

## Visual attributes of vegetation in urban landscape

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### Abstract

RÓZOVÁ, Z., MIKULOVÁ, E. 2012. Visual attributes of vegetation in urban landscape. *Folia oecol.*, 39: 71–76.

The work deals with the evaluation of the visual attributes of vegetation composition such as dimension, shape, colour, texture, proportionality, structure and dominance. It is an attempt how to objectively evaluate the basic combinations of architectonic and vegetation elements. It is generally focused on vegetation areas serving several functions. The only differences are in determination of criterions needed for the evaluation and for the proposal of new composition. The methodology has been tested on the model area of the Pribina square in Nitra.

### Key words

aesthetic function, structure, vegetation design, visual attributes

### Introduction

The authors evaluate the quality and quantity of vegetation from such perspectives as structural attributes of vegetation in aesthetic and representative arrangement of family houses (in front yards) in different types of build-up areas elaborated by RÓZOVÁ (2003). PAULEIT (2001) takes into consideration spatially-planning structure as well as phytosociological, social, environmental and human aspects in the process of the frame evaluation of vegetation in urban settlements. KUCZMAN (2006) evaluates the image of rural residencies based on the three-dimensional analysis of components with abiotic and biotic character. BIHUŇOVÁ et al. (2010) evaluate potential of town outskirts areas and characterize natural conditions as well as determining parameters for the individual activities. PETLUŠ and VANKOVÁ (2010) evaluate potential of visual exposition on the principles of objective physiognomic structural landscape parameters selection.

Woody plants and other plants (lawns and flowers) are considered to be the most important elements of the landscape design. Planning complements are also a part of residential landscape design. These are all volume elements with different visual attributes from the art view (FINKA, 1994). It was necessary to create a methodology

for objective evaluation of combinations of architectural and vegetation constituent attributes. Therefore, this article has a methodical – applicative character and it is focused on the evaluation of the visual attributes of the landscape design such as size, shape, colour, texture, proportionality, structure and dominance. The method has been created on the basis of following methods: MACHOVEC et al. (2000) aimed at landscape design and architectural evaluation of woody plants, RÓZOVÁ (2003) (overgrowth structure evaluation), SUPUKA and FERIANCOVÁ (2003) (compositional – aesthetic and environmental aspects of dendrological structure in urban greenery), KUCZMAN (2006) (the evaluation of the image of rural residence over three-dimensional analysis of components with abiotic and biotic character), PAULEIT (2001) (evaluating the vegetation in urban settlements) and complemented with new evaluation of some of the aesthetic attributes in the way that makes objective evaluation of vegetation modifications with aesthetic and representative function possible. The methodology has been tested on a model area of the Pribina square in Nitra. This area has aesthetic – representative function and it consists of several vegetation elements, urban area (hard landscaping areas) and historical architectural elements (buildings) surrounding the square.

## Material and methods

The studied area is situated in the historical centre in the Upper town (Horné mesto) part of Nitra town. According to the methodology – Determination of the visual vulnerability potential in the landscape (PETLUŠ and VANKOVÁ, 2008), the area has a low potential of the visual vulnerability.

The area is surrounded by historical baroque buildings enclosing the square. Some of the facades have been reconstructed in classicistic and empire style. The square has been formed by building sanitation and two streets connection in the eighties of the Nineteenth Century.

The central point is represented by a circle paving stone patio with the dominating feature – the Statue of Pribina, surrounded by benches and completed by circle flower bed. There is another circle place with drinking fountain and benches at the end of designed area. Connection of two mentioned arrangement knots has been solved by landings placement. Vegetation of the square consists of coniferous and evergreen woody plants. The lawn is well-grown but of a low quality.

## Space and structural analyse

The analysis was focused on the architectural elements (buildings, small architecture elements, reinforced surfaces, art elements, etc.) and vegetation elements (trees, shrubs, grassed areas).

Elements, groups and entire overgrowth were observed in the term of the following visual facilities needed for the evaluation of the landscape design composition performing aesthetic – representative function:

- Aesthetic: texture, colour, height, shape, dominance, space balance (MIKULOVÁ and RÓZOVÁ, 2008)
- Structural: foliation, species diversity, density, cover (RÓZOVÁ, 2003).

Table 2. Point evaluation of vegetation design

Solved area	Spring		Summer		Autumn		Winter										Together	
	A	B	A	B	A	B	A	B	C	D	E	F	G	H	I	J		
Pribina square	3	2	3	2	3	2	3	2	1	3	3	3	2	3	3	3	1	42

A, texture; B, colour; C, height; D, crown shape and ground area shape; E, dominant; F, balance; G, foliation; H, species diversity; I, compactness; J, ratio of overgrowth formation; 3 points – attribute with harmonic effect; 2 points – attribute with partially harmonic effect; 1 point – attribute without harmonic effect.

Table 3. The sum of visual attributes of architectural elements and vegetation overgrowth point values

Solved area	Architectural elements	Vegetation overgrowth	Together
Pribina square	17	42	59

It meets the aesthetic – representative function: 69–62 points.

**It partially meets the aesthetic – representative function: 61–46 points.**

It does not meets the aesthetic – representative function: 45–23 points.

## Results

By the synthesis of the analyzed features has been divided into three following groups with point of importance, expressing the suitability of the features for the harmonic effect in the composition (Tables 1–2):

- Combinations of features with harmonic effect (3 points)
- Combinations of features with partially harmonic effect (2 points)
- Combinations of feature without harmonic effect (1 point).

Table 1. Point evaluation of architectural elements

Solved area	A	B	C	D	E	F	Together
Pribina square	3	3	3	3	3	2	17

A, texture; B, colour; C, height; D, shape; E, dominant; F, balance; 3 points – attribute with harmonic effect; 2 points – attribute with partially harmonic effect; 1 point – attribute without harmonic effect.

The groups are used in the objective state evaluation of vegetation area by creating the following categories (Table 3) for the aesthetic – representative function:

- Designed area performs an aesthetic – representative function.
- Designed area partially performs an aesthetic – representative function.
- Designed area does not perform an aesthetic – representative function.

Proportionality between the dominant and other architectural and vegetation elements arising from the analytical attributes (height, surface, distance) by using the rule of divine proportion has been also evaluated. By this rule, if we divide segment in two parts, so the length ratio of the bigger part 'b' to the smaller part 'a' was the same as the ratio of the whole segment 'a + b' to

the bigger part 'b', i.e.  $(a + b) / b = b / a$ . It is so called divine ratio 1:1.618. We have modified the mentioned formula because of the needs of proportionality evaluation of the landscape design dominant:

$$d = v \times 1.618,$$

where d is the optimal distance of elements from the dominant and v is the dominant height.

### Proportion evaluation of components in composition

The architectonic dominant of the Pribina square is the statue of Pribina and historical buildings surrounding the square. The height of the statue is 7 m. It is set in the reinforced area of the circled shape. The area is surrounded by the overgrowth and the road (i.e. the distance between the statue and the buildings is 30 m). The height of the historical buildings near the statue of Pribina is 10–13 m. The height of the vegetation overgrowth surrounding the reinforced area is 1.2 m. The average height of the shrubs in the square is 0.7–2 m, the height of the trees is 3–7 m, but the terrain undulation causes 2 m higher visual effect in the area. On the basis of the divine proportion rule, the optimal distance from the Pribina statue is 11.3 m, the optimal components height near the statue is 2.7 m, other dominant optimal distance from single-storied building is 16.2 m, from double-storied building 18 m (if we take into consideration 2 m terrain undulation) and 20 m (if the building is placed on the even grounds), and optimal components height near the buildings is 1.8–5 m (according to the buildings height and the terrain undulation). The result of the calculation is that the distance of historical buildings from the Pribina statue should be at least 11.3 m. The dominant fulfils this condition. Double-storied and single-storied buildings do not compete with the statue by their height. They are in the harmony with it (their optimal distance is about 16.2–20 m). The maximum overgrowth height around the Pribina statue is 2.7 m. The vegetation elements and other architectural components should not extend 3.8 m not to compete with historical buildings in the square. We need to modify this dimension in 2 m because of the terrain undulation, i.e. the elements height must not extend 1.8 m.

The next step was the creation of criterions from the feature combinations on the basis of the representative area landscape design keystones providing objective valuation of the concrete landscape design composition (the Pribina square in Nitra in this case).

### Criteria of suitability for landscape design

The criteria of features suitability for the landscape design in the Pribina square in Nitra were elaborated on the basis of the composition elements proportionality evaluation of the analytical facilities of elements being found and on the basis of the representative areas creation principles. Specifics of the landscape design in

front of the significant historical buildings have been considered. Mentioned criteria have been used for the evaluation of the relationship between architectural and vegetation elements as well as for the evaluation of the attributes suitable for the composition of the concrete aesthetic – representative area.

- a) Feature combinations with harmonic effect:
  - o Architectural elements: natural materials, harmonic richness of colours – several colours combinations are in harmonic colour shades, the lower element (to 2.7 m height), geometric or organic shape, harmonic dominant is expressive in one or in more of its visual facilities, harmonic balance – the elements facilities are balanced by the other elements.
  - o Vegetation overgrowth: all types of texture, harmonic richness of colours – several colours combinations are in harmonic colour shades, the lower in the landscape design should be to 2.7 m height, natural shape and form of shape – without artificial interventions to the woody plants crowns and herbs shape or pruned shape, the ground area shape – circle, square, rectangle, polygon, line, harmonic dominant is expressive in one or in several of its visual facilities or neutral dominant – is the dominant on the basis of one inexpressive attribute, harmonic balance – the elements facilities are balanced by the other elements, foliage and species diversity does not affect, vegetation growth is continuous to the spacer, open and overgrowth surface ratio is 2 and more: 1.
- b) Combinations of features with partially harmonic effect:
  - o Architectural elements: neutral richness of colours – elements are in neutral colour or in the shades of green, neutral dominant – is dominant on the basis of one inexpressive attribute, moderately disturbed balance – architectural element disturbing its balance only by one, less meaning feature situated in the landscape design.
  - o Vegetation growth: neutral richness of colours – the overgrowth is in unique green colour or in its shades, the ground area shape – oval, ellipsis, moderately disturbed balance – vegetation element, disturbing its balance only by one, less meaning feature is situated in the landscape design.
- c) Combinations of features without harmonic effect:
  - o Architectural elements: the artificial materials and combined artificial and natural materials of the elements, disharmonic richness of colour – many coloured elements disturbing the area by their colourfulness, middle – tall and tall element, combined shape – geometrical with organic, disharmonic dominant – there are two and more dominants competing with each other in the landscape design, evidently disturbed balance – there are elements strongly invading the balance of the sides in the landscape design by the visually expressive attributes.

- o Vegetation growth: disharmonic richness of colours – many coloured landscape designs invading the area by their colours, middle – tall and tall overgrowth, various shape, disharmonic dominant – there are two and more dominants competing each other in the landscape design, evidently disturbed balance – there are vegetation elements strongly invading the balance of the sides in the landscape design by the visual expressive attributes, strewed vegetation design, open and overgrow surface ratio is 1 : 1 to 1 : 2 and more.

### Compositional – aesthetic evaluation of landscape design in the Pribina square in Nitra

The evaluation rises from the given criteria that have been elaborated for this concrete landscape design on the basis of attributes combination included into categories (Tables 1–2, Fig. 1).

The architectural elements are made from natural materials mainly, that is suitable because of the historical character of the square. Architectural elements are in the harmonic colour (combinations of colours in the building facades). Overgrowth texture is various (it indicates representation of leafy species with soft leaf area – *Spiraea bumalda* 'Anthony Waterer', ever-green species with thick leaves – *Pyracantha coccinea* Roem., *Mahonia aquifolia* (Pursh) Nutt, and coniferous trees – *Pinus nigra* Arnold, *Abies alba* Mill.). Colour of vegetation overgrowth is neutral in all seasons. Woody plants bloom in the spring or the summer, mainly, but their flowers are small and plain (white, yellow, pink). The autumn effect of leaf colour change is almost un-

noticeable (red-green only). The fruits of woody plants in the vegetation overgrowth have less attractive colour as well (brown, red, black, orange, blue and purple). The majority of architectural elements rise to 1 m. The highest and the superficial largest elements are buildings and the Pribina statue. The overgrowth is divided into the middle-tall category on the basis of the height. The terrain undulation causes overlap of the buildings and this fact is considered to be undesirable. The shape of architectural elements is geometrical. Vegetation elements have natural shape given by the cultivar. The ground of the vegetation design is rectangle and circle – the ground plan is dominant. The architectural elements domination is harmonic – buildings that do not compete with each other but create the unique integrity are dominant in the design. The dominant is the statue of Pribina. The overgrowth does not have the vegetation element acting as the dominant one. The dominant is neutral in the category that helps the overgrowth not to compete with architectural dominants. The balance of architectural elements is partially disturbed. The overgrowth is of three-etage, continuous, with large species richness (species number is 24) and ratio of opened and over browened areas 1 : 1 (Figs 2–3).

From the view of the aesthetic effect of the composition were attached points to visual attributes of architectural elements and vegetation growth in the Pribina square in Nitra (the architectural elements – 17 points, Table 1, vegetation growth – 42 points, Table 2). By the summary (Table 3) was determined, that the landscape design in the Pribina square in Nitra performs aesthetic – representative function partially.






-  Element with harmonic effect (3 points)
-  Element with partially harmonic effect (2 points)
-  Element without harmonic effect (1 point)

Fig. 1. Compositional – aesthetic evaluation of landscape design.

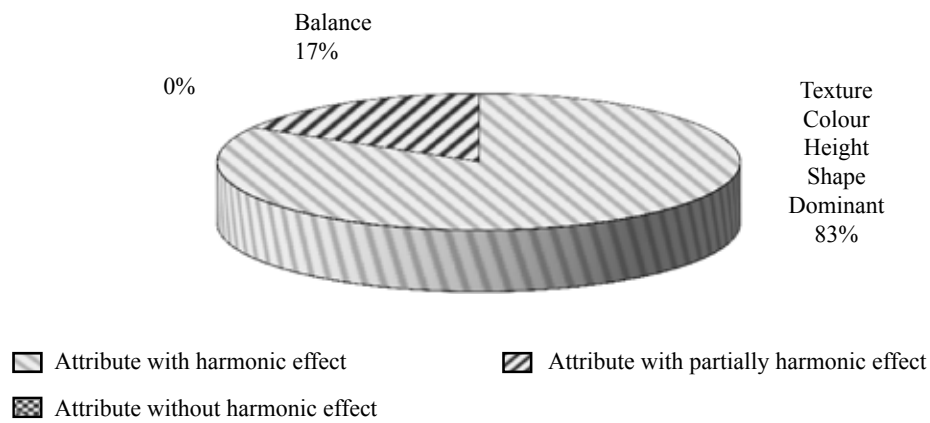


Fig. 2. Percentage representation of the architectural elements and their individual attributes.

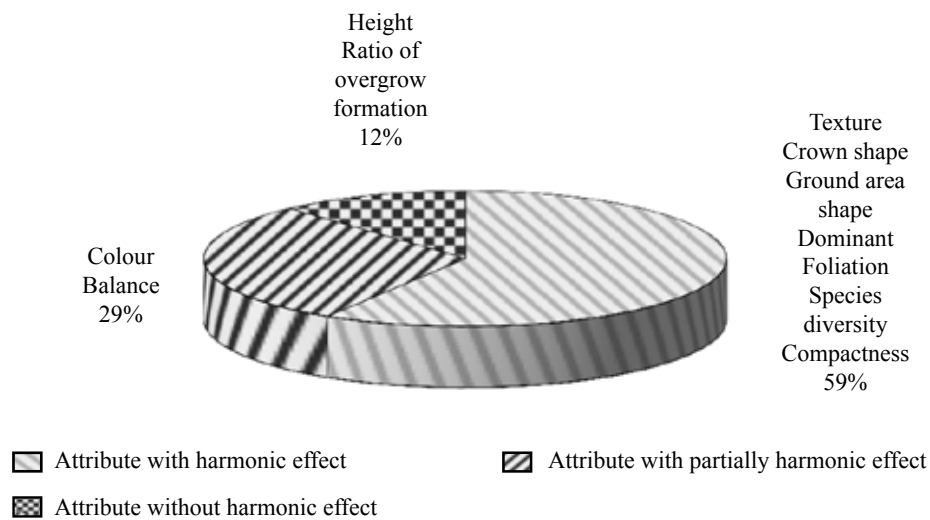


Fig. 3. Percentage representation of the vegetation elements and their individual attributes.

## Conclusions

The subjective evaluation of aesthetic – representative landscape design composition can consist of various levels. The individual taste is something unique for everyone. The feeling and the beauty perception are subjective. The methodology being used was oriented to the increase of the objectivity within the basic principles evaluation of the landscape design with aesthetic – representative function. The methodology is in the general position for the vegetation areas with various functions. There are differences in the determination of the criteria required for the evaluation and for the proportion of the existing landscape design only. It is the basis of the landscape design basic principles de-

fining. It is illustrated on the concrete landscape design example in Nitra town.

The measures improving the vegetation area state with the aesthetic – representative function has been suggested after consideration of the landscape design composition on the basis of determined criteria. Proposals are aimed to:

- o the support and the emphasis of the elements with suitable features indicated as the suitable dominants
- o the dominant supplementation
- o the alternation in the element proportionality so that they do not compete with each other
- o the visual attributes alternation of the arrangement (colour, texture, height, shape, etc.).

## Acknowledgement

This work has been elaborated with the support of FCVV (Fund to Support Research and Development Centres) and ASFEU OPVaV EU Environmental aspects of the urbanized environment ITMS 26220220110.

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## Vizuálne vlastnosti vegetácie v urbanizovanom prostredí

### Súhrn

Práca je zameraná na problematiku hodnotenia vizuálnych vlastností vegetačných úprav ako je veľkosť, tvar, farba, textúra, proporcionalita, štruktúra a dominanta. Je pokusom o objektívne zhodnotenie základných kombinácií vlastností architektonických a vegetačných prvkov. Metodika je postavená všeobecne pre vegetačné plochy s rôznou funkciou, odlišnosti sú iba v stanovení kritérií potrebných pre hodnotenie a návrh danej kompozície. Je to podklad pre definovanie základných princípov kompozície vegetačnej plochy. Metodický postup bol overený na modelovej ploche Pribinovho námestia v Nitre. Na základe analýzy vlastností jedincov a vegetačnej úpravy sme zistili, že tieto vlastnosti nepostačujú na to, aby táto plocha dostatočne plnila esteticko-reprezentačnú funkciu. Je potrebná zmena v oblasti štruktúry, druhového zloženia porastu a celkovej kompozície. Vegetačná úprava len čiastočne plní esteticko-reprezentačnú funkciu.

Received May 5, 2011  
Accepted November 3, 2011