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THE LANDSCAPE COLOURING OF FEOFANIYA PARK AND ITS SEASONAL DYNAMICS

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Annotation. *The article are presened the results of landscape coloring assessment of Feofaniya Park during four seasons. On the basis of the analysis of color seasonal changes in the park, the dominant color schemes for four seasons are determined, their percentage and color bearers, which determine park colouring. Also seasonal color accents in park landscapes are determined.*

Keywords: *park landscape coloring, seasonal dynamics of greenery, seasons, Feofaniya Park.*

Seasonal changes in plantings are one of the main reasons for variability of landscape appearance throughout the year. Focusing on seasonal changes in plantings is worth staying at the term "seasonal dynamics." According to V. V. Bratkov [1], this is dynamics of the natural-territorial complex during the seasons and other periods of time. Voronina O. N. distinguishes two main colour seasons for the urban landscapes: chromatic (spring, summer and autumn), when the background colour of picture is green plantations and achromatic (winter), when main colour palette is determined by black and white gamma. In the first period, the defining background colour is green, in the second period it is white [2]. Based on this distribution, we can say that L. I. Rubtsov distinguishes four periods of changing coloration of plantations, within the framework of the chromatic season: period of development (from opening buds to the development of leaves, the most tender and soft shades of leaves), the formation period (from disclosure of leaves to achievement of normal value), period of normal summer vulgarity (from time of reaching normal size before

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the onset of autumn coloration, the longest period indicating actual colour of the plant) and period of autumn coloration agate for a variety of shades, from yellow to purple-red and violet) [9].

For the colour researching of landscapes and its seasonal changes, it is necessary to choose the appropriate object, which presents both natural and artificial plantings of the different age groups, present decorative cultivars, which are widely used in landscape design. In our opinion, park "Feofaniya" can serve as such object, because it combines all listed elements, which will allow to observe the colour scheme of the park landscape. In addition, park "Feofaniya" is a park-monument of landscape architecture of national importance, and the colorful decision of protected parks and zones requires special attention [6]. This park has an important ecological, historical, cultural and recreational significance [8].

The study aims. Detection of changes in the colour of plantings throughout the year, the definition of characteristics of seasonal variability of plantings and seasonal colour accents to emphasize the natural aesthetics of plantations in the design and reconstruction of parks to fullest.

Objects and methods of research. The object of research is the Feofaniya Park, which is located in the Holosiyivskyy district, at the end of Academic Zabolotny street. In 1972, Feofaniya tract became part of the nature reserve fund; since 1990 it has the status of a park-monument of landscape architecture of national significance, subordinated to the State Reserve Farm "Feofania" of National Academy of Sciences of Ukraine [8]. The area of this park is 166.5 hectares. Since 2004, the reconstruction and development of park has been carried out (chief architect D. P. Voronov, dendroproject Y. O. Klymenko), a network of tracks has been laid, new plantations have been formed with a wide use of cultivars, street furniture has been established, reservoirs have been installed [3]. For this particular park territory valley-beam and marginal relief is the most typical, elevation difference between the highest and lowest marks of relief is 66 m. Park has a cascade of lakes, the total area around 5 hectares. The St. Pantheleimon Nunnery greenery above the upper pond [5]. Following types of landscape occur in park: forest (87.2%),

park (4.1%), meadow (2.8%), garden (5.7%), regular and its elements (0.2%) [3]. The vegetation of forest landscapes in park is represented mainly by hornbeam and oak forests (oaks occur in the age of 200-300 years), small plantings of *Alnus glutinosa* (L.) Gaertn., *Pinus sylvestris* L., *Picea abies* (L.) Karst., *Juglans regia* L., *J. nigra* L. [3]. On the territory of Feofaniya tract, there are rare species of plants and animals recorded in The Red Data Book of Ukraine. Due the reconstruction of the park part during 2005-2007 trees and shrubs were created (46 species and more than 30 cultivars used). Thanks to this, Feofaniya Park differs from other parks in Kyiv by the largest number of cultivars, which are characterized by high decorative character. In the central part of the park, where most of viewpoints are isolated, there are decorative planking alleys (representatives of the genera *Cerasus* Juss., *Betula* L., *Sorbus* L., *Fraxinus* L., *Morus* L.), curtains of different species and cultivars of bushes (*Syringa* L., *Spirea* L., *Berberis* L., *Forsythia* Vahl., *Philadelphus* L., etc.), landscape groups around boulders, combining woody and grassy plants, for example, *Pinus mugo* Turra with flowering plants. The largest participation in the composition of the park (by number of specimens) belongs to the species and cultivars of evergreen plants such as *Thuja occidentalis* L., *Juniperus sabina* L., *J. horizontalis* Moench. A large number of individuals are exotic trees: *Ginkgo biloba* L., *Metasequoia glyptostroboides* Hu et Cheng., *Catalpa bignonioides* Walt. and others [10].

The assessment of colour of the landscape was carried out according to the N. O. Alekseychenko, N. V. Gatalskaya, M. S. Mavko methodology [6]. The determination of viewpoints was based on the analysis of main areas of the movement in park, the location of recreation areas, compositional and seasonal accents. Separate viewpoints were applied to the park's plan, followed by seasonal photophixation of selected landscapes: winter, autumn, spring, and summer. To analyze colouring of the viewpoints, the photographs were processed using the standard operations of the GIMP Image Manipulation Program, version 2.8. Of all the shades that are present in the photo, 15-20 dominant colours were highlighted by indexing the image. Then, the particles that each of the colours (according to the

histogram of colours) were calculated, and the diagrams were constructed based on the obtained relationships [6]. These calculations can be done in a graphical editor, while, in order to optimize the data processing process, in collaboration with other authors, a web application has been developed that can significantly accelerate this process (developed by M. P. Mavko). The application is published and is freely accessible [4].

To assess the colour of Feofaniya Park, 36 landscapes from selected viewpoints were photographed in different seasons: in winter (03.03.2013), in spring (05.09.2013), in the summer (10.08.2013) and in the autumn (19.10.2014). After working out of photos, colours were determined, which form the park colour in the corresponding season. In addition, a photo survey was conducted to determine the seasonal colour accents over 2016-2017.

Research results. Based on the results of the evaluation of colour of landscape of Park Feofaniya, colours are defined, which represent a colour of each season. In particular, the winter colour of the park is formed in an achromatic range of colours, with a small inclusion of green and shades of blue (Fig. 1). Since winter is dominated by dark days, all colours have muted shades and are characterized by low saturation and brightness. The white and light blue colours prevailing in the winter colours of the park, in total their share is 63.7%, coloured carriers with such a colouring are snow cover and sky. Shades of blue (7.0%) are characteristic of snow, especially in shaded areas, as well as due to the phenomenon of air prospects - forest arrays surrounded by young park plantations, painted in blue. Regarding the plantings, it is worth noting that in the fairly large number of evergreen species are represented in park, therefore total share of green (gray-green, olive, dark-green shades) is 5.8%, which, in comparison with other parks [7] is quite high. Leaky plantations, in winter, are characterized by a gray-brown colour, which is provided due to the colour of the trunks and branches (14.5%).

Paving of tracks and platforms, which is seen through the snow and distant landscapes, due to the phenomenon of air prospect, are painted in a cold gray colour, which share in the overall colour of the park makes 8.7%. The role of accent in

achromatic winter colouring, except for green, fulfills the burgundy colour (brick buildings, street furniture), but its share is insignificant - 0,3%.

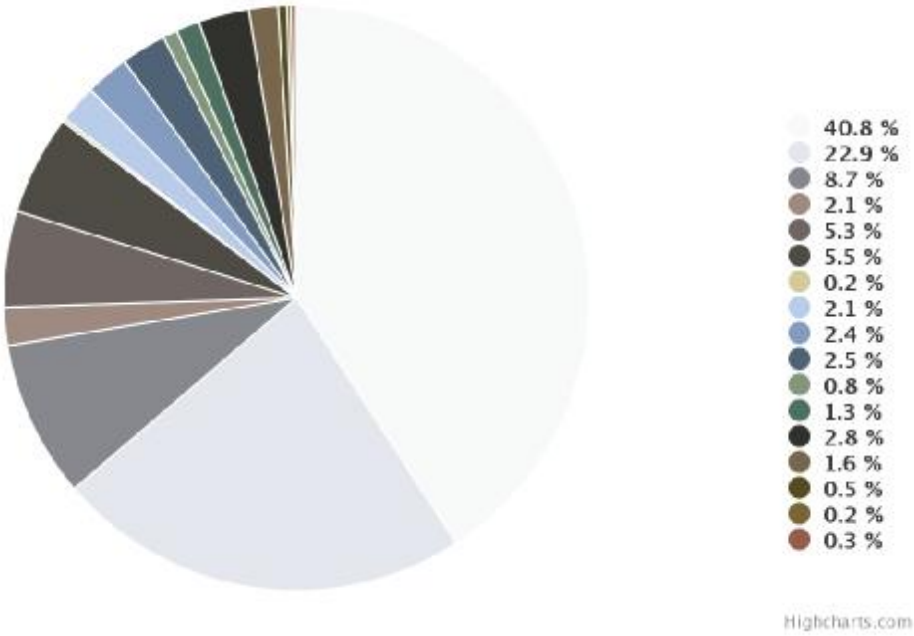

Fig. 1. Winter colouring of Feofaniya Park

The spring colour of the park is marked by a large number of bright shades of green and yellow, high saturation of colours due to bright sunshine, which, as a rule, prevails in the spring (Fig. 2). In particular, in the spring, Feofaniya Park is dominating with white (sky, brightly lit paving) and green and yellow-green colours (plantings), which occupy 21.8% and 28.1% respectively. Also, a large percentage falls on light brown shades, colour carriers are herbal coatings and distant landscapes. The gray colour of the wetted territories in colour of the park is 11.2%. The network of Feofaniy's ponds determines the colourful diversity of the park - share of blue is 9.7%, which is quite high. In addition, water slab has the property to reflect surrounding objects, thus doubling area of colored spots is formed by surrounding landscapes (Fig. 3). The blue-green colour in spring colour (9.6%) represents coniferous plantations and distant landscapes, due to the phenomenon of air prospect. The role of accents in this period is played by *Tulipa hybrida* Hort flowerbeds - red colour (1.1%), street furniture, purple trees and shrubs (*Prunus divaricata 'Atropurpurea', Malus niedzwetzkyana* Dieck., *Berberis thunbergii 'Atropurpurea')* - reddish brown (2.1%).

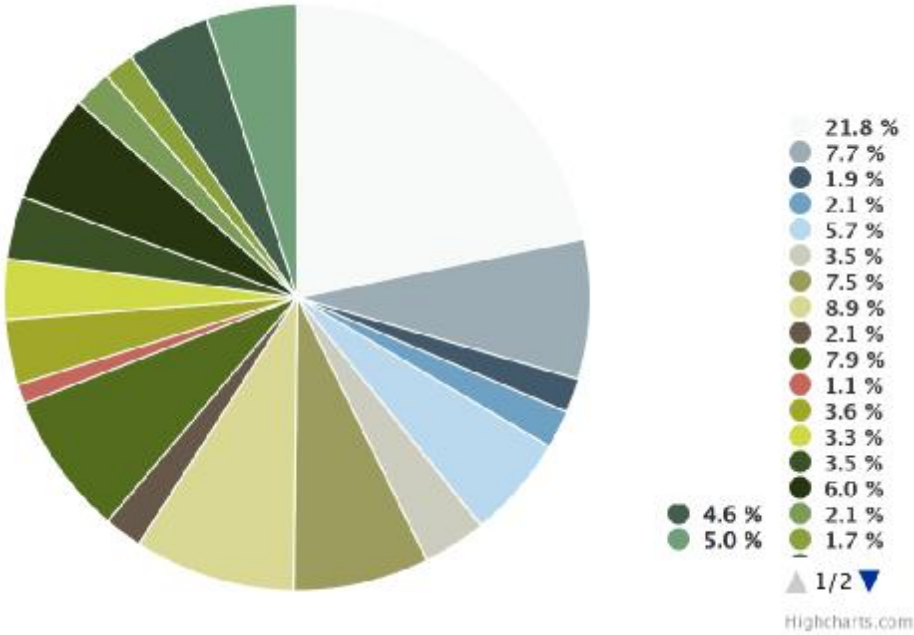

Fig. 2. Spring colouring of Feofaniya Park

A b

Fig. 3. Park pouds in the spring: a - April 6, 2017, b - May 9, 2013

The summer coloration of the park is characterized by contrasting colours, the gray-white-green colour range predominates (Fig. 4). The paving, the shadows of various objects, distant landscapes are the carriers of gray. Its share in the overall colour of the park equals 22.5%. The sky colouring viewpoints occupies 25.9% due to sunlight in the summer, it is painted white (20.9%), a small portion of light blue (5.0%). There is a significant proportion of the light brown (11.0%) burned grass since the park spaces are relatively young and open spaces prevail, the ground cover is slightly burned in summer. Different shades of green color plantations occupy the largest part - 29,3%. Number of other colours and small total of 1.4%, including: shades of red - purple decorative form plantations, orange - flower, blue and yellow - street furniture (playgrounds).

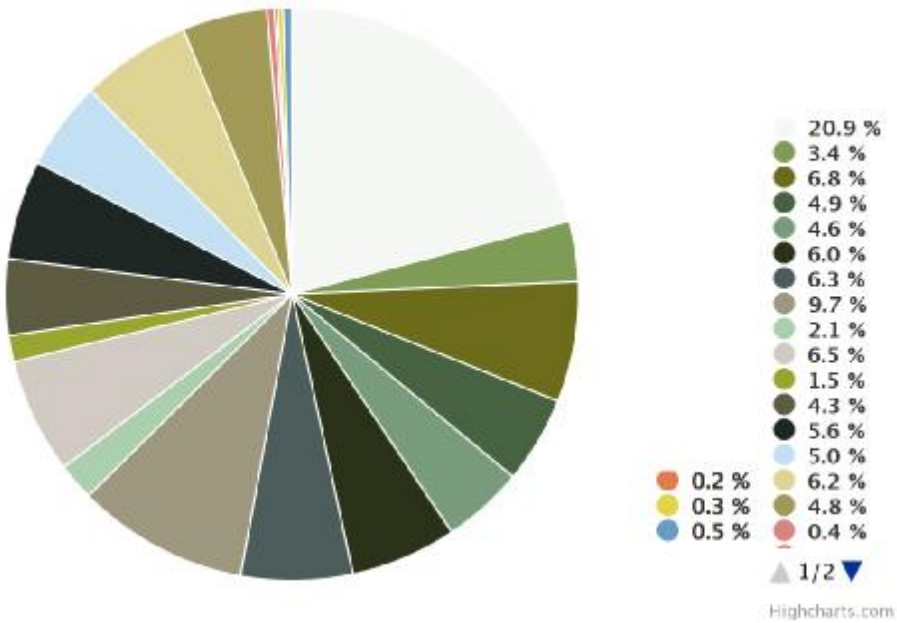

Fig. 4. Summer colouring of Feofaniya Park

In the autumn, as in the winter, park colouring is formed by shades of medium-saturated colour, which is caused by weather conditions, in particular by predominance of the gloomy days. Autumnal colour is represented in an olive-brown colour scheme (36.0%), which is formed mainly for deciduous stands, and there is also a large proportion of white (21.0%) and gray (18.8%), that is, the colours of the sky and paving (Fig. 5). The green colour, represented by a lawn and coniferous stands, which is in colour of the park, occupies 7.8%. Shades of blue (water bodies and coniferous plantations) have a fairly large share of 5.8%.

The role of accents in colour of the park is made up of red (2.8%), bright yellow (1.2%) and orange (1.1%) colours, which are formed by the bright autumn colouration of *Rhus typhina* L., *Parthenocissus quinquefolia* (L.) Planch. and purple forms - P*runus divaricata 'Atropurpurea', Malus niedzwetzkyana* Dieck, *Berberis thunbergii 'Atropurpurea'*. These species play a very important role in shaping colour of park, because their autumn colours stand out against the background of the surrounding landscape, attracting special attention (Fig. 6).

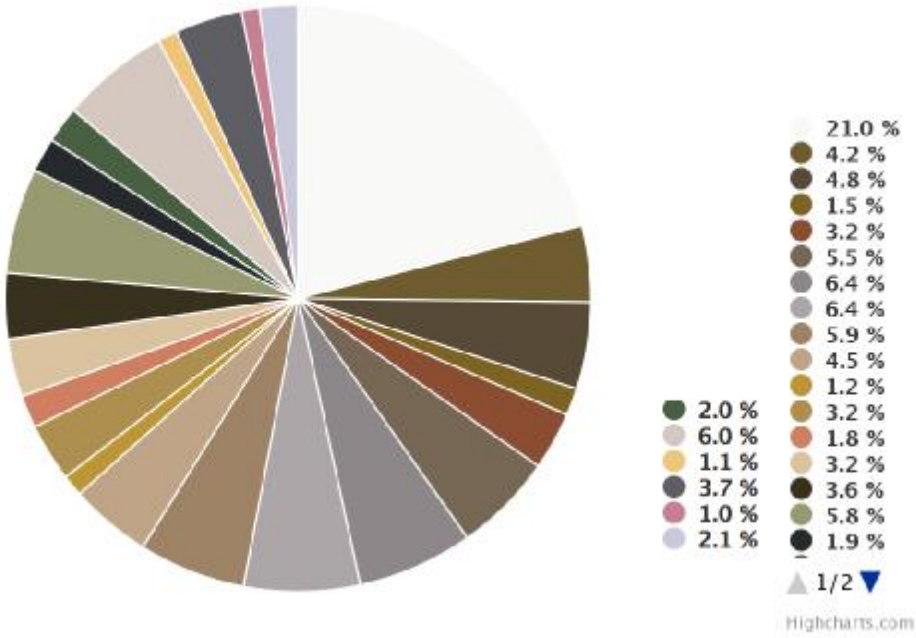

Fig. 5. Autumn colouring of Feofaniya Park

a

b

Fig. 6. Autumn accents in the colour of the viewpoints of Feofaniya Park (a - photo 19 October 2014, b - October 1, 2016)

Conclusions. On the basis of the analysis of seasonal changes in the colour of the Feofaniya Park the main colour schemes are highlighted, in which colouring is formed according to the seasons. Their percentage and colour carriers which determine one or another colour are defined.

The winter colour is represented in achromatic colours and a relatively significant indicator of green colour (5.8%), due to the large number of evergreen plantations. In the spring, as well as in the summer, the park coloring is formed in saturated colours, thanks to bright lighting in this period. Spring colour is formed in a white-green range, with mostly red accents (1.1%). In summer, colouring of the park is represented by a white-gray-green colour and contrasting colour combinations, role of accents is performed in red, orange, blue colours (in general, 1,4%). Autumnal colour is characterized by the highest number of accents in yellow-red scale (5.1%). In general, in the autumn colouring, olive-brown colour range, medium saturation predominates. A characteristic feature of the park is the presence of a network of ponds, which also make a significant contribution to the formation of colour of the park, depending on the weather conditions and the season, the proportion of the blue colour of the water droplet in park colour fluctuates within 5.8-9.7%.

Considering the protection status of Feofaniya Park the changes in the coloring aspect are recommended to be carried out with caution, paying attention to the priority of preserving the natural groups of tracts and their biocenotic ties with each other. Based on these principles, changes in the park coloring should be carried out only in the park zone, with artificially created plantations, without breaking the dendrological principles on which they are formed.

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КОЛОРИТ ПЕЙЗАЖІВ ПАРКУ “ФЕОФАНІЯ” ТА ЙОГО СЕЗОННА ДИНАМІКА

Н. О. Олексійченко, М. С. Мавко, О. С. Данилюк

Анотація. *У статті наведено результати оцінювання колориту пейзажів парку “Феофанія” упродовж чотирьох сезонів. На підставі аналізу сезонних змін колориту парку виділено панівні колірні гами, в яких сформований колорит упродовж року, визначено їх відсоткове співвідношення та носії кольору, які зумовлюють те чи інше забарвлення. Виокремлено посезонні колірні акценти у паркових пейзажах.*

Ключові слова: *парк “Феофанія”, колорит паркових пейзажів, сезонна динаміка насаджень, пори року.*

КОЛОРИТ ПЕЙЗАЖЕЙ ПАРКА "ФЕОФАНИЯ" И ЕГО СЕЗОННАЯ ДИНАМИКА

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Аннотация. *В статье приведены результаты оценивания колорита пейзажей парка "Феофания" на протяжении четырех сезонов. На основании анализа сезонных изменений колорита парка выделено цветовые гаммы, в которых сформирован колорит в то или иное время года, их процентное соотношение и носители цвета, которые обусловливают ту или другую окраску. Также выделены сезонные цветовые акценты в парковых пейзажах.*

Ключевые слова: *колорит парковых пейзажей, сезонная динамика насаждений, времена года, парк "Феофания".*