Iranian Journal of Forest
Vol. 16, No. 5, Winter 2025
pp. 57-70

DOI: 10.22034/ijf.2025.440476.1970

Research Article

The Nature of Vegetation Cover and Urban Biotopes in Kiashahr Port, Gilan Province

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(Received: 20 January 2024; Accepted: 27 October 2024)

Abstract

Urban plants provide multiple ecosystem services for human physical and mental well-being. Understanding these plants is crucial for biodiversity conservation and sustaining ecosystem services. This study focused on the flora of Kiashahr Port city and its various biotopes. The city is located on the southern coast of the Caspian Sea, situated between two important reserves: Safrabasteh Plain Forest and Bujagh National Park. According to the results, 220 species belonging to 190 genera of 76 families were identified. The richest family in terms of species was the Poaceae (26 species), followed by that of the Asteraceae (20 species). The recorded plants were classified as cultivated ornamental, remnant and spontaneous plants. The predominant life form of the cultivated ornamental plants was Phanerophytes (46 species; 56%), while the most common life forms of remnant and spontaneous plants were Therophytes (71 species; 53%). Native species were more widespread than exotic ones, with 96 exotic species (44%) identified, of which 17 species had invasive potential. . Residential or native remnant areas had a higher richness of plant species than other biotopes. Considering that spontaneous and invasive plants contribute to the homogenization of urban vegetation, this paper proposes the conservation of remnant plants and the use of native ornamental plants in man-made green spaces.

Keywords: Caspian Sea, coastal city, exotic species, native species, resistant species.

1. Introduction

Urban green spaces are consisted of natural, semi-natural, and man-made vegetation. They include parks, gardens, street trees, riversides, brownfields, secondary sites, ruderal and pioneer habitats, open spaces, and remnant forests (Kim et al., 2018). Urban vegetation provides a wide range of ecological services in urban areas. These plants affect aesthetic enhancement, environmental improvement, ecological enrichment, and economic and social benefits for residents (Gozalo et al., 2019). In other words, urban green spaces play a key role in supporting human health and well-being (Douglas, 2017).

Urban vegetation can be classified into three main categories: 1. Cultivated ornamental plants which are intentionally introduced and maintained by humans, 2. Remnant plants that grow naturally in native habitats around urban settlements, 3. Spontaneous plants that are not intentionally propagated by humans, but are not considered remnants of natural habitats. These plants can be found in various types of green space within a city as well as growing on hard surfaces such, rooftops, old walls and pavement surfaces (Cervelli et al., 2013; Gao et al., 2021).

Research focusing on urban flora in Iran has been relatively limited. Notable contributions include Ghahreman & Attar's study (2001) on the "Biodiversity of plant species in Tehran Megalopolis," which provided significant insights into urban flora. Shahsavari (2008) documented 285 species from Hamadan, while Naghinezhad et al. (2009) recorded 163 species

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in urban areas of Babol, and offered a classification based on hemeroby. Khajehzadeh and Shahsavari (2014) identified 111 species categorized as ruderal and segetal from Bushehr city. Furthermore, Toghranegar & Vafadar (2020) identified 122 tree and woody shrub species from the central district of Zanjan county. Additionally, urban native plants have been explored from ethnobotanical (Abtahi, 2019) and ornamental perspectives (Mirzadeh Vaghefi & Jalili, 2020).

The rapid expansion of cities and urbanization is significantly altering the ecological processes and the characteristics of urban areas, resulting in the loss of natural habitats and increased heterogeneity in urban habitats (Gao et al., 2021). Kiashahr Port is located between two rare Hyrcanian plain reserves – Safrabasteh lowland forest and Bujagh National Park. Investigating the existing flora, including both native and non-native species, and identifying invasive plants, is crucial for understanding the impact of the city's development on these valuable surrounding natural environments. Therefore, this study aimed to comprehensively investigate all vascular plants across various areas (sites) within the inner court of Kiashahr to (1) assess spontaneous and cultivated ornamental plants, (2) differentiate between native and non-native plants, and (3) evaluate the presence of invasive plants.

2. Material and Methods

2.1. Study area

The Kiashahr Port is located on the coast of the Caspian Sea in Astaneh Ashrafie, Gilan Province. It is situated at the junction of the Sefid-Rud river (37°25'9" N, 49°56'59" E), at an elevation of 26 m below sea level. The whole municipality's green spaces cover ca. 213,870 m^2 and the city has a population of more than 14,000. Most of the people of Kiashahr are farmers and fishermen. The fishing industry in this city is very old (Khairkhah Hasan Kiadeh, 2010).

Available standardized data from the Meteorological Station of Kiashahr Port show an annual mean precipitation of 1,303 mm, with a maximum (ca. 235 mm) in October-November. The average of the lowest monthly temperatures is 8º C, while the average of the highest monthly temperatures is 26ºC (Figure 1). The coldest month is January and the hottest is August. According to the Emberget index, Kiashahr falls within the very humid climatic unit (Naghinezhad et al., 2006).

Figure 1. Ombrothermic diagram of Gaussen based on meteorological data collected at Kiashahr Port Station (period 2007-2021). Blue lines: mean monthly temperatures. Red lines: mean monthly precipitation

This port restricted by two important Hyrcanian plant reserves, Bujagh National Park and Safrabasteh Plain forest and also to the north by Caspian Sea coastline. The potential natural vegetation in the area consists of *Alnus glutinosa -Populus caspica* forests (Naghinezhad et al., 2006).

2.2. Data collection

The field survey was conducted within the borders of the city of Kiashahr Port between 2022 and 2023. The floristic aspect of the study included all vascular plants, on all biotopes including buildings, asphalt and paved surfaces, remnant and ruderal areas,

median and verge, tree alleys, and streams. Taxonomic identification of plant species was carried out using the works of Rechinger (1963-2015), Assadi et al. (1988-2023), Davis (1965-1988), and Bidarlord & Ghahremaninejad (2022). Plant nomenclature and geographic distribution followed Meusel et al. (1965), Borsch et al. (2020), and GBIF (2023). Plant life forms were defined based on Raunkiaer's classification system (Raunkiaer, 1934). Identified species were classified as spontaneous, remanat or planted ornamental plants, both native and alien (Cervelli et al., 2013; Gao et al., 2021). Herbarium materials were deposited in the Herbarium of the Guilan Agricultural and Natural Resources Research and Education Center.

3. Result

A total of 220 vascular plant species were recorded , from 190 genera and 76 families (Table 1). The most conspicuous families were Poaceae (26 species, 24 genera), Asteraceae (20 species, 18 genera) Fabaceae (10 species, 6 genera) and Brassicaceae (9 species, 8 genera) (Figures 2 and 4).

Within the Kiashahr Port green spaces, a large number of species were intentionally planted as ornamental plants (81 taxa or 38%). Remnant species (74 species or 34%) and spontaneous species (61 species or 28 %) were common in the Kiashahr flora (Figure 5).

The vegetation of Kiashahr Port comprises a mosaic of different microhabitats (Figure 3). All green elements within the municipal area were identified and classified into six main biotopes. The species that grow in these biotopes include 121 species on abandoned, ruderal and remnant areas, and peripheral forests (W), 115 species in median refuges, public squares, and municipal parks (R), 74 species on buildings and overgrown structures (B), 63 species around street trees, pedestrian refuges, and street verges (V), 29 species along streams and water adges (S), and 64 species on asphalted and paved surfaces (A) (Figure 7).

The life forms of spontaneous and cultivated ornamental plants were examined separately. The life forms of spontaneous plant species in Kiashahr municipality areas include Therophytes (73 species), Hemychryptophytes (30 species), Geophytes (18 species), Helophytes (8 species), and Chromophytes (4 species). The life forms of plants cultivated as ornamental in the city are presented in Figure 5. The life forms of intentionally planted ornamental species are composed of Phanerophytes (46 species), Hemychryptophytes (19 species), Chromophytes (10 species) and Geophytes (4 species) (Figure 5).

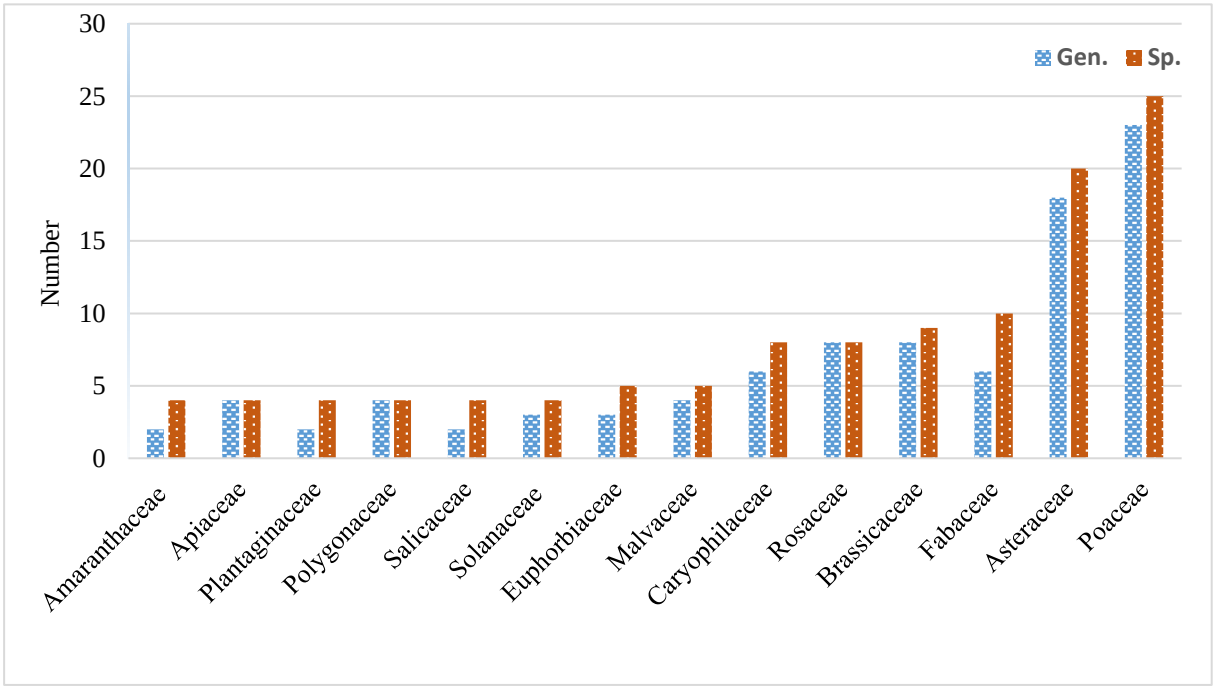

Figure 2. Frequency of plant families in the urban green areas of Kiashahr Port

Figure 3. Representative biotopes of urban green spaces in Kiashahr Port

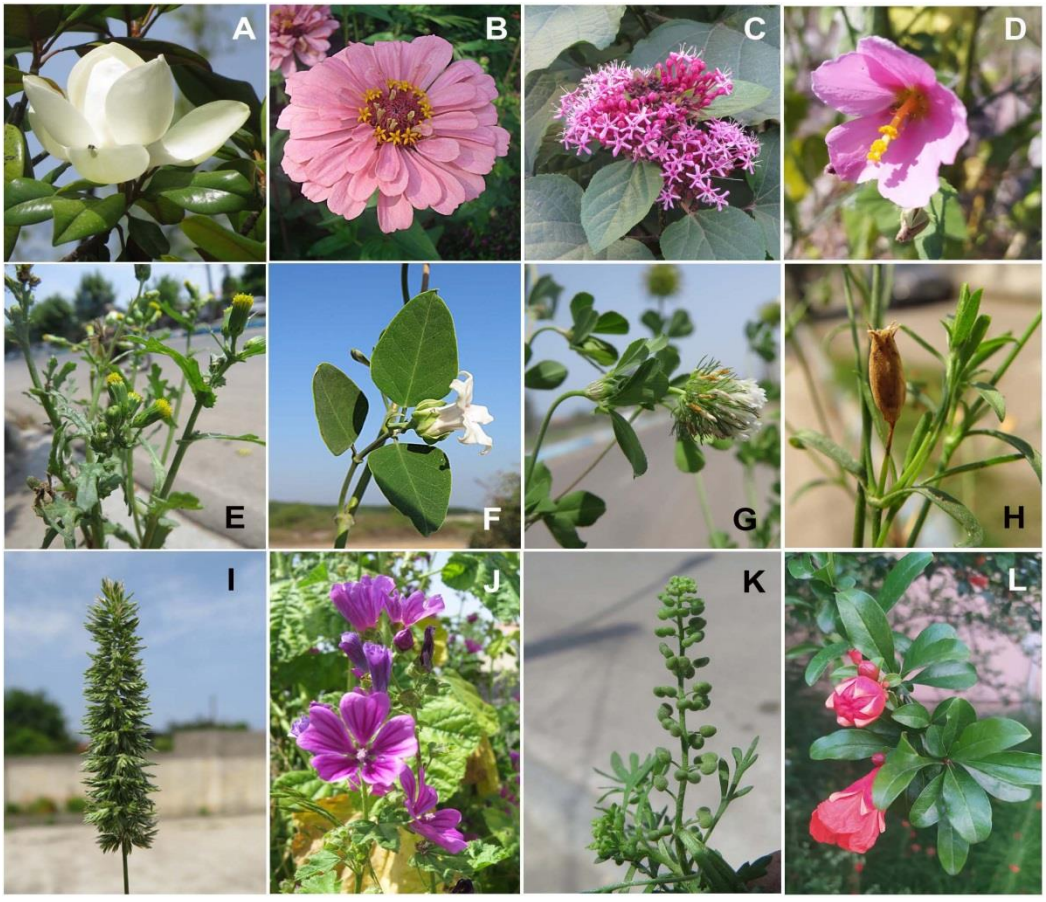

Figure 4. Some plants found in the urban green spaces of Kiashahr Port. A) *Magnolia grandiflora*, B) *Zinnia elegans*, C) *Clerodendrum bungei*, D) *Kosteletzkya pentacarpos*, E) *Senecio vulgaris*, F) *Araujia sericifera*, G) *Trifolium lappaceum*, H) *Silene nocturna*, I) *Rostraria cristata*, J) *Malva sylvestris*, K) *Lepidium didymium*, L) *Punica granatum*

A total of 120 native species were recorded, representing 56% of all surveyed species (Figure 5). Exotic or neophyte species made up a significant portion of the flora, with 96 taxa (44% of the total flora). Seventeen non-native species, known to be invasive, include: *Ailanthus altissima* (Mill.) Swingle, *Araujia sericifera* Brot, *Azolla filiculoides* Lam., *Bromus catharticus* Vahl, *Clerodendrum bungei* Steud., *Erigeron bonariensis* L., *Lepidium didymum* L., *Lepidium virginicum* L., *Lonicera* × *heckrottii* Rehder, *Mirabilis jalapa* L., *Oxalis debilis* Kunth , *Paspalum distichum* L., *Sesbania punicea* (Cav.) Benth., *Sida rhombifolia* L., *Solanum sisymbriifolium* Lam., *Symphyotrichum squamatum* (Spreng.) G.L.Nesom, *Zantedeschia aethiopica* (L.) Spreng.

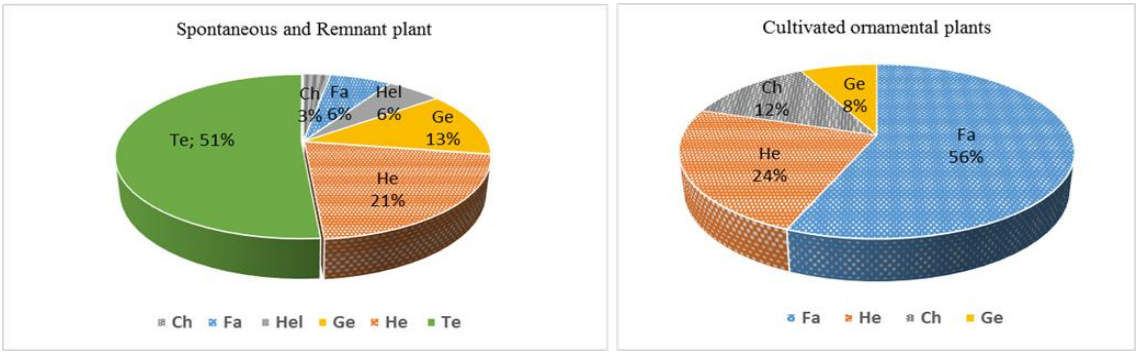

Figure 5. Life form spectrum of the recorded species in the urban green spaces of Kiashahr Port. Spontaneous and Remnant plants (left), cultivated ornamental plants (right), (Abbreviation. Fa: Phanerophytes, Ch: Chamaephytes, Ge: Geophytes, Hel: Helophytes, He: Hemicryptophytes, and Te: Therophytes)

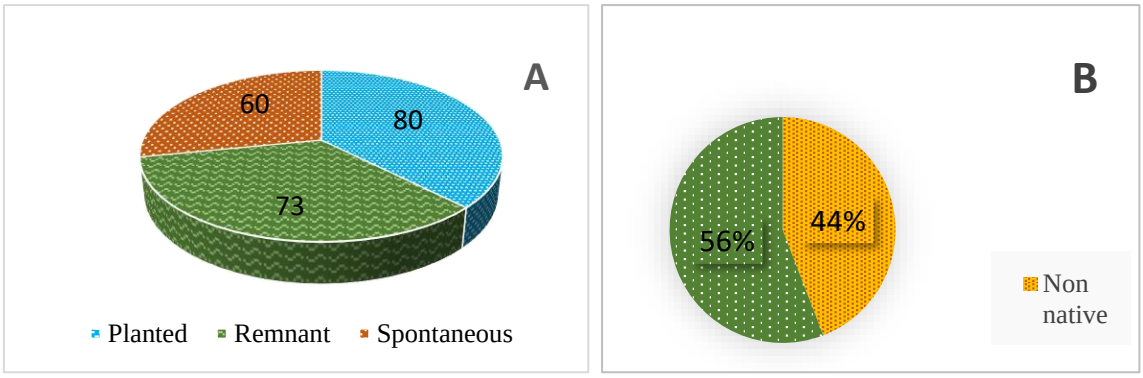

Figure 6. Plants of Kiashahr Port city, A) ratio of cultivated to spontaneous plants; B) ratio of non-native to native plants

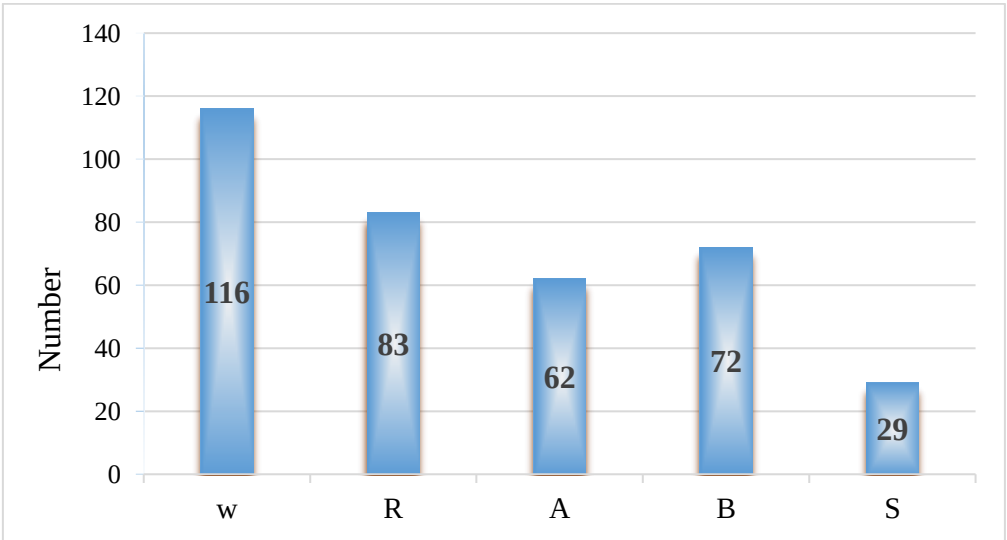

Figure 7. Urban habitat and their recorded plants, Stream and water verge (S), Asphalted and paved surfaces (A), Buildings (B), Street verge (V), Square, median and mini-parks (R), Remnant and abandoned areas (W)

Table 1. Identified taxa on the urban green spaces of Kiashahr Port city. Life forms are classified according to Phanerophyta (Fa), Chamaephyta (Ch), Hemicryptophyta (He), Geophyta (Ge), Therophyta (Te) and Hydrophyta(Hel). Locality designations include: Intentionally planted (P), abandoned, ruderal and remnant areas and peripheral forests (W), around street trees, street medians, verges, and municipal parks (R), buildings and overgrown structures (B), streams and water verges (S), pedestrian refuge, and street verges (V), and asphalted and paved surfaces (A). The origin of species is denoted as Sp. (Spontaneous) or Re. (Remnant plant). The invasive plant are marked with (➢)

Family	Plant Name	Life Form	Biotopes	Spontaeus/ remant	Non native	Native
Acanthaceae	*Justicia brandegeeana* Wassh. & L.B.Sm	Ch	V	P	□	
	Justicia carnea Lindl.	Ch	V	P	□	
Aizoaceae	*Delosperma cooperi* (Hook.f.) L.Bolus	Ch	V	P	□□	
	Mesembryanthemum cordifolium L.f.	He	V	P	□	
Altingiaceae	*Liquidambar orientalis* Mill	Fa	V	P	□	
Amaranthaceae	*Amaranthus hybridus* L.	Te	R, W	Sp	□	
	Amaranthus retroflexus L.	Te	R, W	Sp	□	
	Amaranthus viridis L.	Te	R, W	Sp	□	
	Chenopodium album L.	Te	A,B, R, W	Sp		□
Amaryllidaceae	*Narcissus tazetta* L.	Ge	V	P		□
Apiaceae	*Eryngium caucasicum* Trautv.	He	B, R, W	Re		□
	Hydrocotyle ranunculoides L.f.	Ge (Rh)	S	Re		□
	Pimpinella affinis Ledeb.	He	A, B, R, W	Re		□
	Torilis leptophylla (L.) Rchb.f.	Te	A, B, R,W	Sp		□
Apocynaceae	*Asclepias curassavica* L.	He	V	P	□	
	Araujia sericifera Brot.	Fa	w	Sp	□□	
	Nerium oleander L.	Fa	V, R	P	□	
	Periploca graeca L.	Fa	W	Re		□
Araceae	*Lemna minor* L.	Hel	S	Re		□
	Spirodela polyrhiza (L.) Schleid.	Hel	S	Re		□
	Zantedeschia aethiopica (L.) Spreng.	He	V	P	□□	
Araliaceae	*Hedera helix* L.	Fa	B	P	□	
Arecaceae	*Phoenix dactylifera* L.	Fa	V, R	P	□	
	Washingtonia filifera (Rafarin) H.Wendl. ex de Bary	Fa	V	P	□	
Asparagaceae	*Agave americana* L.	Ch	V, R	P	□	
	Yucca filamentosa L.	He	V, R	P	□	
Asphodelaceae	*Hemerocallis fulva* (L.) L.	Ge (Rh)	V	P	□	
	Phormium tenax J.R.Forst. & G.Forst.	Ch	R	P	□	
Asteraceae	*Artemisia annua* L.	Te	A,W	Sp	□	
	Bidens tripartita L.	Te	R, W	Re		□
	Calendula officinalis L.	He	R	P	□	
	Centaurea iberica Trevir. ex Spreng.	Te	W	Re		□
	Crepis foetida L.	Te	A,B, R, W	Re		□
	Dimorphotheca sp.	He	V	P	□	
	Erigeron bonariensis L.	He	A,B, R, W	Sp	□□	
	Erigeron canadensis L.	Te	A,B, R, W	Sp	□	
	Hedypnois rhagadioloides (L.) F.W. Schmidt	*Te*	R, W	Sp		□
	Gazania linearis Druce	He	V	P	□	
	Mulgedium tataricum (L.) Dc.	He	W	Re		□
	Senecio vernalis Waldst. & Kit.	Te	A,B, R, W	Re		□
	Senecio vulgaris L.	Te	A, B, R,W	Sp		□
	Silybum marianum (L.) Gaertn.	He	W	Sp		□
	Sigesbeckia orientalis L.	Te	W	Re		□
	Sonchus asper (L.) Hill.	Te	A, B, R, S,W	Sp		□
	Symphyotrichum squamatum (Spreng.) G.L.Nesom	He	A, B, R,W	Sp	□□	
	Taraxacum sp.	He	A, B, R,W	Sp		□

Table 1.

Family	Plant Name	Life Form	Biotopes	Spontaeus/ remant	Non native	Native
	***Urospermum picroides* (L.) Scop. ex F.W.Schmidt**	**Te**	**A, B, R,W**	**Sp**		□
	Zinnia elegans Jacq.	He	V, R	P	□	
Berberidaceae	*Nandina domestica* Thunb.	Fa	V	P	□	
Bignoniaceae	*Campsis grandiflora* (Thunb.) K.Schum.	Fa	B	P	□	
Betulaceae	*Alnus glutinosa* (L.) Gaertn.	Fa	W	Re		□
Boraginaceae	*Nonea lutea* (Desr.) DC.	Te	A, B, R, W	Re		□
	Symphytum asperum Lepech.	He	V	P		□
Brassicaceae	*Brassica oleracea* L.	He	R	P	□	
	Capsella bursa-pastoris (L.) Medicus	Te	A,B, R, W	Sp		□
	Cardamine hirsuta L.	Te	A,B, R, W	Sp		□
	Lepidium didymum L.	Te	A, B, R	Sp	□□	
	Lepidium virginicum L	Te	B, R, W	Sp	□□	
	Matthiola sinuata (L.) R.Br	Ch	V	P	□	
	Rorippa palustris (L.) Besser	Ge (Rh)	S	Re		□
	Sisymbrium officinale (L.) Scop.	Te	A, B, R,W	Sp		□
	Spinacia oleracea L.	Ch	R	P		□
Cactaceae	*Opuntia* sp.	He	V	P	□	
Campanulaceae	*Campanula rapunculus* L.	He	R	Re		□
Cannabaceae	*Celtis caucasica* Willd.	Fa	V	P		□
Cannaceae	*Canna indica* L.	Ch	P		□	
Caprifoliaceae	*Lonicera × heckrottii* Rehder	Fa	p		□□	
	Sambucus ebulus L.	He	W	Re		□
Caryophilaceae	*Cerastium semidecandrum* L.	Te	A,B, R, W	Re		□
	Dianthus chinensis L.	He	V	P	□	
	Polycarpon tetraphyllum (L.) L.	Ge (Rh)	B,S, R, W	Sp		□
	Sagina apetala Arduino	Te	A, B, R,W	Sp		□
	Silene conica L.	Te	A, B, R,W	Re		□
	Silene gallica L.	He	W	Sp	□	
	Silene nocturna L.	Te	A, B, R,W	Sp		□
	Stellaria media (L.) Vill.	Te	A, B, R,W	Re		□
Convolvulaceae	*Convolvulus arvensis* L.	Te	R, W	Sp		□
	Dichondra repens J.R.Forst. & G.Forst.	He	V	P	□	
Cupressaceae	*Chamaecyparis sphaeroidea* (Spreng.) Spach	Fa	V, R	P	□	
	Cupressus sempervirens L.	Fa	V, R	P	□	
	Taxodium distichum (L.) Rich.	Fa	V	P	□	
Cyperaceae	*Cyperus alterniflorus* R.Br.	Ge (Rh)	A, B, R,W	Re	□	
	Carex divulsa Stokes	Ge (Rh)	W	Re		□
	Cyperus odoratus L.	Ge (Rh)	w	Re		□
	Cyperus rotundus L.	Ge (Rh)	W, A	Re		□
Elaeagnaceae	*Elaeagnus umbellata* Seeds	Fa	V	P	□	
Equisetaceae	*Equisetum telmateia* Ehrh.	Ge (Rh)	S, W	Re		□
Euphorbiaceae	*Acalypha australis* L.	Te	A, B, R	Sp	□	
	Euphorbia helioscopia L	Te	A,B, R, W	Re	□	
	Euphorbia peplus L.	Te	W	Re		□
	Euphorbia turcomanica Boiss.	Te	W	Re	□	
	Ricinus communis L.	He	W	Sp	□	
Fabaceae	*Lotus corniculats* L.	He	W	Re		□
	Medicago lupulina L.	He	A, B, R, W	Sp		□
	Medicago minima (L.) Bartalini.	He	A, B, R, W	Re		□
	Medicago polymorpha L.	Te	A, B, R, W	Re		□
	Robinia pseudoacacia L.	Fa	P			□
	Senna corymbosa (Lam.) H.S.Irwin & Barneby	Fa	P		□	

Table 1.

Family	Plant Name	Life Form	Biotopes	Spontaeus/ remant	Non native	Native
	***Sesbania punicea* (Cav.) Benth.**	***Fa***	**A, R,W**	**Sp**	□□	
	Trifolium campestre Schreb.	Te	A, B, R,W	Re		□
	Trifolium lappaceum L.	Te	W, B	Re		□
	Trifolium resupinatum L.	He	A, B, R,W	Re		□
Fagaceae	*Quercus castaneifolia* C.A.Mey.	Fa	V	P		□
	Quercus ilex L.	Fa	W	Re	□	
Gentianaceae	*Centaurium pulchellum* (Swarts.) Druca	Te	W	Sp		□
Geraniaceae	*Geranium molle* L.	Te	A,B, R, W	Re		□
Hydrangeaceae	*Deutzia* sp.	Fa	V	P	□	
Hydrangeaceae	*Hydrangea macrophylla* (Thunb.) Ser.	Ch	V	P	□	
Hypericaceae	*Hypericum perforatum* L.	He	W	Re		□
Iridaceae	*Crocus caspius* Fisch. & C.A.Mey. ex Hohen.	Ge (b)	W, R	Re		□
Juglandaceae	*Pterocarya fraxinifolia* (Poir.) Spach	Fa	W	Re		□
Juncaceae	*Juncus articulatus* L.	Te	A, B,S, R, W	Re		□
Lamiaceae	*Clerodendrum bungei* Steud.	Ch	R, W	Sp	□□	
	Lycopus europaeus L.	He	S	Re		□
	Mentha aquatica L.	Ge (Rh)	S	Re		1
Lythraceae	*Lagerstroemia indica* L.	Fa	V	P	□	
	Lythrum salicaria L.	Hel	S	Re		□
	Punica granatum L.	Fa	R,W	Re		□
Magnoliaceae	*Magnolia grandiflora* L.	Fa	V	P	□	
Malvaceae	*Alcea hyrcana* Grossh.	He	W, V	P		□
	Althaea frutex Hort. ex Mill	Fa	V, R	P	□	
	Kosteletzkya pentacarpos (L.) Ledeb.	He	W	Re		□
	Malva parviflora L.	He	A, B, R, W	Sp		□
	Malva sylvestris L.	He	R, W	Sp		□
	Sida rhombifolia L.	Ch	R,W	Sp	□□	
Meliaceae	*Melia azedarach* L.	Fa	V, W	P	□	
Moraceae	*Ficus carica* L.	Fa	P, W	Re		□
	Morus alba L.	Fa	V	P		□
Myrtaceae	*Eucalyptus* sp.	Fa	V	P	□	
	Melaleuca citrina (Curtis) Dum.Cours.	Fa	V	P	□	
Nyctaginaceae	*Bougainvillea glabra* Choisy	Fa	V	P	□	
	Mirabilis jalapa L.	He	W, V, R	P	□□	
Oleaceae	*Jasminum mesnyi* Hance	Fa	V, R	P	□	
	Ligustrum lucidum W.T.Aiton	Fa	V, R	P	□	
	Ligustrum vulgare L.	Fa	V, R	P	□	
Onagraceae	*Oenothera biennis* L.	He	W	Sp	□	
	Oenothera laciniata Hill	He	W	Re	□	
	Oenothera speciosa Nutt.	He	V	P	□	
Oxalidaceae	*Oxalis corniculata* L.	Te	A, B, R, W	Sp		□
	Oxalis debilis Kunth	Ge (Rh)	A, B, R, W	Sp	□□	
Papaveraceae	*Chelidonium majus* L.	He	W	Re		□
	Papaver chelidoniifolium Boiss. & Buhse	Te	A, B, R, W	Re		□
Pinaceae	*Abies alba* Mill.	Fa	V	P	□	
	Pinus sp.	Fa	V	P		□
Plantaginaceae	*Plantago majora* L.	He	A, B,S, R, W	sp	□	
	Veronica arvensis L.	Te	A, B, R,W	Sp		□
	Veronica persica Poir.	Te	A, B, R,W	Sp		□
	Veronica polita Fr.	Te	W	Sp		□
Platanaceae	*Platanus orientalis* L.	Fa	P			□
Poaceae	*Aegilops tauschii* Coss.	Te	W, B	Re		□
	Alopecurus myosuroides Hudson	Ge (Rh)	A, B, S, W	Re		□
	Avena sp.	Te	W, B	Sp		□
	Briza minor L.	Te	R, W	Re		□

Table 1.

Family	Plant Name	Life Form	Biotopes	Spontaeus/ remant	Non native	Native
	***Bromus catharticus* Vahl**	**Ge (Rh)**	**W**	**Sp**	□□	
	Corynephorus articulatus (Desf.) P.Beauv.	Te	W, B	Re		□
	Cynodon dactylon (L.) Pers.	He	A,B, R, W	Sp		□
	Echinochloa crus-galli (L.) P.Beauv.	Te	A, B, R	Sp		□
	Eleusine indica (L.) Gaertn.	Ge (Rh)	A, B, R, W	Sp		□
	Hordeum murinum L.	Te	A, B, R, W	Sp		□
	Lolium loliaceum (Bory Chaub.) Hand.	Te	A, B, S, R, W	Re		□
	Lolium rigidum Gaudin	Te	A, B, S, R, W	Re		□
	Microstegium vimineum (Trin.) A.Camus	Ge (Rh)	W, F	Sp	□	
	Milium vernale M.B.	Te	A, B, R, W	Re		□
	Paspalum distichum L.	Ge (Rh)	A, B,S, R, W	Sp	□□	
	Phalaris minor Retz.	Te	A, B, R	Re	□	
	Phragmites australis (Cav.) Trin. ex Steud.	Ge (Rh)	S, W	Re		□
	Poa annua L.	Te	A, B,S, R, W	Sp		□
	Poa trivialis L.	Ge (Rh)	B, S, R, W	Re		□
	Polypogon monspeliensis (L.) Desf.	Ge (Rh)	B, S, R, W	Re		□
	Polypogon viridis (Gouan) Breistr.	Te	B, S, R, W	Re		□
	Rostraria cristata (L.) Tzvelev	Te	A, B, R,W	Sp		□
	Saccharum spontaneum L.	Ge (Rh)	W	Sp	□□	
	Setaria viridis (L.) p.Beauv.	Te	A, B, R,W	Sp		□
	Sorghum halepense (L.) Pers.	Ge (Rh)	A, B, R,W	Re		□
	Vulpia myuros (L.) C.C.Gmel	Te	A, B, R,W	Re		□
Polygonaceae	*Nephrolepis brownii* (Desv.) Hovenkamp & Miyam.	Ge (Rh)	V	P	□	
	Polygonum arenastrum Boreau	He	A, B, R, W	Sp		□
	Polygonum lapathifolium L.	Hel	S	Re		□
	Rumex conglomeratus Murray	He	R,W	Sp		□
Portulacaceae	*Portulaca oleracea* L.	Te	W	Sp		□
Primulaceae	*Anagalis arvensis* L.	Te	A, B, R, W	Re		□
	Cyclamen coum Mill.	He	W	Re		□
Pteridaceae	*Adiantum capillus-veneris* L.	Ge (Rh)	B	Re		□
Rhamnaceae	*Hovenia dulcis* Thunb.	Fa	V	P	□	
Ranunculaceae	*Ranunculus muricatus* L.	Te	B, R,W	Re		□
	Ranunculus scleratus L.	Hel	S	Re		□
	Ranunculus trichophyllus Chaix	Hel	S	Re		□
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.	Fa	V	P	□	
	Photinia serratifolia (Desf.) Kalkman	Fa	V, R	P	□	
	Potentilla reptans L.	He	B, S, R, W	Re		□
	Prunus divaricata A.Sav.	Fa	R,W	Re		□
	Pyracantha coccinea M.Roem.	Fa	V, R	P	□	
	Rosa spp.	Ge (Rh)	V	P	□	
	Robinia pseudoacacia L.	Fa	V	P	□	
	Rubus sanctus Willd.	Ch	W	Re		□
	Spiraea japonica L.f.	Fa	P	P	□	
Rubiaceae	*Galium ghilanicum* Stapf	Te	A, B, R, W	Re		□
Rutaceae	*Citrus aurantium* L.	Fa	V	P	□	
	Ruta graveolens L.	Ch	R, V	P	□	
Salicaceae	*Populus caspica* (Bornm.) Bornm.	Fa	W	Re		□

Table 1.

Family	Plant Name	Life Form	Biotopes	Spontaeus/ remant	Non native	Native
	Populus deltoides W.Bartram ex Marshall	Fa	V	P	□	
	Salix alba L.	Fa	S, W, V	Sp, P		□
	Salix aegyptiaca L.	Fa	W	Re		□
	Salix babylonica L.	Fa	V	P	□	
Salviniaceae	*Azolla filiculoides* Lam.	Hel	S	Sp	□□	
Sapinsaceae	*Acer cappadocicum* Gled.	Fa	V	P		□
	Acer negundo L.	Fa	V	P	□	
	Acer velutinum Boiss.	Fa	V	P		□
Scrophulariaceae	*Antirrhinum majus* L.	He	V	P	□	
Simaroubaceae	*Ailanthus altissima* (Mill.) Swingle	Fa	V, W	P	□□	
Solanaceae	*Brugmansia arborea* (L.) Steud.	Fa	V	P	□	
	Datura stramonium L.	He	W	Sp		□
	Solanum nigrum L.	Te	A, B, R,W	Sp	□	
	Solanum sisymbriifolium Lam.	He	A, B, R,W	Sp	□□	
Tropaeolaceae	*Tropaeolum majus* L.	He	W	P	□	
Typhaceae	*Sparganium erectum L.*	Hel	S	Re		□
	Typha latifolia L.	Hel	S	Re		□
Ulmaceae	*Zelkova carpinifolia* (Pall.) K.Koch	Fa	V	P		□
Verbenaceae	*Lantana camara* L.	He	W, V, R	P	□	
	Verbena officinalis L.	He	S, W	Re		□
Vitiaceae	*Vitis labrusca* L.	Fa	B	P	□	
Zygophyllaceae	*Tribulus terrestris* L.	Te	A, B, R, W	Re		□

4. Discussion

The study area is a part of the southern coastal region of the Caspian Sea, which belongs to the Euro-Siberian region (Zohary, 1973). This phytogeographic region has a distinct flora compared to other parts of Iran, due to its relatively high rainfall and temperate climate. There were different numbers of families, genera, and species among various taxonomic groups. The dominant representation of plants from Poaceae, Asteraceae and Fabaceae families are in agreement with previous research on spontaneous urban floras around the world (Salinitro et al., 2018) and the remarkable success of these families in terms of ability in dispersal and establishment in highly heterogeneous urban habitats.

In the city, most cultivated ornamental plants are exotic species. These non-native plants are not suitable to the region, despite the occurrence of native ornamental plants and also the unique geographical position of Kiashahr Port city. Whereas, the main source of invasive plants is ornamental horticulture (Mircea et al., 2023). If we want urban green spaces to be managed and grown as diverse and healthy ecosystems for the benefit of wildlife, restoration and ongoing management of diverse and healthy native plants and habitats is necessary (Atha et al., 2020).

Kiashahr is located beside the Bujagh National Park, where 248 species have been reported (Naginezhad et al., 2006). Additionally, in the eastern part of Kiashahr, the International Lagoon of Amir Kalayeh is situated, with 320 vascular plant species (Ghahraman et al., 2004). By comparing the results of this study with those obtained from nearby native habitats, it is evident that all remnant species and some spontaneous species are common in these habitats. The remnant patches of natural vegetation in many cities of the world are significantly threatened by the rapid pace and nature of urban development (Anderson et al., 2021). In Kiashahr Port city, remnant or native plants are regularly pulled up as weeds anywhere they are found. These plants grow in natural and semi-natural areas and provide important forage for migrating domestic and wild animals. Appreciating these plants is crucial for ecosystem restoration and the conservation of biodiversity (Anderson et al., 2021).

The urban habitat of Kiashahr Port is very heterogeneous, making it suitable for growing a wide variety of spontaneous species (Ilie & Cosmulescu, 2023). The spontaneous vegetation mainly consists of ubiquitous plants with cosmopolitan distribution (Del Tredici, 2010). Most of the spontaneous plants in

Kiashahr Port are therophytes. The high share of therophytes is the result of inconsistency in most urban habitats (McIntyre et al., 1995). Spontaneous urban plants have taken root along roadsides, walls, roofs, brownfields, between cracks in asphalt and paving, and within vacant lots, rubble dumps, street verges, and medians. Urbanization has led to an increase in the number of spontaneous alien plants and a decrease of native, especially rare, species. The change in the abundance of native/non- native species contributes to biotic homogenization (Kühn & Klotz, 2006).

In the present study, 17 species were identified as invasive or potentially invasive plants. Most of these species spread anthropogenically, often inadvertently, but occasionally deliberately as ornamentals or food plants. The occurrence of these harmful plant species in the vicinity of Bujagh National Park and Safarabaste Forest is particularly concerning from the point of view of protecting these important reserves (Bidarlord et al., 2023). Detection of new invasive species in the initial stage of establishment and rapid response with control measures is the most efficient and effective means of controlling invasive and protecting the health, beauty, and ecological integrity of landscapes (Atha et al., 2020). Therefore, it is recommended that alien species with invasion potential be identified as soon as they appear and removed before they can cover large areas. The prerequisite for this work is constant monitoring of natural areas. Botanists and other experts should alert management staff as soon as a new potential invasive is recognized. Most of the invasive plants found in Kiashahr Port originally come from the South America and Southwest Asia. Similar results were obtained by Stešević et al. (2014) for the alien plants of Podgorica (Stešević et al., 2014).

The checklist presented here should not be regarded as the final one due to the dynamics of native vegetation destruction and the introduction of alien plants. It is likely to undergo further additions and revisions in the future.

5. Acknowledgements

This study was supported by the Research Institute of Forests and Rangelands (Project no. 4-58-09-054-0201512) and financially supported by Kiashahr Municipality.

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مجلهٔ جنگل ایران، انجمن جنگلبانی ایران
سال شانزدهم، شمارهٔ ۵، زمستان ۱۴۰۳
ص ۷۰-۵۷
مقاله پژوهشی

شناسه دیجیتال (DOI): 10.22034/ijf.2025.440476.1970

ماهیت پوشش گیاهی و بیوتوپ‌های شهری بندر کیاشهر

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(تاریخ دریافت: ۱۴۰۲/۱۱/۰۴؛ تاریخ پذیرش: ۱۴۰۳/۰۸/۰۶)

چکیده

گیاهان شهری خدمات بوم سازگانی متعددی را برای رفاه جسمی و روحی انسان‌ها فراهم می‌کنند. شناخت این گیاهان برای حفظ تنوع زیستی و خدمات بوم سازگانی بسیار مهم است. این مطالعه بر روی فلور شهر بندر کیاشهر و رویشگاه‌های مختلف موجود متمرکز شده است. شهر بندر کیاشهر در کرانه جنوبی دریای خزر و بین دو ذخیره گاه مهم جنگل جلگه‌ای صفرابسته و پارک ملی بوجاق واقع شده است. در طی مطالعه میدانی، ۲۲۰ گونه متعلق به ۱۹۰ جنس و ۷۶ تیره از از عرصه مورد مطالعه فهرست شدند. از نظر تنوع گونه‌ای غنی‌ترین تیره، گندمیان با ۲۶ گونه و کاسنیان با ۲۰ گونه بودند. گونه‌های موجود در سه گروه عمده، گیاهان دست کاشت زینتی، گیاهان باقیمانده از بوم سازگان بومی و گیاهان خود روی طبقه بندی شدند. شکل رویشی غالب گیاهان دست کاشت زینتی، فانروفیت‌ها (۴۶ گونه؛ ۵۶ درصد) بودند، در حالی‌که تروفیت‌ها (۷۱ گونه؛ ۵۳ درصد) رایج‌ترین شکل رویشی گونه‌های باقیمانده و خود روی بودند. تعداد گونه‌های بومی از گونه‌های غیر بومی غالب‌تر بود، به‌گونه‌ای که گیاهان غیر بومی با ۹۶ گونه، ۴۴ درصد از گیاهان شناسایی‌شده را شامل می‌شوند، از میان گونه‌های غیربومی ۱۷ گونه پتانسیل تهاجم داشتند. مناطق رها شده، حاشیه‌ای و لکه‌های باقیمانده از رویشگاه اولیه حوزه شهر غنی گونه‌ای بالاتری نسبت به سایر رویشگاه‌های شهر داشتند. با توجه به اینکه گیاهان خودروی و مهاجم سبب همگن شدن پوشش گیاهی شهری می‌شوند، جهت حفظ و حراست از تنوع زیستی پیشنهاد می‌شود گونه‌های باقیمانده از بوم سازگان جلگه‌ای حفظ شده و همچنین بکارگیری گیاهان زینتی بومی از اصول اولیه راهبردی مدیریت فضاهای سبز شهر های شمالی کشور در نظر گرفته شود.

واژه‌های کلیدی: دریای کاسپین، شهر ساحلی، گیاهان باقی مانده، گونه غیربومی، گونه بومی.

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