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SURVEY OF MEDICINAL AND AROMATIC PLANTS AND DETERMINE ITS LANDSCAPING VALUES IN HOME GARDENS AND MALLS IN CAIRO FESTIVAL CITY, CAIRO GOVERNORATE, EGYPT

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ABSTRACT: Although medicinal and aromatic plants are used in many pharmaceutical preparations and folk remedies, they have pictorial qualities in the field of ornamental and landscaping. Currently, medicinal and aromatic plants are distributed all over the private and public gardens due to the multiplicity of colors, the habit of their growth, and the different flowering times throughout the year. Therefore, a survey must be conducted to determine the coordinating value of these important plants to determine the extent of their spread and their employment in landscaping. This study materials included medicinal and aromatic plants that grown in Cairo Festival City gardens and malls through 2018 and 2019 years. In this study, growth habit, flowering time, foliage texture, landscape value and mode of propagation of medicinal and aromatic plants grown in the home gardens and shops of that area were noticed. Landscape values of 18 species belonging to 13 families were noticed, the Oleaceae family contained the most species, which were olives, royal jasmine and Arabian jasmine. Flowering of *Rosmarinus officinalis*, *Cassia fistula*, *Lawsonia inermis* and *Jasminum smbac* during the spring and summer seasons, as well as flowering of *Acacia farnesiana* during the autumn and winter seasons were recorded. Moreover, it has been found that there are 7 species (*Nerium oleander*, *Tagetes erecta*, *Pelargonium graveolens*, *Rosmarinus officinalis*, *Cassia fistula*, *Jasminum grandiflorum* and *Cymbopogon citratus*) having three properties for utilization in gardening design. The most common propagation methods for these studied plants were seeds and stem cuttings.

Key words: Medicinal and aromatic plants, flowering time, landscape value, gardening, propagation.

INTRODUCTION

In Egypt, rising population and growing urbanization increase the importance of open and green city areas (as Cairo Festival City), while the safeguard of natural resources near the towns and the servicing of environmental balance become a requirement. However, Medicinal plants are reasonable to be that is grown or selected up from nature to make drug convenient with pharmacopoeia while aromatic plants are contain odorant materials in its body and grown or collected from nature to obtain perfumes or other products with goodness standards convenient with pharmacopoeia or other standards (**Sezik *et al.*, 2001**). Furthermore, in order to supply medical and aromatic herbs are ordinarily provided *via* gathering from the nature, with the heavy request some plant species are extricated or are in hazard of extracted. Because maintain and bear the existence of plant species, these species should be included in the landscaping planner (**Kevseroğlu *et al.*, 2014**). In addition, **Çelik (2017)** reported that edible landscapes can include medicinal and aromatic plants (peppermint, geranium, sage, thyme, echinacea, rosemary, *etc.*), herbs, and even contain flowers. Also, these designs can adopt any garden style and may include anywhere from one to hundred percent edible specimens.

Herbs, which are time utilized with the collecting from the wild nature, began to be planted in the gardens when humans started to form regular settlements (**Leszczynski**, **1997**). Actually, the significance of home gardens as focus of biodiversity protection will have to

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compress in the years ahead. Although scarcely formally valued, urban and peri-urban biodiversity will come to play about gradually more significant role in human activities, since it is evaluated that by 2030, about 61% of the world inhabitance will live in cities (**United Nations, 2003**).

In the starting, plants were planted for the aim of nutrition then as their medicinal features got discovered; they began to be planted for the objective of medicine making. These gardens, also named as the "Medical Plants Garden" were highly common in Medieval Europe (A.D. 500-1200). These gardens were especially found in monasteries and they've also included aromatic plants (**Arslan**, **2010**). Medicinal and aromatic plants have a highly important site in the aesthetic and feasible aspects of plant design works with leaf forms, different colors and textures of flowers and fruits. Medicinal and aromatic plants have an enormous range of utilize in therapeutic gardens, combination gardens, botanical gardens, healing gardens, rock gardens, flower beds and roof gardens with their functional and aesthetic features (**Arslan and Ekren**, **2018**).

The main goal of the present work is to survey the medicinal and aromatic plants cultivated in Cairo festival city and used for their medicinal and aromatic advantages to be utilized in urban garden practices in the city by considering their family, Scientific and common name, habit of growth, flowering time, foliage texture, landscape value and propagation method and usability as ornamental aims and landscape gardening ways.

MATERIALS AND METHODS

The present study was conducted during 2018 and 2019 years in Cairo Festival City, Cairo, Egypt. Cairo Festival City located east of the ring road in New Cairo, Egypt, North of 90 Street, South of Orouba Square and Ganoob El-Acadimia and West of Ministry of Interior. It extends over a land area about 714 faddan and situated between latitude (30º 0′ 59″ - 30º 2′ 15″ N) and (31º 24′ 16″ - 31º 25′ 18″ E) longitude with average altitude about 218.5 m while some peaks exceed the height of 255m from the mean sea level. The studied city comprises residential parts, business districts, international schools, and office spaces (Fig.1).

In the survey study, characters of medicinal and aromatic plants cultivated in the gardens in the City center of Cairo Festival City were identified. Nine parameters were recorded and their option criteria were registered as follow:

Family Name

It was determined according to the scientific principles recognized according to the degree of parentage in the plant kingdom.

Scientific Name

It was determined according to the scientific principles recognized according to the name of genus and specie in the plant kingdom.

Common Name

It was listed according to the English name or the common name in the scientific community.

Habit of Growth

Habit of growth as plant group (grass, herbaceous, succulents, shrubs, vines or trees) as well as plant form (mound-forming, stemless, spreading, upright, vase-shape, climbing, round or clump-forming fountain shape) were noticed.

Flowering Time

It was divided into five groups as follow:

a- Spring flowering: Mid Mar. – mid May

b- Summer flowering: Mid May – mid Sep.

c- Autumn flowering: Mid Sep. – mid Dec.

d- Winter flowering: Mid Dec. – mid Mar.

e. All year round: Blossom almost all year round even if it is intermittent.

Habitat Preference

Depending on where the specific plant found or which it grew well, in sun or shade places, the position of plant for landscaping determined according to plant light preference.

Surveyed plants divided into three groups as follow:

a. Full sun (FS);

b. Full sun to partial shade (FS/PSH) and

c. Shade to partial sun (SH/PS).

Fig. 1. Location of Cairo Festival City, Cairo, Egypt

Foliage Texture

Foliage texture was divided into three groups by following the procedure given by **Conners and Harlow (1980)**.

Coarse

A very rough surface, prickly and hairy.

Medium

Comparatively less rough surface, glabrous and finely.

Fine

Very soft, glaucous surface.

Landscape Value

Based on collected data about morphological characteristics for surveyed plant aesthetical/ landscape values for each plant were determined. Every plant observed if it has one or more value from the following:

Form beauty

Natural plant shape and branches sequence.

Ornamental foliage

Leaf color, shape and size, its being attractive in vegetation period and in autumn.

Ornamental fruit

It's being attractive in terms of structure, size and color.

Ornamental flowers

Suitable for using in landscape architecture in terms of florescence structure, number and sequence.

Fragrance

Leaf, flower and fruits having a nice scent concretely.

Mode of Propagation

On different modes of propagation of species, information has been drawn from a wide range of literature as well as from field observations.

RESULTS AND DISCUSSION

Family, Scientific and Common Name and Habit of Growth

From results presented in Table 1 and Figs. 2 and 3 it is clear that, there are 13 plant families in the study area, which are Apocynaceae, Asphodelaceae, Asteraceae, Euphorbiaceae,

Table 1. Survey of plant family name, scientific name, common name/s and habit of growth for plants grown in home gardens and malls in Cairo Festival City, Cairo, Egypt during 2018 and 2019 years

Family name	Scientific name	Common name/s	Habit of growth	
			Group of plant	Plant form
Apocynaceae	*Catharanthus roseus* (L.) G.Do	Cape periwinkle, Vinca	Herbaceous	Mound-forming
	Nerium oleander L.	Nerium, Oleander	Shrubs	Spreading
Asphodelaceae	*Aloe vera* (L.) Burm.f.	Aloe	Succulents	Stemless
Asteraceae	*Tagetes erecta* L.	Mexican marigold, African marigold	Herbaceous	Mound-forming
Euphorbiaceae	*Jatropha curcas* L.	Physic nut, Poison nut	Shrubs	Spreading
Geraniaceae	*Pelargonium graveolens* L'Hér.	Rose geranium, Sweet scented geranium	Herbaceous	Spreading
Lamiaceae	*Ocimum basilicum* L.	Basil	Herbaceous	Spreading
	Rosmarinus officinalis L.	Rosemary	Herbaceous	Mound-forming
Leguminosae	*Acacia farnesiana* (L.) Willd.	Sweet acacia, Needle bush	Trees	Spreading
	Cassia fistula L.	Golden shower, Purging cassia	Trees	Upright
Lythraceae	*Lawsonia inermis* L.	Hina, Egyptian privet	Shrubs	Vase-shape
Malvaceae	*Hibiscus rosa-sinensis* L.	Chinese hibiscus, China rose	Shrubs	Spreading
Oleaceae	*Jasminum grandiflorum* L.	Spanish jasmine, Royal jasmine	Vines	Climbing
	Jasminum sambac (L.) Aiton	Arabian jasmine, Sambac jasmine	Shrubs	Climbing
	Olea europaea L.	Olive	Trees	Round
Poaceae	*Cymbopogon citratus* (DC.) Stapf	Lemon grass	Grass	Clump-forming Fountain-Shape
Rhamnaceae	*Ziziphus spina-christi* (L.) Desf.	Christ's thorn jujube	Trees	Spreading
Rosaceae	*Rosa centifolia* L	Cabbage rose	Shrubs	Upright

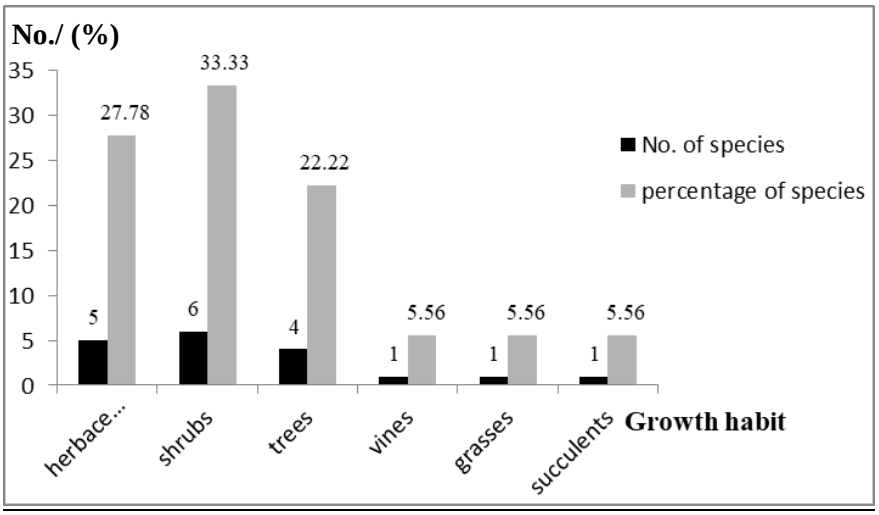

Fig. 2. Growth habit (number and percentage) of 18 species

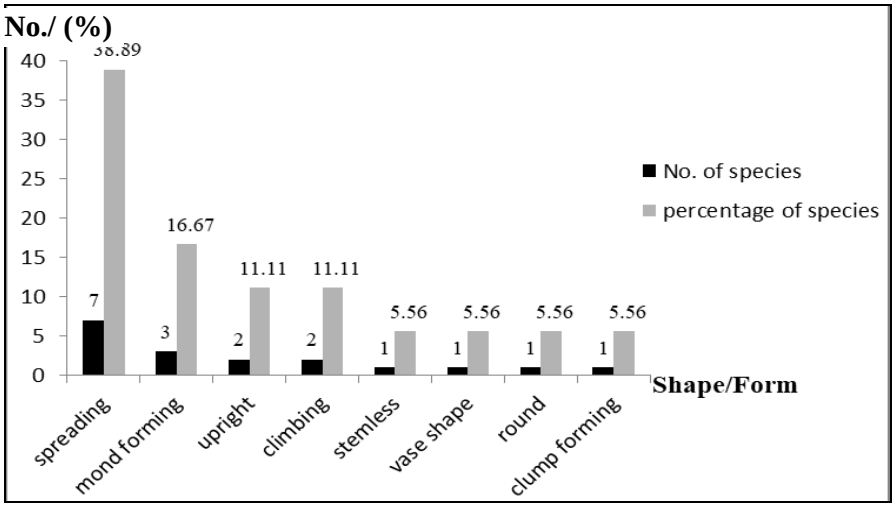

Fig. 3. Plant forms (number and percentage) of 18 species

Geraniaceae, Lamiaceae, Leguminosae, Lythraceae, Malvaceae, Oleaceae, Poaceae, Rhamnaceae and Rosaceae. These families contained 18 medicinal and aromatic plants (18 species) which were varied in their habit of growth. The Oleaceae family contained the most plants, which were olives, royal jasmine and Arabian jasmine. However, the grass habit was noticed only in lemon grass plant and herbaceous habit was recorded in cape periwinkle, African marigold, rose geranium, basil and rosemary plants. Also, the shrub habit was determined in nerium, poison nut, hina, China rose, Arabian jasmine and cabbage rose plants. In addition, only aloe plant has succulent growth habit and only royal jasmine growing as a vine. The tree habit was found in 4 species which were sweet acacia, golden shower, olive and Christ's thorn jujube plants. Most of medicinal and aromatic plants under study were characterized by the fact that their forms are often spreading to reach 7 species out of 18 species. Moreover, the remaining plants (11 species) varied from mound-forming (3 species), upright (2 species), climbing (2 species), stemless (1 specie), vase-shape (1 specie), round (1 specie) to clump- forming fountain-shape (1 specie). These findings are in accordance with those reported by **Sezen *et al*. (2018)**.

Flowering Time, Habitate Preference and Foliage Texture

Results listed in Table 2 suggest that, as a result of flowering time determination there are five flowering times for different medicinal and aromatic plants under study during both years. Most of the plants under study were flowering during summer season (9 species) followed by two equal flowering times (spring and all year-round), while the lowest number of species (3 species) have been flowered during through autumn and winter seasons. Also, there are 8 plants (*Jatrogha curcas*, *Acacia farnesiana*, *Cassia fistula*, *Lawsonia inermis*, *Jasminum grandiflorum*, *Olea europaea*, *Cymbopogon citrates* and *Ziziphusspina-christi*) need full sunlight (FS) while there are 10 plants (*Catharanthus roseus*, *Nerium oleander*, *Aloe vera*, *Tagetes erecta*, *Pelargonium graveolens*, *Ocimum basilicum*, *Rosmarinus officinalis*, *Hibiscus rosa-sinensis*, *Jasminum sambac* and *Rosa centifolia*) need Full sun to partial shade (FS/PSH). Furthermore, texture is one of the most serious spatial features of chosen terrain coverage classes. Since it does not have an unambiguous mathematical definition, in practice, picture processing utilizes a variety of texture analysis methods (**Kupidura *et al*., 2019**). Nevertheless, the texture of the foliage was coarse in 3 species; the medium texture in 6 species, fine texture was recorded in 9 species. These results are in harmony with those pointed out by **Daba and Dalle (2020)**.

Landscape Value and Mode of Propagation

As shown in Table 3, most of medicinal and aromatic plants under study were used as ornamental foliage, ornamental flowers and fragrance of landscape value parameter. While, few plants utilized as form beauty and ornamental fruit in landscape gardening aim. Moreover, it has been found that there are 7 plants (*Nerium oleander*, *Tagetes erecta*, *Pelargonium graveolens*, *Rosmarinus officinalis*, *Cassia fistula*, *Jasminum grandiflorum* and *Cymbopogon citratus*) having three properties for utilization in gardening design. This study shows that there are nine families its plants propagated with seeds, whenever, there are eleven families its plants propagated with cuttings mode. **Díaz-Reviriego *et al*. (2016)** also have reported similar results.

Table 2. Survey of scientific name, flowering time, habitat preference and foliage texture for plants grown in home gardens and malls in Cairo Festival City, Cairo, Egypt during 2018 and 2019 years

Scientific name	Flowering time					Habitat preference	Foliage texture
	Spring	Summer	Autumn	Winter	All year-round		
Catharanthus roseus (L.) G.Do					√	FS/PSH	Fine
Nerium oleander L.					√	FS/PSH	Medium
Aloe vera (L.) Burm.f.		√				FS/PSH	Fine
Tagetes erecta L.					√	FS/PSH	Coarse
Jatropha curcas L.		√				FS	Fine
Pelargonium graveolens L'Hér.	√					FS/PSH	Coarse
Ocimum basilicum L.					√	FS/PSH	Fine
Rosmarinus officinalis L.	√	√				FS/PSH	Medium
Acacia farnesiana (L.) Willd.			√	√		FS	Fine
Cassia fistula L.	√	√				FS	Medium
Lawsonia inermis L.	√	√				FS	Fine
Hibiscus rosa-sinensis L.					√	FS/PSH	Fine
Jasminum grandiflorum L.		√				FS	Fine
Jasminum sambac (L.) Aiton	√	√	√			FS/PSH	Fine
Olea europaea L.						FS	Medium
Cymbopogon citratus (DC.) Stapf						FS	Coarse
Ziziphus spina-christi (L.) Desf.		√				FS	Medium
Rosa centifolia L		√				FS/PSH	Medium

FS= Full sun, FS/PSH= Full sun to partial shade.

Table 3. Survey of scientific name, landscape value and mode of propagation for plants grown in home gardens and malls in Cairo Festival City, Cairo, Egypt during 2018 and 2019 years

Scientific name	Landscape value					Mode of propagation
	Form beauty	Ornamental foliage	Ornamental fruit	Ornamental flowers	Fragrance	
Catharanthus roseus (L.) G.Do				√		Seed
Nerium oleander L.		√		√	√	Cutting
Aloe vera (L.) Burm.f.		√		√		Division, Runer stem
Tagetes erecta L.		√		√	√	Seed
Jatropha curcas L.		√		√		Seed, Cutting
Pelargonium graveolens L'Hér.		√		√	√	Cutting
Ocimum basilicum L.				√	√	Seed, Cutting
Rosmarinus officinalis L.		√		√	√	Cutting
Acacia farnesiana (L.) Willd.				√	√	Seed
Cassia fistula L.		√	√	√		Seed
Lawsonia inermis L.				√	√	Seed, Cutting
Hibiscus rosa-sinensis L.		√		√		Cutting
Jasminum grandiflorum L.		√		√	√	Cutting
Jasminum sambac (L.) Aiton				√	√	Cutting
Olea europaea L.	√	√				Cutting, Suckers
Cymbopogon citratus (DC.) Stapf	√	√			√	Seed
Ziziphus spina-christi (L.) Desf.		√	√			Seed
Rosa centifolia L				√	√	Cutting, Suckers

Conclusion

Through the survey of medicinal and aromatic plants used for landscaping of the Cairo Festival City area, it was noted that the different plant species are differ in habit of their growth (herbaceous, vines, shrubs and trees), flowering time and the landscape value of each. However, the best ones were *Nerium oleander*, *Tagetes erecta*, *Pelargonium graveolens*, *Rosmarinus officinalis*, *Cassia fistula*, *Jasminum grandiflorum* and *Cymbopogon citrates* which having three landscape values for using in gardening design.

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مسح للنباتات الطبية والعطرية وتحديد قيمتها التنسيقية في الحدائق المنزلية والمراكز التجارية في مدينة كايرو فستيفال، محافظة القاهرة، مصر

أحمد سيد إبراهيم عبد النبي – علي عبدالحميد علي معوض

أحمد شاكر حسين جنـــدي- محمد أحمد إبراهيم عبد القادر

قسم البساتين - كلية الزراعة - جامعة الزقازيق - مصر

على الرغم من أن النباتات الطبية والعطرية تستخدم في العديد من المستحضرات الصيدلانية والعلاجات الشعبية إلا أنها ذات صفات تصويرية في مجال تزيين وتنسيق الحدائق، حالياً، تتوزع النباتات الطبية والعطرية في جميع أرجاء الحدائق الخاصة والعامة نظراً لتعدد ألوانها وطبيعة نموها واختلاف موعد تزهيرها على مدار العام، لذا يجب عمل مسح لتحديد القيمة التنسيقية لتلك النباتات الهامة للوقوف على مدى انتشارها وتوظيفها في تنسيق الحدائق، اشتملت مواد الدراسة على النباتات الطبية والعطرية النامية في حدائق ومراكز التسوق في مدينة كايرو فستيفال خلال عامي ٢٠١٨ و ٢٠١٩، في هذه الدراسة، لوحظ طبيعة النمو، ميعاد الإزهار، ملمس الأوراق، القيمة التنسيقية وطريقة إكثار النباتات الطبية والعطرية المزروعة في الحدائق المنزلية والمحلات التجارية في تلك المنطقة، قيم حوالي ١٨ نبات تنتمي إلى ١٣ عائلة نباتية مختلفة القيمة التنسيقية، وضمت العائلة الزيتية العدد الاكبر من الانواع وهي الزيتون والياسمين البلدي والفل المجوز، لوحظ تزهير كل من الحصالبان والخيار شمبر والحناء والفل المجوز خلال فصلي الربيع والصيف، وكذلك نبات الفتنة خلال فصلي الخريف والشتاء، كذلك، وجد أن لسبعة انواع ثلاث استخدامات تنسيقية وهي الدفلة والقطيفة والعطرشان والحصالبان والخيار شمبر والياسمين البلدي وحشيشة الليمون، كانت أكثر طرق الإكثار شيوعا لتلك النباتات تحت الدراسة هي البذور والعقل الساقية.

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