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Economic and Botanical Analysis of Ornamental Plants of the Central Iran

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Abstract

In the last few decades, many non-native plants have been introduced to the flora of the Central Plateau, especially in the green spaces. The present study aimed to identify and understand various ornamental members of 62 diverse plant families in the central plateau of Iran. Many medicinal plants have been used in hand-planted green spaces in desert areas due to their tolerance to salinity and adaptability to arid and semiarid climates. Creating urban green spaces with the plants introduced in this research conserves and restores biodiversity and brings many ecological and economic benefits. The concern of the research was on plant identification and exploring the economic importance of these species. Through detail- oriented fieldwork and observation, the identified plants were categorized into their respective families, providing valuable insights into the rich biodiversity of the central Iran. The economic importance of these plants was thoroughly examined, considering their applications in medicine, landscaping, traditional uses, and potential commercial uses. Out of these 158 studied species, in terms of medicinal and edible uses, 116 species have edible uses, 149 have medicinal uses, and 110 have both edible and medicinal uses. In this study, a model was designed to evaluate aesthetic values and economic services (food provisioning; natural medicines, pharmaceuticals; and wood, fiber production) for 158 ornamental studied species. Using the Ecosystem Services Evaluation Model presented in this study to compare the aesthetic values and economic benefits of ornamental species provides a guide for selecting plants in green spaces. The model ranking Aesthetic Value and Economic Benefits in four level: Low (<1.5), medium (<2.5, >1.5), high (<3.5, >2.5), and very high (>3.5). The main motto of selecting the ornamental flowering plants is to highlight the uses of the plants and their species in various industries rather than just beautifying the gardens and landscapes.

Keywords: Economic plants, Green spaces, Medicinal and industrial plants, Resistance to aridity, Salt tolerance.

INTRODUCTION

Urban biodiversity has a broad definition that is useful in a multidisciplinary approach to biodiversity conservation. Hahs and McDonnell (2014) describe two ideologies at play in managing urban biodiversity for creating biodiversity-friendly cities, namely the conservation of an area's local native biodiversity and managing biodiversity for the benefit of people, i.e. ecosystem services. These two ideologies need to be balanced to achieve long-term success. Management is required to achieve win-win situations that neither overemphasize conservation by creating areas wherein people are largely excluded (nature wins) nor de-emphasize conservation by managing solely for ecosystem service delivery regardless of its effect on other fauna and flora (people win) (Siebert *et al*., 2017).

At present, two types of strategies have been adopted for sustainable landscaping under adverse conditions of drought and salinity. The first strategy is environmental engineering, which manages the increase in salt levels in the soil and reduces water losses by managing irrigation and drainage. Another is plant engineering to increase plant tolerance to salt and drought. However, large areas of saline land cannot be managed this way. Many possible solutions are very expensive in terms of money, energy, and time. Therefore, the effective long-term method is to use plant species resistant to salinity and drought, which can be the most practical and economical solution (Alam *et al*., 2017).

Plants are drought-resistant in two ways. The first is genetically resistant to drought. The second is escape from arid periods. The resistance of drought and cold in plants supports each other. In other words, a plant resistant to drought also has resistance against cold. Therefore, the identification and use of drought-resistant plants and the economic benefit of water are essential in choosing plants for landscape design, especially medicinal plants (Tulukcu, 2020). With an increase in population and a decrease in per capita available arable land (particularly in developing countries), it has become difficult to find fertile land for cultivating medicinal and aromatic plants (MAPs). The results reported in this paper indicate that the cultivation of MAPs on degraded lands through bio saline agriculture is feasible and profitable (Dagmar *et al*., 2011).

Trade-offs exist among the multiple ecosystem services generated by forests. Wood production conflicts with public-good ecosystem services such as carbon storage, nutrient retention, and biodiversity conservation. Recognizing that forests generate both private- and public-good ecosystem services implies that forestry should be optimized to maximize the contribution of forests to societal welfare. Therefore, welfare would improve through the expansion of continuous cover forestry. We anticipate that this approach will contribute to sustainable forestry development by informing decision-makers of the impacts of alternative forestry practices on social welfare (Zanchi and Brady, 2019).

Plant species differ in tolerance to total salts and to specific ions. Certain species are highly tolerant to the shortage or excessive supply of one or more ecological factors, while others are sensitive. However, when water availability is limited, plants struggle to survive, and producing a wide array of secondary chemical metabolites is considered a survival strategy. Medicinal and aromatic plants are important sources of these chemicals used as pharmaceuticals. These appear to be protective agents for plants against biotic and abiotic stresses, including salinization (Qasem, 2015).

Medicinal plants have low water requirements due to their adaptation to arid and semi-arid climates, and their cultivation and development can play an effective role in preserving limited water resources. Therefore, changing the cultivation pattern and replacing common crops with drought-resistant medicinal plants with low water requirements can play a significant role in reducing water consumption and be an effective step toward achieving sustainable agriculture (Al-Ebrahim Dehkordi and Azad Ghahfarkhi, 2021). Many medicinal plants can be used in hand-planted green spaces in desert areas due to their resistance to salinity and adaptation to arid and semi-arid climates.

Nowadays, awareness has increased about medicinal plants, their importance in life, and the benefits of growing them. People are coming forward to cultivate medicinal plants not only as organized farms or large plantations but also as home gardens which are easier to access at home. This paves the way for gardening and landscaping services as an investment and income-generating venture based on our plant wealth (Haridasan *et al.*, 2017). This research aims to introduce medicinal and industrial plants resistant to salinity and drought for the design of hand-planted green spaces in the hot and dry regions of the Iranian plateau.

MATERIALS AND METHODS

Study area

The Central Iranian Plateau lies between 1000 and 2000 m a.s.l. The climate is generally arid, with an annual rainfall of ca. 170-230 mm, falling from January to March or April. The characteristic plateau vegetation consists of a plateau steppe with Artemisia maritima and the grass Stipa holosericea, with occasional trees such as *Pistacia khinjuk, P. terebinthus, Prunus scoparia*, and *Juniperus excelsa*. Poorly drained plateaus support low halophytic communities. There, the specific zonation related to the salinity and depth of the water table is often seen (Wickens, 1998).

Central Iran is bounded by the Alborz Mountains in the north, the Zagros Mountains in the west and south, and the Khorasan Mountains in the east. Most of the central regions of Iran have a hot and dry climate, which is more moderate and humid in the highlands. In terms of forest cover, Iran is considered one of the countries with low forest cover (around 7% of the country's surface) (Foolad and Erfanifard, 2009). Therefore, to increase forest cover the creation of artificial forests is one of the trustee's programs in the development plans.

The area of the central plateau of Iran is 824,400 Km2, and its average surface runoff coefficient is 10%.

The total volume of water spilled in the catchment area of the Central Plateau is 111,210 million m3 according to official statistics. In other words, the average annual rainfall in the region is 135 mm. The annual rainfall in this region is the lowest compared to other parts of the country (Statistical Center of Iran, 2016). Regarding climate classification based on the UNEP aridity index, most of the central plateau areas of Iran are classified as "Arid" environment, and its aridity index is between 0.05 and 0.2 (Marani-Barzani *et al*., 2017).

Djamali *et al.* (2012) demonstrated that climate is a primary determinant of phytogeographic regionalization. Topographic context, geologic history, and climatic history are also important factors in determining the floristic features and the nature of boundaries of floristic regions. The Irano-Turanian region forms a distinct bioclimatic area in South West and Central Asia. It is defined by a small ensemble of climatic parameters (continentality index, winter temperature, precipitation seasonality). The west-central part of the Irano-Turanian region (Iran-Anatolian province or IT2 subregion) is the best representative of the Iran-Turanian territory, with both climatic and floristic aspects that at least overlap with the surrounding regions. While phytogeographic and bioclimatic regionalizations should be determined independently, we suggest that the term "Irano-Turanian bio climate" can be used to describe the climate of the region as well as approximately circumscribing the Irano-Turanian floristic region.

List of studied plants

In the central desert area, there are saline water agricultural lands, with nearby underground water, which have been left barren due to climate change and drought. Furthermore, farmers and investors need to introduce plants that are compatible with these lands and have good economic returns. Also, considering the trend of decreasing water reserves and lowering the level of underground water tables in most of the arid and semi-arid regions of the country, there is a need for a change of attitude in the selection of common agricultural species and the introduction of alternative species with less water requirement and higher economic efficiency. The selection and introduction of salinity and drought-resistant medicinal plants can be a practical step towards solving these problems. Therefore, there was a need for a comprehensive survey regarding the flora of plant species that have entered the flora of the Central Plateau during the last few decades, especially in the green space sector.

A combination of multiple sources, including field visits, and expert opinions have been used to prepare this checklist. As a result, 158 species of medicinal and industrial plants resistant to salinity and drought were identified in the central plateau of Iran, which are either hand-planted or naturally scattered in different regions. In the initial investigation, the edible or medicinal use, resistance to salinity and drought, and the vegetative form of 158 studied ornamental species were investigated through scientific sources. The families, genera, and scientific names of the species are listed in table 1. Then, the global chorotype and regional distribution of each species were studied. The characteristics of nativeness (endemic, indigenous, exotic) and the life forms of 158 studied species were investigated.

To check the global chorotype and geographical distribution of 158 studied species from scientific sources, books and articles, and reliable scientific websites, including the Iran herbal network website (Netplant.ir, 2024), The North Carolina extension gardener plant toolbox (Plants.ces.ncsu.edu, 2024), Plants of the world online (Powo.science.kew.org, 2024), Open online galleries and plant identification guide (Plantarium.ru, 2024), The global biodiversity information facility (GBIF.org, 2024) were used.

The priority of using native medicinal plants in landscaping the green spaces of desert areas should be considered in each region. Although, there is no universally accepted definition of native plants, regardless of the variation in the term, native plants usually include plants found in distinct natural locations without the help or introduction of humans. Naturally, native plant species adapted to local climate conditions are best when designing a landscape in arid areas, as they are adapted for high water efficiency and minimal maintenance time and cost.

Non-native ornamentals are usually hard to adapt, require more care, and use large amounts of irrigation water in addition to other production inputs. Unlike native plants that are best adapted to local climate and soil conditions, using native plants in landscape projects can be very beneficial in conserving limited resources. Natural landscaping is an opportunity to restore and create a diverse native ecosystem while providing a natural look to parks and gardens that reflect national heritage and culture.

Based on the investigations carried out in the central plateau of Iran, of these 158 studied Ornamental species in terms of salinity and drought, 156 species are drought resistant, and 67 species are salinity tolerant (Imanian *et al*., 2023).

Out of these 158 ornamental species, in terms of medicinal and edible uses, 116 species have edible uses, 149 species have medicinal uses, and 110 species have both edible and medicinal uses (Imanian *et al*., 2023). Among these 158 ornamental species in terms of vegetative form, 46 are tree species (29 deciduous trees and 17 evergreen trees), 55 shrub species (26 deciduous shrubs and 29 evergreen shrubs), 10 bush species, 43 herbaceous species, and four succulent species (Imanian *et al*., 2023).

Table 3 presents a list of 158 ornamental, medicinal, and aromatic plants (MAP) cultivated in the green spaces of arid and semi-arid areas of the central plateau of Iran.

In this research, the edible or medicinal use, and vegetative form of 158 studied species were investigated, the results of which are summarized in table 3.

Research methodology

In this study, a model was designed to evaluate aesthetic services and economic services (food, pharmaceutical, and timber production) for 158 ornamental studied species. The proxy indicators of Ecosystem Services Evaluation Model (ESEM) for scoring each of the four ecosystem services: Aesthetic values (d), food provisioning (a), natural medicines, pharmaceuticals (b), and wood, fiber production (c) are presented in table 1.

Table 1. The proxy indicators of the Ecosystem Services Evaluation Model (ESEM) for scoring each of the four plant ecosystem services.

Row no.	Proxy indices	Qualitative expression of index score	Quantitative expression
1	Plant density	Low density	0 - 1.50
		Medium density	1.51 - 2.50
		High density	2.51 - 3.50
		Very high density	3.51 - 4
2	The height of vascular plants	<1.5 meters	0 - 1.50
		1.5 to 3 meters	1.51 - 2.50
		3 to 5 meters	2.51 - 3.50
		>5 meters	3.51 - 4
3	Soil type	Soil fertility	0 - 4
4	Age of plants	0 to 10 years	0 - 1.50
		10 to 25 years	1.51 - 2.50
		25 to 40 years	2.51 - 3.50
		More than 40 years	3.51 - 4
5	Bed depth	0 to 1 meter	0 - 1.50
		1 to 2 meters	1.51 - 2.50
		2 to 3 meters	2.51 - 3.50
		More than 3 meters	3.51 - 4
6	Type of vegetation	Grass(Lawn) or tree or bush	0 - 2.50
		A combination of G and T, or G and B, or B and T	2.51 - 3.50
		A combination of three types of grass, bush and tree	3.51 - 4
7	Fertilizer use	No	0 - 2.50
		Yes, chemical fertilizer	2.51 - 3.50
		Yes, organic fertilizer	3.51 - 4
8	Selection of plant species in terms of beauty	Stimulator of touch / smell / taste / hearing / vision	0 - 4
9	Relative prevalence (RP) of woody species	RP = total population of sample species population of woody species / total population of field species	0 - 4

Table 1. Continued.

Row no.	Proxy indices	Qualitative expression of index score	Quantitative expression
10	Relative prevalence (RP) of edible species (fruits and vegetables)	RP = edible species population / total field species population	0 - 4
11	Relative prevalence (RP) of medicinal species	RP = population of medicinal species / total population of field species	0 - 4
12	Plant species richness	Number	0 - 4
13	Plant diversity index	$H = -\sum_{i=1}^{s} P_i \ln P_i$,Where pi is the fraction of individuals belonging to the i.th species. Pi = Ni/N, Ni = Plant population of i.th species. $N=N_1 + N_2 + N_3 + ... + N_n$ where N is the number of species	0 - 4
14	Presence of seasonal variety (fruits and vegetables)	Yes/No	0- 4
15	Presence of wood/fiber/ pulp producing plant species such as maple, sugarcane, etc.	Yes/No	0- 4
16	Desirability of Crop yield per year	Not at all/ low/ medium/high	0- 4
17	Frequency of crop supply	Yearly/seasonally/monthly/weekly/ regularly	0- 4
18	Frequency of use of herbal medicines	Rarely / little / moderate / much	0- 4
19	Selling crops (sharing products for sale)	Yes/no	0- 4
20	Appearance	Tidy/messy	0- 4
21	Frequency of visit by the visitors	Monthly/weekly/regularly	0- 4
22	Mental satisfaction level of the personnel	Very high/high/moderate/low/not at all	0- 4

The formula for calculating the score of four ecosystem services with the relevant indicators is presented in table 2.

Table 2. Calculating the scores of four ecosystem services with relevant indicators.

Economic, and cultural benefits	Four ecosystem services	Arithmetic average formula of related proxy indicators to calculate the score of four ecosystem services
Provisioning services	Food provisioning(a)	$a= (\sum_i 3,4,5,7,10,14,16,17,19)/n_a$
	Natural medicines, Pharmaceuticals (b)	$b=(\sum_i 3,4,5,7,11,16,17,18,19)/n_b$
	Wood, fiber production(c)	$c=(\sum_i 3,4,5,7,9,15,16,17,19)/n_c$
Cultural Service	Aesthetic values(d)	$d=(\sum_i 1,2,4,6,8,12,13,20,21,22)/n_t$

The Ecosystem Services Evaluation Model (ESEM) presented in this study is a composite index method, and is used to score each ecosystem service in question through a rapid assessment checklist tool. The score of each of the four ecosystem services (indicated in this study by the abbreviation (a, b, c, d) is obtained from the arithmetic mean of its proxy indicators. The score for each of the aesthetic values, and economic benefits (food provisioning; natural medicines, pharmaceuticals; wood, fiber production) was calculated for the 158 ornamental plants studied, and the calculated scores are given in columns 5 and 6 of table 3.

Table 3. Ornamental, medicinal, and aromatic plants (MAP) cultivated in the green spaces of arid and semi-arid areas of the central plateau of Iran.

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/ medicine/ wood values	
Lamiaceae						
1	*Salvia rosmarinus*	Leaves, essential oil	Leaves, spice, herbal tea	2.4	3.00/3.11/1.22	He/ M
2	*Perovskia abrotanoides*	Leaves	Flower	2.3	2.94/2.72/1.16	Ch/ IT(End)
3	*Origanum majorana*	Essential oil, oil	Leaves	2.1	2.78/2.67/1.00	Ch/ Cosm
4	*Ballota nigra*	Leaves	No	2.15	1.78/2.67/1.00	Ch/ M-IT
5	*Salvia sclarea*	Seed essence, oil	Leaves, flowers	2.35	2.78/2.89/1.00	He/ M
6	*Salvia nemorosa*	Leaves, essential oil	Seeds	2.2	2.78/2.83/1.00	He/ ES
7	*Salvia officinalis*	Leaves, essential oil	Leaves	2.05	2.78/2.78/1.00	He/ M
8	*Lavandula angustifolia*	Flowers, leaves, essence, oil	Leaves, flowers	2.4	3.00/3.11/1.22	He/ M
9	*Marrubium vulgare*	Leaves, essential oil	Leaves	2.35	2.83/2.83/1.06	He/ M-IT
Verbenaceae						
10	*Vitex agnus-castus*	Seeds, leaves, flowers, essential oil	Seeds, leaves, flowers	2.56	3.06/3.06/1.28	He/ M-IT
11	*Lantana camara*	Sap, leaves, stem bark	No	2.46	1.11/2.78/1.11	He/ AM
12	*Aloysia citrodora*	Leaves, essential oil	Leaves	2.55	3.12/3.12/1.34	He/ NEO
13	*Phyla nodiflora*	Leaves	Leaves	2.07	2.51/2.51/0.84	He/ AM
Asteraceae						
14	*Artemisia persica*	Essential oil	Leaves	2.4	2.39/2.61/1.06	G/ IT(End)
15	*Artemisia vulgaris*	Leaves, essential oil	Flowering branches	2.45	2.39/2.61/1.06	He/ ES-AM
16	*Gazania krebsiana*	Plant extract	No	2.26	0.89/2.50/0.89	He/ SU
17	*Santolina chamaecyparissus*	Leaves, flowers, essential oil	Leaves, flowers	2.46	2.23/2.68/0.90	He/ M
18	*Artemisia scoparia*	Seeds, essential oil	Leaves	2.2	2.11/2.28/0.94	Ch/IT(End)
19	*Cynara scolymus*	Leaves, plant extract	Buds	2.25	3.11/3.11/1.22	He/ M-ES

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/ medicine/ wood values	
20	*Artemisia absinthium*	Leaves, flowering branch, extract	Extract	2.45	2.39/2.61/1.06	He/ SU-ES
21	*Achillea millefolium*	Leaves, flowering branch, extract	Leaves	2.42	2.61/2.89/0.89	He/ ES-AM
22	*Achillea filipendulina*	Flowering branch, leaves, essential oil	Leaves	2.47	2.61/2.89/0.89	He/ IT
23	*Anthemis nobilis*	Flowers, leaves, essential oil	Flowers	2.27	2.33/2.72/0.72	He/ ES
24	*Tagetes erecta*	Plant extract	Flowers	2.51	2.62/3.06/1.06	Th-He/ NEO
25	*Calendula officinalis*	Plant extract	Leaves, flowers	2.46	2.73/3.17/1.06	Th/ M
26	*Senecio cineraria*	Plant extract	No	2.36	1.12/2.84/1.12	He/ ES- SU
Rubiaceae						
27	*Rubia tinctorum*	Roots	No	2.40	1.28/3.28/1.28	G/ IT(Ind)-M-SU
Apiaceae						
28	*Foeniculum vulgare*	Seeds, leaves, essential oil	Seed, leaf, root, stem	2.20	3.06/3.17/1.17	He/ M
Poaceae						
29	*Cymbopogon schoenanthus*	Leaves, oil, essential oil	Leaves	2.35	2.28/2.83/0.94	He/ SS-SU
30	*Chrysopogon zizanioides*	Root, essence, oil	No	2.55	1.11/3.00/1.11	He/ PAL
31	*Cymbopogon citratus*	Leaves, essence, oil	Leaves	2.25	2.39/2.83/0.83	He/ PAL
32	*Stipa barbata*	No	No (fodder)	2.10	2.39/0.83/0.83	He/ IT(Ind) -SS
33	*Pennisetum orientale*	Plant extract	No (fodder)	2.20	2.39/1.39/0.83	G/ IT, PAL
Onagraceae						
34	*Oenothera glazioviana*	Flowers	Leaves, roots, oil	2.40	2.56/3.00/1.11	He/ NEO
Ephedracea						
35	*Ephedra sinica*	Root and branch extract	Fruits	2.25	2.50/2.89/1.17	Ch/ IT-ES
Oleaceae						
36	*Fraxinus excelsior*	Seed, bark, young branch, extract	Seeds, manna, tea, oil	3.15	3.22/3.28/3.11	Ph/ ES
37	*Jasminum mesnyi*	Essential oil	No	2.71	1.28/3.11/1.28	Ph/ PAL
38	*Jasminum grandiflorum*	Bud, flower, leaf oil, root	No	2.77	1.28//3.11/1.28	Ph/ PAL
39	*Olea europaea*	oil	Fruit, leaves,oil	3.05	3.67/3.61/2.06	Ph/ M, PAL
40	*Jasminum nudiflorum*	Flowers	No	2.71	1.33/3.17/1.33	Ph/ ES
41	*Ligustrum lucidum*	Wax, seed extract	Leaves, seed powder	3.05	3.40/3.46/2.07	Ph/ PAL

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
Salicaceae						
42	*Populus euphratica*	Bark, extract of branches	No	2.91	1.44/2.50/2.00	Ph/ SS-IT
Rosaceae						
43	*Rubus hyrcanus*	Fruit, leaf, root, stem	No	2.55	1.06/2.78/1.06	Ph/ IT(End)
44	*Rosa foetida*	Flower extract	Petal, fruit	2.65	3.00/3.17/1.39	Ph/ IT(Ind)-ES
45	*Pyrus boissieriana*	Young leaves, stem bark, seeds, fruit	Fruits	2.97	3.40/3.18/2.12	Ph/ IT(End)
46	*Amygdalus lycioides*	Fruit, root and stem extract	Fruits	2.71	2.63/2.79/1.34	Ph/ IT(End)
47	*Amygdalus scoparia*	Resin	Fruits	2.61	2.74/2.62/1.46	Ph/ IT(End)
48	*Crataegus monogyna*	Flower, leaf	Leaves, flowers, fruits	3.22	3.37/3.46/1.79	Ph/ M-ES
49	*Rosa canina*	Leaves, flowers, essential oil	Seed, flower, fruit	2.93	3.14/3.52/1.47	Ph/ IT(Ind)-M-ES
50	*Eriobotrya japonica*	Flowers	Fruit, seed	2.73	3.03/2.69/1.24	Ph/ PAL
51	*Rhaphiolepis umbellata*	No	Seed, flower	2.96	2.72/1.30/1.30	Ph/ PAL
52	*Cotoneaster salicifolius*	Resin	Fruits	2.73	2.62/3.01/1.22	Ph/ PAL
53	*Pyracantha coccinea*	No	Fruits	2.91	2.68/1.28/1.44	Ph/ M-IT(Ind)
Lythraceae						
54	*Punica granatum nana*	Flowers, leaves, oil	Flowers	2.96	3.06/3.67/1.72	Ph/ IT(End)
55	*Punica granatum*	Fruit, seed oil	Fruits	2.95	3.61/3.28/1.72	Ph/ IT(End)
Moraceae						
56	*Maclura pomifera*	Fruit, extract	No	3	1.44/3/2.33	Ph/ AM
Fabaceae						
57	*sophora mollis*	No	Leaf	2.76	2.56/150/1.50	Ph/ IT(Ind)-PAL
58	*Robinia pseudoacacia*	Essential oil	Flower, seed, seed pod, oil	3.01	2.61/2.50/2.00	Ph/ AM
59	*Halimodendron halodendron*	Flower, root	No	2.75	1.22/2.56/1.22	Ph/ IT(Ind)-ES
60	*Cercis siliquastrum*	Flowers, bark, roots, young leaves	Seed pod, flower	2.92	2.28/1.83/1.56	Ph/ IT(Ind)-M
61	*Acacia farnesiana*	Essential oil, resin	Flowers	2.97	2.34/2.34/1.84	Ph/ NEO
62	*Amorpha fruticosa*	Fruit extract	Flowers	2.67	2.17/1.94/1.17	Ph/ AM
63	*Spartium junceum*	Flowers, young branches, seeds, roots	Flower, essential oil	2.72	2.00/2.33/1.28	Ph/ M
64	*Acacia victoriae*	No	Seed	2.66	2.33/1.17/1.11	Ph/ AUS
65	*Gleditsia caspica*	Fruit extract	Seed	3.05	2.78/2.06/1.84	Ph/ ES(End)
66	*Erythrostemon gilliesii*	Root	No	3.01	1.44/2.17/1.78	Ph/ NEO
67	*Leucaena leucocephala*	Bark, root, seed	Seeds, green pods	2.96	2.91/2.61/2.28	Ph/ NEO
68	*Albizia Julibrissin*	Bark, flowers, gum	Leaves, flowers	3.11	2.17/2.50/1.89	Ph/ ES(Ind)-PAL
69	*Sophora japonica*	Flower buds	Leaves, flowers	3.26	2.72/3.11/1.89	Ph/ PAL

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
Rhamnaceae						
70	*Ziziphus jujuba*	Fruit	Leaves, fruits, coffee substitute	3.2	3.07/3.07/1.83	Ph/ ES-PAL
71	*Ziziphus lotus*	Fruit, leaf, flower	Fruits	3.16	2.83/2.90/1.72	Ph/ SS-M
72	*Paliurus spina-christi*	Flowers	Fruits	2.92	2.31/2.37/1.24	Ph/ ES(Ind)-M
Convulvulaceae						
73	*Cressa cretica*	Leaf, extract	Fruit oil	2.55	1.72/1.72/0.83	He/ IT(Ind)-M-SS-SU
Ulmaceae						
74	*Ulmus boissieri*	Leaves, the bark of branches	Leaves	3.10	2.07/2.26/1.73	Ph/ IT(End)
75	*Ulmus Umbraculifera*	Leaves, bark, roots	Leaves	3.10	2.07/2.26/1.73	Ph/ IT(End)
76	*Zelkova carpinifolia*	Fruit, extract	Leaves	3.21	2.39/2.34/2.17	Ph/ ES(End)
Meliaceae						
77	*Melia azedarach*	Leaves, root bark	No	2.96	1.34/2.26/1.62	Ph/ PAL- AUS
Amaranthaceae						
78	*Halothamnus subaphyllus*	Plant extract	No	2.46	0.83/1.17/0.83	Ch/ IT(End)
79	*Seidlitzia rosmarinus*	Stem, leaf, extract	No	2.56	1.36/1.92/1.12	Ch/ IT(Ind)-SS-M
80	*Suaeda aegyptiaca*	Leaf-stem	No	2.11	0.78/1.36/0.5	Th/ IT(Ind)-SS
81	*Salsola abarghuensis*	Leaf, stem, extract	No	2.67	1.29/1.81/1.07	Ph/ IT(End)
82	*Salsola dendroides Pall.*	Leaf-stem	No	2.50	1.18/1.70/0.96	He/ IT(End)
83	*Haloxylon recurvum*	Leaf-stem	No	2.51	1.12/1.86/0.90	Ph/ SS
84	*Anabasis aphylla*	Annual branches	No	2.40	1.01/1.59/0.73	He/ IT(Ind) -ES
85	*Atriplex halimus*	Leaf extract	Seed, leaf	2.92	2.06/2.12/1.17	Ph/ M- PAL
86	*Salicornia Europaea*	Plant extract	Stem, leaf, seed, oil	2.08	1.89/1.50/0.50	Th/ ES
87	*Eurotia ceratoides*	No	No	2.41	1.18/0.84/0.84	Ch/IT(Ind)-ES-SS
Arecaceae						
88	*Phoenix dactylifera*	No	Fruits	3.17	3.40/1.89/2.07	Ph/ SS(End)
89	*Nannorrhops ritchiana*	Leaf, flower	Fruits	2.91	2.80/2.57/1.97	Ph/ SS(End)
Tamaricacea						
90	*Tamarix aphylla L*	Leaves extract, bark, gall	No	3.06	1.00/1.90/1.39	Ph/ IT, SS(Ind)
91	*Tamarix ramosissima*	Leaf extract, stem bark	No	3.02	0.91/1.81/0.91	Ph/ IT(Ind) -ES
Nitrariacea						
92	*Nitraria schoberi*	Fruits	Fruits	2.72	1.52/1.52/0.97	Ph/ IT(Ind) -ES
Polygonaceae						
93	*Calligonum aphyllum*	Fruit, essential oil, extract	No	2.67	1.01/1.81/1.01	Ph/ ES

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
Berberidaceae						
94	*Berberis thunbergii*	Root and stem extracts, leaves, flowers, fruits	Fruits, leaves	2.78	2.37/2.48/1.47	Ph/ PAL
95	*Berberis khorasanica*	Fruits	Fruits, leaves	2.97	2.52/2.48/1.47	Ph/ IT(End)
Bignoniaceae						
96	*Chilopsis linearis*	Seed pod, flower	Seed pod, flower	3.07	2.12/2.18/1.62	Ph/ AM
Sapindaceae						
97	*Dodonaea viscosa*	Leaf extract	Seed	2.86	2.00/2.12/1.67	Ph/ AUS-PAL-NEO-SU -SS(Ind)
98	*Koelreuteria paniculata*	Flower	Seed, leaf	3.21	2.06/2.28/1.44	Ph/ ES-PAL
99	*Acer negundo*	Sap, inner bark	Seed, leaf, skin, sap	3.21	2.18/2.57/1.90	Ph/ AM
100	*Acer pseudoplatanus*	Sap	Leaves, sap, seed pods	3.21	2.18/2.57/1.90	Ph/ M-ES
Acanthaceae						
101	*Ruellia simplex*	No	No	2.82	1.11/1.11/1.11	He/ NEO
Nyctaginaceae						
102	*Bougainvillea glabra*	Leaves and bracts	No	3.07	1.46/2.37/1.46	Ph/ NEO
Bignoniaceae						
103	*Tecoma radicanstrumpet*	Flower, leaf, branch, root	No	3.27	1.39/2.40/1.39	Ph/ AM
Simaroubaceae						
104	*Ailanthus altissima*	Leaf, fruit, root bark	Leaf	3.16	1.78/2.11/1.44	Ph/ PAL
Caprifoliaceae						
105	*Lonicera caprifolium*	Flowers, leaves, essential oil	Fruits	2.96	1.96/2.39/1.17	Ph/ ES
106	*Symphoricarpos albus*	Fruits	Fruits	2.66	1.67/1.83/0.83	Ph/ AM
Solanaceae						
107	*Datura stramonium*	Leaf, seed	No	2.46	1.07/2.34/1.07	Ph-Th/ NEO-AM
108	*Withania coagulans*	Seed, leaf, root	Seed, fruit	2.35	2.07/2.23/1.17	Ph/ IT-SS(Ind)
109	*Lycium ruthenicum*	Plant extract	Fruit, leaf	2.61	2.29/2.23/1.07	Ph/ IT(Ind) -ES
Pinaceae						
110	*Pinus mugo*	Leaf, fruit, essential oil	Leaf	3.06	2.11/2.44/1.56	Ph/ ES
111	*Pinus nigra*	Extract	Fruits	3.11	2.00/2.06/1.94	Ph/ M
112	*Cedrus deodara*	Essential oil, stem bark	No	3.22	1.47/2.47/2.19	Ph/ PAL- IT
Boraginaceae						
113	*Cordia myxa*	Fruit, sap, leaf, root	Fruits	3.06	2.51/2.48/1.84	Ph/ PAL-SS(Ind)
114	*Cynoglossum officinale*	Leaf, root, oil	Leaves	2.11	1.61/1.72/0.61	He/ M-ES(Ind)
115	*Symphytum officinale*	Leaf, root, gum	Leaves	2.27	1.40/2.62/1.01	He/ M-ES
116	*Echium amoenum*	Flower, leaf	Flowers	2.27	1.86/2.29/0.68	He/ IT(Ind)-ES

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
Moringaceae						
117	*Moringa oleifera*	Leaves, roots, seeds, bark, fruits, flowers, and unripe pods	Pods, young leaves	2.85	2.63/2.73/1.61	Ph/ PAL
Paulowniaceae						
118	*Paulownia tomentosa*	Leaf and fruit extract	Honey production	3.10	2.37/2.91/2.62	Ph/ PAL
Myrtaceae						
119	*Melaleuca citrina*	Root extract	Seed, leaf	3.01	1.86/2.01/1.51	Ph/ AUS
120	*Eucalyptus camaldulensis*	Leaves, resin	Seed	3.21	1.89/2.34/2.39	Ph/ AUS
121	*Myrtus communis*	Leaf, stem, essential oil	Fruit, leaf, flower	2.91	2.39/2.62/1.73	Ph/ M-IT-SS(Ind)
Fagaceae						
122	*Quercus ilex*	Fruit, skin, oak apple, leaf	Acorn	3.17	2.87/2.89/2.18	Ph/ M-ES
123	*Quercus brantii*	Fruit, skin, oak apple, leaf	Acorn	3.17	2.87/2.89/2.12	Ph/ IT(Ind)
124	*Quercus longipes*	Fruit, skin, oak apple, leaf	Acorn	3.17	2.87/2.89/2.18	Ph/ IT(Ind)-ES
Cucurbitaceae						
125	*Luffa acutangula*	Fruit, seed	Unripe fruits	2.47	2.49/2.91/1.36	Th/ PAL
Lauraceae						
126	*Laurus nobilis*	Leaves, oil, essential oil	Dried leaf	3.18	2.91/3.09/1.73	Ph/ M
Asparagaceae						
127	*Agave americana*	Leaf, sap, root	Seed, leaf, stem, sap	2.50	2.02/2.34/1.28	He/ AM
128	*Yucca gloriosa*	Fruit extract	Flower, fruit, root, stem	2.82	2.42/2.01/1.40	Ph/ AM
129	*Danae racemosa*	Leaf extract	No	2.83	1.40/2.18/1.29	Ph/ IT(Ind)
130	*Ruscus aculeatus*	Root, stem	Stem	2.62	2.12/2.62/1.29	G/ M-ES-IT(Ind)
131	*Ophiopogon japonicus*	Root, root extract	Root	2.57	1.90/2.12/0.96	He/ PAL
Aizoaceae						
132	*Lampranthus spectabilis*	Leaves	No	2.45	1.00/1.68/0.83	He/ SU
Araliaceae						
133	*Hedera helix*	Leaf extract, leaf	No	3.06	1.50/2.39/1.33	Ph/ M-ES(Ind)
Gesneriaceae						
134	*Streptocarpus ionanthus*	Flower, oil	No	2.52	1.13/2.20/1.13	He/ SU
Cupressaceae						
135	*Platycladus orientalis*	Seed, leaf	Seed	3.10	2.22/2.56/1.78	Ph/ ES-PAL-IT(Ind)
136	*Cupressus sempervirens*	Leaves, essential oil	No	3.05	1.22/2.11/2.00	Ph/ M-IT(Ind)

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
137	*Juniperus excelsa*	Leaves	Fruits	3.10	2.28/2.123/2.11	Ph/ M- ES-IT(Ind)
138	*Taxodium distichum*	Essential oil	No	3.15	1.46/2.26/2.68	Ph/ AM
139	*Juniperus sabina*	Essential oil	No	2.91	1.28/2.11/1.33	Ph/ M-ES-IT(Ind)
Celasteracea						
140	*Euonymus japonicus*	Leaf, plant extract	Leaves	3.10	2.54/2.48/1.52	Ph/ PAL
Buxaceae						
141	*Buxus sempervirens*	Leaves, wood, bark	Leaves	3.10	2.37/2.47/1.87	Ph/ M-ES-IT(Ind)
Plantaginaceae						
142	*Veronica chamaedrys*	Aerial part	Leaves	2.47	1.74/1.84/0.89	He/ M-ES-IT
Elaeagnaceae						
143	*Elaeagnus angustifolia*	Flower, essential oil	Seed, fruit	3.05	2.57/2.13/1.73	Ph/ ES-IT(Ind)
Portulacaceae						
144	*portulaca grandiflora*	Aerial branch, extract	Seed, leaf, root	2.31	156/1.94/0.61	Th/ NEO
Ginkgoaceae						
145	*Ginkgo biloba*	Fruit, leaf extract	Seed, oil	3.11	2.51/2.67/2.39	Ph/ PAL
Scrophulariaceae						
146	*Verbascum thapsus*	Leaf, fruit, oil	Flowers	2.67	1.92/2.30/0.84	He/ M-ES-IT(Ind)
Malvaceae						
147	*Alcea rosea*	Flower, leaf, root	Flower, root	2.61	2.34/2.50/1.06	He/ IT
148	*Hibiscus syriacus*	Oil, flower, root	Leaf, root, flower	2.98	2.68/2.78/1.42	Ph/ PAL
Caryophyllaceae						
149	*Saponaria officinalis*	Flower, root	No	2.42	0.96/2.51/0.96	G/ ES- IT
Paeoniaceae						
150	*Paeonia lactiflora*	Flower, root	Seed, root, stem	2.76	2.26/2.80/1.40	G/ ES
Anacardiacea						
151	*Cotinus coggygria*	Essential oil, leaves, bark	Leaves	3.06	1.96/2.08/1.84	Ph/ ES-IT(Ind)
Apocynacea						
152	*Nerium oleander*	Flower, bark	No	3.12	1.34/2.52/1.34	Ph/ M- SS-IT(Ind)
Cannabacea						
153	*Celtis australis*	Leaf, fruit	Fruits	3.17	2.46/2.50/2.29	Ph/ M- ES(Ind)
154	*Celtis caucasica*	No	Fruits	3.17	2.46/1.22/2.29	Ph/ ES-IT(Ind)
Asphodelaceae						
155	*Hemerocallis fulva*	Root, stem, oil	Leaf, root, flower	2.81	2.40/1.97/1.01	G/ PAL-ES

Table 3. Continued

Row no.	Scientific name	Medicinal use	Edible use	Analysis of		Life form/ chorotype
				Aesthetic values	Food/medicine/ wood values	
Calycanthaceae						
156	*Chimonanthus fragrans*	Flower, essential oil, leaf, root	Flowers	2.93	2.24/2.08/1.30	Ph/ ES-PAL
Tropaeolaceae						
157	*Tropaeolum majus*	Flower, oil	Seed pods, seeds, leaves, flowers	2.57	2.13/1.79/0.57	Th/ NEO
Altingiacea						
158	*Liquidambar styraciflua*	Gum	Gum	3.27	2.46/2.57/2.51	Ph/ AM

Life form: Th (Therophyte), Ch (Chamaephyte), He (Hemicryptophyte), Ph (Phanerophyte), and G (Geophyte); Chorotype: SS (Saharo-Sindian); IT (Irano-Touranian); M (Mediterranean); ES (Euro-Siberian); Cosm (Cosmopolitan); AM (American); SU (Sudano-Zambezian); TR (Tropical); NEO (Neotropical); AUS (Australian); PAL (Paleotropic); End (Endemic); Ind (Indigenous).

RESULTS AND DISCUSSION

In arid and semi-arid areas, water and soil resources are salty for many reasons. And the development of vegetation is facing serious problems. In addition, due to population growth, water sources that can used for irrigation are limited. Therefore, the introduction and selection of ornamental species that can tolerate salty conditions is of particular importance and can contribute to the stability of the created green covers. In other words, in the sustainable design of urban green spaces in arid environments, it is necessary to choose plant species that can tolerate water and salinity stress in addition to their aesthetic value (Christoforidi *et al*., 2022). Based on the investigations carried out in this research, 158 ornamental species resistant to salinity and drought have been cultivated in the central plateau of Iran, of which 156 species are resistant to drought, and 67 species are tolerant to salinity.

The selection of native species that have already adapted to the environmental conditions of the region outclass the exotic species in landscape design. Introduced ornamental plants are usually difficult to acclimatize and use large amounts of irrigation water and production inputs. Some native species are more salt tolerant than exotic species, attract and retain greater numbers of natural enemies, are used as habitat management in biological control, and are best adapted to local climatic and soil conditions (Alam *et al*., 2017). Therefore, understanding whether these species are native or non-native and how they are distributed in Iran and the world can help in the optimum exploitation of arid environments. Of the 158 studied species, only 60 are native species, 19 of which are endemic, and 41 are indigenous and there are 98 exotic species (Fig. 3).

The best way to utilize the degraded land is to domesticate the wild native species rather than to increase the salt tolerance of plant species. The successful approach is to select the wild species that have genetic tolerance to salt stress and have some economic and landscape potential. This new policy is proposed to promote arid landscaping and maximum use of water for conserving amenity planting. This approach has been successful in saving water in the arid cities of southwestern UAE. It also helped to increase the beauty and aesthetic value of desert cities. The adoption of an arid landscape policy would reduce the energy requirements by more than half and the maintenance costs of the landscape design. (Alam *et al*., 2017).

Final results on the importance of ornamental plants in creating beautiful and sustainable gardens has shown that these ornamental flowering plants not only enhance the beauty of gardens and landscapes, but also have applications in the pharmaceutical, aromatic, timber, food production, and other industries. In this research, out of 158 studied ornamental species, 116 species have edible uses, 149 species have medicinal uses, and 110 species have both edible and medicinal uses.

The silvomedicinal system is the new paradigm of integration of trees and medicinal plants, which can provide an array of products ranging from food, fodder, fruit, fiber, pulp, medicinal plants, etc for consumption and trade. Moreover, conserves biodiversity and reduces the pressure on natural resources.

Most medicinal plants grow in the under-forest layer and are shade-tolerant. Therefore, the agroforestry system offers a convenient strategy for promoting their cultivation and conservation. In the silvomedicinal system shade tolerant medicinal plants would be integrated as lower-strata species in the multistrata system. It would be cultivated in a short cycle in the existing stands of the plantation crops and the medicinal trees as shade providers and boundary markers. Another way is to grow medicinal trees as shade providers and boundary markers. Tall and perennial medicinal trees are planted at wide spacing in this system (Kalaichelvi and Arul Swaminathan, 2009). The interspaces in between the trees are utilized for growing green spaces or medicinal crops.

In terms of global chorotype, there are 60 species of Irano-Touranian region, 17 species of Saharo-Sindian, 39 species of Mediterranean, 51species of Euro-Siberian, 16 species of American, nine species of Sudano-Zambezian, 32 species of Paleotropic, 12 species of Neotropical, five species of Australian, and one species of cosmopolitan (Fig. 1)

Life form spectra of the 158 studied species included 96 phanerophyte species, eight chamaephyte species, 40 hemicryptophyte species, seven geophyte species, and seven therophyte species (Fig. 2).

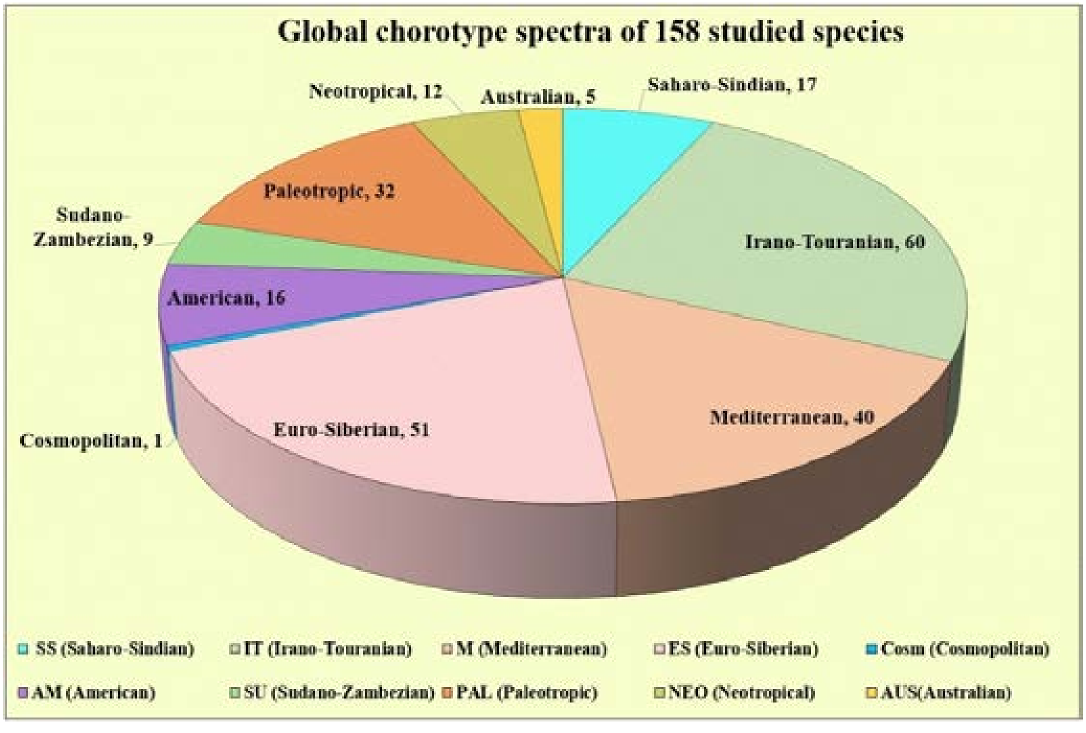

Fig. 1. Global chorotype spectra of the 158 studied species.

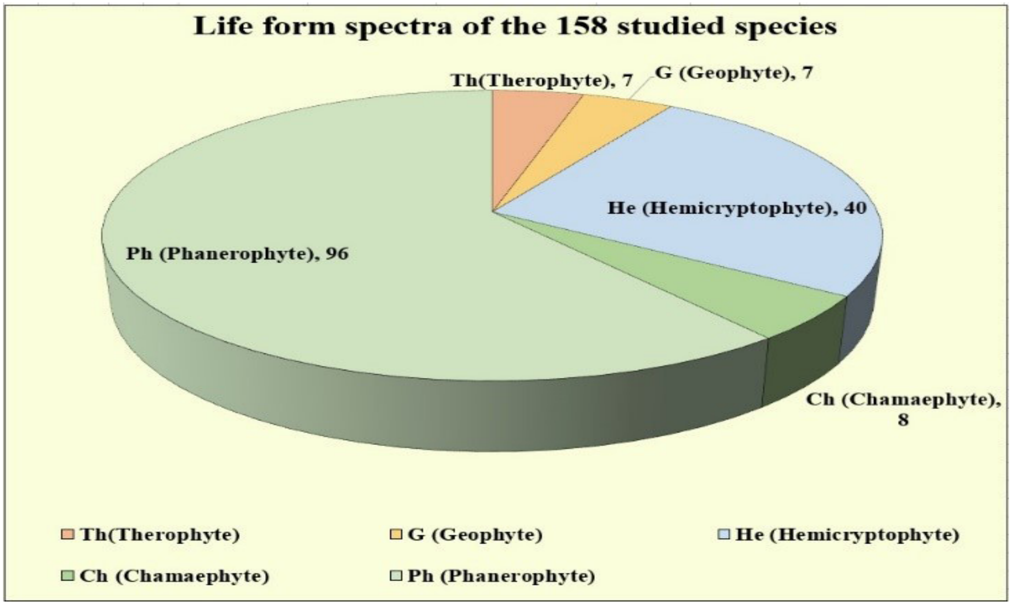

Fig. 2. Life form spectra of the 158 studied species included 96 Phanerophyte species, eight Chamaephyte species, 40 Hemicryptophyte species, seven Geophyte species, and seven Therophyte species.

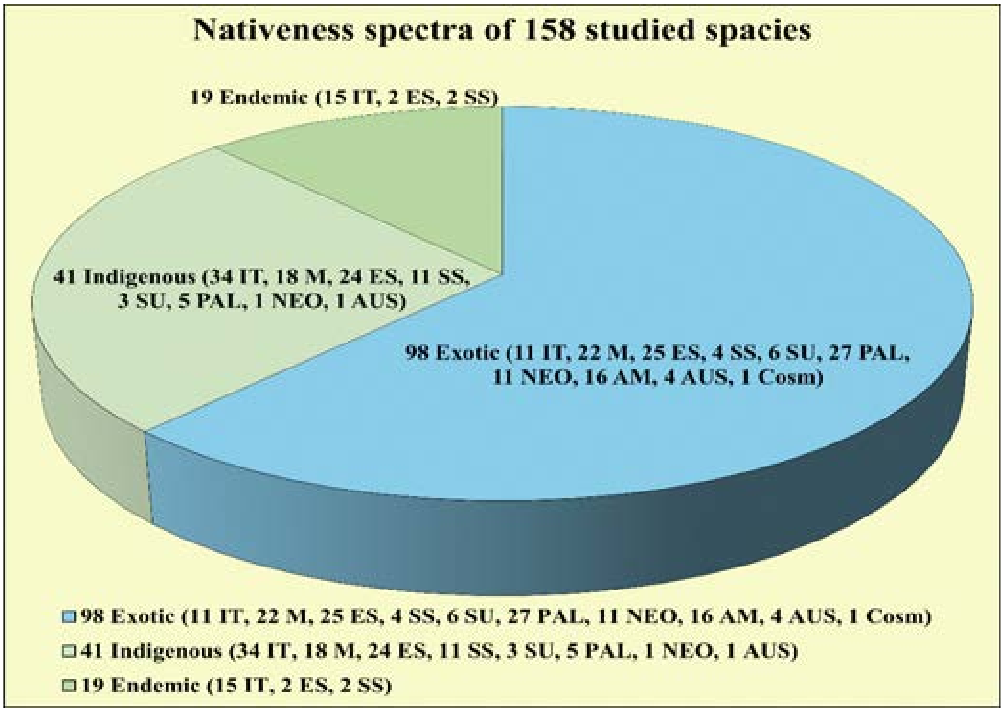

Fig.3. The nativeness spectra of the 158 studied species included 19 endemic species, 41 indigenous species, and 98 exotic species.

In this study, by Ecosystem Services Evaluation Model (ESEM) evaluated aesthetic values and economic benefits (food provisioning; natural medicines, pharmaceuticals; wood, fiber production) for 158 ornamental studied species. The scores of each service are presented in column 5,6 in table 1.

Fig. 4 shows the ranking of aesthetic value and economic benefits in 158 studied ornamental species.

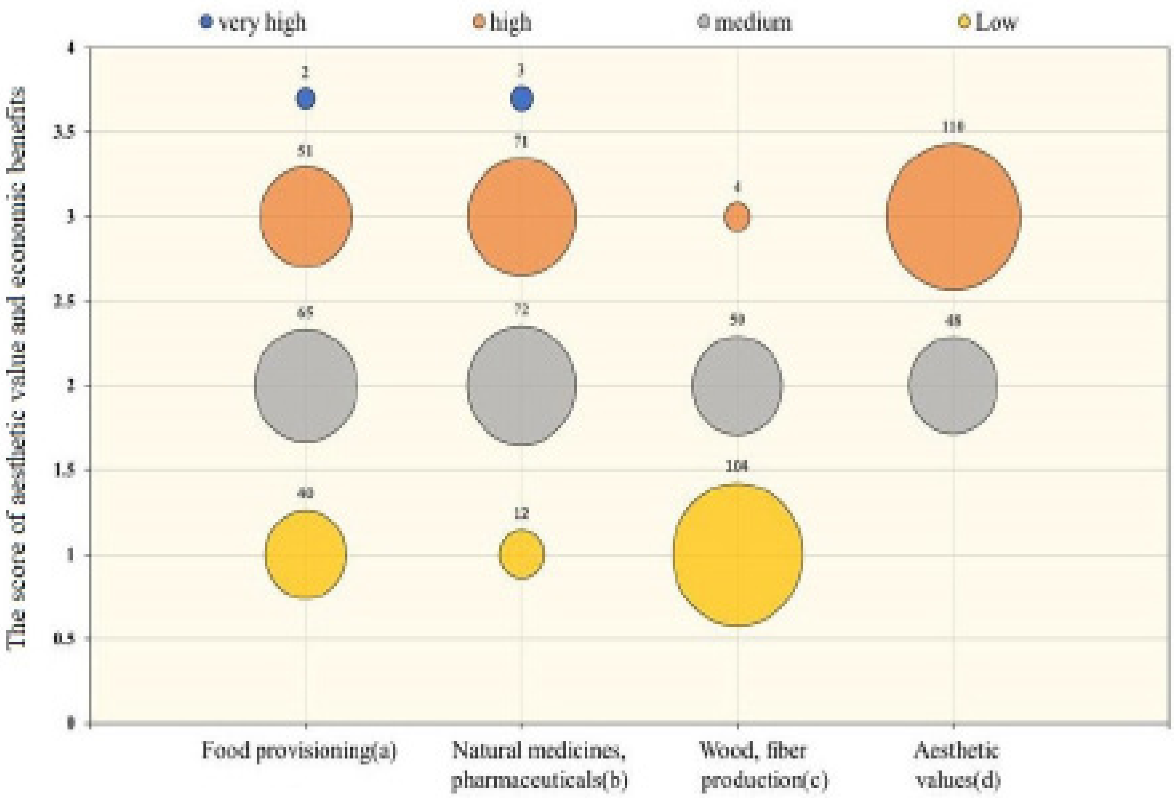

Fig.4. Ranking of aesthetic value and economic benefits in 158 studied ornamental species.

Medicinal plants have a low water requirement due to their adaptability to arid and semi-arid climates, and their cultivation can play an influential role in preserving limited water resources. Therefore, changing the cultivation pattern and replacing drought-resistant medicinal plants can reduce water consumption and be a practical step toward achieving sustainable agriculture. It will also increase the biodiversity of the region.

Nowadays, the introduction and cultivation of new species in Iran has increased, so for better management of dry environments, it is necessary to understand whether this species is native to Iran, what is its life form in Iran, what is its global chorotype, and what is its current geographic distribution in Iran. Investigating these indicators can be used to predict the success or failure of establishing a species in a new environment.

The score for each of the aesthetic values, and economic benefits (Food provisioning; Natural medicines, pharmaceuticals; Wood, fiber production) was calculated for the 158 ornamental plants studied. Then, by comparing the model scores, the species with the highest aesthetic values and economic benefits among the 158 ornamental species studied were identified. Table 4 shows the species with the highest rank of aesthetic values, and economic benefits among the 158 studied ornamental species.

Using the ecosystem services evaluation model presented in this study to compare the aesthetic values and economic benefits of ornamental species provides a guide for selecting plants in green spaces.

Table 4. The species with the highest rank of aesthetic values, and economic benefits among the 158 studied ornamental species.

Rank	Cultural service		Provisioning services					
	Aesthetic values (d)	**Score**	**Food provisioning (a)**	**Score**	**Natural medicines, pharmaceuticals (b)**	**Score**	**Wood, fiber production (c)**	**Score**
1	*Tecoma radicanstrumpet*	3.27	*Olea europaea*	3.67	*Punica granatum*	3.67	*Fraxinus excelsior*	3.11
2	*Liquidambar styraciflua*	3.27	*Punica granatum*	3.61	*Olea europaea*	3.61	*Taxodium distichum*	2.68
3	*Sophora japonica*	3.26	*Ligustrum lucidum*	3.40	*Rosa canina*	3.52	*Paulownia tomentosa*	2.62
4	*Cedrus deodara*	3.22	*Pyrus boissieriana*	3.40	*Ligustrum lucidum*	3.46	*Liquidambar styraciflua*	2.51
5	*Crataegus monogyna*	3.22	*Phoenix dactylifera*	3.40	*Crataegus monogyna*	3.46	*Ginkgo biloba*	2.39
6	*Zelkova carpinifolia*	3.21	*Crataegus monogyna*	3.37	*Punica granatum*	3.28	*Eucalyptus camaldulensis*	2.39
7	*Koelreuteria paniculata*	3.21	*Fraxinus excelsior*	3.22	*Fraxinus excelsior*	3.28	*Maclura pomifera*	2.33
8	*Acer negundo*	3.21	*Rosa canina*	3.14	*Rubia tinctorum*	3.28	*Celtis australis*	2.29
9	*Acer pseudoplatanus*	3.21	*Aloysia citriodora*	3.12	*Pyrus boissieriana*	3.18	*Celtis caucasica*	2.29
10	*Eucalyptus camaldulensis*	3.21	*Cynara scolymus*	3.11	*Foeniculum vulgare*	3.17	*Leucaena leucocephala*	2.28

CONCLUSION

Indiscriminate use of water for irrigation and an increase in population demand can be one of the reasons for severe water shortage soon. In all the cities located in the central plateau of Iran, they are facing the problem of water shortage for green spaces. This lack of water is the limiting factor for landscaping and greenery. Creating urban green spaces with the plants introduced in this research can be an alternative way for sustainable greenery in severe conditions of water scarcity and salinity, which brings many other ecological and economic benefits. This paper introduces many economic ornamental plants suitable for arid environments. By choosing various species of medicinal and edible plants, we have increased ecosystem services and biodiversity, in addition to benefiting from the aesthetic aspect of these species.

In order to identify and select these species to create green spaces in dry environments, knowing the factors of nativeness, resistance to drought and salinity, and the chorotype of these plants is particularly important for the previously mentioned reasons, and the selection of plant species is the success factor in the expansion of green space.

The bioregion of the Central Plateau of Iran is IT (Irano-Touranian). Out of the 158 species studied, 60 plant species have repeated presence in the flora of Irano-Touranian, of which only 15 plant species are endemic to Iran. There are also four endemic species from the bioregions of ES from the country's north and SS from the south of the country in the central plateau of Iran.

In the success of growing plants in dry environments, attention should be paid to the primary origin of the species; the closer the current conditions of cultivation of the species are to its primary origin, the maximum growth that the plant has in its primary origin will also be in the new habitat. The geographical distribution of 158 studied species in Iran shows that the regional chorotype spectrum of species transcribes its global chorotype spectrum. A greenspace species is more successful in that habitat closer to its primary origin. For example, there are 60 repetitions of the presence of the species in the Irano-Touranian bioregion. Regarding providing suitable conditions for plant growth, the 158 studied species respectively have the highest environmental affinity with IT, ES, M, PAL, SS, AM, NEO, SU, and AUS bioregions.

In this study, by Ecosystem Services Evaluation Model (ESEM) compared aesthetic values and economic benefits of 158 ornamental studied species. For qualitative expression of Ecosystem Service Evaluation Model (ESAM) score,the scores distinct to four level low (≤1.5), medium (≤2.5 , >1.5), high (≤3.5 , >2.5), and very high (> 3.5).

For example, in terms of qualitative expression, after scoring the natural medicines, pharmaceuticals (b),3 plant species, including *Punica granatum, Olea europaea, Rosa canina,* had very high scores, 71 plant species, including *Ligustrum lucidum, Crataegus monogyna,* etc. had high scores, 72 plant species had medium scores, and 12 plant species had low scores.

Increasing biodiversity is achieved by cultivating medicinal species in green spaces. The aim of this research is to introduce medicinal and industrial plants resistant to salinity and drought for the design of hand-planted green spaces in the hot and dry areas of the Iranian plateau. finally, the number of 158 ornamental species of medicinal and industrial plants for cultivation in the green space of arid and semi-arid regions has been presented. Among the plant species presented, 17 species of evergreen trees, 29 species of deciduous trees, 29 species of evergreen shrubs, 26 species of deciduous shrubs, 10 species of bushes, 43 species of herbs and 4 species of succulents. The largest number of species presented belongs to the Asteraceae family with 13 species, the Fabaceae family with 13 species, the Rosaceae family with 11 species, the Amaranthaceae family with 10 species, the Lamiaceae family with 9 species, and the Oleaceae family with 6 species. the total number of plant families is 62 families.

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