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Research Article

Role of Voucher Specimens in the Documentation of Historic Gardens of Egypt

Lamiaa Farouq Shalabi and Nagwan Hamdy Atia

Department of Biological and Geological Sciences, Faculty of Education, Ain Shams University, Heliopolis, Cairo, Egypt

Abstract

Background and Objective: Egyptians during their historic periods were interested in horticulture and creating gardens. These gardens carried a precious history, some of them were destroyed, others survived and few had completely disappeared. A voucher specimen is a pressed, dried specimen with complete collection data, kept in a herbarium as a record of an individual plant in time and space. In this study, the relationship between the plant and its history was examined. **Materials and Methods:** The ancient voucher specimens prepared from five historic gardens and kept in Cairo University Herbarium (CAI) were used to ensure this relationship. These historic gardens were: Alfred Bircher's Garden, El Saff; Manial Palace Garden; Orman Garden; Zohria Garden and Zoological Garden. **Results:** The total recorded 1656 specimens were distributed in 124 families and 1278 taxa. The largest family was Myrtaceae and the largest recorded genus was *Ficus* (Moraceae). The highest percentage of the recorded specimens was collected by Vivi Taeckholm. The oldest recorded specimens were collected by Mohamed Hassib Bay in 1927. A brief history of these gardens was addressed and correlated with the collection data. **Conclusion:** The results revealed the significance of voucher specimens in the documentation of historic gardens, as well as recommended the protection of what is remaining from gardens that have great history, plant diversity and conservation significance.

Key words: Protection, Myrtaceae, herbarium, historic gardens, voucher specimens

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Corresponding Author: Nagwan Hamdy Atia, Department of Biological and Geological Sciences, Faculty of Education, Ain Shams University, Heliopolis, Cairo, Egypt

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INTRODUCTION

The open green area in cities is an indicator of a healthy environment for human beings and all living organisms^{1,2}. Botanical gardens are specific ecosystems that have unique microclimates essential for the production of special plant communities, as well as introducing the exotic and spontaneous plant species somehow³⁻⁵. Botanical gardens in addition to being attractive beautiful places for spending enjoyable time, are considered scientific research institutions due to the special living collections of plants which they include^{6,7}. The value of botanic gardens has been well understood in the last few decades by increasing awareness of their important role in scientific research. The collection of living plants with great diversity marks the botanical gardens as the greatest documented source of living plants worldwide.

Aside from the appreciated role of botanic gardens in commercial extension, economic growth and culture development, they serve in the flora conservation of the region in which they are found as indicated by the Global Strategy for Plant Conservation (GSPC)^{8,9}. The historic gardens have additional significance, they tell the ancient events regarding the history of hundreds of years, especially if these gardens are located in Egypt, the land of history.

The horticultural interest of Egyptians dates to ancient times, for example, the era of Egyptian Queen Hatshepsut (1479-58 BC) and extends to thousands of years. By that time, the attention and care were increased by the Egyptians for creating ornamental and fruit gardens. Some of these gardens had completely disappeared as Khamraweh's Garden at El Fostat, others were destroyed leaving only traces like gardens of the Rhoda Island, few that still survive were established at the age of Greater Mohammed Ali Pasha (1805-1848) and his subsequent Caliphs (1848-1952). No doubt, the species collection and plant diversity of these gardens were changed due to natural and human impacts.

Collecting plants to deposit them in permanent voucher specimens and keeping them at a herbarium was the greatest activity that had been achieved at that time. These precious voucher specimens with detailed collection data perform educational, scientific and historical functions. They can be used for plant identification for the first instance and identity confirmation of matching specimens, as well as, the documentation of very rich historic times. They also work as a record for each distinct plant in time and locality¹⁰. Voucher specimens may be used as a proxy for field work or even after the disappearance of living original collections, this approach profits from the recording of all data related to uses¹¹.

Although the original living plants in an arboretum or botanic garden collected for research may eventually die, the well stored voucher specimens would always be available to ensure the documentation of the collection in a long-term manner. As herbarium specimens represent a complete database, it may be possible to recreate the original collection virtually and support related studies to be completed broadly.

The previous studies focused on the ancient botanic gardens in Egypt, from historic viewpoints, in addition to comparing the ancient record of the plant count with the current survey¹²⁻¹⁴. This work aims to address the question, "Did the voucher specimens have a role in the documentation of historic botanic gardens of Egypt?" for the first time. To answer this question, voucher specimens from five ancient Cairo Gardens-Alfred Bircher's Garden, El Saff; Manial Palace Garden; Orman Garden; Zohria Garden and Zoological Garden-kept in the Cairo University Herbarium were utilized.

MATERIALS AND METHODS

Study design: Several visits were made to the Cairo University Herbarium (CAI) during the years 2003-2004. The voucher specimens (about 250,000 specimens) kept in both herbarium halls were examined to document the gardens' plants preserved in the herbarium over different periods. Data was collected from five ancient Cairo Gardens-Alfred Bircher's Garden, El Saff; Manial Palace Garden; Orman Garden; Zohria Garden and Zoological Garden, tabulated and analyzed simply using the MS Excel V. 2010 software.

RESULTS

The herbarium specimens of five historic gardens in the greater Cairo area were kept in Cairo University Herbarium (CAI), distributed and ordered according to the taxonomic system followed by the herbarium set. These gardens are Alfred Bircher's Garden, El Saff; Manial Palace Garden; Orman Garden; Zohria Garden and Zoological Garden. The total count of recorded specimens regarding these gardens was 1656. Due to the large-scale sampling taxa, a part of these recorded data concerning 103 specimens (scientific name, family, date of collection and collector name) were illustrated in Table 1 on the other hand, the complete data set is available when required. The most specimens were recorded from Alfred Bircher's Garden (544, 32.85%); followed by Orman Garden (462, 27.89%); followed by Zohria and Zoological Gardens which recorded 327 and 263 specimens with percentages of 19.74 and 15.88, respectively; while the least collection count was reported from Manial Palace Garden (60, 3.62%) (Table 2).

Table 1: CAI's herbarium sheets include information on five gardens' taxa, each taxon's family, collecting date and collector

Family and scientific name	Alfred Bircher's Garden, El Saff	Manial Palace Garden	Orman Garden	Zohria Garden	Zoological Garden
Astraceae					
<i>Achillea nobilis</i> L.				12-11-1929, M.H.	
<i>Achillea odorata</i> L.					
<i>Achillea pectinata</i> Lam.					
<i>Ageratina havanensis</i> (Kunth) R.M. King & H. Rob.			12-04-1928, M.H.		
<i>Eupatorium ageratifolia</i> DC.					
<i>Arctotis leptorhiza</i> DC.				08-02-1968, Ezz.	
<i>Arctotis breviscapa</i> Thunb.			08-04-1963, M.M.		
<i>Arctotis fastuosa</i> Jacq.					
<i>Venidium fastuosum</i> Stapf			20-09-1976, Ezz.		
<i>Artemisia frigida</i> Willd.					
<i>Bellis perennis</i> L.				12-11-1929, M.H.	
<i>Brachylaena huillensis</i> O. Hoffm.	14-11-1961, V.T. and El Sayed				
<i>Brachylaena hutchinsii</i> Hutch.					
<i>Brachyscome iberidifolia</i> Benth.			16-05-1973, M.M.	08-02-1968, Ezz.	
<i>Callistephus chinensis</i> (L.) Benth.			12-02-1966, M.M.		
<i>Centaurea behen</i> L.	01-03-1970, Kamal Awad				
<i>Centaurea cyanus</i> L.			05-04-1928, M.H.		
<i>Centaurea depressa</i> M. Bieb			12-02-1966, M.M.		
<i>Coreopsis lanceolata</i> L.				12-11-1929, M.H.	
<i>Coreopsis maritima</i> Hook.f.				08-02-1968, Ezz.	
<i>Curio talinoides</i> var. <i>mandraliscae</i> (Tineo) P.V. Heath		21-06-1972, Badia Diwan			01-07-1952, L. Boulos
<i>Kleinia mandraliscae</i> Tineo.					
<i>Blainvillea acmella</i> (L.) Philipson					
<i>Eclipta prostrata</i> Lour.					
<i>Eclipta erecta</i> L.					
<i>Eupatorium album</i> L.					08-04-1970, M.M.
<i>Eupatorium glandulosum</i> Michx					
<i>Farfugium japonicum</i> (L.) Kitam.				23-08-1969, Ezz.	
<i>Ligularia kaempferi</i> Siebold & Zucc.					
<i>Gaillardia pulchella</i> Foug.				12-11-1929, M.H.	
<i>Gazania rigens</i> (L.) Gaertn.		20-06-1973, Badia Diwan			
<i>Gerbera jamesonii</i> Bolus ex Hook.f.					
<i>Kleinia abyssinica</i> (A. Rich.) A. Berger			05-04-1928, M.H.	30-10-1959, V.T.	
<i>Nemonia abyssinica</i> A. Rich.					
<i>Kleinia fulgens</i> Hook.f.			09-11-1969, M.M.		
<i>Senecio fulgens</i> G. Nicholson					
<i>Montanoa bipinnatifida</i> (Kunth) K. Koch				12-11-1929, M.H.	04-03-1972, M.M.
<i>Montanoa grandiflora</i> DC.					01-01-1969, M.M.
<i>Pericallis cruenta</i> (L'Her.) Bolle			10-11-1963, M.M.	30-10-1959, V.T.	
<i>Senecio cruentus</i> DC.					
<i>Rhodanthe chlorocephala</i> subsp. <i>Rosea</i> (Hook.) Paul G. Wilson				12-11-1929, M.H.	
<i>Helipterum roseum</i> Benth.					

Table 1: Continue

Family and scientific name	Alfred Bircher's Garden, El Saff	Manial Palace Garden	Orman Garden	Zohria Garden	Zoological Garden
<i>Roldana petasitis</i> (Sims) H. Rob. & Brettell		07/04/1968, M.M.	05-04-1928, M.H.		
<i>Senecio petasitis</i> DC.					
<i>Rudbeckia laciniata</i> L.				12-11-1929, M.H. and M. Drar	
				30-10-1959, V.T.	
<i>Santolina virens</i> Mill.				12-08-1963, M.M.	
<i>Solidago canadensis</i> L.					
<i>Sonchus oleraceus</i> L.			03-11-1968, M.M.		
<i>Stevia monardaefolia</i> Kunth.				12-11-1929, M.H.	
<i>Symphotrichum novi-belgii</i> (L.) G.L. Nesom				12-11-1929, M.H.	
<i>Aster novi-belgii</i> L.					
<i>Tanacetum cinerariifolium</i> Sch. Bip.	01-06-1961, V.T. and El Sayed				
<i>Chrysanthemum cinerariifolium</i> Vis					
<i>Tanacetum parthenium</i> (L.) Sch. Bip.			06-06-1964, M.M.		
<i>Chrysanthemum parthenium</i> (L.) pers.					
<i>Tithonia diversifolia</i> (Hemsl.) A. Gray					04-12-1972, M.M.
Amaryllidaceae					
<i>Clivia miniata</i> (Lindl.) Bosse			01-03-1964, M.M.		
<i>Crinum americanum</i> L.			21-05-1973, M.M.		
<i>Crinum asiaticum</i> L.			29-06-1970, Ezz.		
<i>Crinum bulbisperrum</i> (Burm.f.) Milne-Redh. & Schweick.			21-05-1973, M.M.		
<i>Hippeastrum vittatum</i> (L'Hér.) Herb.			30-05-1967, M.M.		
<i>Amaryllis vittata</i> L'Her.			16-04-1973, M.M.		
<i>Hymenocallis speciosa</i> Salisb.					
<i>Hymenocallis littoralis</i> Salisb.	14-11-1961, V.T. and El Sayed		01-03-1975, Ezz.		
Hypoxidaceae					
<i>Curculigo capitulata</i> (Lour.) Kuntze				09-09-1969, Ezz.	
Asparagaceae					
<i>Agave americana</i> L.			16-06-1970, M.M.		
<i>Agave attenuata</i> Salm-Dyck	27-05-1961, V.T.				
<i>Agave victoriae-reginae</i> T. Moore	27-05-1961, V.T.				
<i>Asparagus declinatus</i> L.				20-02-1972, Ezz.	
<i>Asparagus crispus</i> Lam.					
<i>Asparagus densiflorus</i> (Kunth) Jessop	27-05-1961, V.T.				
<i>Asparagus sprengeri</i> Regel.					
<i>Asparagus falcatus</i> L.				05-06-1967, M.M. and Ezz.	
<i>Asparagus officinalis</i> L.					
<i>Asparagus racemosus</i> Willd.	28-11-1961, V.T. and El Sayed			22-11-1969, Ezz.	
<i>Asparagus tetragonus</i> Bresler					
<i>Asparagus setaceus</i> (Kunth) Jessop	01-11-1985, El-Hadidi				
<i>Asparagus plumosus</i> Baker					
<i>Aspidistra elatior</i> Blume	27-05-1961, V.T.				
<i>Cordylone pumilio</i> Hook.f.					
<i>Cordylone stricta</i> Hook.f.					
<i>Dracaena angustifolia</i> (Medik.) Roxb.	01-06-1961, V.T. and El Sayed			03-09-1963, M.M. 11-03-1970, Ezz.	
<i>Cordylone terminalis</i> Kunth				05-07-1969, Ezz.	

Table 1: Continue

Family and scientific name	Alfred Bircher's Garden, El Saff	Manial Palace Garden	Orman Garden	Zohria Garden	Zoological Garden
<i>Dracaena draco</i> (L.) L.	27-05-1961, V.T.				
<i>Dracaena hyacinthoides</i> (L.) Mabb.	01-06-1961, V.T. and El Sayed				
<i>Sansevieria thyrsiflora</i> (Petagna) Thunb					
<i>Furcraea foetida</i> (L.) Haw.	01-06-1961, V.T. and El Sayed				
<i>Furcraea gigantea</i> Vent.					
<i>Ophiopogon japonicus</i> (Thunb.) Ker Gawl.				17-11-1959, V.T.	
<i>Ruscus aculeatus</i> L.		24-12-1970, Badia Diwan			
<i>Ruscus hypoglossum</i> L.		24-12-1970, Badia Diwan			
<i>Ruscus alexandrinus</i> Garsault					
<i>Yucca aloifolia</i> L.				24-08-1965, M.M.	08-09-1963, M.M.
<i>Yucca gloriosa</i> L.	27-05-1961, V.T. and El Sayed				
Asphodelaceae					
<i>Aloe arborescens</i> Mill.		27-05-1961, V.T.			
<i>Aloampelos ciliaris</i> (Haw.) Klopp & Gideon F.Sm.		27-05-1961, V.T. and El Sayed			
<i>Aloe ciliaris</i> Haw.					
Bromeliaceae					
<i>Aechmea comata</i> (Beer) Baker					01-02-1969, M.M.
<i>Billbergia forgetiana</i> Sander					
<i>Bromelia karatas</i> L.	27-05-1961, V.T.			10-01-1971, Ezz.	
<i>Bromelia pinguin</i> L.	24-05-1962, V.T.				
<i>Hechtia glomerata</i> Zucc.		16-06-1970, M.M.			
Commelinaceae					
<i>Murdannia nudiflora</i> (L.) Brenan	23-06-1961, V.T. and El Sayed				
<i>Commelina nudiflora</i> L.					
<i>Tradescantia biactea</i> Small.				21-06-1969, anonymous	
<i>Tradescantia fluminensis</i> Vell.		07-04-1968, M.M.			
<i>Tradescantia spathacea</i> SW.				20-08-1963, M.M.	
<i>Rhoeo discolor</i> (L'Hér) Hance in Walp.					
<i>Tradescantia zebrina</i> var. <i>zebrina</i>				03-09-1963, M.M.	
<i>Zebrina pendula</i> Schnizl.					
Poaceae					
<i>Bambusa vulgaris</i> Schrad. Ex J.C. Wendl.	24-05-1962, V.T. and El Sayed				
<i>Cenchrus purpureus</i> (Schumacher) Morrone				24-05-1970, Ezz.	
<i>Pennisetum macrostachyum</i> Benth.					
<i>Chrysopogon zizanioides</i> (L.) Roberty			02-11-1965, M.M.		
<i>Vetiveria zizanioides</i> (L.) Nash.					
<i>Cymbopogon citratus</i> (DC.) Stapf	23-06-1961, V.T. and El Sayed				
<i>Dendrocalamus giganteus</i> Munro			23-06-1960, V.T.		
<i>Guadua latifolia</i> (Bonpl.) Kunth					
<i>Gynenium sagittatum</i> (Aubl.) P. Beauv.	13-05-1975, W. Bircher				07-09-1970, M.M.
<i>Paspalum distichum</i> L.		20-08-1952, El Hadidi			
<i>Paspalum scrobiculatum</i> L.		08-08-1952, L. Boulos			

Table 1: Continue

Family and scientific name	Alfred Bircher's Garden, El Saff	Manial Palace Garden	Orman Garden	Zohria Garden	Zoological Garden
<i>Phalaris arundinacea</i> L.				20-08-1963, M.M.	
<i>Pogonatherum paniceum</i> (Lam.) Hack.				13/10/1968, M.M.	
<i>Setaria palmifolia</i> (J. Koenig) Stapf	10-06-1960, V.T.		03-12-1977, M.M.		
<i>Panicum plicatum</i> Roxb.					
<i>Themeda villosa</i> (Poir.) A. Camus	20-01-1956, V.T.				
Areaceae					
<i>Brahea armata</i> S. Watson	24-02-1962, V.T. and El Sayed				
<i>Brahea roezlii</i> D'Ancona	24-05-1962, V.T. and El Sayed				
<i>Erythea armata</i> (S. Watson) S. Watson					
<i>Bactris guineensis</i> (L.) H.E. Moore	15-05-1961, V.T. and El Sayed				
<i>Bactris minor</i> Jacq.					
<i>Calamus rotang</i> L.	27-05-1961, V.T.				
<i>Caryota mitis</i> Lour.	22-11-1961, V.T. and El Sayed		11-11-1969, M.M.; 14-10-1959, V.T.		
<i>Chamaerops humilis</i> L.			30-11-1969, M.M.		
<i>Latania lontaroides</i> (Gaertn.) H.E. Moore			26-05-1964, M. Drar;		
<i>Latania commersonii</i> J.F. Gmel.			11-11-1969, M.M.		
<i>Licuala grandis</i> (T. Moore) H. Wendl.	17-05-1962, V.T. and El Sayed				
<i>Livistona chinensis</i> (Jacq.) R.Br. ex Mart.			11-11-1969, M.M.		
<i>Phoenix loureirai</i> Kunth			05-10-1966, Fathy Salam		
<i>Phoenix humilis</i> Royle ex Becc.					
<i>Phoenix reclinata</i> Jacq.			15-10-1969, M.M.		
<i>Phoenix sylvestris</i> (L.) Roxb.			05-10-1966, Fathy Salam		
<i>Pinanga gracilis</i> Blume			29-10-1969, Ezz.		
<i>Rhapis excelsa</i> (Thunb.) A. Henry	27-05-1961, V.T.		11-11-1969, M.M.		
<i>Wallichia disticha</i> T. Anderson		08-10-1968, M.M.			
M.H: Mohamed Hassib, Ezz.: Ezz El Din, V.T.: Vivi Taekholm, M.M.: Mohamed El-Mahdy, L. Boulos: Loutfy Boulos, M. Drar: Mohamed Drar, El-Hadidi: Nabil El-Hadidi, W. Bircher: Warda Bircher and El Sayed: Ibrahim El-Sayed					

Table 2: Distribution of the recorded voucher specimens in the historic gardens

	Alfred Bircher's Garden, El Saff	Manial Palace Garden	Orman Garden	Zohria Garden	Zoological Garden	Total
Total specimens	544	60	462	327	263	1656
Percentage	32.85024	3.623188	27.89855	19.74638	15.88164	100

Table 3: Largest families and sub families with the represented taxa

Family/sub family	Represented taxa
Myrtaceae	57
Caesalpinioideae	46
Moraceae	43
Asteraceae	37
Anacardiaceae	35
Mimosoideae	35
Verbenaceae	34
Papilionoideae	33
Bignoniaceae	29
Apocynaceae	28
Euphorbiaceae	24
Rosaceae	24
Asparagaceae	20
Rubiaceae	20
Other families with less than 20 species	813

Table 4: Most recorded collectors of the recorded specimens

Most collectors	Number	Percentage
V.T. (Vivi Taeckholm)	679	41
M.M. (Mohamed El-Mahdy)	621	38
El Sayed (Ibrahim El-Sayed)	421	25
Ezz. (Ezz El Din)	132	8
M.H. (Mohamed Hassib Bay)	120	7

Table 5: Total number and percentage of collected specimens dated from different periods of time

Time period	Number	Percentage
1927-1929	120	7.25
1930-1939	32	1.93
1940-1949	21	1.27
1950-1959	240	14.49
1960-1969	1013	61.17
1970-1979	226	13.65
1980-1985	4	0.24
	1656	100.00

The total of recorded specimens (1656 specimens) were distributed in 124 families and 1278 taxa. The most recorded taxa per family (more than or equal to 20) were distributed in 14 families with a total of 465 taxa (Table 3), the remaining 813 taxa were distributed in the other 110 families with taxa count less than 20 per each. The largest family was Myrtaceae with a total of 57 recorded taxa represented by 100 specimens, while the smallest families were Asparagaceae and Rubiaceae with 20 taxa for each represented by 23 and 27 specimens, respectively. The largest recorded genera were *Ficus* (Moraceae), *Acacia* (Fabaceae, Caesalpinioideae) and *Eugenia* (Myrtaceae) with 31, 18 and 16 taxa, respectively.

The highest percentage 41% of the recorded 679 specimens were collected by Vivi Taeckholm (V.T.) individually or in collaboration with others; on the other hand, 38% (621 specimens) of total specimens were collected by Mohamed El-Mahdy (M.M.), the majority of these specimens were collected in collaboration with others not alone. Ibrahim El-Sayed collected about 25% of the recorded 421 specimens, approximately all of them were collected in collaboration with Vivi Taeckholm for many years. Ezz El Din (Ezz.) and Mohamed Hassib Bay (M.H.) collected 132 and 120 specimens with percentages of 8 and 7%, respectively, almost all of these specimens were collected individually by each of them (Table 4).

As illustrated in Table 5 time distribution of the collected years takes the bell-shaped curve. The oldest specimens were collected in 1927 at the establishment time of Cairo University Herbarium (CAU). This oldest collection of the recorded specimens collected by M.H. (Mohamed Hassib Bay) (1927-1929) represents about 7.25% of the total specimens. The number of specimens gradually decreased during the 30's (1930-1939) reaching about 1.93% of all specimens, the decrease of specimens' collection continued during the fifth decade (1940-1949) which recorded only 1.27% of total specimens. The collection activity increased gradually during the period of 50's (1950-1959), about 14.49% of total specimens were collected during this period. The increase of collection activity of specimens still during the 60's (1960-1969), to record the highest percentage and more than half of the total count of the recorded specimens (61.17%). The period of 70's (1970-1979) shows a low percentage, 13.65% of the recorded specimens and the percentage of collection decrease continued dramatically within a few years later (1980-1985) only 0.24% were recorded, then stopped completely, that the most recent specimen of the observed collection was recorded in 1985 (Table 5).

DISCUSSION

Most specimens were recorded from Alfred Bircher's Garden; this garden was organized and established by the Swiss Alfred Bircher. He spent over fifty years until he died in 1958, working in the field of planting and horticulture, achieving his experiments in his garden "Alfred Bircher's

Garden" located in El-Saff, about 100 km South of Cairo. Although his only daughter Warda Bircher and her husband Dr. Paul Bleser were geologists, they devoted themselves to conserving her father's work. They published 1960 the first handbook "Gardens of the Hesperides" describing briefly the development of historic gardens of Egypt, recording about 2000 species of El-Saff Garden along with their classification, description, origin, common names, utility, in addition to the dates of flowering, fruiting and shedding of leaves. This may interpret the active collection of herbarium specimens within the years 1960-1962 (Table 1). The other valuable contribution of Bircher was published in 1991 which focused on the history of El-Saff Botanical Garden. The plant collection of El-Saff was updated by adding the economic importance of species and the history of its planting¹⁵.

The Orman is a great diversified garden, established in Giza on 95 Feddans by the French gardeners who were evoked by Khedive Ismail in 1873¹⁵, the area has decreased nowadays to be less than 28 Feddans according to the developmental projects along these long eras. The last recorded count of fresh plant collection included in the garden was 835 taxa¹⁵. The total number of recorded herbarium specimens from Orman Garden in this study was 462, from which 277 specimens were collected by Mohamed El-Mahdy (M.M.) and the majority of the remaining count were collected by M.H. and V.T.

Zohria Garden comes in the third order regarding the recorded voucher specimens of the studied gardens with an account of 327 specimens. This garden was designed and established by Des Champs, Delchevalerie and Gaby in 1868 at the era of Khedive Ismail on 49 Feddans. It is located in the South of Gezira Island. The total area of the garden has been diminished to only 8 Feddans as reported by Hamdy *et al.*¹⁵. The most old-dated two specimens were recorded from Zohria Garden were collected by Elhamy Greiss and Gunnar Taeckholm in May, 1927, the majority of the recorded specimens from Zohria were collected by M.M. and M.H. after the association time of the garden to the Ministry of Agriculture (in 1917) as a place for plant propagation and horticultural exhibitions.

The Zoological Garden (The Zoo) is one of the most famous gardens in Egypt, even in all of Africa because of its special nature as a public and botanic garden. The history of this garden returned to the 19th century, the era of Ismail Pasha, who had wished to open the garden at the time of the Suez Canal opening celebrations in 1869, but this was not possible. About 20 years later the era of Khedive Tawfik, was

completed by Des Champs and Delchevalerie and opened in 1890 with 50 Feddans. According to many developmental projects, the area of the garden becomes 80 Feddans by the year 1938. The floristic composition of the garden shows 325 species as reported by Hamdy *et al.*¹⁵. The current study recorded a total of 263 voucher specimens from the zoo, the majority of which (210 specimens) were collected by M.M. in the 60's and 70's of the twentieth century.

The most recent established garden was the Manial Palace Garden, which was established by Prince Mohamed Ali (the son of Khedive Tawfik) in 1909 on 14.4 Feddans along his palace situated on the Manial Al-Rhoda Island facing the eastern side of River Nile. The prince himself with his gardener traveled to many places in Africa, Asia and Europe searching for new and rare species to enrich and value the collection of garden plants. The prince was so interested in plants and horticulture that he planted his favored plants in collections as forests¹⁵. The recorded specimens collected from Manial Palace Garden were fewer than the others, 60 specimens were reported in the periods of 60's and 70's and the majority were collected by Badia Diwan, Ezz. and M.M.

Vivi Taeckholm was the most famous botanist interested in collecting plants from Egypt many years ago, she collaborated with Mohamed Drar and published four volumes (1941, 1950, 1954 and 1969) covering all wild and cultivated plants of monocotyledons in Egypt. Their efforts to complete the record of the entire Egyptian flora were stopped by the deaths of M. Drar and V. Taeckholm in 1964 and 1974, respectively¹⁶. The recorded voucher specimens in this research documented these periods and their announced activity. Besides, the complete absence of voucher specimens dated from October 1973 and the subsequent four years may tell us about the political conditions of Egypt during the War of 6th October and unstable conditions in all sectors of the country.

CONCLUSION

Botanists have been studying cultivated ethno-flora in Cairo's historic gardens, influenced by factors like personal involvement, institutional conditions and political events. The living collections of these gardens were imported from various regions, some adapted and incorporated into Egyptian flora, while others died, impacting their conservation status. Studying these voucher specimens helps answer the research question and recommends saving remaining gardens with significant plant diversity and conservation significance.

SIGNIFICANCE STATEMENT

This study examines the relationship between plants and history in five historic Egyptian gardens. Ancient voucher specimens from these gardens were collected in the Cairo University Herbarium. The study found that voucher specimens are crucial for the documentation of historic gardens and recommends the protection of remaining plants with great history, plant diversity and conservation significance. The largest number of recorded specimens were from the family Myrtaceae and genus *Ficus*. The future recommendation of this study was to preserve historical gardens with diverse plants and save them from extinction.

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