

STUDY ON THE VULNERABILITY / SENSITIVITY OF THE TREE VEGETATION IN THE IAȘI URBAN AREA

STUDIUL PRIVIND VULNERABILITATEA / SENSIBILITATEA VEGETAȚIEI ARBORICOLE DIN ZONA URBANĂ A MUNICIPIULUI IAȘI

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Abstract: *The paper's object is to identify tree species with reduced sensitivity to urban environmental factors. The study was performed between 2012 and 2014 and it used as a material totally or partially dried tree species permanently situated in all kinds of green spaces from Iasi and that were cut during the said period. The studied indicators refer to the trees taxa, trees size, the categories of green spaces where the trees are situated and the initial condition of the trees. Our results show that the green spaces from Iasi are mainly populated with about 18 types of deciduous trees and conifers. The high sensitivity to urban environmental factors between 2012 and 2014 showed tree species ranging from softwood, mainly the t and Populus genera, while from the trees belonging to the hardwood categories, species belonging to the Acer genus.*

Key words: *sensitivity, trees, urban, Iași*

Rezumat: *Lucrarea are ca scop identificarea speciilor de arbori cu sensibilitate redusă la factorii de mediu urban. Studiul a fost efectuat în perioada 2012-2014 și a avut ca material toate speciile de arbori uscați, în totalitate sau parțial, care au fost situați pe toate tipurile de spații verzi ale municipiului Iași și au fost doborâți în această perioadă. Indicatorii luați în studiu se referă la taxonii de arbori, dimensiunile arborilor, categoriile de spații verzi unde se situează aceștia și starea inițială a arborilor. Rezultatele reieșite arată că în cadrul spațiilor verzi din municipiul Iași predomină aproximativ 18 genuri de arbori foioși și rășinoși. Sensibilitate ridicată la factorii de mediu urban, în decursul perioadei 2012-2014 au prezentat speciile de arbori din categoria esențelor moi, cu preponderență cele din genurile Tilia și Populus, iar dintre arbori aparținând categoriei esențelor tari, speciile aparținând genului Acer.*

Cuvinte cheie: *sensibilitate, arbori, mediu urban, Iași*

INTRODUCTION

Once with the cities development, the urban environment worldwide deals with issues like air pollution, industrialization enhancement and growth of the

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road traffic, waste accumulation, agglomerations of built surfaces (Iliescu, 2006). An extra issue regarding the decrease of the quality and quantity of the green space can be added to this, taking into account the great importance it has on the quality of life (Law 24/2007). A very important role as regards the composition of green spaces is played by the wooden vegetation, especially the tree vegetation (Bernardis, 2012, Iliescu, 1998). The climacteric disturbances during the last period together with the urban factors contributed to the decrease of the wooden vegetation resistance of the green spaces from Iasi and to important loses of trees and scrubs. In order to prevent these trees loses of high social, economic etc. impact and a durable development of the landscaping architecture from Iasi, we performed a study meant to identify the tree species of low sensitivity or vulnerability to the urban environmental factors. In order to create green spaces, it is necessary to know about the strong interdependence between wooden vegetation and its development environmental factors, thus conditioning their durability in time (Palade, 1994; Sandu, 2008; Sonea *et al*, 1997).

MATERIAL AND METHOD

The study was performed between 2012 and 2014 and the study material was represented by species of totally or partially dried trees situated in the green spaces of Iasi Municipality and that were cut during this period. The studied indicators refer to the trees taxa, trees size, the categories of green spaces where the trees are situated and the initial condition of the trees belonging to both softwood and hardwood. In order to perform the said research, we made personal assessments directly on site, based on measurements, observations, images, as well as in the production department of Servicii Publice Iași Joint Stock Company.

RESULTS AND DISCUSSIONS

During the study period between 2012 and 2014, 3041 totally or partially dried trees situated in the green spaces of Iasi Municipality were cut. Among these, 1557 trees had a body diameter between 10 and 30 cm, 932 trees had a body diameter between 31 and 50 cm and 552 trees had a body diameter of over 50 cm (*Table 1*).

Table 1

The number and dimensions of the trees in the green space of Iași Municipality cut between 2012 and 2014

No.	Trees diameter (cm)	Year 2012 (pc.)	Year 2013 (pc.)	Year 2014 (pc.)	Total no. of cut trees 2012-2014 (pc.)
1	10-30	930	491	136	1557
2	31-50	487	232	213	932
3	>50	375	127	50	552
4	Total	1792	850	399	3041

By analyzing table 1 we chat in 2012 and 2013 the percentage of partially and totally dried trees that were cut with a body between 10 and 30 cm, meaning young and very young trees, is of 51.89% and 57.76%. In 2014, the percentage of

the cut dried trees with the body between 31 and 50 cm, meaning young trees with physiological functions performed at maximum capacity, was of 53.38%. during the entire studied period the lowest percentage of cut dried trees, meaning under 20%, was registered for the trees whose bodies were over 50 cm, meaning mature trees. The partially or totally dried trees that were cut were mainly situated on the green spaces like parks, gardens, squares, straightway, pertaining to the residential complexes, and green spaces within the institutions, enterprises, social and cultural units, cemeteries and protection curtains. Most of the dried trees were cut in the period between 2012 and 2013 on the green spaces pertaining to the condominium residential complexes, followed by straightway, parks and squares. In the period between 2013 and 2014, most of the dried trees were cut from the straightway areas, followed by the green spaces pertaining to the condominium residential complexes and then from parks, squares, green spaces within the institutions area (Fig. 1).



Fig. 1 - Dried trees in the straightway areas of Iași

Lacking a Green Space Register of Iași, the data could not have been percentually reported for each category of green space and for each trees taxon, in order to observe the loss of trees for each category.

As regards the dried trees taxa, thanks to the anthropic factors of the urban environment, between 2012 and 2014 about 18 types of ornamental dried trees were identified on the green spaces of Iași. From a percentage point of view, about 58.82%, of it belong to the hardwood category and 41.18% to the softwood category. The ornamental trees species of high sensitivity or vulnerability to the urban environmental factors on the green spaces of Iași were those belonging to the *Tilia*, *Populus* and *Acer* genera. In the period between 2012 and 2013, most of the dried trees that needed to be cut were those belonging to the *Tilia* genus – 43.69%, then to the *Populus* genus – 27.90% and the *Acer* genus – 14.84%. The other species registered lower percentages, between 5.63% and 1% for the

Robinia, *Aesculus* and *Gleditsia* genera, while others even percentages under 1% (Table 2).

Table 2

Types of trees cut in the period between 2012 and 2014 on the green space of Iași Municipality

No.	Tree type	Year 2012		Year 2013		Year 2014		Total no. of cut trees 2012-2014	
		(pc.)	(%)	(pc.)	(%)	(pc.)	(%)	(pc.)	(%)
1	<i>Acer</i>	266	14.84	122	14.35	169	42.35	557	18.32
2	<i>Aesculus</i>	55	3.07	128	15.06	4	1.00	187	6.15
3	<i>Betula</i>	1	0.05	1	0.12	4	1.00	6	0.20
4	<i>Catalpa</i>	1	0.05	1	0.12	14	3.50	16	0.52
5	<i>Fraxinus</i>	-	-	-	-	7	1.75	7	0.23
6	<i>Gleditsia</i>	27	1.50	40	4.70	-	-	67	2.20
7	<i>Juglans</i>	-	-	-	-	1	0.25	1	0.03
8	<i>Quercus</i>	15	0.83	22	2.59	1	0.25	38	1.25
9	<i>Malus</i>	-	-	1	0.12	2	0.50	3	0.09
10	<i>Morus</i>	4	0.22	1	0.12	-	-	5	0.16
11	<i>Picea</i>	8	0.44	1	0.12	5	1.25	14	0.46
12	<i>Pinus</i>	6	0.33	-	-	-	-	6	0.20
13	<i>Populus</i>	500	27.90	219	25.76	111	27.82	830	27.29
14	<i>Prunus</i>	3	0.17	2	0.23	1	0.25	6	0.19
15	<i>Robinia</i>	101	5.63	33	3.88	14	3.51	148	4.86
16	<i>Salix</i>	12	0.67	32	3.76	4	1.00	48	1.57
17	<i>Tilia</i>	783	43.69	242	28.47	62	15.54	1087	35.74
18	<i>Ulmus</i>	10	0.56	11	1.29	-	-	21	0.69
19	Total	1792	100	850	100	399	100	3041	100

In 2012, the lowest percentages of dried trees that were cut belonged to the following genera: *Catalpa* by 0.05%, *Betula* cu 0.05%, *Ulmus*, *Quercus* etc. in the period between 2013 and 2014, most of the dried trees that were cut belonged to the *Tilia* genus – 28.47%, followed by the *Populus* genus – 25.76%, *Aesculus* 15.06% and *Acer* 14.35%. Other dried ornamental trees species that registered percentages between 5% and 1% were those belonging to the *Gleditsia* genus by 4.70%, *Robinia* 3.88%, *Salix* 3.76 %, *Quercus* 2.59% and *Ulmus* 1.29%. The other species registered percentages under 1%, and the least dried trees belonged to the following genera: *Morus*, *Catalpa* and *Betula*. In the period between 2014 and 2015, due to some legal mismatches that led to operational procedure difficulties; very few dried ornamental trees were cut (less than 50% in comparison with the previous years), even if their effective number on the green spaces of Iași Municipality was higher. Most of the dried trees cut in 2014 belonged to the *Acer* genus (42.35%), followed by species belonging to the *Populus* genus (27.82%), while on the third place *Tilia* genus by 15.54%. The lowest percentages of dried trees cut in 2014 were registered for the species

belonging to the *Quercus*, *Juglans*, *Fraxinus* and *Robinia* genera. The results of the study performed in the period between 2012 and 2014 show that the green spaces of Iași Municipality of high sensitivity or vulnerability to the urban environmental factors are those belonging to the *Tilia* genus, followed by the *Populus* and *Acer* genera (Fig. 2).

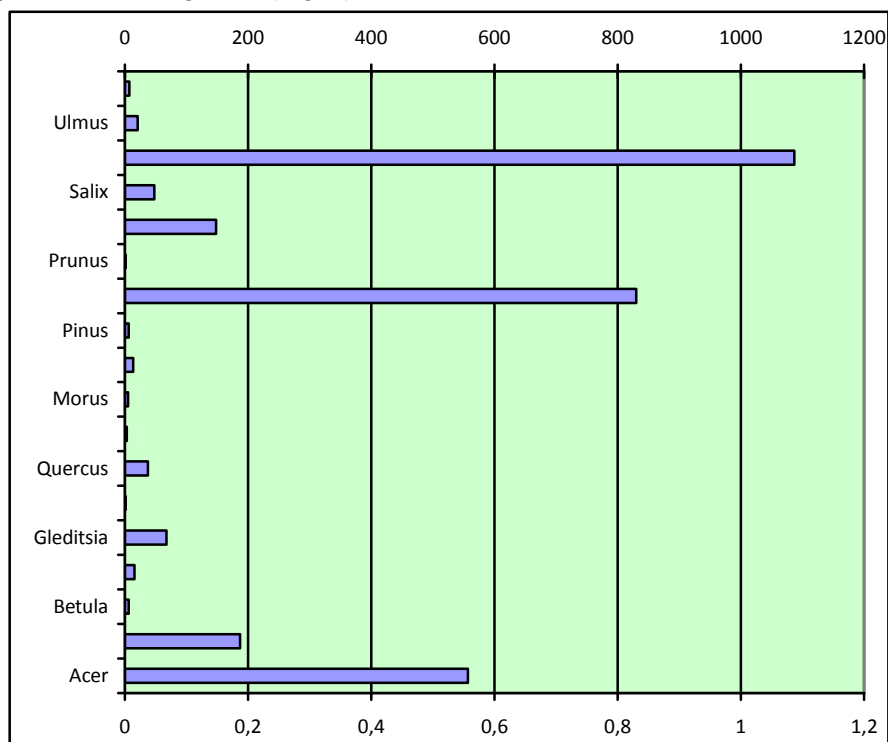


Fig. 2. Trees taxon vulnerability in Iași Municipality in the period between 2012 and 2014

Figure 2 also shows us that in the period between 2012 and 2014 trees of low sensitivity or vulnerability belonged to the following genera: *Juglans*, *Betula*, *Fraxinus*, *Pinus*, *Prunus*, *Ulmus*, *Robinia*, *Quercus*. Among these, most of the low vulnerability species belong to the hardwood category, while most of the high vulnerability or sensitivity ornamental trees belong to the softwood category (*Tilia*, *Populus*), indifferently from the green space category they were situated on.

CONCLUSIONS

1. The green spaces of Iași Municipality are mostly populated by about 18 types of deciduous trees and conifers. Among these, 41.18% belong to the softwood category and 58.2% belong to the hardwood category.

2. The high sensitivity to the urban environmental factors of Iași Municipality for the period between 2012 and 2014 presented the trees species of the softwood category, mainly those of the *Tilia* and *Populus* genera, which were

situated on the 1st and 2nd positions during the entire period of the study. Among the high sensitivity trees species belonging to hardwood, the *Acer* genus trees species were on the 1st position.

3. During the entire study period, among the low sensitivity/vulnerability trees on all the green spaces categories of Iași Municipality the following were signaled: *Ulmus*, *Robinia*, *Quercus* and so on.

4. Most of the dried trees were situated on straightway, followed by the green spaces pertaining to the condominium residence complexes and to the other types of green spaces.

5. Young and very young trees (diameter at the stem between 10-30 cm) have vulnerability/sensitivity increased in urban conditions, compared with mature trees and very mature (diameter at the base of the stems between 31-50 cm and 50 cm).

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