

AN ANALYSIS OF ORNAMENTAL WOODY VEGETATION EXISTING IN IAȘI COUNTY'S GREEN SPACES

ANALIZA STRUCTURII VEGETAȚIEI LEMNOASE ORNAMENTALE EXISTENTE ÎN SPAȚIILE VERZI DIN MUNICIPIUL IAȘI

*SANDU Tatiana*¹, *TROFIN Alina-Elena*¹, *BERNARDIS R.*¹
e-mail: tatiana_sandu69@yahoo.com

Abstract. Iasi has approximately 912 hectares of planted green areas, representing about 23% of the total area of the city. Following assessments conducted periodically since 2002 and so far, we observed some aspects of plant qualitative development and vegetal structure of the urban and suburban green spaces in Iasi city. This paper seeks to present an assessment of structural components for the main plant units of green space and a study of the detection possibilities of improving the value of these green spaces by introducing appropriate arrangement of species in terms of environmental aspect, proper behavior, ornamental and especially the resistance to urban pollution. According to the general structure's evaluation we found that from all the green areas in Iași, approx. 15% are occupied by resin tree, 47% by deciduous trees, 9% by resin shrubs and 29% by deciduous shrubs.

Key words: trees, shrubs, green spaces, structure, Iași

Rezumat. Municipiul Iași deține aproximativ 912 ha de spații verzi plantate, care reprezintă aproximativ 23% din suprafața totală a municipiului. În urma evaluărilor efectuate periodic, începând cu anul 2002 și până în prezent, au reieșit unele aspecte privind evoluția calitativă și structura vegetală a spațiilor verzi urbane și periurbane din municipiul Iași. În lucrare se dorește a fi prezentată o evaluare structurală a componentelor vegetale pentru principalele unități de spațiu verde, precum și efectuarea unui studiu privind depistarea eventualelor posibilități de îmbunătățire a valorii acestor spații verzi prin introducerea în amenajări a unor specii cât mai corespunzătoare din punct de vedere al aspectului ecologic, sanogen, ornamental și mai ales al rezistenței la poluarea urbană. În urma evaluării structurii generale s-a constatat că din totalul suprafețelor cu spații verzi din Iași, cca. 15 % sunt ocupate de arbori rășinoși, 47 % de arborii foioși, 9 % de către arbuștii rășinoși și 29 % de arbuștii foioși.

Cuvinte cheie: arbori, arbuști, spații verzi, structură, Iași

INTRODUCTION

The existence of green space inside localities is essential especially in

¹ University of Agricultural Sciences and Veterinary Medicine of Iași, Romania

urban areas. Green space has no landscape or recreational purposes only, it is a great filter for different pollutants in the environment, helping to improve the environmental quality, reduce noise and thus increase the quality of life. As an indicator of urban development studies show that green spaces should cover about 30% of the city area and their distribution should allow citizens to have access to them in about 15 minutes walking.

This paper aims to present an approximate analysis of the structural situation of the green areas in Iasi city, Romania.

MATERIAL AND METHOD

Analysis of Iasi territory was made between May 2002 - October 2011, through visual monitoring of the current state of green areas in the municipality of Iasi and the surrounding, a more complex observations being made in collaboration with experts from Center for Fruit tree Research and Development Iasi, as part of a broader collaboration.

Collected and processed data were used to arrange the results regarding the structural analysis of vegetation, its health and its placement Iasi's close perimeter in order to shape some conclusions concerning the qualitative evolution and the vegetal structure of urban and suburban green spaces in Iasi.

RESULTS AND DISCUSSIONS

The largest share (about 47%) of green spaces vegetation in Iasi is the deciduous trees. Basically, deciduous trees make up the skeleton of plantations in all functional green spaces in Iasi, being much better adapted to environment under local climatic conditions.

Most species of deciduous trees existing in Iasi are native and grow naturally nearby city and this fact offers Iasi's green spaces the warranty of long term persistence for their "bone structure".

Currently, the total area of green space in the municipality of Iasi is estimated at 912 hectares, of which 363 hectares are green spaces with unrestricted access, 170 hectares of green spaces with limited access, 292 acres of green space with specialized profile, 38 hectares of urban recreational area and 48 hectares of orchards and other green spaces.

Romania's Government adopted through an Emergency Ordinance the regulations by which the local authorities are required to provide an area of at least 26 square meters of green space per capita in urban areas. To acquire this desiderate proposed by the Government, the transition will be gradual, until 31 December 2010 being assured 20 square meters of green space per capita, and by December 31, 2013, 26 square meters of green space for each person in Iasi.

At EU level, the area of green space per capita is at least 26 square feet, and World Health Organization recommendations suggest a minimum of 50 square meters per capita.

So, by early 2014, Iasi local authorities must ensure 26 square meters of green space per capita. One of these projects to increase green areas refer to

building a park on an area of 15 hectares inside Ciric forest area (in progress) and complete PALAS complex project, with about 50,000 sqm green space area. PALAS garden arrangement works - the largest private investment in Romania in a public-purpose space - are ongoing and will be completed this spring.

Even if the area of green space per capita is currently regarded as acceptable (20.6 m / capita), the problem comes from the fact that vegetation zones are unevenly distributed. For example, residents of neighborhoods like Nicolina or Tătărași have no park close, within 15 minutes walking.

Green spaces with unrestricted access currently occupies about 44% (about 363 ha) of the total area of green spaces in Iasi and have the following vegetal structure: 31.5% of those 44% are occupied by ornamental woody vegetation which is structured as follows: 29 ha (3.5%) - resin trees, 133 ha (16%) - deciduous trees, 22 ha (2.7%) - resin shrubs and 73 ha (8.8%) - deciduous shrubs.

Green spaces with limited access are spread on a surface of 170 ha (21%) of total green areas in Iasi, of which 16.1% is occupied by woody vegetation represented as follows: 1.8% - resin tree, 7.5% - deciduous trees, 1.2% - resin shrubs and 5.6% - deciduous shrubs.

Street plantations cover about 38 ha (4.6% of the total green area) and they are 99% composed of deciduous trees, especially from the following species: *Tilia tomentosa*, *Tilia platyphyllos*, *Acer pseudoplatanus*, *Acer platanoides*, *Aesculus hippocastanum*, *Robinia pseudacacia 'Bessoniana'* and *'Umbraculifera'*, *Populus x canadensis*, *Quercus robur*, *Quercus pedunculiflora*, *Juglans regia s.o.* (Zanoschi et al., 1996).

Recreational areas in Iasi occupy an estimated area of 405 ha with the following dominant tree species: *Acer negundo*, *Quercus robur*, *Fraxinus excelsior*, *Robinia pseudacacia*, *Quercus petraea*, *Tilia cordata*, *Tilia tomentosa s.o.*

The dominant tree species for all green spaces in Iasi are:

- Lime trees (*Tilia tomentosa*, *Tilia platyphyllos*, *Tilia cordata*) are native species well adapted to the local climate, with abundant bloom and vigorous growth, with great ornamental and health behavioral value. It should be noted that in Iasi exist some varieties and natural forms, lime trees being Iasi's representative specie (Sîrbu et al., 2011).

- Maples (*Acer platanoides*, *Acer pseudoplatanus*) are native species perfectly adapted to local climate, with vigorous growth and very ornamental foliage, with a high ornamental health behavioral value.

- Oaks (*Quercus robur*, *Quercus pedunculiflora*, *Quercus petraea*) are native species adapted also to the drier climate of Iasi, with great longevity and impressive sizes.

- Poplars (most frequently the Canadian hybrid poplar – *Populus x canadensis*) are present under the form of some cultivars, from which some are of feminine gender, inducing the problematic respiratory allergies. Over the years, there were attempts to replace the Canadian hybrid poplar with the white

poplar (*Populus alba 'Pyramidalis'* and *P. alba 'Nivalis'*). They are found mainly in the lower areas of the city (near swamps on the Bahlui meadow). (Zanoschi et al., 2000)

- Forest pine (*Pinus sylvestris*) has less decorative value but is used successfully on slopes and even on sandy soils.

- Black pine (*Pinus nigra ssp. austriaca*) is one of the coniferous species adapted to Iasi conditions, being more decorative in the first half of its life.

- Pyramid American thuja (*Thuja occidentalis 'Fastigiata'*), very much used in engineering the green spaces in the last 30 years, proves resistant to local climate and with a great ornamental value.

- Acacia (*Robinia pseudacacia 'Bessoniana'* and *'Umbraculifera'*) which vegetates well especially on sunny slopes, is also much appreciated on street alignments and s.o. (Ciocârlan, 2000).

Of all species existing in Iasi green spaces, we consider as appropriate, from the ecologically, health behavior, ornamental and urban pollution resistance point of view the following species (Sandu, 2009), listed in table 1:

Table 1

Species of trees and shrubs with ornamental, ecological, health behavior, ornamental and pollution resistance value

Angiosperm trees	<i>Tilia tomentosa, Tilia platyphyllos, Tilia cordata, Acer campestre, Acer platanoides, Acer tataricum, Carpinus betulus, Fraxinus excelsior, Fraxinus angustifolia, Fraxinus ornus, Ulmus foliacea, Sorbus torminali, Quercus robur, Quercus pedunculiflora,.</i>
Angiosperm shrubs	<i>Cotinus coggygria, Cornus mas, Cornus sanguinea, Viburnum lantana, Euonymus europeus, Ligustrum vulgare, Staphylea pinnata, Corylus avellana, Crataegus monogyna, Hedera helix, Mahonia aquifolium, Lonicera sp.</i>
Gymnosperm trees and shrubs	<i>Pinus nigra var. banatica, Abies concolor, Pinus nigra var. nigra, Pinus sylvestris, Taxus baccata</i>

Valuable species in terms of ornamental value existing in Iasi's green spaces are presented in table 2.

Table 2

Species of trees and shrubs with great ornamental value

Angiosperm trees	<i>Acer platanoides, A. negundo, Acer pseudoplatanus, Aesculus hippocastanum, Albizzia julibrissin, Betula pendula, Carpinus betulus, Cercis canadensis, Cercis siliquastrum, Fraxinus excelsior, Fraxinus angustifolia, Koelreuteria paniculata, Liriodendron tulipifera, Magnolia acuminata, Paulownia tomentosa, Platanus x acerifolia, Populus x canadensis, Populus alba 'Pyramidalis', Populus alba 'Nivalis', Quercus robur, Quercus pedunculiflora, Quercus rubra, Salix babylonica, Sophora japonica, Sorbus aria, Tilia tomentosa, Tilia platyphyllos, Tilia cordata, Ulmus pumila 'pinnato-ramosa'</i>
Angiosperm	<i>Berberis vulgaris, Buddleia alternifolia, Buxus sempervirens,</i>

shrubs	<i>Campsis adicans, Chaenomeles japonica, Colutea arborescens, Cornus sanguinea, Cotinus coggygria, Deutzia crenata, Diervilla florida, Euonymus fortunei, Fosythia suspensa, Fosythia viridissima, Hibiscus syriacus, Hydrangea arborescens, Kolkwitzia amabilis, Ligustrum ovalifolium, Lonicera sp., Mahonia aquifolium, Philadelphus coronarius, Pyracantha coccinea, Rhus typhina, Rosa sp., Spiraea sp., Symphoricarpos orbiculatus, Symphoricarpos albus, Tamarix sp., Viburnum opulus 'Roseum'.</i>
Gymnosperm trees	<i>Abies concolor, Chamaecyparis lawsoniana (divers cultivars), Ginkgo biloba, Juniperus virginiana, Larix decidua, Picea pungens "Argentea", Pinus nigra var. banatica, Pinus nigra var. nigra, Pinus strobus, Pinus sylvestris, Pseudotsuga menziesii, Thuja occidentalis (divers cultivars), Thuja plicata.</i>
Gymnosperm shrubs	<i>Juniperus communis 'Suecica', Juniperus communis 'Hibernica', Juniperus horizontalis, Juniperus sabina, Taxus baccata, Thuja occidentalis 'Globosa compacta', Thuja orientalis 'Globosa'.</i>

The most valuable species in terms of resistance to exhaust existing in Iasi green spaces are presented in table 3.

Table3

Species of trees and shrubs with resistance to exhaust

Species resistant to sulfur dioxide	<i>Quercus rubra, Acer negundo, Morus alba, Ulmus foliacea, Sambucus nigra, Lonicera sp., Buxus sempervirens, Thuja occidentalis, Thuja orientalis, Juniperus communis, Juniperus horizontalis, Juniperus sabina.</i>
Species resistant to hydrofluoric acid	<i>Euonymus europaeus, Quercus robur, Sambucus racemosa, Rosa rugosa.</i>
Species resistant to hydrochloric acid	<i>Populus tremula, Robinia pseudacacia, Picea pungens, Pinus nigra.</i>
Species resistant to ammonia	<i>Robinia pseudacacia, Quercus robur, Acer pseudoplatanus, Pinus nigra.</i>

CONCLUSIONS

1. From the total area with green spaces in Iasi, approx. 15% are occupied by tree resin, 47% by deciduous trees, 9% by resin shrubs and 29% by deciduous shrubs.

2. After browsing the land there was noted that the largest share, about 47%, is occupied by the deciduous trees.

3. Inside Iasi urban green spaces are present around 256 taxa, of which 192 are taxa of angiosperms (broadleaf) and approx. 64 taxa of gymnosperms (softwoods).

4. Iasi dominant trees in green areas appear to be varieties of lime (*Tilia tomenosa, T. platyphyllos, T. cordata*), followed by the species: *Acer platanoides, Acer pseudoplatanus, Quercus robur, Quercus pedunculiflora, Quercus petraea, Populus x canadensis, Populus alba 'Pyramidalis', Populus*

alba 'Nivalis', Pinus sylvestris, Pinus nigra ssp. Austriaca, Thuja occidentalis 'Fastigiata', Robinia pseudacacia 'Bessoniana' and 'Umbraculifera', s.o.

5. Among the shrub species (50 taxa), going into hedges, alignments or used as flowering shrubs, we meet with a high frequency: American thuja (*Thuja occidentalis*), Oriental thuja (*Thuja orientalis*), honeysuckle (*Spiraea x vanhouttei*), different species and cultivars of roses (*Rosa species*), silver carp (*Cornus sanguinea*), boxwood (*Buxus sempervirens*), lilac tree (*Syringa vulgaris*), privet (*Ligustrum vulgare*) and forsythia (*Forsythia sp.*) s.o.

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