

Diversity of Woody Vegetation in Tallinn, Estonia

HELDUR SANDER¹, JÜRI ELLIKU²

¹ Estonian Agricultural University, Forest Research Institute and Institute of Zoology and Botany, Fr. R. Kreutzwaldi 5, Tartu 51014, Estonia

² Tallinn Botanic Garden, Kloostrimetsa 52, Tallinn 11913, Estonia

Sander H., Elliku J. 2001. Diversity of Woody Vegetation in Tallinn, Estonia. *Baltic Forestry*, 8 (2): 78-85.

In Estonian capital city Tallinn, approximately 1,275 taxa of woody plants have been registered (without taking into account the Tallinn Botanic Garden). The data were collected mainly in the 1990s. At that, cultivars of clematis, rose and lilac, fruit trees and berry bushes were determined. These 1,275 taxa fall into 51 families and 145 genera. However, the number is that high mostly on account of relatively rare taxa that are represented by solitary specimens. The areas within the 10 habitat complexes having the greatest number of species in Tallinn are gardens. In the gardens, 86.3 % of the total taxa were found. Gardens are followed by urban parks, forest- and park-like cemeteries and yards, and gardens of former suburbs, where 260, 210 and 200 taxa of woody plants were found, respectively. A total of 750 taxa of woody plants grow in the largest private collection, about 200 taxa were found in the Kadriorg Park and 131 taxa in the Metsakalmistu forest-cemetery. A total of 97 (7.6%) taxa of woody plants belong to the indigenous Estonian dendroflora and 153 taxa (26.2%) come from Europe, 128 taxa (22.0%) from East Asia, 119 taxa (20.4%) from North America, etc.

Key words: taxonomic composition, habitats, geographical origin, frequency

Introduction

Much attention has been paid to the biodiversity in cities (Murphy 1988; Folch 1996; Pesci 1996; Reduron 1996 etc.), as well as to the diversity of urban trees (Sukopp 1978; Masing 1980; Kunick 1985; Bassuk, Jaenson 1990; Jim 1991; Kim, Weaver 1994; Reisner 1997 etc.).

The diversity and species composition of urban vegetation are determined by the character and intensity of human influence. Preurban landscapes and vegetation, the predominant functional type of a city, the evolution and structure of urban planning, as well as some other factors have also a certain impact.

The species diversity of urban vegetation has devolved as a result of the synergistic co-existence (Jim 1991).

Urban ecosystems consist of a full spectrum of habitats from artificial asphalt road or stone building habitats to managed or natural forest habitats (Olsson 1978). The large number of plant communities and species may usually be explained by the following factors: (1) growth of towns: towns were often founded on the contact areas of different landscapes where the vegetation was more diverse; (2) great diversity of the urban landscape and habitats, including different structures of urban planning, various uses of open areas, and many small-scale habitats, producing a great variety in the ecological environment; (3) human activities, that, either directly or indirectly, intentionally

or unintentionally, continuously favour the invasion of foreign species.

A major difference in community composition has been observed between central urban, suburban (semiurban), and the surrounding buffer, periurban zone (between suburban and administrative boundaries of a city) with dispersed settlements due to differences in land use (Tomteri, Haila 1990).

The impact of foreign species sometimes exceeds that of the local indigenous woody plants several times, especially in cities of boreal zone.

Artificial communities of woody plants that have developed in different habitats, consist of species diverse in their environmental requirements and spreading. Many of them survive thanks to human care on the one hand and the interaction between the adaptation of species and environmental conditions on the other.

The aim of this study is to characterize the diversity (species richness, taxonomic composition, geographical origin and frequency) of woody plants in the city of Tallinn. The study also aims to describe various habitat complexes. All this enables the topic to be treated from a variety of aspects.

Study area and climate

Tallinn, the capital of the Republic of Estonia, is located in the northern part of Estonia on the coast of the Gulf of Finland. Tallinn is the largest Estonian city with an administrative area of 158.3 km² and about

400,000 inhabitants (in 2001). The territory is divided into dense and sparse settlement areas of high and low buildings, further referred to as "urban" and "suburban" zones (about 60%), and a town border zone (undeveloped area), further referred to as the "periurban" zone (about 40 %).

The "green space" of the present-day Tallinn has very diverse habitats and a varied functional structure, consisting of parks, gardens, courtyards, various greeneries (plantings in new districts and small areas between the urban blocks), yards with dense trees and bushes in old suburbs, streets, cemeteries, forests, grasslands, meadows, etc., and occupies approximately 60% in the settlement areas and 80% in the town border zone.

Tallinn lies at the northern border of hemiboreal vegetation zones (Ahti et al., 1968). A comparison of 100 European cities showed that Tallinn together with Oslo, Stockholm, Helsinki, St Petersburg, and Riga belongs to the maritime Baltic cold "subclimaton" (Hubalek, Horakova 1991).

In the period 1881-1975 the mean temperature in Tallinn in July was 16.6°, ranging from 13.0° (1902) to 20.8° C (1914), and in January -5.3°, ranging from 1.2° (1925) to -15.8° C (1942). The lowest mean air temperature was recorded in February (-6.0° C) that is usually the coldest month of the year (Климат Таллина, 1982). The mean annual precipitation in 1891-1975 was 550 mm, ranging from 362 mm (1900 and 1901) to 813 mm (1923) (Tarand 1976).

It could be noted about the winters (December-March), going back to 1757 that by the data of mean air temperatures (Tallinn, Maarjamäe), the warmest winter was in 1960/61 (5° C) and the coldest in 1928/29 (-11.3° C) (Bensaar, Tarand 1991).

The centre of the city is known to be warmer and less humid than the surrounding areas; and certain microclimatic differences can exist due to variations in the topography and distance from the sea (Tarand 1976).

Material and methods

The collection of the dendrological data described in this paper started in the late 1970s in the Tallinn Botanic Garden (where the herbarium gathered during the inventory of woody plants was stored).

The gathering and publishing of dendrological data has continued ever since. The latest data were obtained in 2000.

During the inventory of woody plants the species-rich collections (without Tallinn Botanic Garden), city parks and greeneries around the Old Town of Tallinn, parks of former summer estates, gardens and court-

yards of former suburbs (Kalamaja and Kadriorg) as well as green areas of new districts (Mustamäe and Väike-Õismäe) and cemeteries (altogether about 600 ha) were systematically investigated. Woody plants were determined mostly during field works. Specimens of more complicated taxa were herbarized and determined indoors. Cultivars of clematis (*Clematis*), rose (*Rosa*) and lilac (*Syringa*), fruit trees (*Malus*, *Prunus* and *Pyrus*), and berry bushes (*Ribes* and *Rubus*) were not determined.

Habitat complexes were defined mainly on the basis of the land use, woody vegetation and human activity. By analysing quantitatively the taxonomic composition of woody plants, the corresponding index (modified index of synanthropic fauna) was used to describe the habitat complexes. Similarly to the index of synanthropic fauna (Klausnitzer, 1987), the importance of the cultivated flora can be characterized by an index of cultivation (W_c) (Sander et al 1992):

$$W_c = \frac{Hwp}{Swp} \quad (1),$$

where Hwp denotes the number of the taxa of cultivated (adapted indigenous and introduced) woody plants, and Swp is the total number of the taxa of woody plants in urban areas.

Values found in a similar way may be used as indices of introduction (W_i) and horticulture (W_h):

$$W_i = \frac{Jwp}{Swp} \quad (2),$$

where Jwp is the number of introduced plants in urban areas.

$$W_h = \frac{Cwp}{Swp} \quad (3),$$

where Cwp is the number of cultivars in urban areas.

Results

Taxonomic composition and geographic origin

Tallinn is remarkably rich in plant species. We recorded about 2,600 taxa of native and introduced plants, of which about 1,300 taxa were those of herbaceous (Kukk 1991; Ploompuu, Laansoo 2001) and about 1,300 taxa of woody plants.

In the course of this research 1,275 taxa of woody plants were recorded in Tallinn (Table 1). These 1,275 taxa fall into 51 families and 145 genera. The 1,275 taxa included 321 (25.2%) conifers from 13 genera (9.0%). Among the taxa there were 516 species (40.5%), 624 cultivars (48.9%), 68 hybrids (5.3%), 42 varieties (3.3%), 15 forms (1.9 %), and 10 subspecies (0.8%).

Table 1. Taxonomic composition of woody plants

Unit	Total number	%	Conifer trees and bushes			Broadleaved trees, bushes, etc.		
			Number	% of unit	% of total number	Number	% of unit	% of total number
Species	516	40.5	63	19.7	12.2	453	47.6	87.8
Hybrids	68	5.3	2	0.6	2.9	66	6.9	97.1
Subspecies	10	0.8	3	0.9	30.0	7	0.7	70.0
Varieties	42	3.3	14	4.4	33.3	28	2.9	66.7
Forms	15	1.2	6	1.9	40.0	9	0.9	60.0
Cultivars	624	48.9	233	72.6	35.7	391	41.0	62.7
Total	1275	100	321	100	25.2	954	100	74.8

The geographical origin of individual species was identified mainly on the basis of the work by F. Encke et al. (1989). The origin of the studied woody plants species, subspecies, varieties and forms (583 taxa) showed that 153 taxa (26.2%) originated from Europe and North Africa, 128 taxa (22.0%) from East Asia, 119 taxa (20.4%) from North America, 18 taxa (3.1%) from Siberia, 9 taxa from Central Asia, 5 taxa from the Middle-East and 1 taxa from Latin America. 150 (25.7%) taxa represented widespread woody plants (Eurasia, Eurasia and North America).

97 (7.6%) of the registered 1,275 taxa of woody plants belong to the indigenous Estonian dendroflora. The number of local native taxa in Tallinn is 70 (5.5%). All the other taxa are introduced woody plants, i.e. foreign species and developed hybrids and cultivars.

Thus, it could be noted that the majority of our urban woody plants are plants introduced either directly or indirectly as a result of human activities. Only a small part of our woody plants are cultivated indigenous dendroflora while the majority are anthropophytes (hemerophytes). The predominating taxa among anthropophytes are useful and ornamental plants that have been imported intentionally. Therefore, with regard to woody plants in urban areas, we can speak mostly of a cultivated (synanthropic) flora.

The frequency

The distribution of woody plants taxa in any city can be characterized by their frequency. The frequency can be estimated with a scale (Table 2) worked out by T. Kukk (1991). It is possible to estimate the frequency of rare taxa relatively exactly due to the large amount of the gathered data.

Table 2. Frequency of woody plants in Tallinn

No.	Frequency	Taxa	
		Number	%
1.	Rr (rarissim), very rare (1-3 sites)	710	55.8
2.	R (raro), rare (4-9 sites)	265	20.8
3.	St r (sat raro), quite seldom (10-27 sites)	173	13.6
4.	St p (sat passim), quite scattered (over 28 sites)	89	7.0
5.	P (passim), scattered	17	1.3
6.	St fq (sat frequente), quite frequent	13	1.0
7.	Fq (frequente), frequent	7	0.5
8.	Dominant	1	0.0
Total	-	1275	100

Frequency can be estimated on an 8-degree scale. Frequency can be applied to the whole area of the town (urban and suburban zone), without taking into account communities (habitats). The estimation of frequency is subjective, depending mostly on the observations of the authors and also on literature.

The frequency depends on species composition of forests in Tallinn (Pärn 1990). The 8th degree characterizes the frequency of the dominating species in Tallinn – Scots pine (*Pinus sylvestris* L.). Scots pine is widely distributed in several city quarters – Nõmme, Mustamäe and Piritä; in other parts of Tallinn it is absent or almost absent.

When comparing the frequency of different taxa of woody plants it becomes evident that most of the taxa occur relatively seldom. Five native species – Norway maple (*Acer platanoides* L.), white birch (*Betula pendula* Roth), European ash (*Fraxinus excelsior* L.), small-leaved lime (*Tilia cordata* Mill.) and mountain elm (*Ulmus glabra* Huds.) are the most widespread species next to Scots pine. Older fruit-trees and garden berries are also quite frequent: *Malus domestica* Borkh., *Ribes uva-crispa* L. *R. rubrum* L., *R. nigrum* L., and *Rubus idaeus* L. Among the introduced ornamental species *Syringa vulgaris* L., *Aesculus hippocastanum* L., *Philadelphus coronarius* L., *Tilia platyphyllos* Scop., *Tilia × vulgaris* Hayne, *Symphoricarpos albus* (L.) Blake, *Caragana arborescens* Lam., *Cotoneaster lucidus* Schlecht. and *Spiraea chamaedryfolia* L. are the most common.

Introduced coniferous tree species have a smaller share; the most widespread among them are *Picea pungens* Engelm. ‘Glauca’ and *Pinus mugo* Turra.

It was found during the study that the green areas and the old and new districts of Tallinn were relatively poor in species and the most widespread indigenous and introduced species were predominant. Rarer ornamental woody plants occur only as individual specimens. Thus, a conclusion can be made that the city’s green areas are poor in terms of woody plants diversity. Many green areas and districts (Kalamaja and Kadriorg) are species poor due to the fact that they have not been renovated. In 1960-1990, green areas were mostly developed in our new districts (Mustamäe, Väike-Õismäe and Lasnamäe) and in these green areas our most common native and introduced species were planted, mainly because they were widely grown in the nurseries and were cheaper. As it was, in the city much attention was not paid to the diversity and decorative nature of woody plants.

Naturalization

It is also possible to analyse the naturalization of woody plants on the basis of the data published in

the literature (Kukk 1991, 1999; Abner, Laansoo 2000, 2001) and on our own data. Based on the naturalization research of the Estonian vegetation (Kukk 1999) we have made a distinction between species running wild and naturalized species of woody plants. Species running wild are plants that have "fled" the places of cultivation; such species are always found near gardens, abandoned farmland etc. Running wild and naturalization take place by seeds, by root suckers or rhizome, or by cut branches. Naturalized plants are introduced plants that are more or less common in natural communities without the need of human help in distribution (e.g. silvicultural plantations of foreign species with any natural second growth are not considered as naturalized species). The running wild and naturalized woody plants in Tallinn amount to 71 species (13.8%) in 30 genera and 12 families. The highest number belongs to family *Rosaceae* Juss – 22 species. Out of the 71 registered species 20 are naturalized species (3.9%).

Differences in species richness in habitats complexes

The abundant material about the vegetation of Tallinn allows us to analyse the taxonomic differences of woody plants within 10 habitat complexes. The character and distribution of the taxa in the subject habitats complexes are shown in Table 3. In relatively natural habitats, both the indigenous species and planted trees as well as naturalized woody plants were counted.

The areas having the greatest number of species in Tallinn are gardens. In the gardens we found 86.3% (1,100 taxa) of the registered woody plants. Gardens are followed by urban parks, forest- and park-like cemeteries and yards and gardens of former suburbs with 260, 210 and 200 taxa of woody plants, respectively,

i.e. 4.9, 6.1 and 6.4 times less than in gardens. The smallest number of taxa was detected in the yards of the Old Town.

The distribution of native and introduced plants, etc. in different habitats is shown in Table 3. The relative importance of indigenous woody plants taxa in Tallinn ranges from 4.8% (gardens) to 67.8% (relatively natural habitats). The share of the introduced plants taxa in gardens and relatively natural habitats ranges from 95.2% to 32.2%, respectively.

Gardens are richest in species due to the high level of gardening in Tallinn. Town gardens are habitats richest in species in other countries as well (Owen, Owen 1975).

The highest number – 750 taxa of woody plants (113 taxa of conifers and 637 taxa of deciduous trees and bushes) were found in 1997 in the largest private collection in Kloostrimetsa. It is also the largest private collection in Estonia. This collection is followed by gardens with 255, 210 and 200 taxa of woody plants. In several gardens the number of woody plants taxa reaches 80–150. The park richest in species (about 200 taxa) is the Kadriorg Park (Aaspõllu 1993), founded in 1728. In Hirvepark (the former garden of the Estonian Gardening Society) we found 110 taxa of woody plants, in Toompark 75 taxa were recorded (both parks are in the bastion zone around the Old Town and were founded at the beginning of the 20th century). The number of taxa in all the other parks is below 60.

It appeared that urban public parks are by far richer in species (260 taxa) than the green areas of new districts (191 taxa) and yards and small gardens of old districts (200 taxa) (Table 3). The green areas of different ages in the districts of dense and sparse settlement demonstrated about the same number of taxa. For example, in the old districts Kalamaja and Kadriorg (founded at the end of the 19th and at the begin-

Table 3. Distribution of woody plant taxa in different habitats

No.	Habitat types	Number of taxa	% of taxa	Number of conifers	% of taxa of habitats	% of conifers taxa
1.	Relatively natural forest habitats (the forest-meadow-wetland complexes)	115	9.0	13	11.3	4.0
2.	Forest- and park-like habitats (parks of former summer estates)	165	12.9	25	15.2	7.8
3.	Urban public parks	260	20.4	28	10.8	8.7
4.	Forest and park-like cemeteries	210	16.5	42	20.0	13.1
5.	Small open green areas	174	13.6	24	13.8	7.5
6.	Green areas of various density and different tall buildings in new districts of free planning	191	15.0	23	12.0	7.2
7.	Private gardens (in garden-town Nõmme, in new districts and in "periurban" zone)	1100	86.3	306	27.8	95.3
8.	Yards and gardens of former suburbs around the Old Town	200	15.7	25	12.5	7.8
9.	Yards of the Old Town	75	5.9	4	5.3	1.2
10.	Sweets	104	8.2	13	12.5	4.0
-	Total	1275	-	321	25.2	-

ning of the 20th century), the numbers of the recorded taxa were 129 and 155, and in the new districts Väike-Õismäe and Mustamäe (founded in 1960-1990), 106 and 150, respectively.

High species richness is characteristic also of cemeteries. In the forest-cemeteries of Tallinn – Metsakalmistu, Liiva and Rahumäe, 131, 127 and 111 taxa of woody plants were registered, respectively (Reisner 1997).

Yards of the Old Town are poorest in species, being even poorer than street-sides. The area suitable for growing woody plants is quite small in the yards and woody plants also suffer from strong human pressure. This is why in this area the number of coniferous trees is smallest – only 4 taxa.

On the whole territory of Tallinn, the values of the indices of cultivation, introduction and horticulture (Wc, Wi, Wh) are 0.95, 0.92, and 0.49, respectively. The values of the same indices range from 0.43, 0.32, and 0.03 (relatively natural habitats) to 0.97, 0.95, and 0.56 (gardens), respectively (Table 4). The ratio of cultivars to species demonstrated considerable differences on different sites – it was smallest at street-sides and highest in gardens.

Table 4. Distribution of woody plant taxa characterizing human impact in different habitats

No. of habitats	Number of native taxa	Cultivated taxa	Introduced taxa	Cultivars	Wc	Wi	Wh
1.	78	49	37	4	0.43	0.32	0.03
2.	41	137	124	27	0.83	0.75	0.16
3.	38	235	222	63	0.90	0.85	0.24
4.	48	174	162	56	0.83	0.77	0.27
5.	31	152	143	49	0.87	0.82	0.28
6.	48	158	143	30	0.83	0.75	0.26
7.	53	1065	1047	616	0.97	0.95	0.56
8.	37	176	163	37	0.88	0.82	0.19
9.	21	59	54	8	0.79	0.68	0.11
10.	29	82	75	15	0.79	0.73	0.15
Total	98	1205	1177	624	0.95	0.92	0.49

In the relatively natural habitats of the city the ratio of the indigenous woody plants to the introduced plants is 1 : 0.6 and in the gardens 1 : 19.8.

Discussion

Compared to its closest cities St. Petersburg and Riga, several similarities and differences may be detected for Tallinn.

In St. Petersburg, located in the Ladoga-Ilmen floristic area, 85 native species have been recorded, of which 34 species are used in plantings (9 species are used extensively). The most common species are *Tilia cordata* Mill. and *Acer platanoides* L. (Булыгин, Фирсов 1995). The green areas of St. Petersburg have 217 species of woody plants of which 35 species are

native and 182 introduced. The most common introduced species are *Cotoneaster lucidus* Schlecht., *Cornus alba* L., *Syringa vulgaris* L., *Syringa josikaea* Jacq., *Symphoricarpos albus* (L.) Blake, *Spiraea chamaedryfolia* L. (Игнатъева 1994, 1995).

In Riga, 593 woody plant taxa have been recorded (Cinovskis 1982). In the 76 green areas of Riga there are 341 (Pūka et al. 1988) and in the urban public parks and small open areas of Tallinn 312 taxa of woody plants.

Four native species in Riga were most common: *Tilia cordata* – 58 sites (76,3%), *Acer platanoides* – 54 sites (71,1%), *Betula pendula* – 52 sites (68,4%) and *Quercus robur* – 47 sites (61,8%), as well as four introduced species: *Tilia × vulgaris* Hayne – 60 sites (78,9%), *Cotoneaster lucidus* – 55 sites (72,4%), *Aesculus hippocastanum* and *Syringa vulgaris*, both in 50 sites (65,8%). The four most common native species in the green areas of Tallinn are *Acer platanoides* L., *Betula pendula* Roth, *Fraxinus excelsior* L. and *Tilia cordata* Mill., and introduced species are *Syringa vulgaris* L., *Aesculus hippocastanum* L., *Philadelphus coronarius* L. and *Tilia × vulgaris* Hayne.

It appears that the most common coniferous tree in Riga and Tallinn is *Picea pungens*, especially its cultivar (*P. pungens* 'Glauca') that has turned out to be quite pollution-resistant in both cities.

The comparison of the three cities – Tallinn, St. Petersburg and Riga – shows that there are significant differences in the number of taxa in green areas. We can see that species richness tends to increase from north to south. This is due to the changes in the climatic conditions on the one hand and some other factors on the other. In the distribution of the most common native and introduced species there are no major differences between St. Petersburg, Riga and Tallinn.

The inventory also shows that in Riga the green areas richest in species were plantings on the banks of the Riga city canal – 129, Kronvald park – 126, plantings by the „Etnography Museum in the Open Air” – 109, Victory park – 98 and Park of the Culture and Rest – 96 taxa. There are 19 green areas with more than 50 taxa (the average number of taxa was 79). Therefore, the green areas of Riga are richer in species than those in Tallinn, evidently due to the more favourable climatic conditions, their larger area, planning, historical character, intensity of use, and other factors.

In general it may be observed that the woody vegetation of cities situated further to the south is considerably poorer in introduced species, especially as regards cultivars. For example, in 78 cities of the Ukraine a total of 576 woody plant taxa have been

recorded, including 439 species (76,2%) and 137 hybrids, cultivars, etc. (Кохно 1983). In the green areas of the cities and settlements in Armenia 350 woody plant species have been recorded, of which 116 (33,1%) are native species. In Yerevan 250 species have been found of which 77 are native species (Варданян 1996).

Conclusions

Getting a complete picture of the diversity of woody plants in cities is a fairly voluminous and time-consuming task. Ultimately, it is a phenomenon of human activity. It also depends on the climatic factors and micro-climatic stresses, the percentage of natural plants (forests), vegetation traditions, planting material used, financial resources of the vegetation organizations, soil limitations, air pollution, vandalism and many other factors.

The extensive research of woody plants conducted by us supports the following statements:

1. A rather large number of taxa of woody plants in Tallinn (1,275) do not demonstrate a high diversity. A large number of taxa is only related to the existence of collections of woody plants rich in species and the number is large on account of the relatively rare taxa represented by solitary specimens.

2. Of the recorded 516 species 71 (13,8%) were running wild and naturalized woody plants.

3. A comparison of the taxonomic composition showed that different native species (*Pinus sylvestris* L., *Acer platanoides* L., *Betula pendula* Roth), species of fruit-trees and garden berries (*Malus domestica* Borkh., *Ribes uva-crispa* L. *R. rubrum* L.) and introduced ornamental species (*Syringa vulgaris* L., *Aesculus hippocastanum* L., *Philadelphus coronarius* L.) were predominant.

4. The comparison of different growth sites revealed that gardens created through private initiative were richer in species. An overwhelming majority of woody plants taxa were recorded in gardens followed by city parks, graveyards and other sites. However, the number of taxa in the latter appeared to be substantially smaller than in gardens. Gardens also play a central role in species introduction – introduced woody plants first arrive in private gardens and only later in green areas.

5. The analysis shows that the indices of cultivation, introduction and horticulture (Wc, Wi, Wh) characterise different taxa groups on different sites rather well.

6. The comparison of native and introduced species in the urban zone revealed that native species form a small part of the total number of species but, depend-

ing on the urban district, may account for 1/2 to 2/3 of the individual plants. This result is close to those obtained by other authors who have found that native tree species comprise only a quarter of the total number of species but more than 2/3 of individual plants (Ploompuu, Laansoo 2001).

Acknowledgements

I would like to express my thanks to the anonymous referee for his valuable comments.

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Received 05 June 2001

РАЗНООБРАЗИЕ ДРЕВЕСНЫХ НАСАЖДЕНИЙ В ТАЛЛИННЕ, ЭСТОНИЯ

Х. Сандер, Ю. Эллику

Резюме

Согласно собранному материалу (в основном в 1990—е годы), в Таллине зарегистрированы 51 семейство и 1275 таксонов 145 родов древесных растений (исключая Таллиннский ботанический сад). При этом не учтены ломоносы (*Clematis*), а также сорта роз (*Rosa*), сирени (*Syringa*), фруктовых деревьев (*Malus*, *Prunus*, *Pyrus*) и ягодных кустарников (*Ribes*, *Rubus*). Среди 1275 таксонов было 516 видов и 624 сорта. В Таллине 97 таксонов (7,6%) являются местными.

153 таксона (26,2%) родом из Европы, 128 (22,0%) из Восточной Азии, 119 (20,4%) из Северной Америки и 150 (25,7%) таксона из Евразии, Евразии и Северной Америки и 33 из других мест.

Судя по частоте встречаемости древесных растений, преобладающая их часть представлена относительно редко. Наряду с наиболее привычной сосной обыкновенной (*Pinus sylvestris* L.) широкое распространение имели клен платановидный (*Acer platanoides* L.), из экзоты- сирень обыкновенная (*Syringa vulgaris* L.) и садовая яблоня (*Malus domestica* Borkh.).

Из различных мест обитания (сады, парки, кладбища, улицы и т.д.) наибольшим разнообразием видов отличаются сады, прежде всего частные 1100 таксонов, за ними следуют городские парки, кладбища и старые кварталы пригорода (дворово-садовые участки) – 260, 210 и 200 таксонов соответственно. Наиболее богатая коллекция содержала 750 таксонов. Видовым разнообразием также выделялись парк Кадрнорг и Лесное кладбище – 200 и 131 таксон соответственно.

Ключевые слова: флористический состав, местообитание, происхождение, частотность