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Residents' perception and preferences with regard to fruit species in public spaces and private gardens

Andreea Melinescu [1]*

[1] University of Craiova, Faculty of Horticulture, Doctoral School of Plant and Animal Resources Engineering, no. 13, A.I. Cuza Street, 200585, Craiova, Romania; melinescu93@gmail.com

* Correspondence: melinescu93@gmail.com

Abstract: The need for vegetation, in a rapid process of urbanization, is vital for the future. In the context in which residents are not satisfied with the vegetation around their place of living, it's necessary to study their perception and preferences in order to improve environmental planning. The research focuses on fruit species to demonstrate their importance, through their utility and aesthetic function, with the aim of drawing and exploring residents' preferences regarding fruit trees, in order to increase the use in green spaces, but also to highlight the diversity of fruit species that can contribute to new approaches in urban horticulture.

Keywords: fruit trees; landscape design; urban horticulture; aesthetic function; residents' perception;

1. Introduction

In urban areas, trees, whether they grow on roadsides, on boulevards, in parks, in private gardens, remain the prime green component of the urban ecosystem [1], thus being a vital component, important for the quality of the environment, but also for the quality of life of residents [2]. In Romania, fruit species are widespread both in public green spaces as well as in private gardens. A number of studies conducted in urban areas indicate that urban vegetation plays a significant role in improving human health [3] and ecology. Urban vegetation generates a full range of aesthetic functions including visual, scenic factors, but also olfactory and tactile senses, as well as multisensory effects [4], thus stimulating residents' senses and contributing to their physical and mental well-being.

The study aimed at analyzing the perception and preferences of residents with regard to fruit species, both in public green spaces as well as in private gardens, the information obtained being necessary to outline a complex image with regard to aesthetic aspects, ecological, psychological, functional effects of fruit species, with a view to improve the urban planning of green spaces, but also to recommend the much more frequent use of fruit species.

2. Materials and Methods

In order attain the purpose, we have performed 3D simulations using the Realtime Landscaping Architect, a digital landscape design program, elaborating five proposals for planning a street without or with different types of vegetation (Figure 1). The study method was the psychophysical paradigm [5], also called the perception-based paradigm [6], which involves the evaluation of the visual aesthetics of the landscape by questioning the wide public based on the stimulus-response relationship to the evaluations and the behavior of the observer. Based on the SBE method, Scenic Beauty Estimation, the average visual quality index was calculated [7]. A three-part questionnaire was developed on

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Google Forms platform, the first part of the questionnaire containing general information designed to outline the respondent's portrait. The second part of the questionnaire included a series of questions regarding the knowledge of fruit species, their benefits and negative aspects, as well as the visual quality evaluation of the 3D simulations. The evaluation of images was performed using the Likert scale from 1 to 4, 4 representing the lowest value (not at all attractive), and 1 the highest value (highly attractive). The third part of the questionnaire was addressed exclusively to the respondents who planted fruit species in their garden.

The questionnaire was distributed online, recording 219 responses from Romania, and the statistical data were analyzed both in Microsoft Excel and IBM SPSS Statistics 28.0, in which the average values were calculated [8] of the residents' preferences and satisfaction with the landscape, as well as a series of descriptive analyzes necessary for the interpretation of the questionnaire.

3. Results and Discussion

The first data obtained was necessary to create the identity of the respondents, therefore 80.8% of the respondents were female and 19.2% were male. When it comes to the residence of the respondents, 86.7% live in urban areas, while 13.3% live in rural areas, of which 69.4% live in blocks of flats and 30.6% live in houses.

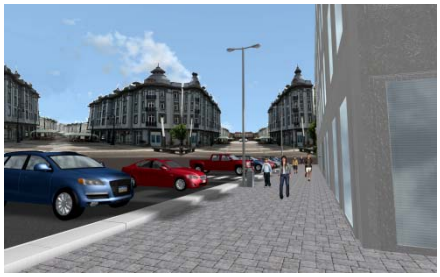
Both in public green spaces and in private gardens, due to the temperate continental climate, there is a multitude of fruit species which, by their elements, such as leaves, flowers and fruits, but also through colours and shapes, influence the aesthetics of the landscape, playing at the same time a utilitarian role, through fruit production.

Visually speaking, residents recognize in the landscape most fruit species characteristic of the climate. The top ten are: apple tree, cherry tree, nut tree, strawberry bush, sour cherry tree, plum tree, pear tree, chestnut tree, Mirabelle tree, quince tree. Unrecognized species in the landscape are: rowan tree, jojoba, medlar, almond tree, gooseberry bush and the Cornelian cherry tree. These species must be promoted by the specialists in the field and recommended in landscaping, presenting decorative features that can contribute to a more diverse and complex landscape [9, 10].

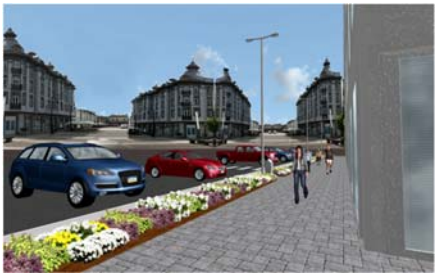
Regarding to how satisfied the residents are with the vegetation around their place of living, the answers were as follows: 14.6% of the residents are very satisfied, 35.6% are satisfied, 30.1% are a little satisfied, 19.6% are not at all satisfied. These percentages indicate the need to improve urban plans, focusing on adding more green spaces.

Fruit species, along with other trees and shrubs, contribute to reducing the degradation of the environment, which is currently in a process of rapid urbanization, therefore there is a number of benefits generated by fruit species. Very important for the respondents is the benefit of reducing air pollution, along with the contribution of fruit species in creating a relaxing environment, as well shading urban areas or reducing stress. Fruit production is very important for 65.8% of respondents, while 21% of them consider fruit production to be unimportant. Fruit production represents the utility function of fruit species, a benefit of fruit trees that recommends them in use to create edible landscape or community gardens. The positive attitude of respondents regarding the benefits of fruit species recommends their integration into the urban landscape and illustrates their importance in the development of sustainable green cities.

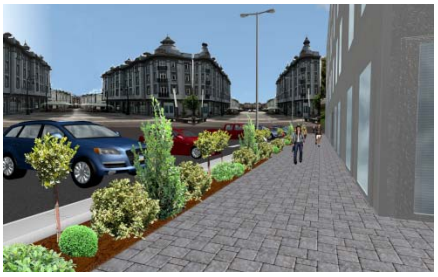
When we discuss the negative aspects of fruit species, residents consider as important the aspect regarding the cause of allergies due to pollen, but also the indefinite growth of the crown that limits visibility, which is an aesthetic aspect that can be reduced by careful grooming or by creating various artistic crowns [11], which create a particular aesthetic aspect, which makes it different from other tree species.



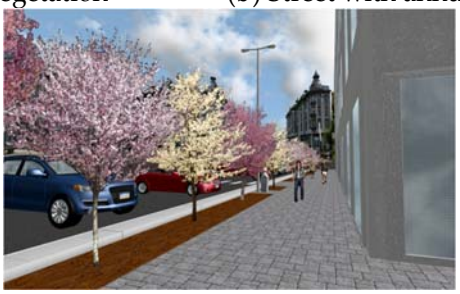
(**a**) Street without vegetation



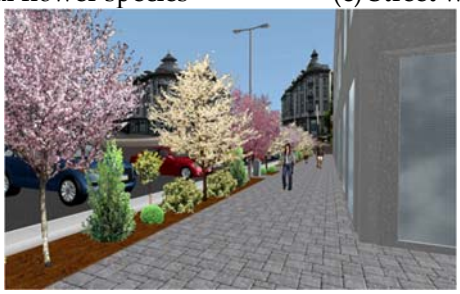
(**b**) Street with annual flower species



(**c**) Street with shrubs



(**d**) Street with fruit species



(**e**) Street with fruit species and shrubs

Figure 1. 3D simulations evaluated in terms of vegetation attractiveness.

The aesthetic perception plays an important role in the overall evaluation of urban vegetation [12], therefore, the 3D simulation (Figure 1) of the street without vegetation obtained an average visual quality index of 3.77 (Table 1), being not at all attractive for 82.6% of the respondents. The view of the street with fruit trees and shrubs was very attractive for 71.2% of the respondents, obtaining the average visual quality index of 1.39.

Table 1. The average index of visual quality according to the perception of residents, following the evaluation of the five 3D simulations (rated on a scale of 1 to 4 (1 - very attractive, 2 - attractive, 3 - unattractive, 4 - not at all attractive)

Variables	Average index of visual quality	Standard deviation
Street with fruit species and shrubs	1,39	0,691
Street with fruit species	1,52	0,616
Street with shrubs	1,85	0,727
Street with annual flower species	2,18	0,862
Street without vegetation	3,77	0,569
N	219	219

Fruit trees differentiate themselves by the colour of the flowers, in spring, a strong aesthetic element, being preferred by residents. Colour is a variable in the analysis of answers, along with the size of plants, and so we notice that residents were very attracted to a landscape presenting a variety of colours and sizes. Fruit species, unlike trees, during their annual evolution, go through different stages of colour, and this is an advantage in their use. Furthermore, due to their height, fruit species mask the concrete jungle, thus helping to create an aesthetic environment. In the design of green spaces, we should take into account the perception and preferences of residents, precisely to increase satisfaction with the level of vegetation surrounding them, which, in its turn, will develop and strengthen both the psychological benefits generated by nature on humans, as well as aesthetic benefits.

The last part of the study focused on residents who own a private garden. Out of a total of 219 respondents, 49.8% own a private garden, 34.9% in urban areas and 56% in rural areas, and 9.1% of residents have a garden in both urban and rural areas. Out of

them 95.4% planted fruit species in the garden. With regard to the criteria for the selection of fruit species cultivated in their private gardens most of them took into consideration the space available in the garden and the taste of the fruit. Only 37.5% of the residents took into account the visual aspect of the fruit species, therefore we notice that residents give more emphasis on the utilitarian function of fruit species, than on their decorative function. Respondents who have cultivated fruit species, declare to be highly satisfied with their evolution (43.3%) and satisfied (44.2%), therefore based on these perceptions we can recommend fruit species, both in private gardens as well as in public green spaces.

4. Conclusion

Residents are well aware of the need for vegetation and its importance in the ecosystem. Fruit species differ from trees and shrubs, due to their utilitarian function, the taste of the fruit being one of the criteria for the selection of fruit species cultivated in private gardens of residents. Despite the negative aspects of fruit species, such as causing allergies due to pollen, fruit species are considered highly attractive from a visual point of view. Understanding and evaluating visual quality is a complicated process, which is generally based on individual variables. The results of the current study can be used for planning, designing and managing public and private green areas, focusing on enhancing the visual quality of the landscape, through the colour composition and diversity of species, two features that fruit species have. Increasing the visual quality of both public and private green spaces will improve both the quality of life of residents as well as the identity of the city, thus providing a favourable psychological environment for residents.

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