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URBAN FARMING - OPPORTUNITY FOR FRUIT GROWING DEVELOPMENT IN ROMANIA

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Abstract

We often hurry on the streets, next to parks, among the planted areas of the city without giving them too much importance, perhaps careless or worried about daily worries, most of us do not pay attention to the oases of greenery and trees except when they are cut and replaced by built areas. This study sets out a new way of developing the green spaces, centered on the citizen, wishing to become a way for cities to cope with climate change, food and nutritional security, biodiversity management and human prosperity. The purpose of the present work was to find and implement a tool for the sustainable recovery of degraded lands, by using landscaping that includes spaces dedicated to urban fruit growing orchards. The study was conducted between 2016-2019 and represents a multidisciplinary approach, which took into consideration as many aspects as environment, economic, social, horticultural and biological. The horticultural part is characterized by a great biodiversity and is dominated by fruit growing species. As for the degraded area in which urban orchards are located, they could be the hope of having safe spaces, of improving the landscape, as well as another form of social inclusion. The most important benefits from a social point of view are the maintenance of public spaces at a low cost, the social inclusion, the economy of saving food and the short chain, while under the environmental aspect, the protection of biodiversity and the safety of health become important.

Key words*: urban farming, fruit growing, landscaping.*

INTRODUCTION

Population growth and increasing consumption are placing huge demands on agriculture and natural resources. In the present, approximately 15% of world population is chronically malnourished while our agricultural systems are degrading land, water, biodiversity and climate on a growing scale. To stand up to the world's future food security and sustainability needs, food agriculture production must grow substantially but in the same time to protect the environment (UNDESA, 2014).

This is why we have to find solutions for a cultivated planet and UF could be one.

In the last decade urban farming is expanding into European cities and has recently colonized the roofs of buildings, being part of the large category of roof agriculture, especially due to constraints related to the availability of urban land (Artuso, 2015). The implementation of Roof Agriculture has been done in several ways: from high-tech business-oriented solutions, often promoted by the European Commission's research and innovation programs, to community-oriented agri-environmental and social initiatives (Timpanaro, G., Scuderi, A., Foti, VT and Lo Giudice, V., 2015). An internet search study led us to a series of existing projects in Europe, which we classified into 4 categories: gardens, farms, engineering and landscape (Kothencz, G., Kolcsár, R., Cabrera- Barona, P. and Szilassi, P., 2017).

The multi-functionality of roof agriculture involves a combination of objectives and benefits, namely food and non-food products, economic and social production services, financial and environmental impact (Torquati, B., Giacchè, G., Marino, D., Pastore, R., Mazzocchi, G., Niño, L., Arnaiz, C., Daga, A., 2018).

The analysis also presented some implementation barriers that constrain the development of RA, limiting the long-term viability of existing projects. How many will stay in the next few years? And how many will replace them, and find a sustainable system? This is the role of research teams to study these initiatives, to test technical policy options and regulations through socio-economic models and scenarios to provide an enabling environment for roof agriculture to become a way for cities to cope with climate change, food and nutrition

security, biodiversity management and human prosperity (Zasada, 2011).
This paper proposes a series of projects/arrangements, analysing solutions to this dilemma, showing that tremendous progress could be made by halting agricultural expansion, closing 'yield gaps' on underperforming lands, increasing cropping efficiency, shifting diets and reducing waste. Together, these strategies could double food production while greatly reducing the environmental impacts of agriculture (Montanaro, G., Xiloyannis, C., Nuzzo, V. and Dichio, B, 2017).

MATERIALS AND METHODS

In order to better understand the ideology (Specht, K., Weith, T., Swoboda, K. and Siebert, R., 2016) of the use of fruit species in public spaces, we resorted to their integration in a proposal to arrange a urban orchards in the city of Iasi.
In the process of identifying the areas with high potential for such territorial systematizations, we discovered different sites of a special kind of picturesque in which the built elements were harmoniously combined with the vegetal ones. These positive aspects of landscape architecture and urban aesthetics of the city led us to identify 3 types of green spaces, ac also were identified by Irvine and collaborators in 2013. The percentage for Iasi is as it follows:
- public parks and gardens, which occupy 14% of the city area;
- forests, located on the outskirts of the city, with the role of stabilizing hilly areas, which do not exceed 11% of the surface of urban green spaces;
- street green spaces which represent the largest percentage of the surface of green spaces of over 70% (Iasi County Directorate of Statistics, 2019).
Also, in the study, we identified the 10 most populated neighborhoods in Iasi, which comprise 56% of the total population of the city and in which green spaces account for only 20% of total green spaces. Among these neighborhoods are the Mircea cel Batran, Nicolina and CUG neighborhoods (Figure 1), where the lack of green spaces was intensified by uncontrolled asphalting in the perimeter of the few areas with vegetation and also did not allow the reintroduction or creation of new green spaces.

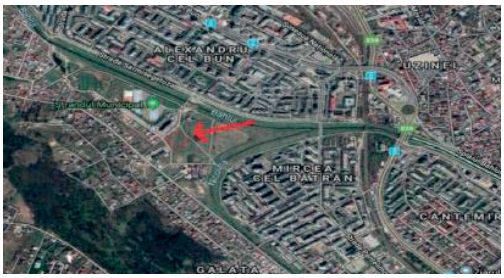

Figure 1. Area between Alexandru cel Bun, Mircea cel Bătrân and Galata Districts, Iasi

Taking into account these considerations, we propose the implementation of the concept of Urban Orchard in an unused space of 6400 sqm, located between the neighborhoods Alexandru cel Bun, Mircea cel Bătrân and Galata (Figure 2.), more precisely to the right of Sofia Nădejde street in front of Arcadia Hospital.

Figure 2. Proposed area for urban orchard project

Figure 3. The existent vegetation at the site

The area proposed for the development of an urban orchard, at the moment does not serve any purpose (Figure 3), it being left in ruins with a rich grassy vegetation. In the realization of the systematization proposal of the space, fruit species were used as a priority, but also dendrological and shrub species (Table 1), according to the requirements of the project and the recommendations for this kind of sites (Montanaro, G., Xiloyannis, C., Nuzzo, V. and Dichio, B., 2017).

In order to achieve a coherent, harmonious, sustainable development proposal that meets all the requirements in the field (Negri, V., Branca, F., and Castellini, G., 2008) and also the needs of the inhabitants of Iasi and those of the three neighborhoods in particular, but also of the people who attend the medical center in the space marked in figure 2, two main tools were used, namely art principles and a structured design process.

Table 1. List of proposed vegetation, species and quantity required

Nr. crt.	Specie	Variety	Pieces
1	*Prunus persica* L., Batsch	**'Dida'**	4
		'Crăița'	4
2	*Pyrus sativa* L.	**'Williams'**	2
		'Williams roșu'	2
		'Untoasă Hardy'	2
3	*Cerasus vulgaris* L.	**'Northstar'**	3
		'Pitic de Iași'	3
4	*Prunus cerasus* L.	**'Rivan'**	4
		'Kordia'	4
5	*Juglans regia* L.	**'Novaci'**	4
6	*Corylus avellana* L.	**'Arutela'**	6
7	*Mespilus germanica* L.	-	4
8	*Citrus limon* L.	**'Bush lemon tree'**	4
9	*Citrus reticulata* Blanco	-	
10	*Cydoni oblonga* Mill.	**'Aromate'**	3
11	*Rubus fruticosus* L.	**'Thornfree'**	20
12	*Rubus idaeus* L.	**'Fertodi Zamatos'**	10
13	*Vaccinium myrtillus* L	**'Blue Gold'**	10
14	*Hippophaë rhamnoides* L.	**'Askola'**	8
15	*Ginkgo Biloba* L.	-	1
16	*Juniperus horizontalis* L.	**'Blue Chip'**	4
17	*Berberis thunbergii* DC	**'Atropurpurea Nana'**	2

The principles used in the proposal for the arrangement of the Urban Orchard not only want to offer solid arguments regarding the efficient change of the landscape on which it is based, but also describe the means by which the fusion between artistic values and the qualities of the created environments is created (Sander, H.A. and Zhao, C., 2015). Thus, within the urban orchard development project, it was decided to suppress the presence of cars in the landscaped space in order to obtain a strictly pedestrian landscape.

Another common technique of spatial planning often found in modernist design principles, namely functional analysis, was used to make the arrangement proposal for easier separation of site functions as a means of resolving conflicts in the landscape.

Functional analysis

As a result of the detailed analysis processes that took place in the area of interest for the project, it was possible to create a list of strengths and weaknesses existing on site, but also outside it. Detailed measurements were made, the components and composition of the area were closely studied, and thus the current needs that will be taken into account in the realization of this urban orchard were identified.

The strengths or advantages of the site are characterized by:

- the presence of institutions of interest to the population, such as the Arcadia hospital and the municipal swimming pool, this being beneficial to the development in terms of the flow of people transiting the area and could benefit from the advantages offered by the urban orchard.

- the geographical location between the three districts, bringing a greater contribution of visitors to the respective area, it being daily crossed by numerous inhabitants, on an alley formed rudimentarily around the analyzed site.

- the presence of access roads for cars, being also a strong point of the area, the access being easier, in all seasons, even in unfavorable weather conditions for walking.

- the construction of a bridge in the vicinity is considered to be a strong point of the analyzed area, because it will increase the flow of people in that area, and the street will also benefit from an adequate lighting system.

The Bahlui River plays an essential role in the development of the site, being considered an ideal water source for irrigating the land at a low cost, even in the driest times of the year.

As disadvantages of the site we can observe:

- the lighting system is not sufficiently developed, in some places being absent, and in

others being in an advanced state of degradation.
- access roads and pedestrian alleys are in an average state of degradation, with potholes and missing parts.
- lack of bicycle tracks,
Following field research, we noticed that the parking lots in the hospital and pool area are not large enough for all visitors to the area, and they park their cars on the nearby green space. All these detailed observations were made in order to make a coherent proposal in terms of the location of the plants, the systematization of the alleys, the correct zoning of the site functions, so that the arrangement is harmonious, beautiful and sustainable.
Following the analysis, it was determined exactly what are the needs, desires and functions that will have to be fulfilled by the urban orchard development project, as well as how their desired fulfillment could be achieved safely and with minimal effort from all the parties involved in the project implementation process but also in the long term of its maintenance.

RESULTS AND DISCUSSIONS

In this paper, we aimed to design and arrange an urban orchard in Iasi, at the interference of Mircea cel Batran, Alexandru cel Bun and Galata, open to the public, with an essential role in developing the economic and aesthetic potential of the targeted area, by creating new jobs, but also a space designed to relax in a pleasant atmosphere, as close to nature as possible with the family, thus trying to keep the idea of a rustic orchard, but with modernist elements.
Urban orchards are a creative and sustainable solution to many of the urban challenges, providing access to fresh fruit, improving the urban environment and creating habitats necessary to protect local wildlife (especially birds). However, the most important aspect of the project is the opportunity to facilitate connections between the inhabitants of the area, but also for them to benefit from a balanced diet rich in fresh fruits and vegetables (Torquati, B., Viganò, E., and Taglioni, C., 2016). Connecting residents so they can create and view urban orchards as a great way to spend time in the city (most do not have their own garden). There is also a strong educational element: children, in particular, love to learn how to grow and harvest their own food, and early education creates healthy eating habits (Torquati, B., Tancini, C., Paffarini, C., and Illuminati, R., 2015). Harvesting is also an essential part of this goal.
Another aim is to stop wasting the crops produced in the municipality of Iasi, thus ensuring a space for marketing fruits and other products obtained by the most environmentally friendly methods.
The orchard is an element that ensures flavor, freshness and color to each garden. It offers a decorative spring look through flower and color, attracting pollinators and offering delicious and fragrant fruits. In addition, fruit growing can be a relaxing activity practiced with pleasure, which pleases you on all levels. Also, the surplus fruit can be used by processing in different forms: jam, marmalade, compote, etc.
We tried to create an orchard as varied as possible in terms of assortment (Figure 4), especially using qualitative varieties, low vigor (Stănică, F., Dumitraşcu, M., Peticilă, A., 2008) dwarf type (to use the space as efficiently as possible), with medium to high production, with a wide ripening season , from early May to late November.

Figure 4. *Prunus*, *Cydonia* and *Cerasus* genera used in the project

Regarding the location of the trees in the orchard, this was done according to their size from large to small from outside to inside. Perimeter high-species species were used, the specimens being positioned so as to create a natural curtain of protection against proximity, but also to offer privacy to visitors.
The vigor of the planted species was taken into account, ensuring the appropriate planting distances, but also the space necessary for maintenance, the need for water, this being ensured by a well-developed irrigation system.
The planting of fruit bushes (Figure 5) was done near the hedge, on trellis, they also have a fencing purpose, being cultivated in the form of continuous fruit fences.

Figure 5. *Rubus*, *Vaccinium*, *Hippophaë*, *Mespilus* and *Corylus* genera used in the project

The location was made as follows (Figure 6): in yellow we represented the alignment of walnut and hazelnut, with green, peach, quince, sour cherry, cherry and pear, and in red the fruiting shrub species.

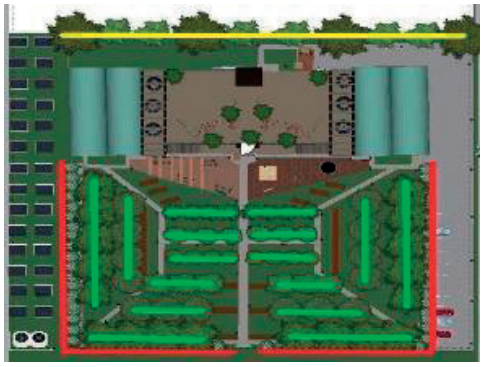

Figure 6. Location of fruit species in the orchard

On the surface of the terrace we placed lemons and mandarins grown in pots, primarily for decorative purposes. Also, in the design theme, the design of an urban orchard was considered, along with a space for capitalizing on products obtained in a way that is as accessible and transparent as possible for the inhabitants of Alexandru cel Bun, Mircea cel Bătrân and Galata neighborhoods.
After making the schemes for planting fruit vegetation, we framed the surface in two main initial areas, the one related to the outside, more precisely the orchard itself, but also the area that will be used to place the ensemble designed for the greenhouses, but first of all the main capitalization and preservation space for the products in a sustainable, modernist manner. The delimitation of the previously mentioned areas was made with two colors, green for the orchard area and blue for the construction area, as can be seen in Figure 7.

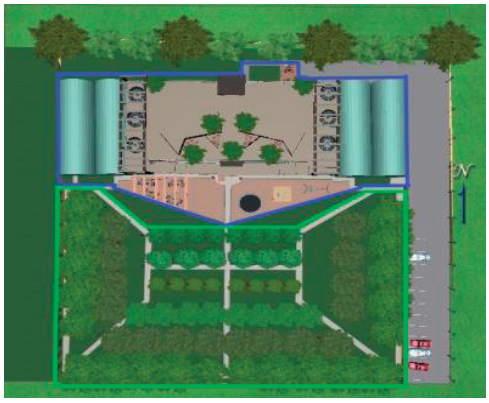

Figure 7. Main zoning

These two areas define a whole, which through its sanogenic, ecological and aesthetic qualities form an oasis of relaxation in the city for the inhabitants of the 3 neighborhoods, but also a place where children can learn new and exciting things in agriculture and horticulture.
The alley frame has been designed so that all areas of the site are as accessible as possible, regardless of positioning, or the access roads used to enter it.
To streamline traffic inside the orchard, as seen in Figure 8, there are two types of alleys, drawn with two different colors, depending on the level of use established.
The most frequently used areas were marked in light blue, and the less frequented areas in dark blue.

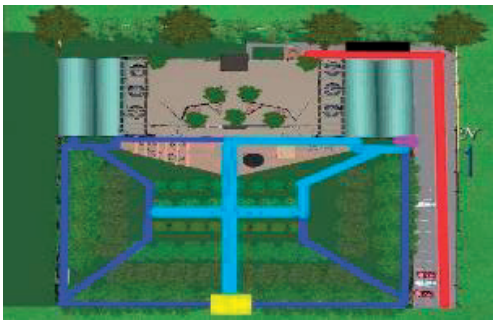

Figure 8. Alley plot and access ways

The area drawn with the red line shows the access way of the visitors' cars to the arranged parking lot, but also of those used for supply in the area marked in black, where the cold storage of the ensemble is located.

We used the color yellow to present the main entrance inside the orchard, and with the secondary purple, from the parking lot.

In order to facilitate the perception of the project, we made a compartmentalization of it, dividing it into eleven areas of interest, trying to respond to all the needs of the inhabitants of these neighborhoods, by creating inside the urban orchard areas destined for recreational, play, social interaction and last but not least of some active relaxation areas, by interacting with the vegetal elements located at the level of the site (Figure 9) (Zlati Cristina, Pașcu Roxana, Bernardis R., (2020).

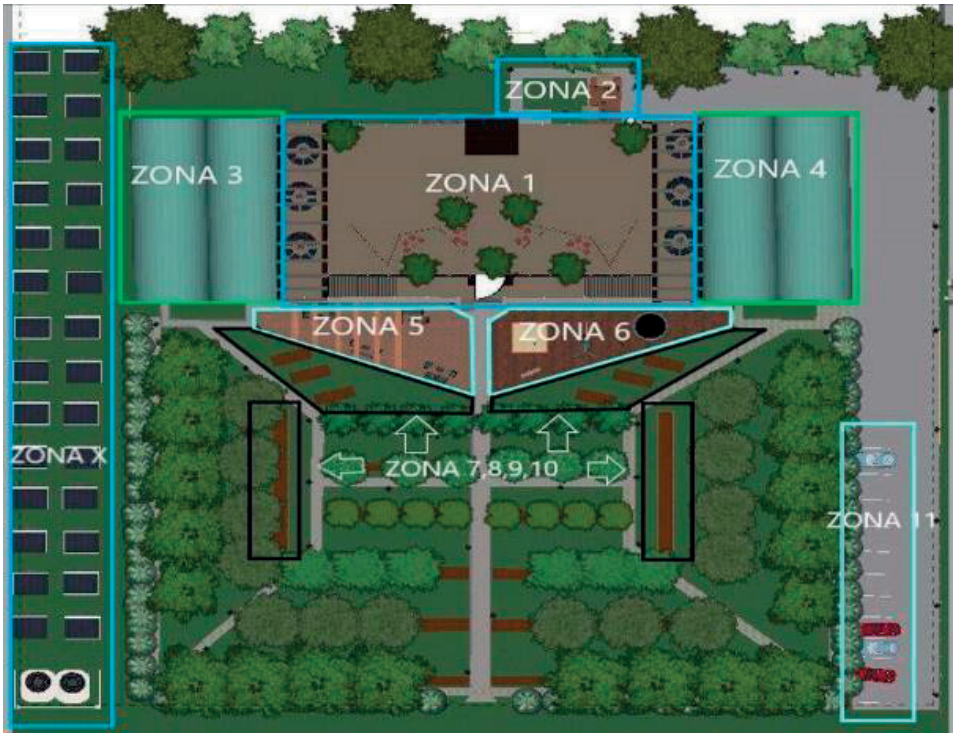

Figure 9. The zoning of the Urban Orchard project, area at the interference of Alexandru cel Bun, Mircea cel Bătrân and Galata neigberhoods

By creating these areas, we did not want to form barriers between users of this space, but instead, we wanted to design a whole consisting of several spaces adapted and created according to the needs of the inhabitants of Iasi, so that they feel as well within the formed ensemble and be as close as possible to nature.

As a result, in Zone 1 we proposed arranging a terrace on the roof of the technical building, with dining areas and an island kitchen. This space was designed specially to host events, not only by the systematization of the elements that make it up, but also by its location at the highest point of the site with a panoramic view

of the orchard, but also the playground for the children.
In order to enliven this area, it is proposed to use several specimens of *Citrus limon* (L.), grown in pots.
In this space we also proposed to introduce an island kitchen, which will be accessible to visitors in the summer months, next to a piece of furniture, located under the two pergolas of the area.
The point of maximum interest of this area are the decorative walls (Figure 10), with the role of compartmentalizing the space.

Figure 10. Zone 1 in detail

Zone 2, of the urban orchard, was designed to offer the ensemble's employees a private space to spend time during the break. The intimacy and shade in this space is to be ensured by the alignment of nuts and hazelnuts, but also by the vegetal compositions of which the specimens of *Ginkgo biloba* are part of.
In **Zones 3** and **4** we suggested to arrange two solariums on each side of the technical building (Figure 11), in which to cultivate a wide range of plants (strawberries, lettuce, greens, seedlings but also various fruiting shrubs), including in the winter months with the help of heating systems based on energy produced by solar panels.
Zone 5 is intended for relaxation and supervision of children aged between 2 and 6 years whose playground we placed in **Zone 6** next to the educational spaces where they have the opportunity to learn the fascinating secrets of agriculture and fruit growing.
For children over 6 years old, we have provided educational spaces in **Zones 7, 8, 9** and **10**, where they can learn through play, how to perform various horticultural operations such as planting, watering and caring for fruit crops.

Figure 11. Green houses from zone 3 and 4

Figure 12. Zone 11-parking detail

The last area planned to be arranged within this urban orchard is Zone 11 (Figure 12), a space where we placed a parking lot with over 15 spaces, which will be available to visitors.

CONCLUSIONS

Considering the importance of green spaces, especially in urban areas, the concept of Urban Orchard is meant to create a space, not only with an aesthetic role, but also with an important sanogenic, economic and social role. This desire can be achieved by introducing an

oasis of relaxation, as close as possible to nature for site visitors.

The advantage of using this type of arrangement of fruit species, initially induces visitors the feeling of modernism, but in reality, the landscape created is a rustic, natural and local, being easy to maintain.

The site has been designed so that each space has a well-defined role, both as an orchard, but also as a space for relaxation, trying to please all types of visitors.

The planting of trees and shrubs species will take into account the optimal conditions for these works to ensure the highest possible planting success.

Networking researchers from different fields, agriculture, landscape, biology and others will lead to diverse projects, perspectives, expertise, approaches and solutions, essential for biodiversity in food, agriculture, quality of life and for conserving food plants and will also include their use in our natural landscapes.

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MISCELLANEOUS


EX·TERRA·AVRVM