+			Tree
<i>Alexa imperatricis</i> R.H.Schemburgk Baker *				+			Tree
<i>Amorpha fruticosa</i> L.				+			Shrub
<i>Bauhinia candida</i> Ait.*	+	+		+	+		Tree
<i>Bauhinia hookeri</i> Hort.					+		Tree
<i>Bauhinia racemosa</i> Lam.*					+		Tree
<i>Bauhinia retusa</i> Roxb.					+		Tree
<i>Bauhinia variegata</i> L.*			+	+	+8		Tree
<i>Brownea ariza</i> Benth.	+						Shrub
<i>Butea monosperma</i> (Lam.) Taub.*	+			+			Shrub
<i>Caesalpinia ferrea</i> Mart. ex Tul.*	+			+	+		Tree
<i>Caesalpinia gilliesii</i> (Wallich ex Hook.) Benth.*	+				+		Shrub
<i>Caesalpinia pulcherrima</i> (L.)Sw.*					+		Shrub
<i>Calliandra haematocephala</i> Hassk.				+	+		Shrub
<i>Cassia fistula</i> L.*	+			+	+	+	Tree
<i>Cassia grandis</i> L.f.	+				+		Tree
<i>Cassia nodosa</i> Roxb.	+		+	+	+		Tree
<i>Cassia roxburghii</i> DC.	+			+	+	+	Tree
<i>Ceratonia siliqua</i> L.*	+						Tree
<i>Cercis chinensis</i> Bunge	+			+	+		Shrub
<i>Colvillea racemosa</i> Bojer ex Hook.					+		Tree
<i>Crotalaria madurensis</i> Wight				+	+		Shrub
<i>Dalbergia paniculata</i> Roxb.*	+			+	+		Tree
<i>Dalbergia sissoo</i> Roxb ex DC.*				+	+		Tree
<i>Delonix regia</i> (Bojer) Raf.*	+		+	+			Tree
<i>Derris elliptica</i> (Wallich) Benth.	+	+	+		+	+	Climber
<i>Dischrostachys cinerea</i> (L.) Wight & Arn.*				+	+		Shrub
<i>Enterolobium contortisiliquum</i> (Vell.)Morong.*	+			+	+	+	Tree
<i>Enterolobium cyclocarpa</i> (Jacq.) Griseb.*	+		+		+		Tree
<i>Erythrina caffra</i> Thunb.*					+		Tree
<i>Erythrina corallodendrum</i> L.*	+	+	+		+		Tree
<i>Erythrina crista-galli</i> L.*		+		+	+		Tree
<i>Erythrina crista-japonica</i>					+		Tree
<i>Erythrina poeppigiana</i> (Walp.) Cook.*				+	+		Tree
<i>Erythrina speciosa</i> Andr.					+		Tree
<i>Erythrina spinosa</i> Voigt					+		Tree
<i>Erythrina variegata</i> L.					+		Tree
<i>Genista monosperma</i> (L.)Lam.*	+			+	+		Tree
<i>Gleditsia aquatica</i> Marsh.*					+		Tree
<i>Gleditsia caspica</i> Desf.*	+				+		Shrub
<i>Gleditsia triacanthos</i> L.*	+			+	+		Tree
<i>Haematoxylum campechianum</i> L.*			+	+	+		Tree
<i>Leucaena leucocephala</i> (Lam.) De Wit.	+		+		+	+	Tree
<i>Lonchocarpus speciosus</i> Boulos*	+	+	+	+	+		Tree

Appendix. Contd.

<i>Parkia biglobosa</i> (Jacq.) Benth.*	+			+	+		Tree
<i>Parkia roxburghii</i> G. Don*	+						Tree
<i>Parkinsonia aculeata</i> L.*	+						Tree
<i>Peltophorum africanum</i> Sonder	+				+	+	Tree
<i>Pithecellobium dulce</i> (Roxb.) Benth.				+			Tree
<i>Pithecellobium lobatum</i> Benth.	+						Tree
<i>Pongamia pinnata</i> (L.) Merr.*	+		+	+	+	+	Tree
<i>Prosopis juliflora</i> (Sw.) DC.*				+	+		Tree
<i>Pterocarpus dalbergoides</i> Roxb.*					+		Tree
<i>Pterocarpus indicus</i> Willd.					+		Tree
<i>Robinia pseudoacacia</i> L.*				+	+		Tree
<i>Saraca cauliflora</i> Bak.*					+		Tree
<i>Saraca indica</i> L.*	+				+		Tree
<i>Schotia brachypetala</i> Sonder					+		Tree
<i>Senna alata</i> (L.) Roxb.					+		Shrub
<i>Senna artemisioides</i> (DC.) Randell.*					+		Shrub
<i>Senna bicapsularis</i> (L.) Roxb.					+		Shrub
<i>Senna didymobotrya</i> (Fres.) Irwin & Barneby	+		+	+	+		Shrub
<i>Senna occidentalis</i> (L.) Link.*	+				+		Shrub
<i>Senna siamea</i> (Lam.) Irwin & Barneby*				+	+		Shrub
<i>Senna spectabilis</i> (DC.) Irwin & Barneby*	+						Shrub
<i>Senna surratensis</i> (Burm f.) Irwin & Barneby*	+				+		Shrub
<i>Sophora japonica</i> L.*				+	+		Tree
<i>Sophora secundiflora</i> (Ort.) Lag.ex DC.*	+				+		Tree
<i>Tamarindus indica</i> L.*				+	+		Tree
<i>Tipuana tipu</i> (Benth.)G. Kuntze*		+	+	+	+		Tree
<i>Wisteria sinensis</i> (Sims.) Sweet*	+	+		+	+		Climber
Liliaceae							
<i>Asparagus densiflorus</i> (Kunth) Jessop.*	+		+	+	+	+	Perennial herb
<i>Asparagus falcatus</i> L.*	+						Climber
<i>Asparagus setaceus</i> (Kunth) Jessop.*				+	+		Climber
<i>Aspidistra lurida</i> Ker-Gawl.*	+				+		Perennial herb
<i>Chlorophytum comosum</i> (Thunb.) Jacques	+		+		+		Perennial herb
<i>Hemerocallis fulva</i> L.					+		Bulbs
<i>Ruscus aculeatus</i> L.*		+		+	+		Perennial herb
Loganiaceae							
<i>Buddleja asiatica</i> Lour.					+		Shrub
<i>Buddleja x hybrida</i> Farq.					+		Shrub
<i>Buddleja madagascariensis</i> Lam.*	+						Shrub
<i>Strychnos nux-vomica</i> L.				+			Tree
<i>Strychnos spinosa</i> Lam.				+			Shrub
Lythraceae							
<i>Heimia myrtifolia</i> Cham. & Schlechtend	+				+		Shrub
<i>Lagerstroemia indica</i> L.*	+	+	+	+	+	+	Shrub
<i>Lagerstroemia speciosa</i> (L.) Pers.*	+						Tree

Appendix. Contd.

<i>Lagerstroemia tomentosa</i> K.Persl*	+	*					Tree
<i>Woodfordia fruticosa</i> (L.)Kurz.*				+	*		Shrub
Magnoliaceae							
<i>Magnolia grandiflora</i> L.*	+	*		+	+		Tree
Malpighiaceae							
<i>Byrsonima crassifolia</i> (L.) HBK.*	+	*					Tree
<i>Hiptage madablota</i> Gaertn.	+			+	+		Climber
<i>Malpighia glabra</i> L.					+		Tree
Malvaceae							
<i>Abutilon hirtum</i> (Lam.) Sweet.	+				+		Shrub
<i>Anisodonteia capensis</i> (L.) Bates.					+		Perennial herb
<i>Hibiscus rosa-sinensis</i> L.*	+	*	+	+	+	+	Shrub
<i>Hibiscus rosa-sinensis</i> L. 'Cooperi'					+		Shrub
<i>Hibiscus rosa-sinensis</i> L. 'Red'					+		Shrub
<i>Hibiscus syriacus</i> L.			+		+		Shrub
<i>Hibiscus syriacus</i> L. 'Blue'					+		Shrub
<i>Hibiscus tiliaceus</i> L.					+		Shrub
<i>Lagunaria patersonii</i> (Andrews) G. Don. f.				+	+		Tree
<i>Malvaviscus arboreus</i> Cav.	+		+		+	+	Shrub
<i>Thespesia populnea</i> (L.) Sol. ex Corr.					+	*	Tree
Marantaceae							
<i>Calathea makoyana</i> (E.Morr.) E.Morr.	+				+		indoor
<i>Thalia dealbata</i> J. Fraser.*					+	*	Water plant
Meliaceae							
<i>Aphanamixis polystachya</i> (Wallich) Parker.*	+	*		+	+		Tree
<i>Azadirachta indica</i> A. Juss				+	+		Tree
<i>Cedrela odorata</i> L.*				+	+		Tree
<i>Cedrela toona</i> Roxb.ex Rottl..*				+	+		Tree
<i>Khaya dawei</i> .*				+			Tree
<i>Khaya senegalensis</i> (Desr.) A.Juss.*	+	+		+	+		Tree
<i>Melia azedarach</i> L..*	+	*		+	+		Tree
<i>Swietenia macrophylla</i> King.*				+	+		Tree
<i>Swietenia mahogany</i> (L.) Jacq.*				+	+	+	Tree
Moraceae							
<i>Artocarpus altilis</i> (Parkinson) Fosb.*	+	*			+		Tree
<i>Artocarpus heterophyllus</i> Lam.*	+	*			+		Tree
<i>Ficus afzelii</i> G.Don ex Loud.*				+	+	+	Tree
<i>Ficus aspera</i> Forst.f.*					+		Tree
<i>Ficus auriculata</i> Lour.*					+		Tree
<i>Ficus benghalensis</i> L.*	+	*	+	+	+	+	Tree
<i>Ficus benjamina</i> L.*	+	+	+	+	+	+	Tree
<i>Ficus bennedykii</i> (Miq.) Miq.	+	+	+	+	+	+	Tree
<i>Ficus bennedykii</i> (Miq.) Miq. 'Variegata'					+		Tree
<i>Ficus carica</i> L.*	+	*			+		Tree
<i>Ficus cunninghamii</i> Miq.*			+	+	+		Tree

Appendix. Contd.

<i>Ficus cyathistipula</i> Warb.			+		+		Tree
<i>Ficus deltoidea</i> Jack.	+				+		Tree
<i>Ficus elastica</i> Roxb.ex Hornem.*	+			+			Tree
<i>Ficus elastica</i> Roxb.ex Hornem. 'Decora'	+	+	+	+	+	+	Tree
<i>Ficus elastica</i> Roxb.ex Hornem.'variegata'					+		Tree
<i>Ficus exasperata</i> Vahl.	+	+	+		+		Tree
<i>Ficus gibbosa</i> Blume*					+		Tree
<i>Ficus hispida</i> L.f.*					+		Tree
<i>Ficus laurifolia</i> Lam.*				+			Tree
<i>Ficus lyrata</i> Warb.*	+	+		+	+		Tree
<i>Ficus macrophylla</i> Desf. ex Pers.*				+	+		Tree
<i>Ficus microcarpa</i> L.f.'Hawai'	+	+	+		+	+	Tree
<i>Ficus mysorensis</i> Heyne ex Roth.*	+		+	+	+		Tree
<i>Ficus nitida</i> Thunb.	+	+	+	+	+	+	Tree
<i>Ficus platipoda</i> Miq.*			+	+	+	+	Tree
<i>Ficus platyphylla</i> Del.*			+	+	+		Tree
<i>Ficus pseudosycomorus</i> Decne*					+		Tree
<i>Ficus pyriformis</i> L.*	+			+	+		Tree
<i>Ficus racemosa</i> L.*		+	+	+	+	+	Tree
<i>Ficus religiosa</i> L.*		+	+	+	+		Tree
<i>Ficus rubiginosa</i> Desf. ex Vent.*		+					Tree
<i>Ficus spreguana</i> Mildr.*					+		Tree
<i>Ficus sycomorus</i> L.*			+	+	+		Tree
<i>Ficus trijuja</i> L.*					+		Tree
<i>Ficus vasta</i> Forssk.*	+						Tree
<i>Ficus virens</i> Ait.*			+		+		Tree
<i>Maclura pomifera</i> (Raf.) Schneid.*		+		+	+	+	Tree
<i>Morus alba</i> L.*		+		+	+		Tree
<i>Morus macroura</i> Miq. 'Omani'					+		Tree
<i>Morus nigra</i> L.*	+		+		+		Tree
Moringaceae							
<i>Moringa aptera</i> (Forssk.)Fiori*					+		Tree
<i>Moringa oleifera</i> Lam.*					+		Tree
Myoporaceae							
<i>Bontia daphnoides</i> L.					+		Shrub
<i>Eremophila maculata</i> F.Muell.					+		Perennial herb
<i>Myoporum laetum</i> Forst. f.*			+				Tree
Myrsinaceae							
<i>Ardisia crenata</i> Sims.*					+		Shrub
Myrtaceae							
<i>Callistemon citrinus</i> (Curtis) Skeels*	+			+	+		Tree
<i>Callistemon linearis</i> (Schrad. & J.C.Wendl.) DC.*					+		Tree
<i>Callistemon rigidus</i> R.Br.*					+		Tree
<i>Callistemon subulata</i>					+		Shrub
<i>Eucalyptus camaldulensis</i> Dehnh.*			+	+	+	+	Tree

Appendix. Contd.

<i>Eucalyptus citriodora</i> Hook.*	+			+			Tree
<i>Eucalyptus gomphocephala</i> DC.*				+		+	Tree
<i>Eugenia supra-axillaris</i> Spring.*	+			+			Tree
<i>Eugenia uniflora</i> L.*	+			+	+		Tree
<i>Feijoa sellowiana</i> O.Berg.*	+				+		Shrub
<i>Melaleuca ericifolia</i> Sm.*		+		+	+	+	Tree
<i>Melaleuca leucadendron</i> (L.) L.*				+			Tree
<i>Myrciaria edulis</i> (Vell.) Skeels*			+	+	+		Tree
<i>Myrtus communis</i> L.*	+				+		Shrub
<i>Pimenta dioica</i> (L.) Merr.*	+				+		Tree
<i>Pimenta racemosa</i> (Mill.) J.W.Moore*	+				+		Tree
<i>Psidium guajava</i> L.	+			+	+	+	Tree
<i>Syzygium aqueum</i> (Burm.f.) Alston.*	+						Tree
<i>Syzygium cuminii</i> (L.)Skeels *	+			+	+	+	Tree
<i>Syzygium jambos</i> (L.) Alston*					+		Tree
<i>Syzygium samarangense</i> Blume Merrill & L.M.Perry*	+			+			Tree
Nelumbonaceae							
<i>Nelumbo nucifera</i> Gaertn.*		+			+		Water plant
Nyctaginaceae							
<i>Bougainvillea x buttiana</i> Holtt & Standl.'Mss.Butt'					+		Climber
<i>Bougainvillea glabra</i> Choisy*	+	+			+		Climber
<i>Bougainvillea glabra</i> Choisy 'Variegata'					+		Climber
<i>Bougainvillea spectabilis</i> Willd.*		+	+		+		Climber
Nymphaeaceae							
<i>Nymphaea caerulea</i> Savigny*					+		Water plant
Ochnaceae							
<i>Ochna serrulata</i> (Hochst.) Walp.	+						Shrub
Oleaceae							
<i>Fraxinus angustifolia</i> Vahl*				+	+		Shrub
<i>Fraxinus velutina</i> Torr.*				+			Shrub
<i>Jasminum azoricum</i> L.*			+		+		Climber
<i>Jasminum dichotomum</i> Vahl					+		Climber
<i>Jasminum grandiflorum</i> L.*	+				+		Climber
<i>Jasminum mesnyi</i> Hance	+				+		Climber
<i>Jasminum multiflorum</i> (Burm.f.) Andr.	+				+		Climber
<i>Jasminum sambac</i> (L.)Ait.*	+						Climber
<i>Ligustrum lucidum</i> Ait.f.*	+			+			Tree
<i>Ligustrum ovalifolium</i> Hassk.*	+			+	+		Shrub
<i>Olea europaea</i> L.*	+						Shrub
<i>Syringa amurensis</i> Rupr.*	+						Shrub
Oxalidaceae							
<i>Averrhoa carambola</i> L.					+		Shrub
Palmae							
<i>Acrocomia aculeata</i> (Jacq.)Lodd.ex.Mart.*					+		Palm

Appendix. Contd.

<i>Archontophoenix alexandrae</i> (F.J.Muell.)H.A.Wendl. & Drude*	+				+		Palm
<i>Archontophoenix cunninghamiana</i> (H.A.Wendl.)& Drude*				+	+		Palm
<i>Arenga engleri</i> Becc.*	+				+		Palm
<i>Attalea</i> sp.					+		Palm
<i>Bismarckia nobilis</i> Hildebr. & H. Wendl.					+		Palm
<i>Borassus flabellifer</i> L.*					+		Palm
<i>Brahea armata</i> S.Wats.*	+			+	+		Palm
<i>Butia capitata</i> (Mart.) Becc.*					+		Palm
<i>Calamus rotang</i> L.	+				+		Palm
<i>Carpentaria acuminata</i> (H.Windl. &Drude) Becc.					+		Palm
<i>Caryota mitis</i> Lour.*	+	+		+	+		Palm
<i>Caryota urens</i> L.*		+		+	+		Palm
<i>Chamaedorea elegans</i> Mart.*	+				+		Palm
<i>Chamaedorea microspadix</i> Burret.					+		Palm
<i>Chamaedorea seifrizii</i> Burret.	+				+		Palm
<i>Chamaerops humilis</i> L.*	+	+			+		Palm
<i>Copernicia prunifera</i> (Mill.)H.E.Moore					+		Palm
<i>Dypsis decari</i>					+		Palm
<i>Dypsis lutescens</i> H.Wendl.H.Beentje & J.Dransfield*					+		Palm
<i>Elaeis guineensis</i> Jacq.					+		Palm
<i>Howea belmoreana</i> (C. Moore & F. Muell.) Becc.	+				+		Palm
<i>Howea fosteriana</i> (C. Moore & F. Muell.) Becc.	+				+		Palm
<i>Hyophorbe lagenicaulis</i> (L.H.Bail.) H.E.Moore*					+		Palm
<i>Hyophorbe verschaffeltii</i> H.A.Wendl.*	+				+		Palm
<i>Hyphaena thebaica</i> (L.) Mart.*	+		+	+	+		Palm
<i>Latania lantaroides</i> (Gaertn.)H.E.Moore*					+		Palm
<i>Licuala grandis</i> H.A.Wendl.					+		Palm
<i>Livistona australis</i> (R.Br.) Mart.*	+			+	+		Palm
<i>Livistona chinensis</i> (Jacq.)R.Br.ex Mart.*	+	+	+	+	+		Palm
<i>Livistona decipiens</i> Becc.*	+				+		Palm
<i>Livistona robinsoniana</i> Becc.*					+		Palm
<i>Livistona rotundifolia</i> (Lam.)Mart.*	+				+		Palm
<i>Normanbya normanbyi</i> (W.Hill) L.H.Bail.					+		Palm
<i>Phoenix canariensis</i> Hort.ex Chabaud.*	+	+	+	+	+		Palm
<i>Phoenix dactylifera</i> L.*	+	+	+	+	+	+	Palm
<i>Phoenix reclinata</i> Jacq.*			+		+		Palm
<i>Phoenix roebelinii</i> O'Brien*			+				Palm
<i>Phoenix rupicola</i> Anderson*					+		Palm
<i>Ptycosperma elegans</i> (R.Br.)Bl.*	+				+		Palm
<i>Ravena rivularis</i> Jum. & H. Perrier					+		Palm
<i>Rhapis excelsa</i> (Thunb.) A.Henry*	+		+	+	+		Palm
<i>Roystonea oleracea</i> (Jacq.) Cook.*	+	+	+	+	+	+	Palm
<i>Roystonea regia</i> (HBK) O.F.Cook*	+				+		Palm
<i>Sabal blackburniana</i> Glazeber.ex Schult. & Schult.f.*	+	+			+		Palm

Appendix. Contd.

<i>Sabal causerianum</i> (Cook) Becc.*					+		Palm
<i>Sabal minor</i> (Jacq.)Pers.		+			+		Palm
<i>Sabal palmetto</i> (Walt.) Schult. &Schult.f.*	+		+		+		Palm
<i>Sabal yapa</i> Wright ex Becc.*	+	+	+	+	+	+	Palm
<i>Syagrus romanzoffianum</i> (Cham.) Glassman*	+	+	+	+	+	+	Palm
<i>Thrinax parviflora</i> Swartz.*	+						Palm
<i>Trachycarpus fortunei</i> (Hook.)H.Wendl.*	+				+		Palm
<i>Trithrinax acanthocoma</i> Drude					+		Palm
<i>Washingtonia filifera</i> (Linden) H.Wendl.*	+	+	+	+	+	+	Palm
<i>Washingtonia robusta</i> H.Wendl.*	+	+	+	+	+	+	Palm
<i>Wodyetia bifurcata</i> A.K.Irvine					+		Palm
Pandanaceae							
<i>Pandanus utilis</i> Bory					+		Tree
Passifloraceae							
<i>Passiflora caerulea</i> L.*					+		Climber
<i>Passiflora edulis</i> Sims.*					+		Climber
Phytolaccaceae							
<i>Phytolacca dioica</i> (L.) Moq.*	+				+		Tree
<i>Rivina humilis</i> L.*					+		Perennial herb
Pinaceae							
<i>Pinus brutia</i> Medv.					+		Conifer
<i>Pinus brutia</i> Ten.ssp. <i>eldarica</i> (Medv.) Nahal.					+		Conifer
<i>Pinus canariensis</i> Sweet ex Spreng*	+				+		Conifer
<i>Pinus halepensis</i> Mill.*	+	+	+		+		Conifer
<i>Pinus pinea</i> L.*		+	+		+		Conifer
<i>Pinus roxburghii</i> Sarg.*	+	+	+		+	+	Conifer
Piperaceae							
<i>Peperomia obtusifolia</i> (L.) Dietr.					+		Succulent
<i>Piper nigrum</i> L.					+		Climber
Pittosporaceae							
<i>Hymenosporum flavum</i> (Hook.)F.Muell.					+		Tree
<i>Pittosporum tobira</i> Ait.*	+			+	+		Shrub
<i>Pittosporum tobira</i> Ait. 'Variegata'	+			+			Shrub
Platanaceae							
<i>Platanus orientalis</i> L.*				+	+		Tree
Plumbaginaceae							
<i>Plumbago auriculata</i> Lam.*	+			+	+		Perennial herb
Podocarpaceae							
<i>Afrocarpus gracilior</i> (Pilg.) C.N.*	+				+		Conifer
<i>Podocarpus macrophyllus</i> (Thunb.) Sweet*	+						Conifer
<i>Podocarpus elongatus</i> (Ait) L'Her. ex Pers.*	+				+		Conifer
Polygalaceae							
<i>Polygala myrtifolia</i> L.*					+		Shrub
<i>Polygala x dalmatisiana</i> Hort.					+		Shrub
Polygonaceae							

Appendix. Contd.

<i>Antigonon leptopus</i> Hook. & Arn.	+				+		Climber
<i>Coccoloba peltata</i> Schott.*					+		Tree
<i>Coccoloba uvifera</i> (L.) L.					+		Tree
<i>Ruprechtia polystachya</i> L.*	+				+		Tree
<i>Ruprechtia salicifolia</i> (Cham. & Schlecht) C.A. Mey*					+		Tree
Polypodiaceae							
<i>Polypodium vulgare</i> L.	+						Fern
Portulacaceae							
<i>Portulacaria afra</i> Jacq.*					+	+	Succulent
<i>Portulacaria afra</i> Jacq. 'Variegata'					+		Succulent
Proteaceae							
<i>Grevillea hilliana</i> F.Muell.*					+		Tree
<i>Grevillea robusta</i> A.M.Cunn. ex R.Br.*	+		+		+	+	Tree
<i>Macademia integrifolia</i> Maiden & Betche*					+	+	Tree
Punicaceae							
<i>Punica granatum</i> L.*			+			+	Shrub
<i>Punica granatum</i> L.'Nana'						+	Shrub
Ranunculaceae							
<i>Clematis flammula</i> L.	+						Climber
Rhamnaceae							
<i>Hovenia dulcis</i> Thunb.*					+		Tree
<i>Rhamnus alternus</i> L.					+		Tree
<i>Rhamnus cathartica</i> L.*					+	+	Tree
<i>Ziziphus jujuba</i> Mill.	+	+	+	+	+		Tree
<i>Ziziphus spina-christi</i> (L.) Willd.*	+		+		+		Tree
Rosaceae							
<i>Cotoneaster horizontalis</i> Decne					+		Shrub
<i>Cydonia oblonga</i> Mill.*	+				+		Shrub
<i>Eriobotrya japonica</i> (Thunb.) Lindl.*	+				+	+	Tree
<i>Prunus armeniaca</i> L.			+	+	+	+	Tree
<i>Prunus persica</i> (L.) Batsch.			+		+		Tree
<i>Pyracantha crenatoserrata</i> (Hance) Rehd.	+				+		Shrub
<i>Pyrus calleryana</i> Decne*	+				+	+	Tree
<i>Raphiolepis umbellata</i> (Thunb.) Mak.	+				+		Shrub
<i>Rosa banksiae</i> Ait.	+				+	+	Shrub
<i>Rosa multiflora</i> Thunb.ex J.Murr.					+		Shrub
<i>Spiraea x vanhouttei</i> (C.Briott.) Zab.	+				+		Shrub
Rubiaceae							
<i>Coffea arabica</i> L.*	+				+	+	Shrub
<i>Gardenia</i> sp.					+	+	Tree
<i>Gardenia thunbergia</i> L.f.*					+		Tree
<i>Hamelia patens</i> Jacq.*	+				+		Shrub
<i>Ixora coccinea</i> L.					+		Shrub
<i>Ixora undulata</i> Roxb.*	+				+		Shrub
<i>Morinda tinctoria</i> Roxb.*					+		Tree

Appendix. Contd.

<i>Mussaenda luteola</i> Delile*	+	*					Shrub
<i>Nauclea orientalis</i> (L.) L.*				+	*		Tree
<i>Pentas lanceolata</i> (Forssk.) Deflers*	+	*			+		Perennial herb
<i>Rondeletia odorata</i> Jacq.*	+	*					Shrub
<i>Vangueria edulis</i> Vahl*	+	*					Shrub
<i>Vangueria tomentosa</i> Hochst.*	+	*					Shrub
Rutaceae							
<i>Aegle marmelos</i> (L.) Correa*	+	*		+	+		Tree
<i>Casimiroa edulis</i> Llave*	+	*	+	+	+		Tree
<i>Citrus aurantifolia</i> (Christm.)Swingle*			+	*	+	+	Tree
<i>Citrus aurantium</i> L.*			+	*	+		Tree
<i>Citrus limon</i> (L.) Burm.f.*						+	Tree
<i>Feronia limonia</i> (L.)Swingle*				+	*		Tree
<i>Fortunella margarita</i> (Lour.) Swingle					+		Shrub
<i>Glycosmis pentaphylla</i> (Retz.)Corr.Serr.				+	+		Shrub
<i>Murraya paniculata</i> (L.) Jacq.*	+	*		+	+		Shrub
<i>Ruta graveolens</i> L.*				+	+		Perennial herb
<i>Severenia buxifolia</i> (Poir.)Ten.*					+	*	Shrub
Salicaceae							
<i>Populus nigra</i> L.	+						Tree
<i>Salix babylonica</i> L.*					+	*	Tree
<i>Salix mucronata</i> Thunb.			+		+		Tree
<i>Salix tetrasperma</i> Roxb.					+		Tree
Salvadoraceae							
<i>Salvadora persica</i> L.					+		Shrub
Sapindaceae							
<i>Alectryon tomentosum</i> F.Muell. &Radlk.*				+	+	+	Tree
<i>Cardiospermum halicacabum</i> L.					+		Climber
<i>Dimocarpus longan</i> Lour.*	+	*			+	*	Tree
<i>Dodonaea viscosa</i> (L.) Jacq.	+	+	+	+	+	+	Shrub
<i>Harpullia arborea</i> (Blanco) Radlk.	+			+			Tree
<i>Harpullia pendula</i> Planch.ex F.Muell.	+			+	+		Tree
<i>Koelreuteria elegans</i> (Seem.)A.C.Sm.	+			+	+		Tree
<i>Koelreuteria paniculata</i> Laxm.				+	+		Tree
<i>Sapindus saponaria</i> L.*		+	*	+	+		Tree
Sapotaceae							
<i>Chrysophyllum cainito</i> L.*				+	+		Tree
<i>Chrysophyllum oliviforme</i> Roxb.*				+	+		Tree
<i>Madhuca latifolia</i> Roxb.*	+	*		+	+		Tree
<i>Madhuca longifolia</i> (Koenig) Macbr.*				+	+		Tree
<i>Manilkara hexandra</i> (Roxb.) Dubard*				+	+		Tree
<i>Manilkara zapota</i> (L.)Royen.*	+	*		+	+		Tree
<i>Mimusops caffra</i> E.H.Mey ex A.DC.*					+	*	Tree
<i>Mimusops elengi</i> L.*	+	*			+	*	Tree
<i>Mimusops laurifolia</i> (Forssk.) Friis*	+	*			+		Tree

Appendix. Contd.

Saxifragaceae							
<i>Deutzia scabra</i> Thunb.*				+	+		Shrub
<i>Philadelphus x virginalis</i> Rehd.*	+				+		Shrub
Scrophulariaceae							
<i>Leucophyllum frutescens</i> (Bert.) I.M.					+		Shrub
<i>Paulownia tomentosa</i> (Thunb.) Steud.*				+	+		Tree
<i>Russelia equisetiformis</i> Schldl. & Cham.*	+				+		Perennial herb
Simaroubiaceae							
<i>Ailanthus altissima</i> (Mill.) Swingle*				+	+		Tree
<i>Ailanthus excelsa</i> Roxb.	+			+			Tree
Solanaceae							
<i>Cestrum diurnum</i> L.					+		Shrub
<i>Cestrum elegans</i> (Brongn.) Schldl.					+		Shrub
<i>Cestrum endlicheri</i> Miers.					+		Shrub
<i>Cestrum fasciculatum</i> (Schldl.) Miers.	+				+		Shrub
<i>Cestrum nocturnum</i> L.*	+			+	+		Shrub
<i>Cestrum parqui</i> L'Hér.	+			+	+		Shrub
<i>Iochrona cyaneum</i> (Lindl.) Green.*					+		Shrub
<i>Solandra grandiflora</i> Swartz					+		Shrub
<i>Solanum rantonnetii</i> Carrière*	+				+		Climber
<i>Solanum seaforthianum</i> Andr.	+			+	+		Climber
<i>Trachylopernum jasminoides</i> (Lindl.) Lem.					+		Climber
Sterculiaceae							
<i>Brachychiton acerifolius</i> (Cunn.) ex F.Muell.*	+			+	+		Tree
<i>Brachychiton australis</i> (Schott. & Endl.) A.Terrocc.*				+	+		Tree
<i>Brachychiton discolor</i> F.J.Muell.*		+	+	+	+	+	Tree
<i>Brachychiton populneus</i> (Schott & Endl.)R.Br.*	+	+	+		+	+	Tree
<i>Brachychiton rupestris</i> (Mitch.ex Lindl.)Schum.*				+	+		Tree
<i>Dombeya burgessiae</i> Gerrard ex Harv.					+		Shrub
<i>Dombeya tiliacea</i> (Endl.) Planch.					+		Shrub
<i>Firmiana simplex</i> (L.) W.Wight*					+		Tree
<i>Pterospermum acerifolium</i> (L.) Willd*	+			+	+		Tree
<i>Pterygota alata</i> (Roxb.) R.Br.*	+			+			Tree
<i>Sterculia balanghas</i> L.*				+			Tree
<i>Sterculia foetida</i> L.*	+			+	+		Tree
Strelitziaceae							
<i>Ravenala madagascariensis</i> Sonn.*	+				+		Tree-like
<i>Strelitzia alba</i> (L.f.) Skeels*	+				+		Tree-like
<i>Strelitzia nicolai</i> Regel. & Körn.	+				+	+	Tree-like
<i>Strelitzia reginae</i> Ait.*	+				+		Tree-like
Tamaricaceae							
<i>Tamarix aphylla</i> (L.) Karst.*	+						Tree
<i>Tamarix nilotica</i> (Ehrenb.) Bunge*					+		Tree
Taxodiaceae							
<i>Sequoia sempervirens</i> (D.Don.) Endl.*					+		Conifer

Appendix. Contd.

<i>Taxodium distichum</i> (L.) L.Rich.*	+	*				+		Conifer
Theaceae								
<i>Camellia japonica</i> L.*	+	*						Shrub
Tiliaceae								
<i>Grewia asiatica</i> L.*					+	*		Climber
<i>Grewia caffra</i> Meissn.						+		Climber
Ulmaceae								
<i>Celtis occidentalis</i> L.	+					+		Tree
<i>Ulmus parvifolia</i> Jacq.						+		Tree
<i>Ulmus pumila</i> L.					+	+		Tree
Verbenaceae								
<i>Caryopteris incana</i> (Thunb.) Miq.						+		Shrub
<i>Citharexylum spinosum</i> L.*			+	*	+	*		Tree
<i>Clerodendrum bungei</i> Steud.*	+	*				+	*	Shrub
<i>Clerodendrum glabrum</i> E.Mey.	+							Shrub
<i>Clerodendrum indicum</i> (L.) Kuntze	+				+	+		Shrub
<i>Clerodendrum inerme</i> (L.) Gaertn.		+				+		Shrub
<i>Clerodendrum philippinum</i> Schauer.*						+	*	Shrub
<i>Clerodendrum speciosissimum</i> Van Geert ex Morr.*	+	*				+		Shrub
<i>Clerodendrum x speciosum</i> Domb.	+					+		Shrub
<i>Clerodendrum splendens</i> G.Don ex James*	+	*			+	+		Climber
<i>Clerodendrum thomsoniae</i> Balf.*	+	*				+		Shrub
<i>Clerodendrum trichotomum</i> Thunb.						+		Shrub
<i>Duranta erecta</i> L.*	+	*	+	*	+	+	*	Shrub
<i>Duranta lorentzii</i> Griseb.						+		Shrub
<i>Gmelina arborea</i> Roxb.		+			+	+		Tree
<i>Gmelina hystrix</i> Schult.ex Kurz.						+		Shrub
<i>Lantana camara</i> L.*		+	*	+	+	+	*	Shrub
<i>Petrea volubilis</i> L.*	+	*	+	*		+	*	Climber
<i>Tectona grandis</i> L.f.*	+				+	+		Tree
<i>Verbena bipinnatifida</i> Nutt.					+			Perennial herb
<i>Vitex agnus-castus</i> L.			+			+		Shrub
<i>Vitex trifolia</i> L.		+	+	+	+	+		Shrub
<i>Vitex trifolia</i> L. 'Purpurea'						+		Shrub
Violaceae								
<i>Viola odorata</i> L.	+					+		Perennial herb
Vitaceae								
<i>Ampelopsis brevipedunculata</i> (Maxim.) Trautv.*	+	*						Climber
<i>Cissus rotundifolia</i> (Forssk.) Vahl.						+		Succulent
Zamiaceae								
<i>Dioon edule</i> Lindley*	+	*				+		Cycads
<i>Dioon edule</i> Lindley var. <i>rio-verdi</i>						+		Cycads
<i>Dioon spinulosum</i> Dyer.						+		Cycads
<i>Encephalartos ferox</i> Bertol.						+		Cycads
<i>Encephalartos gratus</i> Prain.						+		Cycads

Appendix. Contd.

<i>Encephalartos</i> sp.					+		Cycads
<i>Encephalartos laurentianus</i> De Wild.	+						Cycads
<i>Encephalartos lebomboensis</i> Verdoorn.					+		Cycads
<i>Encephalartos natalensis</i> R. A. Dyer & Verdoorn.					+		Cycads
<i>Encephalartos principes</i> R. A. Dyer					+		Cycads
<i>Encephalartos sclavoi</i> A. Moretti et al.					+		Cycads
<i>Encephalartos sudanensis</i>					+		Cycads
<i>Encephalartos villosus</i> Lem.	+				+		Cycads
<i>Zamia fischeri</i> Miq.					+		Cycads
Zingiberaceae							
<i>Alpinia</i> sp.					+		Perennial herb
<i>Alpinia zerumbet</i> (Pers.) B.L. Burt & Rosemary M. Sm.*	+	*			+	*	Perennial herb
<i>Hedychium coronarium</i> J. G. Koenig.*					+	*	Perennial herb
<i>Hedychium gardnerianum</i> Ker-Gawl.					+		Perennial herb
<i>Zingiber officinalis</i> Roscoe	+				+		Perennial herb
Zygophyllaceae							
<i>Guaicum sanctum</i> L.					+		Shrub

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