

INVENTORY OF GREEN SPACES AND WOODY PLANTS IN THE URBAN LANDSCAPE OF RĒZEKNE

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This article presents the results of dendrological inventory of largest green territories of Rēzekne and analysis of obtained data. The inventory of arboreal plants in the territory of Rēzekne was carried out in four parks, in one square and in two of the town's main streets. In general, 2060 trees are surveyed, the largest number of them – street trees. The green space inventory was conducted during summer months of years 2012 and 2013. There are 94 taxa enumerated in Rēzekne town during inventory, 18 of them (19%) are native species, while non-native taxa – 76 or 81%. The most often planted tree species in Rēzekne city greeneries are: *Tilia x vulgaris* Hayne, *Tilia cordata* Mill., and *Acer platanoides* L. Rēzekne is a first city in Latvia, where analysis of the Species Diversity Index (SDI) was carried out. The analysis of woody plants of Rēzekne has shown, that the SDI was moderately low (SDI= 6.5). The analysis of vitality of trees and shrubs showed, that in most cases vitality is excellent or good - 43%. Only 15% of all trees in parks and streetside plantations are defined as such with poor vitality or as not appropriated plant material.

Key words: urban dendroflora, street trees, parks, Species Diversity Index (SDI), vitality.

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INTRODUCTION

Green areas have a very important role in the urban environment and create a link between natural and anthropogenic factors (Čekstere 2011). It is argued that urban trees provide numerous environmental and social benefits for the quality of life of our urbanized society (Ulrich 1984, Xiao et al. 1998, McPherson et al. 1999, Chiesura 2004, Nowak et al. 2006, Arnberger 2006). The green space of city includes all parks, squares, streets and plantations of semi-private living zones. It is the city's Green decoration

(Zvirgzds 1986). Street trees are an integral part of the urban landscape (Sreetheran et al. 2011). Firstly street greenery helps create a city's visual image and it provides extra public space, and secondly it ecologically links bigger green planting areas (parks, squares, etc.) and improves the microclimate (Jankevica & Zigmunde 2013). The seasonal changes of vegetation is one of the most important aesthetic characteristics found in Latvia's climatic zone. The plants express different season through blossoms in spring and summer, fruits and coloured leaves in the autumn and evergreen foliage and peculiar bark in the winter (Schmidt 2012).

However, urban environments are particularly stressful and cause low diversity of street trees due to a low survival rate of newly planted trees and short life-span for many tree species (Sanders 1981, Richards 1983, Sreetheran et al. 2011).

Overplanting of a species from tree nurseries could lead to maintenance problems such as weak wood, the tendency to develop chlorosis, girdling roots, and messy fruits, but they are manageable only when planted in moderation (Trowbridge & Bassuk 2004).

Rēzekne was granted with the rights of county town in 1773, and, together with the formation of town, formation of the greenery began. Rēzekne boomed in its development in 1836, when the road St. Petersburg - Warsaw was built. (Anonymous 2007). Roadside plantations along this road are considered as a start point of *Atbrīvošanas Alley* and its streetside plantations. Some of old monumental trees that survived in Rēzekne town centre along main streets are live witnesses of first greeneries and were previously used as plant materials along roadsides in Latgale.

Previous dendrological inventory of Rēzekne was carried out in 1974, but, unfortunately, fragmentary and only for town center and *Atbrīvošanas Alley* (Bice et al. 2005), without any clarification what does it mean territorially. No doubts that these territories are reconstructed over the years and new plantations are formed. Therefore, there are no aggregated data about Rēzekne's trees and shrubs available. Such territories as *Raiņa park*, park of Northern industrial area and *Dārzu Street* has been inventoried for first time.

The aim of the study is dendrological inventory of largest green territories of Rēzekne, and analysis of obtained data. According to the aim, the main tasks are defined:

- to assess the taxonomic diversity of main greeneries in Rēzekne;
- to evaluate the vitality of woody plants according the our proposed vitality scale;
- to approbate the use of the Species Diversity Index in Latvia on the example of green spaces of Rēzekne.

MATERIALS AND METHODS

Study Area

Rēzekne is seventh biggest town of Latvia by population. The town is located in the Northern descent of Latgale Highland, on banks of river Rēzekne (Fig. 1.). The total area of town is 1748 ha and it has a population of 30 756 (data from year 2013). 70% of the town's territory is built up, 13% is green area but 15% - industrial zone (Anonymous 2007).

The inventory encompassed 2060 individuals of woody plants growing in public area. Plants on private residential land were not included. The lowest point in Rēzekne is 130 m above the sea level but the highest point reaches approximately 187 m above the sea level. The town located in Latvia's wet continental agroclimatic region, mild temperature subregion with hydrotermical coefficient (HTC) 1.5-1.7. The moderately moist sandy or loamy soils were formed in such conditions. Annual average temperature in Rēzekne is +4.7 °C, it ranges from -7 °C in January to +17 °C in July (Turlajs 2007). The absolute lowest temperature observed in January or February is -39 °C, the absolute maximum +34 °C in July. The average date then thaw occurs is March 30, the first frosts of autumn are usually observed starting from the 15th of November. Number of days with daily average temperature above 0 °C is 230. Annual average rainfall is 639 mm. (Rudovics & Rudovica 1993).

Inventory

The public greeneries of Rēzekne are inventoried in years 2012 and 2013 – *Raiņa park*, park at the Orthodox Church, park of the Northern industrial area and square at City Council as well as street trees of *Atbrīvošanas Alley* and *Dārzu Street* (Fig.2.).

The green space inventory was conducted during summer months of years 2012 and 2013, when vegetation is most abundant and can fully reveal



Fig. 1. Location of research area – Rēzekne in Latvia.

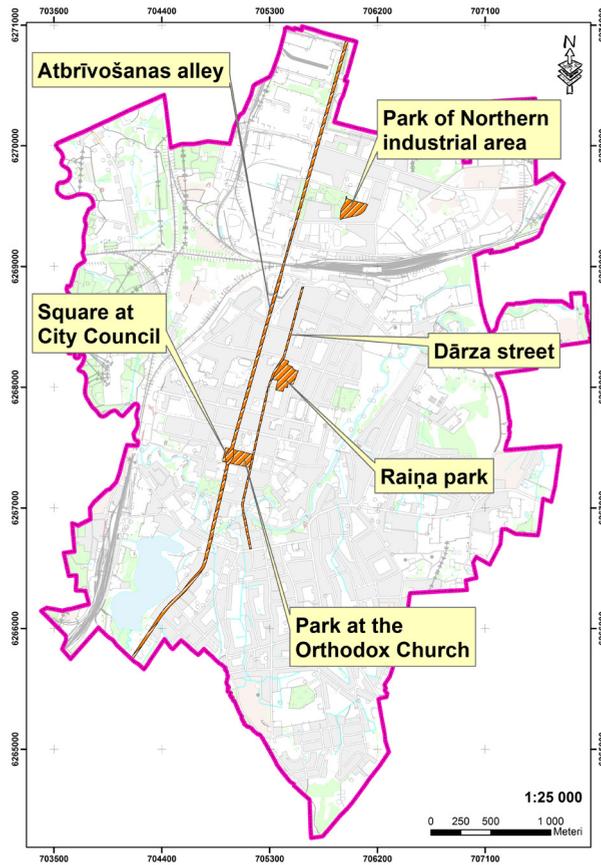


Fig.2. Inventoried territories in Rēzekne.

the morphological characteristics of the plants, and their condition can be determined accurately. Specimens of rare and unclear taxa were collected in herbarium of Daugavpils University (DAU). We collected the following data by performing the inventory: botanical name (species, taxa, cultivar); height; diameter (measured at breast height 1.3 meters from the root collar). Tree height was obtained by using Hypsometer Vertex IV-360, whereas diameter was measured using diameter tape. The data were integrated in the Geodatabase, created by ESRI ArcGIS 10 software.

The vitality of trees was evaluated according to scale proposed by authors:

1. Tree with perfect vitality, decorative and without any damages, management measures is not required.
2. Tree with good vitality, immediate management measures is not required. In the near future removal of dead wood or forming of canopy can be required.
3. Tree with suitable vitality and mediate landscape value. Care of tree canopy, cutting of dead or broken branches and other canopy forming works are necessary to extend the landscape value of tree.
4. Tree with weak vitality. Tree is not vital, with deformed canopy. Immediate cutting of concrete tree is not necessary, however, for sustainable planning of landscape of urban parks and streetsides, it is advised not to retain the tree.
5. Vitality of tree is very weak or tree is withered. The tree totally lost its landscape value. Concrete tree is not necessary to preserve, tree even can be dangerous, should be removed, and, if required, replaced by a new plant.
6. Vitality of tree is not specified. Too small or not appropriated plant material in this case is used for public plantations.

Species Diversity

The biological and genetic diversity level is a major factor in determining the stability and catastrophic tolerance of the roadside tree population (Richards 1983; Sun 1992). Diversity index is defined as a measure of the number of species in a community and their relative abundances

(Lincoln et al. 1982; Streetheran et al. 2011). For the purpose of quantifying the species diversity in Rēzekne, a simple measure of the inverse of Simpson's Diversity Index (SDI) was employed as derived by Sun (1992):

$$\text{SDI} = \text{Inverse of Simpson's Index} = \frac{\sum N_j}{\sum N_j(N_j - 1)}$$

where N_j = number of individuals in the j th ($j = 1, 2, 3 \dots n$) group (species or genus), and n = the total number of groups in a particular population.

The Inverse of Simpson's Index can be interpreted as the expected number of samples with two randomly selected trees, of which one sample could have two trees belonging to the same species. The greater the SDI, the higher the diversity level. This SDI can be considered as the adjusted number of species in a street population based on species composition. This is because SDI equals the number of species if all the species are evenly represented in a population. Any street population with a SDI + X is diverse as much as an evenly-distributed population with X species. The SDI permits linear comparisons of species diversity levels between any street tree populations (Sun 1992).

RESULTS AND DISCUSSION

Taxonomical diversity of arboreal species

The inventory of arboreal plants in the territory of Rēzekne was carried out in four parks, in one square and in two of the town's main streets. In general, 2060 trees are surveyed, the largest number of them – street trees, 1065 – on Dārzu Street (533) and Atbrīvošanas Alley (532) There are 994 trees together surveyed in the main parks of Rēzekne – in the Raiņa park (453) in the park near the Orthodox Church (279), in the park of Northern industrial area (178) and the City Council square (85). There are 900 or 44% native species trees from inventoried trees, while 1160 or 56% - non-native or introduced species. During inventory of green areas, 94 taxa (species, subspecies, varieties, forms, and cultivars) were enumerated in Rēzekne, 18 of them (19%) are

Native and non-native taxa surveyed the greenery in Rēzekne

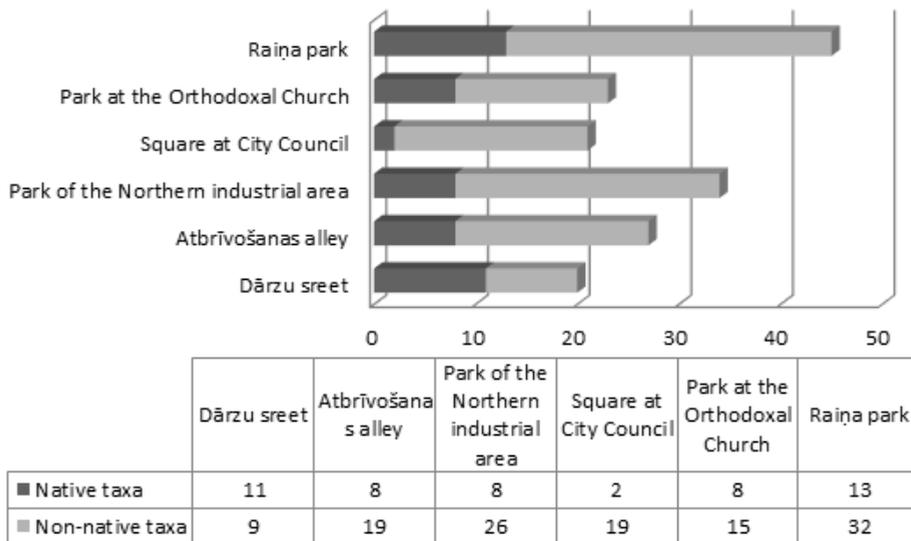


Fig. 3. Native and non-native taxa surveyed in the greenery of Rēzekne.

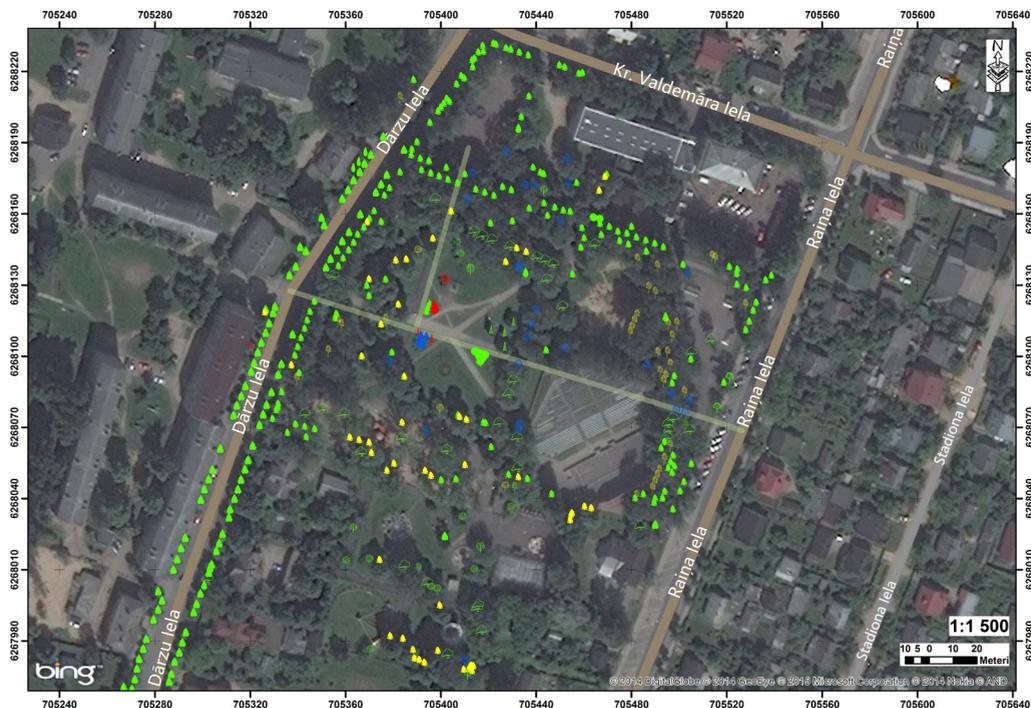


Fig. 4. Map of Raiņa park with a fragment of Dārzu Street. Example of taxonomical diversity of green territories.

native species, while non-native taxa – 76 or 81% (Fig. 3). The ratio between native and non-native taxa surveyed in the greenery of Rēzekne is 1:4.

The highest number of taxa was found in two town parks - in Raiņa park (45 taxa at all, 13 of them - native, 32 - non native) (Fig. 4.), and in park of Northern industrial area (34 taxa at all, 8 native, 26 non native). It shows that the street plantings is remarkably poor - only 20 taxa was counted along Dārzu Street, little bit more – 27 along town's main street - Atrīvošanas Alley. For comparison, the inventory of urban green areas was also carried out in the Lithuanian cities of Ariogala and Raseiniai, where in street plantings accordingly 26 and 55 taxa are surveyed (Straigytė & Vaidelys 2012, Straigytė et al. 2009). Of course, it should be noted that during these studies all street plantings are counted in these relatively small towns, while we have prepared data only about two of Rēzekne centre streets.

Atrīvošanas Alley is one of the few plantations that previously have been inventoried in the town of Rēzekne. Previous inventory was carried out in September 1974. During this inventory, there were only two native taxa and 17 non-native taxa registered. Native species - *Acer platanoides*, *Tilia cordata* and *Ulmus glabra* Huds. and non-native taxa of genus *Populus* L. (*Populus x petrowskyana* (Schröd. Ex Regel) Dippel, *Populus nigra* x *P. laurifolia*, *Populus* 'Lettland' et al.) (Bice et al. 2005). After street reconstruction works (launched in 2009), the street plantings are also considerably renovated. Some of the previously listed native taxa were found here during our studies in the summer of 2013 - *Qercus robur*, *Fraxinus excelsior*, *Sorbus acuparia* et al. Alley has been renovated mostly with trees of genus *Tilia* L. (*T. x euchlora* C.Koch, *T. dasystyla* Stev. subsp. *caucasica* (V.Engl.) Pigott, *T. platyphyllos* Scop., *T. platyphyllos* 'Aurea', *T. platyphyllos* 'Rubra', *T. x vulgaris*).

The most often planted tree species in Rēzekne greeneries is *Tilia x vulgaris* – it represents 34% from all trees and bushes counted. Other commonly cultivated native species are *Tilia cordata* (12%) and *Acer platanoides* (11%) The most

valuable arboreal species in surveyed areas are selected, which is rare in the whole region or country. Such species in Raiņa park and park of the Northern industrial area is *Malus cerasifera* Spach, but in park at the Orthodox Church - *Pinus sibirica* Du Tour.

The most valuable non-native woody plant taxa considered by authors are: *Betula alleghaniensis* Britton, *Juglans ailanthifolia* Carrière, *Phellodendron amurense* Rupr. These taxa should be considered as valuable and rare non-native taxa and could be protected in scope of the town.

Species Diversity Index

The analysis of the Species Diversity Index for the street trees in Rēzekne has shown that the SDI was moderately low (SDI= 6.5) (Appendix 1.), when compared to the SDIs for other cities around the world calculated by Sun (1992).

Highest SDI value among inventoried dendrological objects is defined for park of Northern industrial area (15.4), SDI value for other objects are: Raiņa park (8.7), square at City Council (8.4), park near the Orthodox Church (6.7). Lowest SDI values - Atrīvošanas Alley (3.8) and Dārzu Street (1.9). Low SDI value for Dārzu Street is expected, because here the smallest number of taxa and highest number of measured specimen ratio was found.

Rēzekne is a first town in Latvia where analysis of the Species Diversity Index was carried out. More detailed analysis of street tree biodiversity and populations of trees in greeneries were carried out in USA major cities (Richards 1983; Sanders 1981), UK (Allison et al. 1985), and Malaysia (Sreetheran et al. 2011).

The frequencies of the occurrence as well as percentage of of all arboreal species are shown in Appendix 1. Bassuk (1988) proposed a 5% criterion for urban street tree planting. She found that many underused tree species could adapt well to the urban environment and suggested that any species in a street tree population should not be more than 5%. An equivalent SDI to this criterion

Table 1. Comparison of vitality levels of parks and streetside plantations in Rēzekne

	Vitality of parks	Vitality of street trees	Vitality of all greenery
1	24	10	17
2	40	13	26
3	20	63	42
4	8	11	9
5	5	3	4
6	3	0	1

Vitality of trees and shrubs

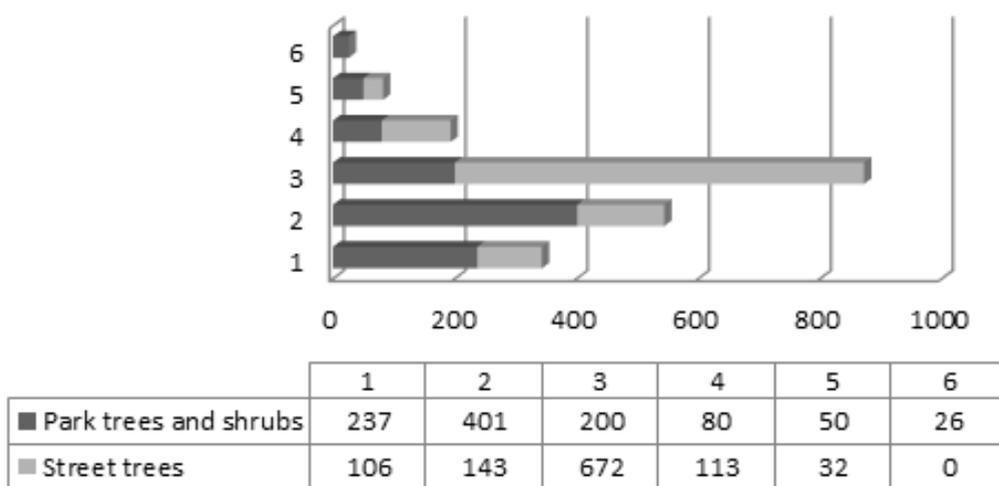


Fig. 5. Comparison of vitality levels in greeneries of Rēzekne.

is 20. To raise the SDI from the current level to 20, the diversity of Dārzu Street and Atbrīvošanas Alley as well as in other territories number of planted tree species must be raised more than fivefold or even tenfold. However, dominance by few species is quite common in urban street tree population both in tropical and temperate zones. Miller (1988) and Jaenson et al. (1992) also found the overplanting or the exclusive planting of a single species in their research (Sreetheran et al. 2011; Trowbridge and Bassuk 2004). So, the dominant tree species in Rēzekne is *Tilia x vulgaris* (34.1%), as well as *Tilia cordata* (12.67%) and *Acer platanoides* (10.67%). Such populations are more exposed to infection risk, as a result,

greeneries is much more sensitive and vulnerable. There is a high risk level, that significant part of urban trees can be damaged or even die by different mycosis, pests, inappropriate ecological conditions etc.

A classic example is from the epidemic of Dutch elm disease in cities of the United States and Eastern Europe (Cinovskis 1979, Grey & Deneke 1986, Philips 1993), or invasion of *Chalara fraxinea* in Eastern Europe as the cause for common ash decline (Kenigvalde et al. 2010). Therefore, the SDI for Rēzekne could be enhanced by selecting underused species from local nurseries.

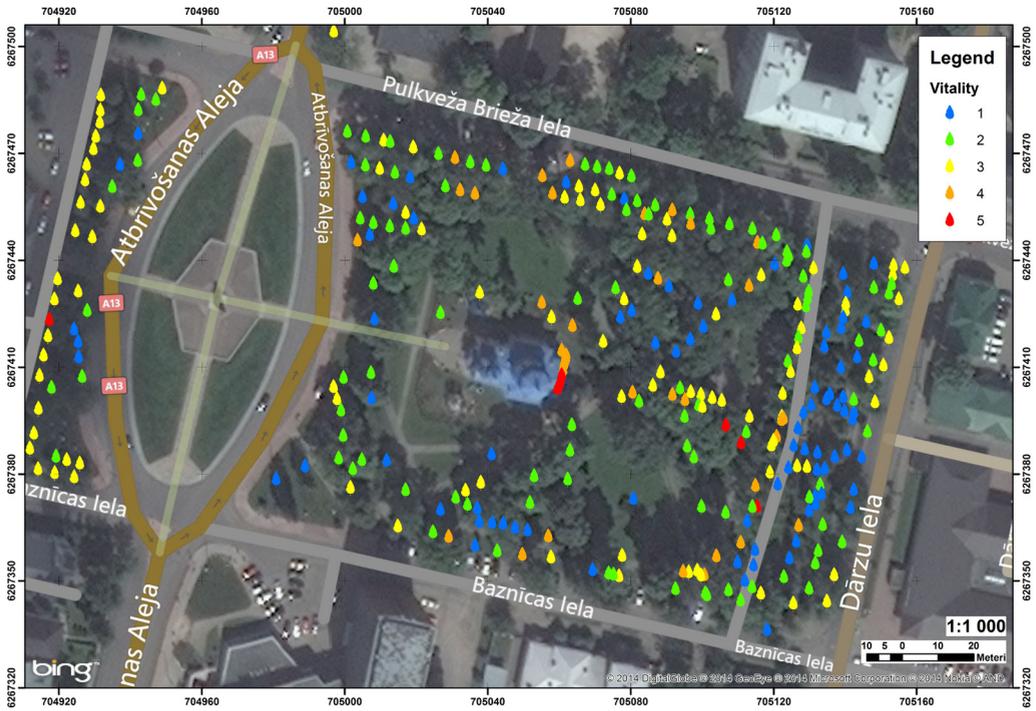


Fig. 6. Map of square at City Council and park near the Orthodox Church with rated vitality of all trees and shrubs.

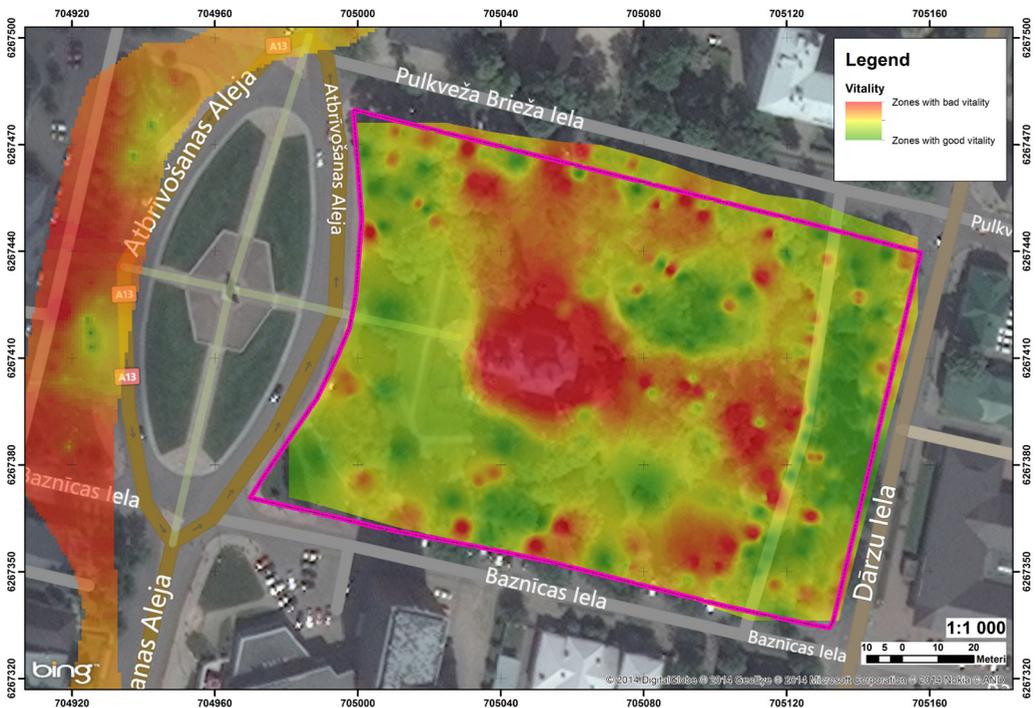


Fig. 7. Map of square at City Council and park near the Orthodox Church with defined vitality zones.

Evaluation of vitality

The vitality of inventoried greeneries of Rēzekne is evaluated according to our previously developed six-ball scale. With a perfect vitality or grade '1' 343 trees or 17% of all greeneries is rated (Tab.1. and Fig.5.). More than 2/3 from these outstanding, vital trees are found in town parks. In contrast, largest part of vital street trees is only recently planted young trees of genus *Tilia* L. in Atbrīvošanas Alley. With a good vitality or grade '2' 544 trees or 26% is rated in Rēzekne greeneries at all. Comparing parks and street trees, one can clearly see that all parks are more vital according our evaluation - 64% of trees are rated with grade '1' or '2', and immediate management activities are not required here. Street trees are recognized as less vital in many cases - 63% are rated with grade '3' - trees with suitable vitality and mediate landscape value, and canopy forming works, cutting of dead or broken branches etc. are necessary to extend the landscape value of these. Largest share from these trees is a truncated *Tilia x vulgaris* – trees with radically cutted canopy and trunk, therefore, in most cases height of tree does not extend 10 m. Unfortunately, such radically formed canopy is suitable only for *Tilia x vulgaris*, therefore *Tilia platyphyllos* and other trees, that have been truncated, is nearly withered and lost its landscape value. With grade '4' rated all trees with weak vitality or untypical, deformed canopy. The landscape value is lost in this case due to different reasons – signs of Dutch elm disease for *Ulmus glabra*, old specimens of *Fraxinus excelsior* with signs of *Chalara fraxinea* damages etc. With a poor vitality or grade '5' 82 trees or 4% of all greeneries are rated. All dead or nearly dead trees, dangerous trees, trees with serious mechanical damages etc. are included here All these trees are totally lost their landscape value. Here included also The tree and shrub species, which are not suitable for sustainable urban greenery, are included in this group – *Prunus cerasifera* Ehrh., apple, cherry etc. fruit tree seedlings, *Caragana arborescens* Lam. and other. Trees rated with grade '6' (not appropriated plant material for public plantations) have not been found in the street plantations, nevertheless, in Raiņa

park these trees constitute 5% of all inventoried trees, and indicate a non-professional greenery building strategy.

Another inventoried green territory – the square in front of Rēzekne City Council created as new block plantings. Nearly all arboreal plants here are young plants with excellent or good vitality (Fig. 6. and 7.). Vitality is also excellent for several taxa in Atbrīvošanas Alley. They are young plants of broad-leaved lime *Tilia platyphyllos* cultivars and varieties, as well as *Tilia dasystyla* subsp. *caucasica*, which is also valuable, rare taxon in Latvia as whole.

CONCLUSIONS

The main green spaces of Rēzekne was inventoried during vegetation seasons of 2012 and 2013 – Raiņa park, park at the Orthodox Church, park of the Northern industrial area and square at City Council as well as street trees of Atbrīvošanas Alley and Dārzu Street. In general, 2060 trees are surveyed, 1065 of them – street trees, 994 – in main parks of Rēzekne. There are 900 or 44% native species from all inventoried trees, while 1160 or 56% - non-native of introduced species. There are 94 taxa (species, subspecies, varieties, forms, and cultivars) enumerated in Rēzekne town during inventory, 18 of them (19%) are native species, while non-native taxa – 76 or 81%. The most often planted tree species in Rēzekne city greeneries are: *Tilia x vulgaris*, *Tilia cordata*, and *Acer platanoides*. The most valuable non-native woody plants in inventoried greeneries are specimens of *Malus cerasifera* and *Pinus sibirica*. Rēzekne is a first city in Latvia, where analysis of the Species Diversity Index was carried out. The analysis of the Species Diversity Index for the urban trees in Rēzekne has shown that the SDI was moderately low (SDI= 6.5). Highest average SDI value for inventoried dendrological objects is defined in parks – 9.8, lowest SDI values – for street trees – only 2.85. It is considered as low in both cases, whereas optimal SDI for urban territories is regarded as 20.

The analysis of vitality of trees and shrubs has shown, that in most cases vitality is excellent or good - 43% rated with marks '1' or '2', 42% - with mark '3'. Only 15% of all trees in parks and streetside plantations are defined as such with poor vitality or as not appropriated plant material – rated with '4', '5', or '6'. When comparing parks and street trees one can clearly see that all parks are evaluated as more vital - 64% is rated with grade '1' or '2', and immediate management activities here are not required. Street trees are commonly recognized as less vital - 63% is rated with grade '3' - trees with suitable vitality and mediate landscape value.

ACKNOWLEDGEMENTS

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Appendix 1

Taxa	Number of trees (n)	%	n-1	n*(n-1)
<i>Acer platanoides</i>	220	10.68	219	48180
<i>Betula pendula</i>	51	2.48	50	2550
<i>Betula pubescens</i>	57	2.78	56	3192
<i>Cerasus vulgaris</i>	5	0.24	4	20
<i>Corylus avellana</i>	4	0.19	3	12
<i>Cotoneaster lucidus</i>	2	0.1	1	2
<i>Fraxinus excelsior</i>	80	3.88	79	6320

Taxa	Number of trees (n)	%	n-1	n*(n-1)
<i>Padus avium</i>	8	0.39	7	56
<i>Picea abies</i>	1	0.05	0	0
<i>Populus tremula</i>	2	0.1	1	2
<i>Pyrus pyraeaster</i>	1	0.05	0	0
<i>Quercus robur</i>	117	5.68	116	13572
<i>Salix caprea</i>	3	0.15	2	6
<i>Salix fragilis</i>	1	0.05	0	0
<i>Salix myrsinifolia</i> x <i>cinerea</i>	2	0.1	1	2
<i>Salix alba</i>	1	0.05	0	0
<i>Sorbus aucuparia</i>	9	0.44	8	72
<i>Tilia cordata</i>	261	12.67	260	67340
<i>Ulmus glabra</i>	78	3.79	77	6006
<i>Acer ginnala</i>	1	0.05	0	0
<i>Acer ginnala</i> x <i>tataricum</i>	6	0.29	5	30
<i>Acer negundo</i>	7	0.34	6	42
<i>Acer pseudoplatanus</i>	2	0.1	1	2
<i>Acer tataricum</i>	2	0.1	1	2
<i>Aesculus hippocastanum</i>	60	2.91	59	3540
<i>Berberis thunbergii</i>	7	0.34	6	42
<i>Berberis thunbergii</i> 'Purpurea'	1	0.05	0	0
<i>Caragana arborescens</i>	4	0.19	3	12
<i>Crataegus alemanniensis</i>	1	0.05	0	0
<i>Crataegus laevigata</i> 'Rosea'	3	0.15	2	6
<i>Crataegus submollis</i>	2	0.1	1	2
<i>Fraxinus pennsylvanica</i>	2	0.1	1	2
<i>Fraxinus pennsylvanica</i> var. <i>subinetegerrima</i>	3	0.15	2	6
<i>Hippophaë rhamnoides</i>	4	0.19	3	12
<i>Juglans cinerea</i>	1	0.05	0	0
<i>Juniperus communis</i> 'Hibernica'	1	0.05	0	0
<i>Juniperus cominis</i> 'Tatra'	4	0.19	3	12
<i>Juniperus horizontalis</i> cv.	4	0.19	3	12
<i>Juniperus horizontalis</i> 'Glaucua'	1	0.05	0	0
<i>Juniperus sabina</i>	7	0.34	6	42
<i>Juniperus sabina</i> 'Blue Danube'	3	0.15	2	6
<i>Juniperus sabina</i> 'Tamariscifolia'	9	0.44	8	72
<i>Juniperus squamata</i>	3	0.15	2	6

Taxa	Number of trees (n)	%	n-1	n*(n-1)
<i>Larix decidua</i>	5	0.24	4	20
<i>Malus cerasifera</i>	4	0.19	3	12
<i>Malus domestica</i>	10	0.49	9	90
<i>Padus serotina</i>	1	0.05	0	0
<i>Philadelphus pubescens</i>	5	0.24	4	20
<i>Philadelphus pubescens</i> var. <i>verrucosus</i>	4	0.19	3	12
<i>Physocarpus opulifolius</i>	1	0.05	0	0
<i>Picea abies</i> 'Nidiformis'	2	0.1	1	2
<i>Picea pungens</i>	29	1.41	28	812
<i>Picea pungens</i> 'Glaucua'	3	0.15	2	6
<i>Picea pungens</i> 'Koster'	4	0.19	3	12
<i>Pinus mugo</i>	1	0.05	0	0
<i>Pinus sibirica</i>	1	0.05	0	0
<i>Populus alba</i>	2	0.1	1	2
<i>Populus balsamifera</i>	1	0.05	0	0
<i>Populus laurifolia</i>	1	0.05	0	0
<i>Prunus cerasifera</i> var. <i>divaricata</i>	2	0.1	1	2
<i>Prunus domestica</i>	2	0.1	1	2
<i>Pyrus communis</i>	1	0.05	0	0
<i>Quercus rubra</i>	4	0.19	3	12
<i>Rhododendron japonicum</i>	7	0.34	6	42
<i>Rhus typhina</i>	1	0.05	0	0
<i>Robinia pseudoacacia</i>	2	0.1	1	2
<i>Rosa pimpinelifolia</i>	2	0.1	1	2
<i>Rosa subcanina</i>	5	0.24	4	20
<i>Salix alba</i> 'Sericea'	1	0.05	0	0
<i>Salix purpurea</i> 'Gracilis'	1	0.05	0	0
<i>Spiraea chamaedryfolia</i>	4	0.24	3	12
<i>Spiraea japonica</i> 'Gold Mound'	8	0.39	7	56
<i>Spiraea x vanhouttei</i>	1	0.05	0	0
<i>Spirea japonica</i>	1	0.05	0	0
<i>Syringa josikaea</i>	18	0.87	17	306
<i>Syringa vulgaris</i>	29	1.41	28	812
<i>Syringa vulgaris</i> cv. <i>alba</i>	1	0.05	0	0
<i>Thuja occidentalis</i>	63	3.06	62	3906
<i>Thuja occidentalis</i> 'Aurea'	1	0.05	0	0
<i>Thuja occidentalis</i> 'Columna'	1	0.05	0	0

Taxa	Number of trees (n)	%	n-1	n*(n-1)
<i>Thuja occidentalis</i> ‘Globosa’	5	0.24	4	20
<i>Thuja occidentalis</i> ‘Globosa Salaspils’	3	0.15	2	6
<i>Thuja occidentalis</i> ‘Rheingold’	2	0.1	1	2
<i>Thuja occidentalis</i> ‘Smaragd’	5	0.24	4	20
<i>Tilia dasystyla</i> subsp. <i>caucasica</i>	17	0.83	16	272
<i>Tilia platyphyllos</i>	10	0.49	9	90
<i>Tilia platyphyllos</i> ‘Aurea’	14	0.68	13	182
<i>Tilia platyphyllos</i> ‘Obliqua’	1	0.05	0	0
<i>Tilia platyphyllos</i> ‘Rubra’	9	0.44	8	72
<i>Tilia platyphyllos</i> var. <i>cordifolia</i>	6	0.29	5	30
<i>Tilia x euchlora</i>	6	0.29	5	30
<i>Tilia x vulgaris</i>	702	34.1	701	492102
<i>Ulmus glabra</i> ‘Camperdownii’	2	0.1	1	2
<i>Ulmus glabra</i> var. <i>montana</i>	5	0.24	4	20
Σ	2060	100		650196

SDI = 6.5

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