STUDIA UBB GEOGRAPHIA, LXIII, 1, 2018 (p. 63-75)
(RECOMMENDED CITATION)
DOI:10.24193/subbgeogr.2018.1.04

TREE-FRUIT CROPS IN CLUJ-NAPOCA – ARE THERE ANY VIABLE PERSPECTIVES FOR PERMACULTURE?

COSMINA-DANIELA URSU[1], GABRIELA MOȚCO[2]

ABSTRACT. – Tree-Fruit Crops in Cluj-Napoca – Are There Any Viable Perspectives for Permaculture? Ever since the communist period, fruit farming has been a significant economic activity in many areas of Romania. The hills of Cluj and Feleac were renowned for their significantly productive orchards. Once with the change in the political regime, the large agricultural holdings were divided and reorganized. Orchards were now administered by private land-owners, whose diverse judgment brought up several changes in the land use. Thus, some orchards were abandoned, others were grubbed up to clear the land for constructions, while, in some of the best cases, orchards were rehabilitated to meet the current quality standards. Our study aimed to analyze how the land used for tree-fruit crops would be better managed by adding up the benefits of permaculture. Methodologically, cartographic reconstructions were carried out based on topographic maps from the 1950s, military shooting range maps and recent orthophoto maps. Also, a sociological survey was carried out to determine the perception of people about the need to still have traditional orchards. Due to the large extension of degraded orchard areas, it has been found that the optimal solution to increase their viability is to encourage farm holders to practice permaculture, instead of removing large portions of farm land from production and use it for construction purposes.

Keywords*: metropolitan area, urban farms, orchards, Cluj-Napoca*.

1. INTRODUCTION

Often defined as a set of rules on gardening techniques, permaculture has also been assigned other meanings, such as: art, design, philosophy and a way of living. The purpose of permaculture is to create viable systems that would provide for the human needs, yet replicating the model of natural ecosystems. The practice of permaculture is not exclusive, in the sense that it can be adapted

[1] *Babeș-Bolyai University, Faculty of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania, e-mail: ursucosmina@yahoo.com.*
[2] *Babeș-Bolyai University, Faculty of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania.*

to the specificities of any area at any time, being only conditioned by the broad comprehension of the area and by a detailed study on the mechanisms, relationships and processes governing the proper functioning of the system (Harland, 2013).

Permaculture can be practiced both in urban areas (apartments, courtyards, parks, gardens) as well as in suburban and rural areas, farms and large-scale farming lands (Harland, 2013).

The principles of permaculture have been applied ever since the ancient times. For example, the Egyptian people, who benefited from an important source of water in the Nile Delta, used to practice organic farming, strictly based on the features of the land. The wetlands were cultivated with certain plant species, while the more arid areas were cultivated with other species of plants, adapted to this type of environment (Krebsbach, 2017).

The principles of permaculture were illustrated and explained by Smith (1929) and Yeomans (1964). Other authors, such as Brand and Fukuoka, have tested ecological methods of practicing agriculture with no use of mechanized means ("the Fukuoka Method", "the natural way of farming" or "do-nothing farming").

It was not until 1978 that the Australians Mollison and Holmgreen applied for and received the patent for the concept of permaculture and even issued a few principles for it. Bill Mollison defined permaculture as "a philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labor; and of looking at plants and animals in all their functions, rather than treating any area as a single project system."

Another author bringing special contributions to the permaculture field is Holzer, who, through the works: *The rebel farmer* (2002) and *Sepp Holzer's Permaculture: A Practical Guide to Small-Scale, Integrative Farming and Gardening* (2011) and by his personal example, has promoted the cultivation of plants adapted to harsh climatic and field conditions, such as: vegetables in fertile soil areas, mushrooms in wetlands, various fruit trees that would endure increasingly harsh conditions. He even constructed fish ponds, catching water from swamp areas. The test site was Lungau, Salzburg. At present, there are courses, trainings and also international farms where permaculture is practiced. Courses are organized by permaculture associations from European states (France, Italy, Germany, Finland, Great Britain) but also from extra-European countries (India, Thailand, Indonesia, Sri Lanka, Australia, USA). As for examples, we mention here: the Ridgedale farm in northern Sweden (it supports trainings and seminars in addition to agricultural production), Du Bec Hellouin farm in France, Aranya Permaculture Farm in India, Fair Harvest in Southwestern Australia, Numbi Valley Permaculture Farm in South Africa, etc.

The principles of permaculture respond to some tangible objectives, namely: natural environment protection, sustainable use of existing resources by the current generations and ethical distribution and limitation of resource consumption (Mollison and Holmgreen, 1978). Among the 12 principles of permaculture we note the following: observing how natural mechanisms act, capturing renewable energy, recycling, encouraging cropping diversity instead of monocultures, increased attention to peripheral environments, and continuous adaptation to change (Baci, 2010). Among the benefits of permaculture, we reveal the following: lower agriculture costs, less waste amounts, use of natural protectors such as insects, birds and plants to keep pests away, more optimal land use zoning, improved soil fertility.

Permaculture is suitable both in urban areas (on rooftops and facades of buildings, in apartments and gardens, and on balconies) and in large open spaces, where, besides plant crops, livestock can be grown and ponds can be set up.

As a relatively new concept, launched in the last 3-4 years in Romania, permaculture seems to have valid chances of development proved by real initiatives in Cluj, Bucharest and Braşov and of individual practitioners in rural areas. In addition, training courses such as the "Permaculture Design Certificate (PDC) Course" are organized by permaculture associations, free of charge or for a fee, which help farmers become attested permaculture practitioners.

When it comes to tree-fruit farming, permaculture integrates the orchard holistically, meaning that trees do not grow isolated from other ecosystems, but as a component of the natural scenery (Mollison, 1981). Besides providing food for both humans and animals, orchards have an ecological role, too. They maintain air moisture and alleviate wind effects. Tree pruning practice is not encouraged by permaculture because it weakens the tree elasticity and makes them prone to diseases. In order to provide wind protection for the fruit trees, windbreaks are planted or earth berms are built. Other techniques include planting wild fruit trees that would enhance the pollination of fruit tree crops and whose fruit could be used to make jam and medicinal juices (Holzer, 2011).

Although an old agricultural practice in Romania, fruit farming is currently predominantly subsistent, farmers owning small orchards, thus producing just enough to cover their own needs. Classical tree care techniques and insecticides are applied, thus farms produce below the expected. Producers are encouraged to take action for the revitalization of fruit farming under the National Rural Development Programme. Actions are funded under sub-measure 4.1a – Investments in fruit holdings and sub-measure 4.2a – Processing of agricultural products.

The main objective of this study is to analyze the tree-fruit farms in Cluj-Napoca and its immediate neighborhood in correlation with the implementation of permaculture principles. We described the theoretical framework, we presented

the working methodology, we elaborated the space-time analysis of the tree-fruit farms in Cluj-Napoca, followed by the analysis of the current state of the fruit farms in Cluj metropolitan area. We then tried to investigate on the perception of local actors regarding the viability of the fruit farms and the support of the fruit growing practices by complying with the principles of permaculture.

2. MATERIALS AND METHODS

2.1. Study area

The main reason for choosing the city of Cluj-Napoca as the study area for the proposed research theme is that tree-fruit farming has been one of the highly productive traditional agricultural activities practiced here even since the coomunist period. This location shows a number of factors conducive to the development of fruit farming: hilly area, illuvial clay soils and moderate climate. In addition to these reasons, we should not disregard the ecological function of orchards, which provide space for the creation of natural microclimates and natural ecosystems, ensure the increase of oxygen level, enhance the stabilization of slopes and protect soil against surface erosion. On the other hand, for the population, the orchard brings extra green space, provides recreational spaces and encourages social relationships. Economically, in this case, we note the reduced distance to the markets, which also determines low transportation costs. Fresh, unprocessed fruit products could be directed to more than 300,000 city inhabitants for consumption, and in case of surplus, to other localities.

In order to cover the entire market at the county level, we extended the study area, including the metropolitan area of Cluj-Napoca, as well. The metropolitan area was established in 2008 and consists of the city of Cluj-Napoca and 17 other neighbouring communes. Setting up the Metropolitan Area of Cluj-Napoca, was based on several objectives of which we mention: development of road accessibility, modernization and extension of technical networks, increase of economic competitiveness through the relocation of population with university degree (Association for Intercommunity Development – Cluj Metropolitan Area, 2017).

In the case of Cluj-Napoca, orchards used to cover approximately 1883 ha during their expansion period, predominantly located in the northern part of the city, but also in the southern area, the plots being quite extensive and compact.

To reveal the current situation of the tree-fruit growing farms, three case studies were chosen to be analyzed: Sfântu Gheorghe Farm, Steluţa Farm and the Horticultural Research Center of Cluj-Napoca. For each of the 3 case studies, data provided by the maps were supplemented by the results of the sociological survey, which was applied to grasp the perception of local factors on the evolution and future of urban tree-fruit growing activities.

2.2. Data collection and processing

For the space-time reconstruction of the fruit growing areas in Cluj-Napoca municipality and reveal the current state of the existing farms, first we needed to obtain some cartographic and sociological data.

In the case of spatial data, the sources used were the following: military shooting range maps – scale 1:25,000 (1952), topographic maps – scale 1:25,000 (1968-1984), orthophoto maps – scale 1:5,000 (2005), data provided by the Agency for Payments and Intervention in Agriculture of Cluj-Napoca (2017). Based on these cartographic materials, the processed data was mapped (fig. 1).

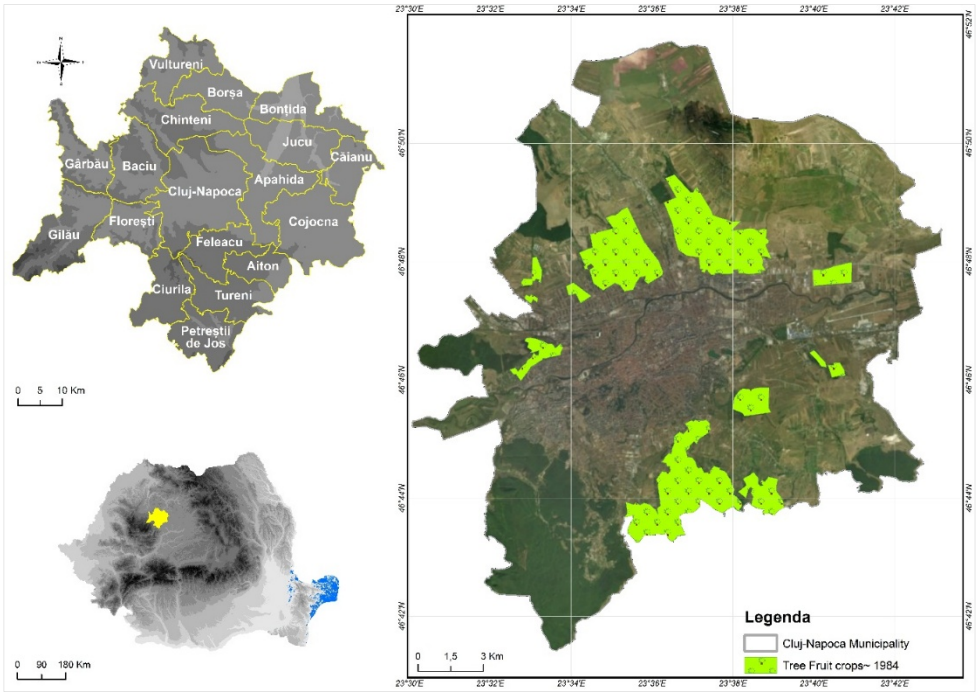


Fig. 1. Spatial distribution of tree-fruit crops in Cluj-Napoca Municipality

We learned about the opinion of local stakeholders regarding the viability of pomology and urban tree-fruit farms by applying semi-structured interviews in the spring of 2017 to people who are working at or used to be employed by the analyzed farms. The questions targeted two time intervals. On the one hand, questions addressed the issue referring to the communist period, asking for

information on the main fruit trees cultivated, maintenance techniques applied, necessary human resources, quantities collected annually, destination and profitability of the fruit production for that period. On the other hand, as regards the post-socialist transition period, the information sought was focused on the actual state of orchards, their usefulness and the profitability of their activity. All three respondents, as in one interviewee/case study, were over 40 years old. They looked at fruit farms as a form of optimal land use, beyond a personal income source.

Methodologically, the research also involved reading specialized literature on the analyzed topic and field documentation in order to observe the current state of exploitation of the tree-fruit farms.

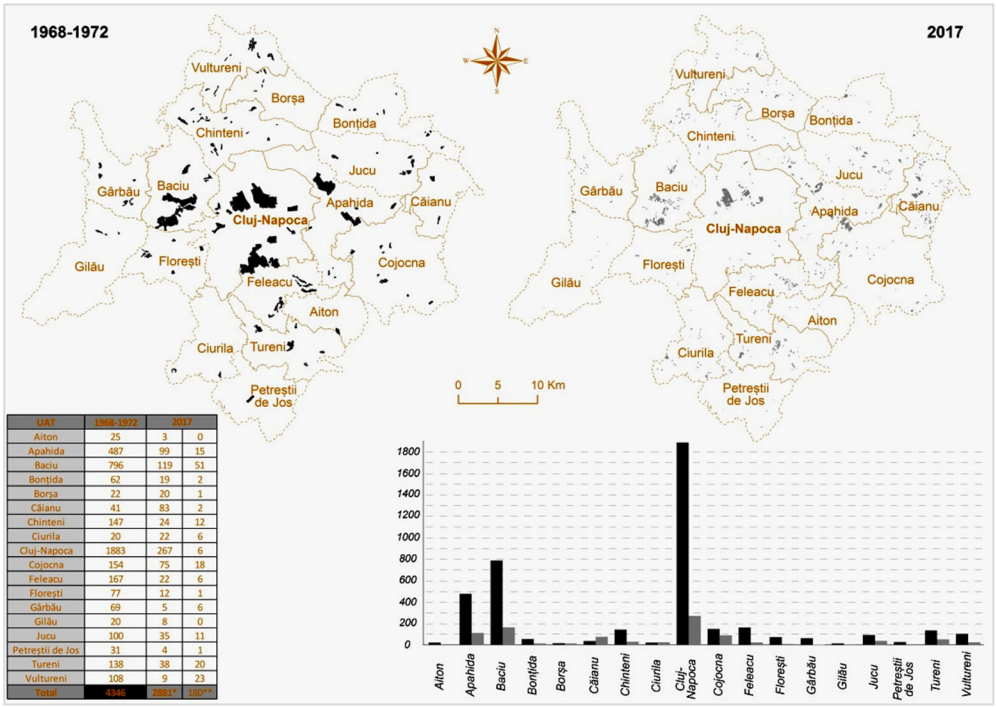
3. RESULTS AND DISCUSSION

3.1. Space-time analysis on tree-fruit crops in Cluj-Napoca

First, we analyzed the spatial distribution of fruit farms with reference to the socialist period. The fruit growing plots were vectorized by using the topographic map of Romania, on a scale of 1:25,000. The second reference period was the year 2017 and the data source was represented by the Agency for Payments and Intervention in Agriculture of Cluj-Napoca (fig. 2).

During the socialist period, the tree-fruit growing farms were mainly located in the hilly area of the city (Viilor Hill, Lomb Hill, Sfântu Gheorghe Hill in the North and Feleacu Hill in the South). According to some sources, pomology has been practiced since the beginning of the 20th century as a replacement of a previous traditional practice (which was vine plantations, according to the first Habsburg topographic survey between 1763-1787): "Especially the part of the city facing northeast is nicely displayed, the upper half of the slopes being filled with houses surrounded by fruit trees. It is the land on which, besides the walls of the fortified city, the vineyards of private holders (individuals) were planted even from the 14th century, which nowadays are crossed by streets bordered by large gardens with mansions in their midst" (Lazăr, 1923).

In the post-socialist period, orchard plots were considerably reduced as a result of massive land fragmentation. The interest for real estate development became visible, against the interest for continuing the fruit growing tradition. In the northern part of the city there are still some functional orchards, while in the southern part of the municipality, they are almost non-existent.



UAT	1968-1972	2017	
Aiton	25	3	0
Apahida	487	99	15
Baciu	796	119	51
Bonțida	62	19	2
Borșa	22	20	1
Căianu	41	83	2
Chinteni	147	24	12
Ciurila	20	22	6
Cluj-Napoca	1883	267	6
Cojocna	154	75	18
Feleacu	167	22	6
Florești	77	12	1
Gârbău	69	5	6
Gilău	20	8	0
Jucu	100	35	11
Petrești de Jos	31	4	1
Tureni	138	38	20
Vultureni	108	9	23
Total	4346	2881*	180**

Fig. 2. Space-time analysis on tree-fruit crops in Cluj Metropolitan Area

The largest and most extensive tree-fruit crops were developed in the socialist period, unlike today, when we note a massive reduction of orchards (down to 1,500 ha). We can also deduce the considerable extension of the orchards in the city of Cluj-Napoca. Even though we note the extensive decrease in the size of orchard areas, Cluj-Napoca still holds the position of a main fruit growing centre for Cluj metropolitan area, followed by the communes of Apahida and Baciu.

In the table and graph we reveal the tree-fruit growing plots in every locality of the metropolitan area of Cluj, in the period of 1968-1972, and in 2017. According to data provided by APIA (2017), traditional orchards are not very well individualized spatially, and they cover very little land. In fact, we note that these areas are officially declared as meadows or pastures (meaning that the former traditional orchards are extensively used for other purposes). Another unfortunate conclusion is that orchards are affected by irreversible degradation, which proves the inclination of owners to use their land for construction purposes.

Data reveal that about 1,883 hectares of orchard land were recorded in Cluj-Napoca area during the socialist period, while now there are only 267 ha; in other words, about 85% of orchards have disappeared. The commune of Baciu registered 796 hectares of orchards, which is currently reduced to 119 ha. Ranked third among the administrative units under study, due to the highly extended orchard plots (up to 487 ha) recorded in the socialist period, Apahida commune currently records less than 100 ha of orchard land. The other localities also recorded drastic cuts in the fruit growing areas after the fall of the communist regime. To sum up, after 1990 the orchard land has decreased from 4,346 ha to only 2,881 ha, plus 180 ha of land declared as having other uses. Currently, only about 66% of the former orchard land is registered in Cluj Metropolitan Area.

3.2. Diagnostic analysis of Cluj tree-fruit growing farms

According to the information provided by the interviewees and collected from field observations, fruit growing in Cluj-Napoca has undergone severe changes since the 1990s. Some of the remaining orchards are almost completely damaged and not cared, some of trees being already dry, buried in weeds and affected by pests (fig. 3). In other cases, the land use was changed on large areas due to growing population and increase in housing demand. Many buildings have been built, both for residential use or other uses (i.e. car repair and servicing workshops). On the other hand, favoured by the investments of several entrepreneurs, some of the orchards were less affected by decline and recorded a reactivation of the old tree-fruit crop.

Fig. 3. Details on the preservation status of the plots within Sfântu Gheorghe tree-fruit farm, Cluj-Napoca

The fruit growing plots in Cluj-Napoca were mapped based on four reference years: 1952, 1984, 2005 and 2017 (fig. 4). We can note that in 1952 orchards were still at an early stage of development, distributed predominantly to the north and west of the city, and afterwards being substantially developed in the south, mainly during the communist period. Beginning with 2005 orchards have been affected by land fragmentation. Not properly cared, orchards in the northern part of the city were sold as construction land. In the southern part, some of the orchards belonging to the Horticultural Research Centre of Cluj-Napoca were given back to the former owners, while the rest of them, still in the ownership of the Centre, could not be cared anymore due to the lack of funds and staff.

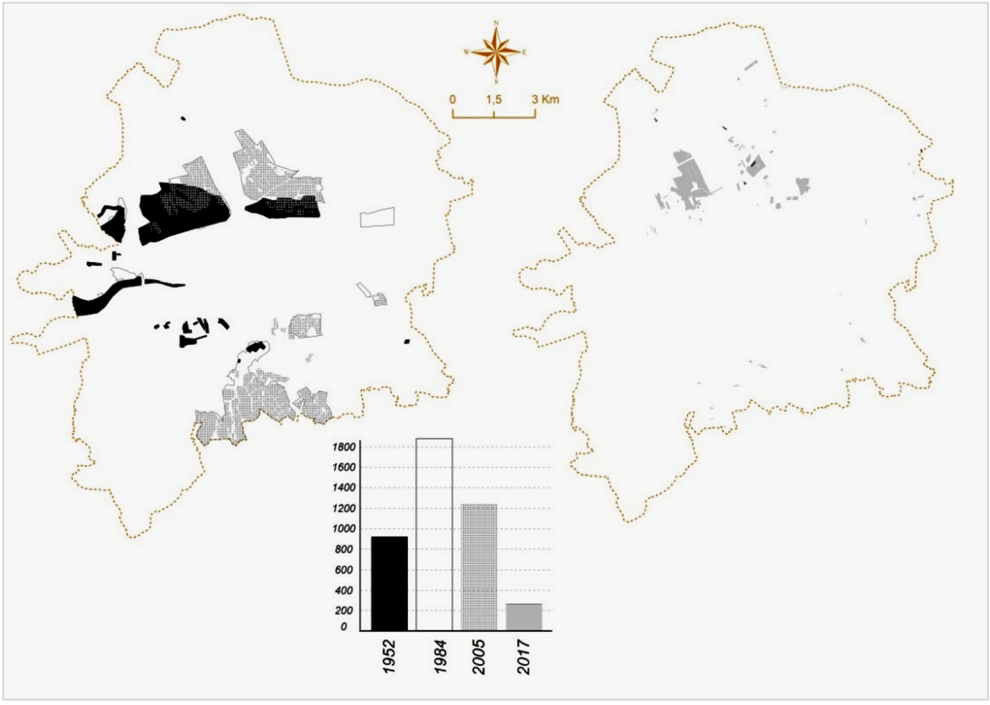


Fig. 4. Analysis on the current status of tree-fruit growing farms in Cluj-Napoca City

In order to illustrate the current status of fruit farming, we employed data provided by APIA related to the extent of functional orchards and of the extensive orchards that were declared pastures and meadows, yet in a small share. Results showed that the only functional fruit farms are those located in the northern part of the city. Tree-fruit growing has then survived in this area due to the interest of some entrepreneurs who have rehabilitated the old plantations, invested and successfully continued tree-fruit farming.

The interviews supplemented the array of information on the progress of fruit growing in Cluj-Napoca, especially since the interviewees have been or are still active in the field.

Sfântu Gheorghe Farm was our first case study. The respondent was a former employee and team leader (53 years old, male). According to his statements, fruit growing was a thriving activity in the communist period, and it was practiced on hundreds, even thousands of hectares. Dealu Morii, Steluța and Feleacu were some other known fruit growing farms. The fruit crops included apple trees (90%), plum trees (5-10%), cherry trees (very low shares). There were 30 permanent employees who were involved in the spring work; most of them came from villages in Bistrița-Năsăud County, namely: Agrieș, Târlișua and Borleasa. However, during harvesting, hundreds of people were seasonally hired. They were either military (who were provided accommodation) or pupils who participated in fruit picking until school started. In the period 1990-1998, farms were highly productive, meaning that a single farm would produce between 100-200 tonnes of apples. Fruit were mainly exported at juice factories located in Carei and Bistrița. There was also a refrigerated warehouse where high-quality apples were kept. Each of the farms was equipped with automatic machines, tractors, offices, fruit sorting warehouses, workshops and accommodation facilities for workers. As for maintenance techniques, they used to practice plowing, tree pruning and spraying. Usually, after harvesting they spread manure, brought from the dairy farms in exchange for hay.

After 2000, the farm went through the process of privatization. Machines were sold, buildings were rented for various uses, namely dog shelters, car workshops, paint shops, cardboard collection centers, PVC double-glazing windows producing centers. Workers were laid off and they professionally retrained. The former orchards were grubbed up and the land was used for constructions. The respondent believes that orchards in this area can no longer be revived due to massive land fragmentation, stakeholders' lack of interest in fruit growing and the increased attention to real estate development.

Steluța Farm represented our second case study. The interviewed person was an agricultural engineer (40 years old, male). During the communist period, Steluța Farm represented a State Agricultural Enterprise, as did Dealul Morii and Sfântu Gheorghe farms. The tree-fruit crops consisted mainly of cherry trees, but also of apple and plum trees. The regime of the working staff was similar to the one described in the case of Sfântu Gheorghe Farm. They had permanent employees (technicians, tractor drivers, engineers) and temporarily hired fruit-picking workers during harvesting. They were people coming from other counties, namely Bistrița-Năsăud and Maramureș. Both natural and chemical fertilizers were applied, and production was quite significant (5-6 cherry trucks were exported).

After 2000, all fruit growing areas were claimed by the descendants of the former owners (approximately 2,200 hectares); hence, only 200 hectares remained in the ownership of the State Land Agency. In 2011, the fruit crops on Steluța Hill (approximately 100 ha) were given to the Roman Catholic Parish, and Steluța Company has leased the land for 40 years. The orchard was cleansed, new cherry trees were planted, and innovation systems, supported by the European funds were implemented, such as: drip fertilizers, anti-hail nets, tree supports. Pollination is supported by over 300 hives set up in the vicinity of the orchard. The cherry yields 8 tonnes/ha, and the apple 30 tonnes/ha, but production greatly depends on the climate, as well. Fruits are distributed on the local markets of Cluj and hypermarkets, but they are also exported to Russia. There are 6-7 people permanently employed, and during harvesting, other 150 people from other counties are temporarily hired while receiving meal and accommodation. We believe that for the moment, the farm has real development prospects.

For the last case study, represented by the Horticultural Research Station of Cluj-Napoca, the person interviewed was a former technician (over 70 years old, female). Since its opening in 1953, the research centre has started shy, with an orchard area of only 4 hectares, and then they expanded over the entire Hill of Feleacu (about 1,000 hectares of orchard). In addition to the greenhouses, where flowers were grown and various experiments were carried out, the orchard was cultivated with apple, pear, cherry, sour cherry trees including fruit shrubs. In fact, various varieties of fruit trees were developed here. There were 250 permanent employees, namely researchers and technicians, who were professionally trained in this research centre and about 1,000 seasonal employees during spring works and harvesting. Besides the traditional working techniques (plowing, cutting, spraying, application of organic fertilizer), soil analyses were carried out periodically to observe the potential deficiencies in nutrients and supplement with chemical fertilizers, if needed. Thousands of tonnes of fruit were produced, which were directed for export to Germany, to the canning factory in Dej, the juice factory in Zalău, and the wine factory to produce fruit spirit drinks.

After the year 2000, the land was returned to the former owners. Thus, only 175 ha of orchard still remained functional, out of over 1,200 ha available at the beginning. No wages have been paid, so many of the employees resigned, currently only five to six people being employed. Since 2015, the horticultural research centre has been taken over by the University of Agricultural Sciences and Veterinary Medicine and they hope to identify some solutions to revive it. Currently, the orchard is no longer productive; only the fruit shrub lab is still operational. When asked about profitability, the interviewee said: "The centre will be cost-efficient only after 3-4 years [...] until then, until it starts moving, until some plantations are set up ... [...] we revive, we regenerate [...] it would be good to succeed [...]".

4. CONCLUSIONS

Following the analysis of the three case studies, we can state that tree-fruit farming is an economic activity that can bring substantial income. However, we must optimally manage the natural potential and some stakeholders are needed to advocate for the benefits of fruit products on the local market. Spatially, all three tree-fruit growing farms in Cluj-Napoca are located close to the markets. Much more, the fruit products from Steluța Farm are already to be found in the local supermarkets in the full picking season.

In terms of human resources, even though fruit growing activity does not require a large number of permanent employees, still numerous workers are needed during harvesting, thus giving the opportunity to unqualified people to earn additional income.

Furthermore, the implementation of the Law no. 150/2016 that stipulates and encourages the selling of at least 51% of domestic products on the local markets stands for another argument to practice and support tree-fruit farming.

There are active measures provided by the National Plan for Rural Development 2014-2020 under which a variety of actions are financially supported, namely for the rehabilitation of the matured orchards, setting up micro-farms or other facilities for production/distribution. There are over 300 million Euros allocated only for fruit growing activities. It is however necessary to encourage and advise individuals to make the necessary steps to benefit from these financial opportunities.

On the other hand, permaculture comes with several solutions to obtain a consistent and healthy fruit production, as follows:

- cultivate different tree species so as to ripen at different times, to ensure diversity and sustainability in case economic changes should occur;
- maintain a small distance between trees;
- maintain a low height of the trees to facilitate harvesting and nutrients to reach the fruit as quickly as possible, resulting in high-quality production;
- sow support plants (alfalfa, chamomile, cress, clover, peppermint) for soil loosening, moisture maintenance, attraction of beneficial, pest control insects;
- integrate mini-ponds to attract species of frogs and birds to exterminate pests;
- include bee hives that would contribute to pollination;
- maintain soil fertility by providing an ecosystem favorable to earthworms and micro-organisms;
- spray with fungicides and bio insecticides (obtained by macerating and fermenting of certain plants) to replace harmful substances.

REFERENCES

1. Baci, Fl. (2010), *12 Principii*, http://www.permacultura.ro/blog/2010/11/17/principiile-permaculturii/, accessed on 18.10.2017.
2. Beligăr, Cristina (2016), *La vremuri noi, livezi noi: Ferma Steluța renaște în era Facebook,* Transilvania reporter, 13 octombrie 2016.
3. Diaconu, G. (2013), *Experimente „permaculturale" la Strâmbeni*, www.permacultura.ro, accesed on 25.11.2017.
4. Frith, S. (2016), *Understanding Permaculture*, www.holisticmanagement.ca, accessed on 25.11.2017.
5. Lazăr, V. (1923), *Clujul*, Editura CVLTVRA Națională.
6. Krebsbach, J. (2017), *Permaculture and its future*, https://northamericanfarmer.com, accessed on 15.10.2017.
7. Harland, Maddy (2013), *What is Permaculture - Part 1: Ethics*, www.permaculture.co.uk, accessed on 15.10.2017.
8. Holzer, S. (2011), *Sepp Holzer's Permaculture: A Practical Guide to Small-Scale*, Integrative Farming and Gardening, Chelsea Green Publishing Company.
9. Howe, Meg (2017), *Advantages and Disadvantages Organic Farming,* https://small-farm-permaculture-and-sustainable-living.com/advantages_and_disadvantages_organic_farming/, accessed on 19.10.2017.
10. Mehta, F. (2016), *What are the Benefits of Permaculture? You'll Be Amazed to Know*, https://www.buzzle.com/articles/what-are-the-benefits-of-permaculture.html, accessed on 19.10.2017.
11. Ministerul Agriculturii (2017), *Sub-program tematic „Creșterea competitivității sectorului pomicol",* PNDR 2014-2020.
12. Mollison, B. (1991), *Introduction to permaculture*, Permaculture Resources.
13. Smith, J.R. (1929), *Tree Crops: A Permanent Agriculture*, Harcourt Brace and Company, New York.
14. Telford, R. (2008), *Permaculture Principles*, https://permacultureprinciples.com, accessed on 21.11.2017.