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Urban Dendroflora of Dry Subtropics of the Northwestern Part of The Greater Caucasus on the Example of the City of Gelendzhik

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Abstract: The article presents the results of the analysis of the species composition of the dendroflora of the city of Gelendzhik. The research covered 20 hectares of tree plantations. The route method and the transect method were used. In total, 30 transects were laid with a width of 5-20 m and the total length was 22 km. The routes covered all biotopes of natural (natural forest plantations on the outskirts of the city) and anthropogenic habitats (boarding houses, house territories of private households, spontaneous vegetation of roadsides and wastelands). True census of all tree and shrub species was carried out on the transects. Special attention was paid to rare species for which renewal and undergrowth were taken into account. The arboreal flora of Gelendzhik is represented by 110 species, which belong to 75 genera and 35 families. The predominant part of the dendroflora is represented by angiosperms (82.7%) and gymnosperms (13.7%). The families of Rosaceae, Cupressaceae and Fabaceae are most widely represented in the dendroflora of the city's green spaces (44%). The analysis of the species composition on their share of participation showed that the native fraction of the dendroflora prevails over the cultural one, which indicates its species richness. The analysis of the geographical element of the wild-growing fraction showed the heterogeneity of the dendroflora, in the formation of which 15 geographical elements take part. The largest number of species in the studied dendroflora belongs to the ancient Mediterranean group of geoelements. The significant participation of the Mediterranean and Caucasian geoelements indicates a high degree of autochthonicity in the development of the dendroflora of the city of Gelendzhik. Phanerophytes predominate among the life forms, represented equally by mesophanerophytes, nanophanerophytes and microphanerophytes. It should also be emphasized the significant participation of adventitious tree species (15.4% of the aboriginal fraction). Most of the adventitious species are of North American origin. The leading place in the quantitative spectrum is occupied by rare Mediterranean species Pinus brutia var. pityusa (Stev) Silba) (21% of the total number of studied individuals), *Prunus mahaleb* (L.) Vassilcz.) (7%), *Pistacia atlantica* Desf. (2.1%), which reflects the specifics of the dendroflora of the city of Gelendzhik.

Keywords: dendroflora, species composition, rare species, urban flora, Gelendzhik resort, Krasnodar Krai, Black Sea coast of Russia, North-Western Transcaucasia.

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Research Article

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1. Introduction

Tree plantings perform an important systemic function in the urban ecosystem (dust and gas cleaning, climate control, soil protection) [*Bukharina et al.*, 2007]. The relevance of research on the dendroflora of cities is confirmed by many works [*Alikhadzhiev et al.*, 2019; *Arkuschina and Gulay*, 2010; *Bayramyan and Shekoyan*, 2021; *Boiko and Dementieva*,

2018; *Borzenkova*, 2021; *Dudyn et al.*, 2020; *Khalatyan*, 2014; *Klimko and Kaczmarek*, 2006; *Magomedova*, 2014; *Okazova et al.*, 2019; *Padutov et al.*, 2016; *Polyakova*, 2005]. This makes it possible to take into account the peculiarities of the biological diversity of urban ecosystems when making economic decisions, acquiring special significance in the presence of rare plant species [*Postarnak and Litvinskaya*, 2022]. Green spaces are of particular importance in resort towns. The city of Gelendzhik is one of the largest climatic resort towns on the Black Sea coast of Russia (Krasnodar Krai) [*Volkova et al.*, 2017]. The dendroflora of the city of Gelendzhik has not been studied specifically. There are a number of works on individual taxa [*Administration of the city of Gelendzhik: official website*, 2020; *Bondarenko*, 2020; *Ivankina et al.*, 2016].

The purpose of the work is to study the modern species composition of the tree and shrub flora on the territory of the city of Gelendzhik.

The object of the study is the cultural and spontaneous dendroflora of the city of Gelendzhik.

2. Characteristics of the research area

The research area belongs to the Anapa-Gelendzhik District, the North Black Sea Province occupying the northern part of the Black Sea coast of Russia from Anapa to Tuapse [*Gvozdetsky*, 1968]. The region is the most remote, northern region of dry subtropics in the North Caucasus with a characteristic Mediterranean climate regime: dry warm summers and rainy, relatively mild winters [*GOST 16350-80*, 1981]. The soil cover in the city of Gelendzhik is represented by zonal brown soils and azonal sod-carbonate (rendzins). The soils of the city's surface area are represented by lithostrats and urban quasi-soils [*V. V. Dokuchaev Soil Science Institute*, 2012].

Geobotanically, the territory of the city of Gelendzhik belongs to the Anapa-Gelendzhik district of the Northwestern Transcaucasia [*V. L. Komarov Botanical Institute of the Russian Academy of Sciences*, 2014]. It is characterized by the development of sub-Mediterranean ecosystems and upland xerophytic vegetation. The ancient Mediterranean biotic core is concentrated here, although somewhat depleted by the Mediterranean flora [*Litvinskaya*, 2020a]. It is distinguished by the presence of a number of genera not found in the area of European broad-leaved forests (*Colutea*, *Rhus*, *Vitex*, *Paliurus*, *Ruscus*, *Pistacia*, *Celtis*, *Jasminum*) [*Litvinskaya*, 2020b].

The primary plant communities were pine and oak-hornbeam forests on the territory of the city of Gelendzhik, fragments of which are now preserved in crevices and gullies located on the territory of the city. They play an important role as refugiums of natural flora. Currently, the vegetation on the territory of Gelendzhik has been changed, it is composed of anthropogenically transformed types of vegetation: artificial forest plantations of park and alley type, the species composition of which is determined by man, as well as spontaneous types of vegetation formed by the synanthropic component of flora (communities of wastelands, roadsides, construction and industrial sites). The object of research belongs to the type of urban flora according to the classification of anthropogenically transformed communities.

The specifics of the arboreal green spaces of the city of Gelendzhik is a rare endemic relict species – the Pitsunda pine, which became widespread in the landscaping of the city in the 1960s and 70s. Today, this view can be called the "calling card" of the resort. It has a ubiquitous growth in the city and performs the most important ecological functions. The species is unpretentious to soil fertility, dust- and gas-resistant. As a littoral calcifilous species, Pitsunda pine is demanding for an increased calcium content. Therefore, the species has an active renewal and forms a stable undergrowth in the territories with the outputs of the parent calcifilous rocks.

3. Object of study and methods

The work is based on the materials of floristic studies conducted in 2021–2022 on the territory of the city of Gelendzhik, Krasnodar Krai (Russia). The research covered

20 hectares of tree plantations. The route method and the transect method were used. In total, 30 transects were laid with a length of 0.15–2.16 km and a width of 5–20 m (Figure 1). The total length of the transect was 22 km (Figure): Primorsky Boulevard str. (4662 m), Pogranichnaya str. (500 m), Turisticheskaya str. (580 m), Solntsedarskaya str. (100 m), Konechnaya str. (200 m), Pyaty Pereulok str. (200 m), Highway 03K-555 (1780 m), Pogranichnaya str. (mkr. Blue Bay) (1600 m), Vzletnaya str. (1320 m), Gurzufskaya str. (100 m), Zheleznovodskaya str. (460 m), Severomorskaya str. (400 m), Sanatornaya str. (150 m), Sochinskaya str. (200 m), Krasnodarskaya str. (220 m), Borisovskaya str. (500 m), Kirova str. (150 m), Kurzalnaya str. (100 m), Ulyanovskaya str. (120 m), Griboyedov str. (100 m), Polevaya str. (500 m), Krasnodonskaya str. (150 m), Leselidze str. (200 m), Novorossiyskaya str. (950 m), Dekabristov str. (400 m), Mira str. (1150 m), Sadovaya str. (80 m), Revolutsionnaya str. (1450 m), Tchaikovsky str. (580 m), Ostrovsky str. (520 m), Sovetskaya str. (230 m), Sevastopolskaya str. (500 m), unnamed driveways and vacant lots (4280 m). The routes covered all biotopes of natural (natural forest plantations on the outskirts of the city limits in the Blue Bay area) and anthropogenic habitats on the territory of the city, including boarding houses, house territories of private households, spontaneous vegetation of roadsides and wastelands) (Figure 2, 3).

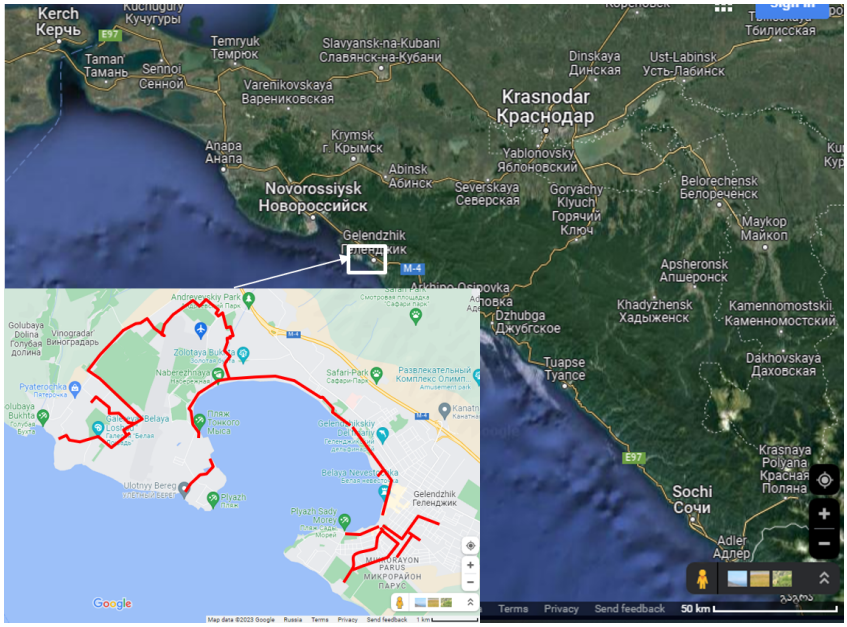

Figure 1. The scheme of research routes.

(a) Slope along the Highway 03K-555 near SNT Vinogradar-3. (11.12.2021).

(b) Forest belt along the Highway 03K-555 (Poeticheskaya str., 80B). (10.11.2021).

(c) Spontaneous vegetation of linear type, Vzletnaya str., 3. (14.11.2021).

(d) Zheleznovodskaya str., adjacent to the territories of the residential sector. (15.11.2021).

(e) Wasteland near the airport. (10.11.2021).

(f) The territory of a wasteland on the site of a former vineyard between Turisticheskaya str. and Solntsedarskaya str. (15.12.2021).

Figure 2. Slope along the Highway 03K-555 near SNT Vinogradar-3. (11.12.2021). Spontaneous dendroflora of Gelendzhik.

(a) Attraction area (Lunacharsky str., 129 A.)

(b) Turisticheskaya str., 27 A.

(c) Plantations *Pinus brutia* var. *pityusa* (Steven) Silba: Turisticheskaya str., 19.

(d) Plantations *Quercus pubescens* Willd.

Figure 3. Cultural dendroflora of Gelendzhik in Naberezhnaya str.

True census of all tree and shrub species was carried out on the transects. The diameter of the trunk, the height of the tree and shrub, the width of the crown projection, and the sanitary condition were evaluated. Special attention was paid to rare species evaluating renewal and undergrowth.

Based on the materials of field research, a list of the dendroflora of Gelendzhik has been compiled. Ecological and biological features and distribution areas of species are specified according to the monographs of A. S. Zernov [*Zernov*, 2013], A. L. Ivanov [*Ivanov*, 2019], S. A. Litvinskaya, R. A. Murtazaliev [*Litvinskaya*, 2006, 2019]. The analysis of the dendroflora was carried out according to the methods generally accepted in comparative floristics [*Yurtsev and Kamelin*, 1991]. The analysis of life forms was carried out using the RAUNKIAER system [*Raunkiaer*, 1934]. The analysis of geographical elements was carried out in accordance with the classification of elements of the Caucasian flora by N. N. Portenier [*Portenier*, 2000, 2012] and A. L. Ivanov [*Ivanov*, 2019]. Latin names of plants are given according to World Flora Online [*WFO*, 2023].

4. Results and discussion

The species composition of the identified woody plants of Gelendzhik has 110 species and hybrids. Of these, gymnosperms account for 19 species (17.3%) and angiosperms – 91 species (82.7%). The systematic composition of the taxa identified in the dendroflora of Gelendzhik is given in Table 1.

A detailed systematic analysis of the dendroflora is presented in Table 2, which shows the number of genera and species in each of the families. The leading in the number of species are the families Rosaceae, Cupressaceae and Fabaceae, which account for the third part (44 species; 40%) of the species composition of the dendroflora under consideration. The predominant role of Rosaceae is a characteristic feature of the dendroflora of the temperate climatic region of the Holarctic [*Litvinskaya*, 2019]. The high participation of Cupressaceae is explained by the high share of coniferous exotics of the dendroflora of the city. And the Salicaceae family, which is one of the three popular families of most cities, occupies only the 11th place in Gelendzhik. Also, the difference between the dendroflora of

Table 1. Systematic composition of the dendroflora of the city of Gelendzhik.

	Number of families	% of the number of families	Number of genera	% of the number of genera	Number of species	% of the number of species
Gymnospermae	2	5.7	8	10.7	19	17.3
Angiosperms	33	94.3	67	89.3	91	82.7
Total	35	100	75	100	110	100

Gelendzhik from similar floras of other cities is the low participation of monotypic families (16 families; 14.5%) and families represented by 2–3 species (13 families; 11.8%). In general, these families occupy 25.3% in the systematic spectrum, while in the dendroflora of most cities they reach 50–80%. This indicates the species richness of the dendroflora of the city of Gelendzhik.

Table 2. Systematic composition of the dendroflora of the city of Gelendzhik.

Family	Quantity, pcs.		Quantity, pcs.		Family	Quantity, pcs.		Quantity, pcs.	
	species	%	genera	%		species	%	genera	5
Aceraceae	2	1.82	1	0.91	Magnoliaceae	1	0.91	1	0.91
Agavaceae	2	1.82	1	0.91	Malvaceae	1	0.91	1	0.91
Anacardiaceae	3	2.73	3	2.73	Moraceae	4	3.64	3	2.73
Araliaceae	1	0.91	1	0.91	Oleaceae	6	5.45	6	5.45
Berberidaceae	2	1.82	1	0.91	Pinaceae	6	5.45	3	2.73
Betulaceae	4	3.64	3	2.73	Platanaceae	1	0.91	1	0.91
Bignoniaceae	1	0.91	1	0.91	Punicaceae	1	0.91	1	0.91
Caprifoliaceae	3	2.73	1	0.91	Ranunculaceae	1	0.91	1	0.91
Celastraceae	1	0.91	1	0.91	Rhamnaceae	2	1.82	1	0.91
Cornaceae	2	1.82	2	1.82	Rosaceae	24	21.82	15	13.64
Cupressaceae	13	11.82	5	4.55	Salicaceae	5	4.55	2	1.82
Ebenaceae	2	1.82	1	0.91	Simaroubaceae	1	0.91	1	0.91
Fabaceae	7	6.36	7	6.36	Tamaricaceae	1	0.91	1	0.91
Fagaceae	2	1.82	1	0.91	Tiliaceae	2	1.82	1	0.91
Hippocastanaceae	1	0.91	1	0.91	Ulmaceae	2	1.82	1	0.91
Hydrangeaceae	1	0.91	1	0.91	Viburnaceae	1	0.91	1	0.91
Juglandaceae	1	0.91	1	0.91	Vitaceae	3	2.73	1	0.91
Lamiaceae	1	0.91	1	0.91	Total	35	31.82	75	68.18

The woody vegetation of the city of Gelendzhik consists of representatives of: 1) wild flora fraction (64.2% of the total flora), including both native and naturalized cultivated species; 2) introduced – cultivated introduced and native flora species (35.8%). The wild-growing fraction of the Gelendzhik dendroflora consists of 65 species (Table 3), which is 21% of the dendroflora of the Krasnodar Krai [*Ivankina et al.*, 2016]. It includes an aboriginal (58 species; 52.7%) and a naturalizing (adventitious) component (9 species; 8.2%).

Table 3. Types of wild-growing fraction of the dendroflora of the city of Gelendzhik

Species	Family	Life form	Geographical element	Number of individuals
Cimnosperma (Pinopsida)				
Juniperus communis L.	Cupressaceae	Phn:sv	Caucasian.: Pan-Caucasian	112
Juniperus foetidissima Willd.	Cupressaceae	Phms:sv	Eastern Mediterranean	1
Juniperus oxycedrus L.	Cupressaceae	Phn:sv	Eastern Mediterranean	13
Juniperus sabina L.	Cupressaceae	Phn:sv	Pontic-South Siberian.	17
Pinus nigra subsp. pallasiana (Lamb.) Holmboe	Pinaceae	Phmg:sv	Crimean-Novorossiysk	27
Pinus brutia var. pityusa (Steven) Silba	Pinaceae	Phmg:sv	Caucasian.: Eucaucasian.	2889
Platycladus orientalis L. Franco	Cupressaceae	Phms:sv	Adventitious: Southeast Asia	145
Angiospermae (Magnoliopsida)				
Acer campestre L.	Aceraceae	Phms	Euro-Caucasian	2
Acer pseudoplatanus L.	Aceraceae	Phms	European	48
Ailanthus altissima Mill. Swingle	Simaroubaceae	Phm	Adventitious China	109
Astracantha arnacanthoides (Boriss.) Boriss.	Fabaceae	Phn	Caucasian.: Eucaucasian	12
Berberis vulgaris L.	Berberidaceae	Phn	European	1
Betula pendula Roth	Betulaceae	Phms	Palearctic	2
Carpinus betulus L.	Betulaceae	Phms	Caucasian.: Pan-Caucasian	2
Carpinus orientalis Mill.	Betulaceae	Phm	Eastern Mediterranean	1058
Chrysojasminum fruticans (L.) Banfi	Oleaceae	Phn	Mediterranean	279
Clematis vitalba L.	Ranunculaceae	Ch:ll	Submediterranean *.	78
Cornus mas L.	Cornaceae	Phm	General Ancient Mediterranean	153
Cornus sanguinea subsp. australis (C.A.Mey.) Soó	Cornaceae	Phm	General Ancient Mediterranean	237
Corylus avellana L.	Betulaceae	Phn	Palearctic	9
Cotinus coggygria Scop.	Anacardiaceae	Phn	General Ancient Mediterranean	197
Crataegus monogyna Jacq.	Rosaceae	Phm	European	731
Crataegus pentagyna Waldst. & Kit. ex Willd.	Rosaceae	Phm	Western Ancient Mediterranean	134
Cydonia oblonga Mill.	Rosaceae	Phm	General Ancient Mediterranean	1
Diospyros lotus L.	Ebenaceae	Phm	Armenian-Iranian	1
Euonymus europaeus L.	Celastraceae	Phn	European	4
Ficus carica L.	Moraceae	Phm	Adventitious. Asia Minor	29

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Table 3. Types of wild-growing fraction of the dendroflora of the city of Gelendzhik (Continued)

Species	Family	Life form	Geographical element	Number of individuals
Fraxinus excelsior L.	Oleaceae	Phmg	European	2408
Gleditsia triacanthos L.	Fabaceae	Phm	Adventitious North America	48
Hedera helix L.	Araliaceae	Ch:ll	Euxine	98
Juglans regia L.	Juglandaceae	Phms	Adventitious Eastern Mediterranean.	32
Ligustrum vulgare L.	Oleaceae	Phn	European	469
Lonicera caprifolium L.	Caprifoliaceae	Ch:ll	Subcaucasian *.	87
Maclura pomifera Raf. C.K. Schneid.	Moraceae	Phms	Adventitious North America	135
Malus orientalis Uglitzk.	Rosaceae	Phms	Subcaucasian *.	4
Morus alba L.	Moraceae	Phms	Adventitious China	1
Morus nigra L.	Moraceae	Phms	Adventitious Western Asia	26
Paliurus spina-christi Mill.	Rhamnaceae	Phn	General Ancient Mediterranean	2305
Pistacia atlantica Desf.	Anacardiaceae	Phm	Eastern Mediterranean	388
Platanus occidentalis L.	Platanaceae	Phn	Adventitious Eastern Mediterranean.	2
Populus alba L.	Salicaceae	Phms	Palearctic	3
Populus nigra L.	Salicaceae	Phms	Palearctic	2
Prunus avium (L.)L. Moench	Rosaceae	Phms	European	7
Prunus cerasifera Ehrh.	Fabaceae	Phm	General Ancient Mediterranean	245
Prunus mahaleb L.	Rosaceae	Phm	Mediterranean	967
Prunus spinosa L.	Rosaceae	Phn	Euro-Caucasian	640
Pyracantha coccinea M. Roem.	Rosaceae	Phn	Western Ancient Mediterranean	1
Pyrus caucasica Fed.	Rosaceae	Phms	Caucasian: Pan-Caucasian	7
Quercus pubescens Willd.	Fagaceae	Phms	Submediterranean *.	800
Quercus robur L.	Fagaceae	Phms	European	14
Rhamnus cathartica L.	Rhamnaceae	Phm	Palearctic	43
Rhus coriaria L.	Anacardiaceae	Phn	General Ancient Mediterranean	129
Robinia pseudoacacia L.	Fabaceae	Phm	Adventitious North America	44
Rosa canina L.	Rosaceae	Phn	Euro-Caucasian.	156
Rubus canescens DC.	Rosaceae	Phn	Western Ancient Mediterranean	666
Salix alba L.	Salicaceae	Phm	Palearctic	4

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Table 3. Types of wild-growing fraction of the dendroflora of the city of Gelendzhik (Continued)

Species	Family	Life form	Geographical element	Number of individuals
Salix caprea L.	Salicaceae	Phm	Palearctic	1
Spartium junceum L.	Fabaceae	Phn	Adventitious Mediterranean region	33
Tamarix tetrandra Pall. ex M. Bieb.	Tamaricaceae	Phn	Eastern Mediterranean	16
Thymus markhotensis Maleev	Lamiaceae	Ch:	Caucasian: Eucaucasian	1
Tilia platyphyllos Scop.	Tiliaceae	Phmg	European	2
Ulmus glabra Huds.	Ulmaceae	Phms	Euro-Caucasian	1167
Ulmus minor Mill.	Ulmaceae	Phm	Euro-Caucasian	15
Viburnum opulus L.	Viburnaceae	Phn	Palearctic	1
Vitis vinifera L.	Vitaceae	Phn:ll	Submediterranean *	10

The wild-growing fraction was analyzed for the correlation of life forms and geographical element.

The analysis of life forms showed the predominance of phanerophytes (Figure 4), represented equally by mesophanerophytes (25%), nanophanerophytes (26%) and microphanerophytes (28%).

Note. Phmg (Megaphanerophyton) – megaphanerophyte, Phms (Mesophanerophyton) – mesophanerophyte, Phm (Microphanerophyton) – microphanerophyte, Phn (Nanophanerophyton) – nanophanerophyte, Ch (Chamaephyton) – chamaephyte; ll (liana lignosa) – lignifying liana, sv (sempervirens) – evergreen, fl (fruticulus) – low shrub.

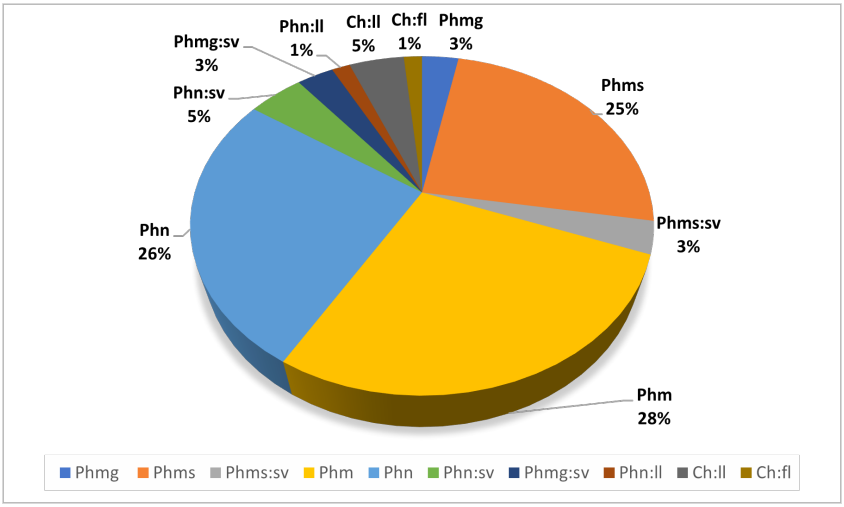

Figure 4. The ratio of life forms of the Gelendzhik dendroflora.

The analysis of the geographical element of the wild-growing fraction showed the heterogeneity of the dendroflora. 15 geographical elements take part in its formation (Table 4). The largest number of species in the studied dendroflora belongs to the ancient Mediterranean group of geoelements – 20 species (30.8% of the wild fraction of dendroflora). The group of widespread species included seven Common Mediterranean and Eastern Mediterranean species (12.3%). The majority of the boreal group of geoelements are Caucasian geoelements – 13 species (20%). The participation of Subcaucasian species (3 species) emphasizes the link between Caucasian species and the flora of the Mediterranean

and European forest flora. The European element is in the first place in terms of the number of species – 9 (13.8%), but quantitatively its representatives do not occupy significant positions. Palearctic (8 species) and adventitious geoelements (9 species) are of great importance in the composition of the dendroflora. Most of the adventitious species are of North American origin.

Table 4. Geographical spectrum of the wild-growing fraction of the dendroflora of the city of Gelendzhik

Geographical element	Number of species	%
Holarctic		
Palearctic	8	12.3
Boreal		
Pontic-South Siberian	1	1.5
Euro-Caucasian	5	7.7
European	9	13.8
Caucasian		
Pan-Caucasian	3	4.6
Eucaucasian	3	4.6
Euxine	1	1.5
Ancient Mediterranean		
General Ancient Mediterranean	7	10.8
Eastern Mediterranean	7	10.8
Mediterranean	2	3.1
Western Ancient Mediterranean	3	4.6
Crimean-Novorossiysk	1	1.5
Binder		
Subcaucasian*	2	3.1
Submediterranean*	3	4.6
Adventitious		
North America	3	4.6
China	2	3.1
Southeast Asia	1	1.5
Armenian-Iranian	1	1.5
Mediterranean region	1	1.5
Western Asia	1	1.5
Asia Minor	1	1.5

The analysis of the quantitative composition of woody plant species showed a clear predominance of representatives of the native dendroflora fraction. Figure 5 shows the ratio of the dominant species of dendroflora, which make up 72% of all 18,897 recorded specimens of tree and shrub plantations. The highest occurrence is from woody life forms – Pitsunda pine (*Pinus brutia* var. pityusa (Steven) Silba) and tall ash (*Fraxinus excelsior* L.) and from shrubby – hold-tree and common mahalebka (*Prunus* mahaleb (L.) Vassilcz.).

The Pitsunda pine (*Pinus brutia* var. pityusa (Stev) Silba) and the common mahaleb (*Prunus mahaleb* (L.) Vassilcz.) are rare species listed in the Red Book of the Russian Federation [*Bardunov*, 2008] and the Krasnodar Krai [*Litvinskaya*, 2017] as Mediterranean

native species. This indicates the originality and specificity of the species composition of the tree plantations of the city of Gelendzhik. Also, *Pistacia atlantica* Desf. [*Bardunov*, 2008] grows on the territory of the city of Gelendzhik, numbering 388 specimens of various age groups (2.1% of the dendroflora), some specimens of which reach a diameter of more than 60 cm.

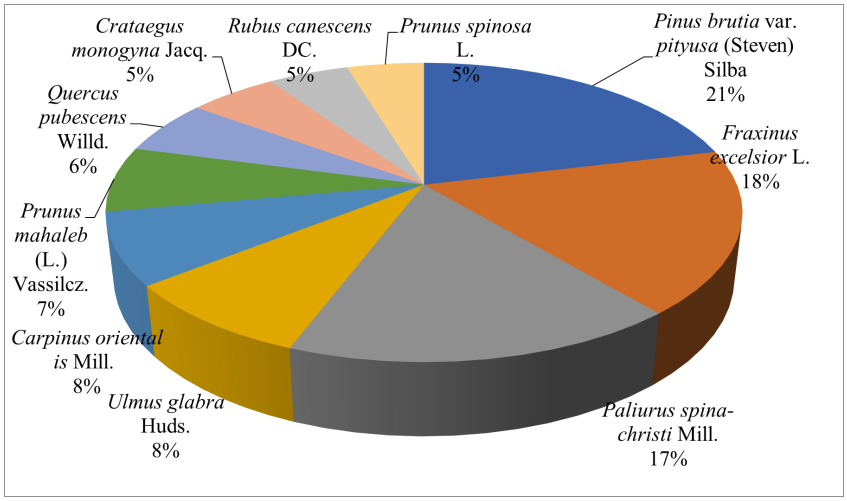

Figure 5. Percentage of the leading species of woody plants in the tree plantations of the city of Gelendzhik.

5. Conclusion

Based on the analysis of 18,897 specimens of cultural and spontaneous tree and shrub plantations of Gelendzhik, the growth of 110 species of dendroflora was established. Of these, gymnosperms account for 19 species (17.3%) and angiosperms – 91 species (82.7%). The most widely represented families are Rosaceae, Cupressaceae, Fabaceae (44%). The insignificant participation of monotypic families and families represented by 2–3 species indicates the species richness of the dendroflora of the city of Gelendzhik.

The analysis of the qualitative and quantitative composition of the dendroflora of Gelendzhik showed its original character. The predominance of representatives of the aboriginal faction over the cultural one speaks of its species richness. The wild-growing fraction of the Gelendzhik dendroflora consists of 65 species (21% of the dendroflora of the Krasnodar Krai), including an indigenous (52.7% of the Gelendzhik dendroflora) and an adventitious component (8.2%).

The significant participation of the Mediterranean and Caucasian geoelements indicates a high degree of autochthonicity in the development of the dendroflora of the city of Gelendzhik. Phanerophytes predominate among the life forms, represented equally by mesophanerophytes, nanophanerophytes and microphanerophytes.

The specifics of the dendroflora of the city of Gelendzhik is wide participation in its composition of the Mediterranean species *Pinus brutia* var. *pityusa* (Steven) Silba (21%), *Prunus* mahaleb (L.) Vassilcz. (7%), *Pistacia atlantica* Desf. (2.1%), which are rare protected species. All registered specimens of rare red Book plant species must be registered by the administrative authorities; old-aged individuals should be given a specially protected status of natural monuments.

The obtained results of the study indicate the sustainability of green spaces in the urban environment of the city of Gelendzhik and their performance of ecological functions that are of particular importance for the resort city.

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