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Determinant factors for species choosing in urban street plantations

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Abstract The present study proposes to highlight the multitude of aspects and factors which determine the choosing of dendrologic species assortment for street plantations and alignments in the urban environment. These factors are grouped in categories, depending on their nature and importance, so that the final decision of choosing street dendrologic species and alignments can be taken correctly and accordingly to each situation in particular. Therefore street plantations will ensure an adequate aspect, and the urban image will be considerably improved.

Key words

urban green system, street plantations, dendrologic assortment, selection factors

Street plantations are included in the category of urban green spaces of general usage; they contribute to the unification of the complete urban green system, representing veritable green axes of the urban space together with the other green entities – squares, public gardens and parks (4). It would be unimaginable to picture a city with arterial roads lacking plantations, especially in the current conditions in which urban pollution reaches alarming rates. In the great urban aggregations a series of specific artificial factors such as: noxae from the atmosphere and ground, vertical and horizontal agglomerations of concrete and asphalt, interfere with the climate factors from the surrounding area, which they sometimes alter; this situation has the consequences of air contamination, reduction of natural ventilation, increase in temperature levels due to radiant heat and the production of the "urban heat island" phenomenon, atmospheric drought etc. The pollution generated by transportation agents includes structural and functional mutations in the urban ecology, while the specific urban climate definitively marks and profoundly influences the vegetation behaviour – especially of the street one, which is in direct contact with the pollution induced by urban traffic. It has been assessed that urban areas which lay on flat lands must hold at least 60% streets with plantations, the rate decreasing as the city is situated in an area of high hills and mountains – approximately 40% of streets must have plantations (2).

Plantations which lay alongside streets and great urban arterial roads carry out a series of functions among which: the decorative function due to habitus, chromatic of foliage and flowers or fruits; sanitary function which is embodied in protecting pedestrians from sunstroke, moderation of diurnal extreme temperatures, increase of relative air humidity, enrichment of the atmosphere with oxygen, reduction of the carbon dioxide concentration, decrease of wind speed, noise and trepidation reduction, destruction of some types of microbes (as a consequence of the capacity of plants to emanate phytoncides); the function of protecting and supporting roads and traffic, which materializes by: enhancement of orientation possibilities, acknowledging from the distance the geometrical particularities of the road, decreasing the "blinding" effect on nighttimes, attenuation of the fatigue state by removing visual monotony which has beneficial effects in maintaining attention while driving, anchorage and prevention of erosion for backfills and excavating due to roots; the economic function which is a result of the variety of products offered by vegetation planted alongside the traffic lanes: wooden materials, leafs, flowers, fruits used in the alimentary, pharmaceutical, sericultural and apiculture sectors.

Materials and Methods

The study material used in the present work is represented by arboreal and arbustive wooden vegetation, which is used in urban traffic arterial roads, and the elaboration of a classification of factors which must be taken into consideration when choosing the optimum vegetal assortment in specific conditions.

The method of research used in the study is documentation and selection of determinant factors which underlie choosing the species for use in street landscape arrangements.

The multiple applications which arbours and scrubs must serve in urban street plantations, have led to the separation of determinant factors of species choosing in several categories:

Urbanistic factors: refer to the transversal profile of the street, the longitudinal profile (the length of the arterial road and its levelling), the architectural volumes which limit the arterial road and their style, the intensity of vehicle traffic (motor vehicles and public transportation), the width of the pavement, the solution for organizing the green surface (green band or individual plantation pill), the intensity of pedestrian traffic, the existence of former plantations in the area (in this case species, age of specimens and arrangement style will be considered), and also the tradition of a certain type of plantation (species) and its behaviour throughout time.

Dendrological factors: take into consideration the plant's outfit (the shape of the crown and stern), stature (the height that the plant reaches when mature), the diameter of the crown, the color of the leafage and flowers (the differences between seasons will be also considered), the persistence of the leafage determined by the period covered between viridescence and fall of leafs (in the case of deciduous species), flowerage and the duration of the period of flowerage, fructification, smell, the "drawing" made by branches in wintertime, the maximum lifetime of the species, growth rate (slower or faster).

Pedological, climate and ecological factors: refer to the types of rooting (pivoting or tracing) and the implications they have on the plant's life, the resistance to climate conditions of the area and the excessive temperatures from summer and winter; the adaptation of different species of arbors and scrubs to a certain type of heat condition is also expressed by the tolerance interval between a minimum thermal threshold and a maximum thermal threshold, which characterizes each species individually; the influence of extreme temperatures is vital for plants (1); resistance to the noxae from air and soil, the quality of soil, the level of the underground water (which indicates a moist or dry land), the habitat area of the species (the geographical area where it vegetates in optimum conditions).

Technical factors: when choosing species for street plantations concrete, asphalt or free surrounding surfaces will be analyzed in order to estimate the effects on the plants' nutrition; furthermore the situation of the underground and above-ground urban networks and systems will be taken into consideration (light poles, tramway and electric bus aerial networks, electrical networks etc.); also, in this category of technical factors lies the distance between the future alignment and the buildings and constructions which define the street front.

Maintenance factors: refer to the necessities of plants watering (frequency of watering), trimming type and its frequency (where necessary) and to the operations of pest control.

The economical factors implied by choosing of species in street plantations regard the acquisition price taking into consideration that tens and hundreds of samples will be needed, and the possibility of acquirement from the nearby sources.

Results and Discussions

From the analysis of the multitude of functions which street plantations must serve within urban areas, a series of factors have resulted which must be taken into consideration when choosing the assortment of arbours and scrubs. Street alignments are regular and linear plantations which are formed of arbours, scrubs or combinations of the two. The form, stature and sequence rate of the components of an alignment lead to certain architectural and esthetical effects. The factors and criteria listed previously contribute to the correct choosing of species with optimal development in listed conditions of urban landscape arrangements, so that the effect desired by the architect is entirely obtained (3). The selection and correct choosing of arbours and scrubs species taking into consideration urban, dendrological, pedological, climate, ecological, technical and economical factors will lead to the achievement of high quality arrangements, with viability and long-lasting resistance. Here are some examples of complex alignments made from hedges, arbours and scrubs (5).

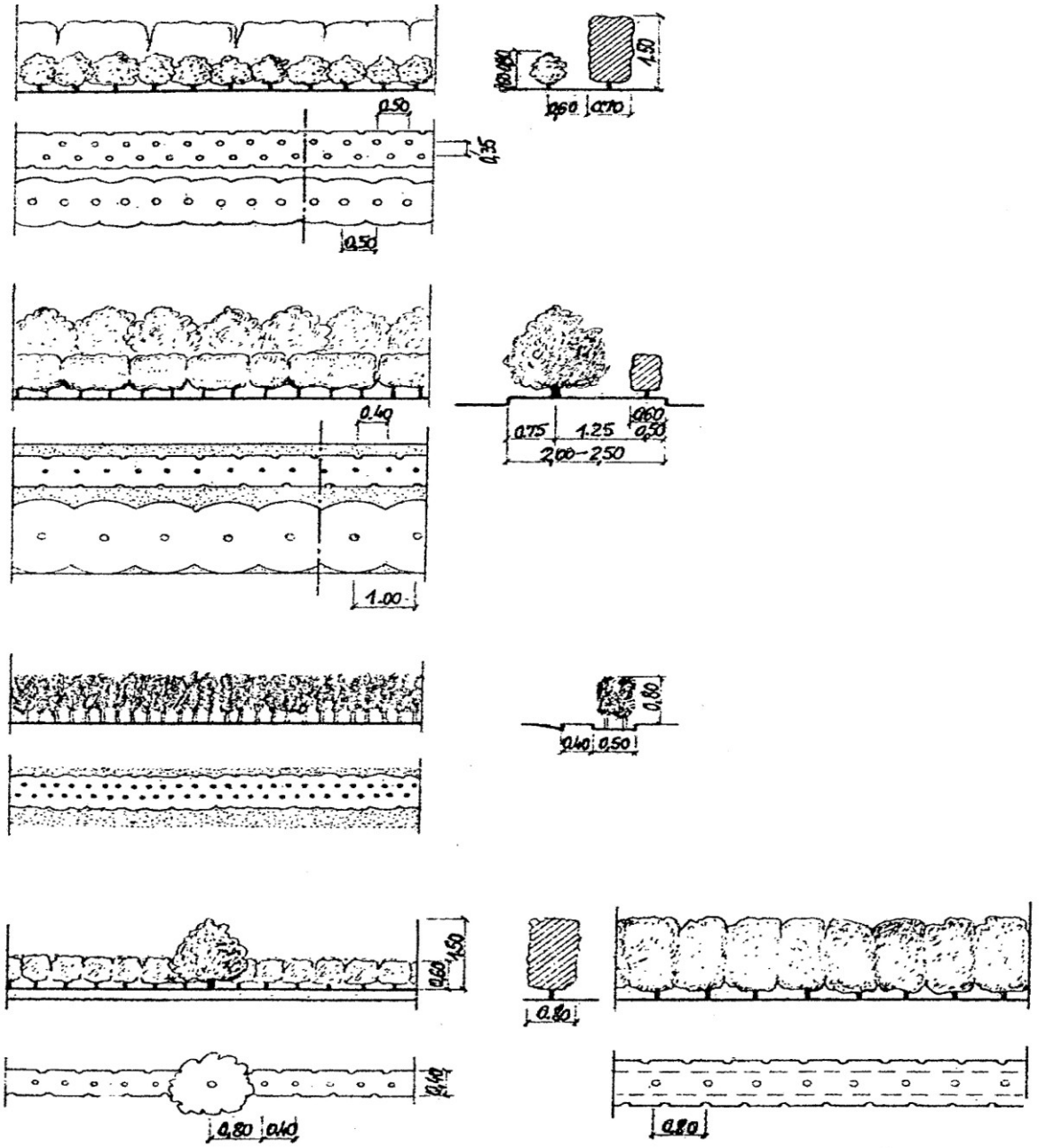

Figure 1 – Examples of complex alignments of hedges, arbours and scrubs (5)

Conclusions

The present study aimed at analyzing the determinant elements, aspects and factors as regards choosing the dendrologic species assortment for arbours and scrubs that would be planted on streets and urban arterial roads. The general intention was to include all aspects that might affect the viability of plants and their well-adaptation to the urban conditions. The prominence of all these factors may establish a useful work instrument for all those involved in designing and execution of urban street arrangements: landscapers, urban architects, horticulturists, construction engineers.

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