# SESAME

Encourage the deployment of agricultural projects in urban & peri-urban areas through the development of innovative training

# MODULE 1 : INTRODUCTION TO THE CONCEPTS & TYPES OF URBAN AGRICULTURE

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# 1. Concept of urban agriculture and environment

How can we define what urban agriculture is and what factors are behind the growth of (peri-)urban agriculture? How do trends in food consumption, urban planning and professionals influence the development of urban agriculture?

## 1.1. Definition of Urban Agriculture

Urban agriculture is practiced by people from all over the world. Poor farmers and their families can practice urban agriculture outside their homes for reasons of food security. Or middle-class or high-income families may grow flowers and vegetables in their gardens and balconies for leisure, recreational or therapeutic reasons. Others may produce compost for urban agriculture, while others participate in the transformation and commercialization of the products.

National and local governments can actively support or prohibit this practice. NGOs can provide training and support. Research institutes can investigate the quantity and quality of land available for urban agriculture, test new production practices or monitor the impacts of urban agriculture projects.

Urban agriculture is a dynamic concept that includes a wide variety of agricultural systems, from subsistence to fully commercial agriculture. For this reason, it is considered that it should be better defined locally.

We will apply the following definition of urban agriculture, in order to have a common basis for discussion:

Industry located within (intra-urban) or on the outskirts (peri-urban) of a town, city or metropolis, which cultivates, processes and distributes a variety of food and non-food products, (re-) utilizing human and material resources, products and services that are located around an urban area, which at the same time supplies human and material resources, products and services to this area."(Mougeot, 2000).

Urban agriculture includes:

- The production of crops, animal husbandry, as well as fish farming around cities.
- The production of food and non-edible products (flowers, trees, plants in flower pots...).
- Processing and commercialization of food and non-food products in and around the urban area.
- Uses compost and urban wastewater (treated or untreated) as resources.
- It can take place in open areas of the city or in yards and roofs.

## 1.2. Intraurban and peri-urban agriculture

Urban agriculture can be located inside (intra-urban) or outside (peri-urban) a population center.

Intra-urban agriculture takes place within the built-up city. In most cities and towns, we can find areas of unused land that can be used for urban agriculture. These cultivated areas are usually (very) small and the agricultural systems have a subsistence nature or are very specialized. The economic impact of intra-urban agriculture is difficult to measure, but it can be limited, while the effect on food security can be significant.

Peri-urban agriculture is located in the periphery. The location of this type of agriculture tends to be unstable over time, due to the increase in land prices, the appearance of new constructions and infrastructures caused by the growth of cities, multiple uses of land.... These changes affect agricultural production systems. They tend to become small agricultural systems with an intensive production, which are used to grow perishable crops (which may cease to exist) and to carry out animal production. Peri-urban agriculture is often more intensive and market-oriented than intra-urban agriculture, providing higher income and more jobs.

Urban and rural agriculture have many things in common. However, there are also important differences:

- the role of agriculture in local livelihoods,
- the social context in which agriculture develops,
- the political and institutional context,
- the access and use of productive resources,
- the types of agriculture found in the area and the processes of agricultural innovation
- and the demand for non-agricultural services.

In the metropolitan area of Barcelona (AMB), urban and peri-urban agriculture is a dynamic and multifunctional phenomenon that occurs in many different forms and for many different purposes, and which operates at different levels. This ranges from medium to small producers installed in the Baix Llobregat Agricultural Park, through municipal and school garden initiatives promoted by the administrations, to community garden experiences, or even more informal gardens located in marginal lands -along river banks or transport infrastructures. There are also other smaller-scale agricultural production initiatives, such as gardens in private backyards, balcony gardens and vegetable gardens on roofs (Institut d'Estudis Regionals i Metropolitans de Barcelona, 2016).
The metropolitan area is a predominantly urban area, has a geographic area of 63,600 ha, of which, in 2015, only approximately 8.5% was dedicated to professional agriculture (SIGPAC, 2015). In contrast, the urban area represents 53.9%, a fact that places it among the most urbanized metropolitan areas in Europe (Institut d'Estudis Regionals i Metropolitans of Barcelona, 2017).

Some clear examples of peri-urban agriculture are:

- **The Baix Llobregat Agricultural Park: In the delta and lower valley of the Llobregat River, near Barcelona, there is a very unique productive area: the Baix Llobregat Agricultural Park. With an area of 3,300 hectares and its own protection and management elements, the Agricultural Park is the greatest exponent of peri-urban agriculture in the city, and is also an ideal space from which to analyze issues such as the importance of local production, the multifunctionality of agriculture or the role of public institutions in the regulation and promotion of agricultural production (link 1).**
- **Els Gallecs: Gallecs is a rural area of 733.52 hectares, located fifteen kilometers north of Barcelona, which preserves its natural and landscape values in a highly anthropized environment. The main activity of the area is agriculture, an area in which the conversion to ecological agriculture is being carried out. It is also the reference, cultural and recreational open space for the neighboring populations, and is a green space at the service of the Metropolitan Region of Barcelona and an intensely urbanized environment of more than 150,000 inhabitants (link 2).**

Considering agricultural production, the most significant crops within the AMB are (Àrea Metropolitana de Barcelona, 2018):

- The artichoke, the tomato and the potato (at the Parc Agrari del Baix Llobregat),
- Barley (in Plana del Vallès),
- The wine (in the Parc del Maresme and Begues),
- The olive tree (Baix Llobregat mountains),
- Plums (in Papiol, Torrelles de Llobregat, Sant Climent de Llobregat and Begues).

## 1.3. Dissemination of urban agriculture

There are no firm figures on the number of people worldwide who practice some sort of urban agriculture. Smit et al. (1996) have estimated that 800 million farmers around the world are involved, of which 200 million are full-time farmers. This estimate has not been refuted and is used by organizations such as the FAO. Thebo et al. (2014) conducted a global assessment of urban and peri-urban agriculture and concluded that 266 million families worldwide are engaged in crop production in developing countries. The same article shows that within a 20 km radius around urban centers there is an area of 68 Mha under cultivation around the world, about the size of Europe.

After decades of industrialization of the food system and increasing globalization of production, consumers are becoming concerned about the traceability and safety of food. Food that was once produced and processed locally is now produced elsewhere, and people want more information about the origin of their food.

An important part of the population has begun to be concerned about the origin of the food they eat, giving priority to local food. Urban agriculture is in part a direct response to consumer-driven food demand, and complements the objectives of proximity and sustainable production methods.

Education is also an important way to spread urban agriculture. In Catalonia, the green schools movement has been created (link 3). A green school is an educational center that actively forms part of a network of centers that incorporate education for sustainability in their educational project and that, therefore, integrate the contents and values of sustainability in the curriculum and in the management of the center and are actively involved in the improvement of their environment, promoting the active participation of the entire educational community.

In order to join the green schools network, the educational center must undergo specific training that has, among other things, the objective of carrying out a diagnosis of the initial situation of the center in the four contexts of the Program (curriculum, management, participation and environment) and defining, from this diagnosis, some strategic objectives to concretize the actions to be integrated in the annual general programming of the center.

Once this initial training is completed and the required documentation is presented, the center is incorporated into a territorial seminar of center teams.

A green school is committed:

- Design and carry out, in a participatory manner and with the support of the school management and the approval of the School Council, a process of continuous improvement in education for sustainability, which includes:
    - Elaborate and revise, periodically their Sustainability Education Plan.
    - Carry out annual action plans to achieve the prioritized objectives.
    - Carry out a continuous self-assessment process.
- Impregnate the basic documentation of the center (Educational Project, Management Project or equivalent and Annual General Program) with the agreements contained both in the Education for Sustainability Plan and in the Annual Action Plan.
- Participate in ongoing training (Seminar on Coordination of School Teams).
- Involve the faculty: a minimum of 20% directly in classroom actions and 80% in supporting the actions of the Plan.
- To have an Environmental Committee as a driving team.

In the Metropolitan Area of Barcelona, every year a meeting called the Urban Agriculture Event is organized, with the aim of promoting and raising awareness of urban agriculture in this area. This event is an annual meeting with the objective of bringing all those interested in urban agriculture and gardening to the city and generating an effective working network among all participants. The Economic Development Agency of the AMB collaborates with the urban agriculture workshops, since the event is an opportunity to promote agriculture in the cities, and the Agency promotes the metropolitan food system (link 4).

## 1.4. Growth of the importance on urban and peri-urban agriculture

In the municipal world, many cities recognize the opportunities that urban agriculture represents.

This recognition is manifested in the 2013 Mayors Declaration at the ICLEI Resilient Cities Congress in Bonn (June 2, 2013), which states: "We call on local governments to comprehensively develop and implement food systems in regions close to cities that ensure food security, contribute to poverty eradication, protect and enhance local biodiversity, and are integrated into development plans that strengthen urban resilience and adaptation. "

The importance of urban agriculture is also reflected in the Milan Urban Food Policy Pact of October 2015, signed by more than 120 cities around the world. The role of family farmers and small producers in feeding their communities was recognized, along with their role in providing culturally and equitably adequate food. The opportunities that peri-urban agriculture offers for the improvement of biodiversity and food landscapes of the city have been observed. Furthermore, links between food security and climate change have been observed.

The world is urbanizing at unprecedented levels. Currently, more than 50% of the world's population lives in cities and it is expected to double by 2050. In 2007-2008, food prices rose rapidly and had a significant impact on the food security of people living in cities. The main reasons for the growth of urban agriculture are food security and nutrition, economic development, social benefits, community development and environmental benefits.

In the Metropolitan Area of Barcelona the cultivated area is decreasing steadily. Below are the updated data of the occupied area and the cartography for the area of the AMB and the Vallès Occidental region.

The agricultural land includes the following categories: arable land, mixed fruit trees, olive trees and vineyards. According to the SIGPAC data, in the period 2009-2015 there was a generalized decrease in land used for agricultural purposes. In 2009, professional agriculture in the AMB as a whole occupied 5,651 ha, 8.9% of the territory, and decreased by -4.7% in 2015. The decline in the rest of the territories analyzed was less pronounced, -3.7% in the rest of Vallès Occidental and -3.0% in the whole of the Barcelona Metropolitan Area (Institut d'Estudis Regionals i Metropolitans of Barcelona, 2017).

| | | 2009 | | 2015 | | Δ 2009-2015 |
|---|---|---|---|---|---|---|
| | | ha | % | ha | % | % |
| AMB | Conreu herbaci | 4.063 | 6,4% | 3.883 | 6,1% | -4,4% |
| | Forestal, matollar i pastures | 23.993 | 38,0% | 23.979 | 37,7% | -0,1% |
| | Fruiter i arbrat mixt | 1.387 | 2,2% | 1.306 | 2,1% | -5,8% |
| | Improductiu | 33.545 | 53,1% | 34.323 | 53,9% | 2,3% |
| | Olivera | 70 | 0,1% | 88 | 0,1% | 24,9% |
| | Vinya | 132 | 0,2% | 110 | 0,2% | -16,7% |
| | Total usos agrícoles | 5.651 | 8,9% | 5.387 | 8,5% | -4,7% |
| Resta Vallès Occidental | Conreu herbaci | 4.782 | 11,0% | 4.516 | 10,4% | -5,6% |
| | Forestal, matollar i pastures | 24.977 | 57,3% | 24.797 | 56,8% | -0,7% |
| | Fruiter i arbrat mixt | 339 | 0,8% | 312 | 0,7% | -7,8% |
| | Improductiu | 13.278 | 30,4% | 13.654 | 31,3% | 2,8% |
| | Olivera | 206 | 0,5% | 201 | 0,5% | -2,4% |
| | Vinya | 43 | 0,1% | 143 | 0,3% | 236,1% |
| | Total usos agrícoles | 5.369 | 12,3% | 5.173 | 11,9% | -3,7% |
| RMB | Conreu herbaci | 30.025 | 9,3% | 29.695 | 9,2% | -1,1% |
| | Forestal, matollar i pastures | 171.743 | 53,1% | 171.946 | 53,1% | 0,1% |
| | Fruiter i arbrat mixt | 4.726 | 1,5% | 4.375 | 1,4% | -7,4% |
| | Improductiu | 94.378 | 29,2% | 96.433 | 29,8% | 2,2% |
| | Olivera | 2.013 | 0,6% | 2.209 | 0,7% | 9,7% |
| | Vinya | 20.570 | 6,4% | 19.361 | 6,0% | -5,9% |
| | Total usos agrícoles | 57.334 | 17,7% | 55.641 | 17,2% | -3,0% |

Font: IERMB a partir de SIGPAC.

On the other hand, the area occupied by precarious orchards (small orchards) has increased by 10.5% in the period 2009-2015, while in the Vallès Occidental region it has decreased by 12.7%. Thus, in these two areas there are opposing trends. A priori it would seem that a large part of

the increase (78.0%) that has occurred in the AMB area has been within the Baix Llobregat Agricultural Park, which may mark part of the difference between areas. It is worth remembering that in the Agricultural Park there are some processes of renting lands by the owners to be used as orchards. As for the rest of Vallès Occidental, all the municipalities except Palau-Solità i Plegamans, Polinyà and Santa Perpètua de la Mogoda have seen a decrease in the surface area of vegetable gardens in precarious conditions. The municipalities that have lost the most precarious vegetable garden area in absolute value are also the ones that have the most: Terrassa, Sabadell, Rubí and Castellar del Vallès.

The user population of the precarious orchards has been estimated assuming an average plot size of 250 m2 (Domene et al., 2016), and therefore, the trend is the same as the area occupied by the corresponding area (Institut d'Estudis Regionals i Metropolitans de Barcelona, 2017).

| | 2009 | 2015 | Δ 2009-2015 |
|---|---|---|---|
| • *Àmbit de l'AMB* | | | |
| Superfície (ha) | | | |
| total | 239,52 | 264,6 | 10,5% |
| dins del Parc Agrari del Baix Llobregat | 78,9 | 98,4 | 24,8% |
| Usuaris (estimació) (#) | 9.581 | 10.585 | 10,5% |
| Mida mitjana parcel·la (teòrica) ($m^2$) | 250 $m^2$ | 250 $m^2$ | |
| • *Resta del Vallès Occidental* | | | |
| Superfície total (ha) | 133,1 | 116,2 | -12,7% |
| Usuaris (estimació) (#) | 5.326 | 4.647 | -12,7% |
| Mida mitjana parcel·la (teòrica) ($m^2$) | 250 $m^2$ | 250 $m^2$ | |

Font: IERMB.

In the 2009-2015 period, the number of municipal and community garden areas and the surface area they occupy in the AMB area has doubled. The number of plots and the average plot size in municipal orchards has increased. In contrast, the average size of communal orchards has decreased by 21.7% (Institut d'Estudis Regionals i Metropolitans of Barcelona, 2017).

| | 2009 | 2015 | Δ 2009-2015 |
|---|---|---|---|
| • *Àmbit de l'AMB* | | | |
| Zones d'horts (#) | 31 | 74 | 138,7% |
| municipals | 23 | 56 | 143,5% |
| comunitaris | 8 | 18 | 125,0% |
| Superfície (ha) | 13,7 | 22,2 | 61,7% |
| municipals | 13,0 | 20,7 | 59,7% |
| comunitaris | 0,8 | 1,5 | 95,7% |
| Parcel·les (municipals) (#) | 1.049 | 1.611 | 53,6% |
| Mida mitjana parcel·la (municipals) ($m^2$) | 123 | 128 | 4,0% |
| Mida mitjana parcel·la (comunitaris) ($m^2$) | 245 | 192 | -21,7% |
| • *Resta del Vallès Occidental* | | | |
| Zones d'horts (#) | 7 | 21 | 200,0% |
| municipals | 7 | 21 | 200,0% |
| comunitaris | 0 | 0 | -- |
| Superfície (ha) | 11,2 | 15,1 | 35,5% |
| municipals | 11,2 | 15,1 | 35,5% |
| comunitaris | 0,0 | 0,0 | -- |
| Parcel·les (municipals) (#) | 830 | 949 | 14,3% |
| Mida mitjana parcel·la (municipals) ($m^2$) | 135 | 159 | 18,5% |
| Mida mitjana parcel·la (comunitaris) ($m^2$) | 0 | 0 | -- |

Nota: Es considera que els horts d'origen comunitari només disposen d'una única parcel·la comunitària. L'única excepció és el cas dels horts comunitaris de Can Masdeu, que estan parcel·lats.
Font: IERMB.

## 1.5. Consumer trends

Consumers are demanding more and more organic and sustainably produced food.

Decades ago, there was a close link between organic food production and the idea of local. This relationship is changing as agribusinesses are adopting organic production, largely in response to the growing demand for organic consumption. In 2014, the organic food market grew by 7.4% with sales of 24,000 million euros (www.organic-europe.net). In the United States, sales of organic products increased by 11% over the previous year (www.naturalproductsinsider.com). The consumer concern about the food industry and the fear of GMOs, makes it likely that this trend will continue.

The demand for local food has existed for some time and it is difficult to define it as a trend. However, they are not always cheaper, the values behind how they are grown and processed are becoming more and more significant. How food is produced, how animals are treated and what are the labor standards of agricultural workers are important values that influence the purchase of food. Authenticity and expertise are two linked trends that influence food. Foods that are "real", those that are true to their origin and linked to the location where they were produced, represent an added value for many consumers and help to promote gastronomic and restaurant tourism.

Healthy foods are also considered basic for many consumers. This makes some foods go in or out of fashion quickly, such as superfoods that claim to have beneficial nutritional qualities like quinoa. Cereals are another area where consumers are driving demand for gluten-free varieties.

A pronounced trend is "supermarketization". This refers to the growing presence of large-scale supermarkets that carry a more internationalized set of products that differ from those found in small stores, which are now in decline. This change in marketing has an impact on the food that is being grown and produced, especially in peri-urban areas.

There are many other purchasing channels that involve urban agriculture. This is the case of the distribution of baskets of products that are delivered directly to consumers every week.

Online shopping is another way for consumers to purchase food, who can access both supermarkets and smaller or more specialized grocery stores. Recently, online agents have aggressively entered the market, the most notable examples being Amazon and Hello Fresh in Europe.

Regarding the national consumption of local products, one of the main trends in 2017 on the part of consumers has been the adoption of healthier habits.
They consider important:

- Follow a healthy diet (74%),
- To seek out and consume local or nearby products (69%), and
- Be willing to pay more for products that help prevent disease (38%).

The consumer understands by proximity the products with origin in:

- its Autonomous Community (41%),
- their district (47%), or their
- municipality (55%).

77% of consumers prefer to buy local products, rather than organic (23%) (Àrea Metropolitana de Barcelona, 2018).

There are initiatives to promote the consumption of local products. A clear example is Benvinguts a Pagès, an open-door weekend to learn about the origin of the products we eat,

taste the products grown, raised and fished around Catalonia, taste the cuisine of the territory in the restaurants and sleep in the participating accommodations.

You can find information about this initiative at the following link: https://benvingutsapages.cat/

## 1.6. Professional trends in relation to urban agriculture

The professional trends emerging in urban agriculture are a response to social and technological changes and above all to how people think about the food they eat. At the same time, farmers in rural areas are seen as professionals, while urban farmers are seen as amateurs.

With the average age of farmers increasing significantly in areas such as Europe and North America, the question arises as to who will farm in the future. The high price of land makes entry into farming difficult for many. Urban agriculture offers an opportunity for people who want to farm and continue to enjoy the benefits of living in cities. This brings into play new forms of organization not normally associated with agriculture in rural areas, such as the emergence of the 'shared economy'.

This trend is reflected in several studies. Food for Good, in the Netherlands, operates as a social enterprise with the objectives of improving social inclusion, participation, healthy eating and education. Specifically, there is interaction with homeless people, people with addictions, lonely elderly people and the long-term unemployed. Volunteers are well represented in these groups.

AMAP (Association pour le maintien d'agriculture paysanne), in France, is a network of small producers usually located in peri-urban areas that currently gathers more than 1,600 farms in all regions of France. Consumers are committed to buy the production at a fair price. The relationship between producers and consumers is established by communicating needs and capacities to be shared. Normally a contract is established that lasts for two production seasons.

In these examples, maximizing profits is not the goal. Rather, they serve a social purpose, promoting integration, inclusion and other values such as health promotion and mental wellbeing. Generally, this is called green entrepreneurship, where the goods and services produced benefit the environment or reduce environmental impact to a certain extent.

Urban agriculture requires skills that are not always available in traditional agriculture. For example, when it is practiced in densely populated cities, skills such as self-management, teamwork, problem solving and communication become more important.

The knowledge of how to use social networks is vital to the success of any business and agriculture is no exception, especially in the marketing of the produce or service provided. Platforms such as Facebook and Twitter offer unique opportunities for producers to market their products in a creative way and to communicate with customers, while gaining new ones.

Urban agriculture has evolved a lot in the last decade. At the same time, when we think of urban agriculture, community gardening and cultivating in the house or apartment is the first thing that comes to mind. Nowadays, we see that companies are very capitalized and technologically advanced. Some of the most relevant examples are included in this project,

such as offering the possibility of growing crops in and on buildings. In some areas, this is known as ZFarming (zero surface cultivation).

These companies stand out for their contributions to urban agriculture, city sustainability, food security and poverty reduction.

## 1.7. Urban development trends

The development and governance model of cities has a direct impact on urban agriculture.

The concept of sustainable cities emerged in Rio de Janeiro with the Agenda 21 Conference (1991) and continued at the 1996 United Nations Summit in Istanbul. The Habitat Agenda, signed in Istanbul by 180 nations, reaffirmed a worldwide social commitment to improve the quality of life in urban centers, highlighting the role and importance of local authorities in this issue. The Habitat Agenda specifically mentions the role that UA, together with other activities and initiatives, can contribute to the future sustainability of cities.

Pothukuchi and Kaufman's 1999 article, "The Food System: A Stranger to Urban Planning," was an important turning point in how cities are viewed. City planners quickly began to realize that planning cities without an understanding of how a food system works would lead to less than optimal designs. Today these types of aspects are gaining importance.

Attempts at land use planning taking into account the future demands of the territory have faced many challenges, whether in terms of forecasting needs, planning on a metropolitan or regional scale, or implementing these types of plans. Nevertheless, there have been cases in which they have been successfully carried out. Done correctly, they can have a positive impact on people's lives and on how their needs are met (housing, transport, environment and food security). However, in many jurisdictions there is a lack of resources to create and implement plans. Powerful economic actors and influences often overwhelm the plans of government officials. It is difficult to take into account future land demands on regions or cities, but it must be ensured that cities and regions can develop in a sustainable and orderly manner.

One of the most important tools that can have a direct effect on the food system is zoning (dividing the city into zones where different activities are allowed and prohibited), which affects everything from the ability to grow food to where people can access markets.

Tax incentives for certain types of infrastructure are an important tool that can be used to promote cities that develop in a more sustainable way. An excellent example is the green roofs of new buildings. Many cities, such as Toronto, New York, Copenhagen and Singapore, either require green roofs or apply tax reductions to buildings that install them.

## 1.8. Urban agriculture challenges

Urban farmers face many challenges every day, which they have to solve in a different way than what would be considered normal in conventional agriculture.

### *Land*

Soil is an essential resource for urban agriculture, although it should not necessarily be equated to the surface of the ground, since it can be cultivated on terraces, walls, balconies or even inside buildings.

Access to arable land is one of the major constraints for UA. This may be related to the actual availability of land for plant cultivation or animal husbandry, but also to the price, safety and yield of such land.

After highlighting the limitations of agricultural land around the cities, it is necessary to focus on the areas that currently have agricultural use, but are threatened by urban sprawl. This is a challenge that all cities are currently facing and will undoubtedly continue to face in the future.

In each case it will be necessary to ask yourself this questions:

- What are the causes of the abandonment of agricultural activities in and around urban areas and what are the new uses given to these lands?
- Who are the public responsibles for these changes?

Urban agriculture is becoming increasingly recognized for its excellent use of underutilized areas around cities. Moreover, it occupies marginal areas of the city that would otherwise be abandoned and even unsafe.

### *Waste*

Waste can be a problem or a resource in urban agriculture. Waste can be a significant resource in urban agriculture and become an asset for the city, but it also presents a series of conditions that make its use in agriculture complicated in many cases.

There are different types of waste. We will distinguish between those coming from farms, those coming from wastewater and solid waste.

Plant material can be recycled into compost, a necessary contribution to ecological production.

The use of greywater (domestic water from the kitchen, shower, etc., excluding the wash basins (black water) before treatment, is becoming more and more popular. This use is often confronted with problems such as the fact that the water tap rarely separates the grey water from the black water. Moreover, grey water has to be treated to ensure its safe use. Finally, the legislation must allow the use of this resource and facilitate its potential users' access to it.

All these problems should not prevent the use of grey water in urban agriculture. In fact, it is a practice that is becoming increasingly common, especially in arid and semi-arid areas, where access to running water is becoming more and more difficult.

### *Urban policies and regulations*

Although policy makers are familiar with activities such as home gardening and urban agriculture, in many cases, this knowledge does not translate into a recognition of urban agriculture as an important element of the city's economy.

Cities are often conceived as a solid construction without any free area. We see agriculture and urbanization as two opposing activities that should be separated. The pollution of products coming from urban agriculture and the use of impure water for food production have been institutionalized in the law and have provoked reluctance on the part of many local governments that do not take into account the potential benefits of urban agriculture.

In many cities, agriculture is still considered "illegal", although it can be tolerated in practice. These prejudices, supported by the lack of interest shown by policy makers in scientific

information on urban agriculture and the ecological and participatory development of the city in general, have led to the development of restrictive laws on urban agriculture.

The Parliament of Catalonia approved the LLEI 3/2019, of June 17, on agricultural areas. This law defines peri-urban agriculture as follows:

Article 22. Concept and conditions of peri-urban agricultural activity

For the purposes of this law, peri-urban agricultural activity is understood to be that which is carried out in peripheral zones of urban areas and has the following characteristics:

a. It is subject to strong urban pressure.
b. It is in competition with other economic sectors for the use of soil and the resources necessary for food production.
c. It is subject to instability due to the prospects for the use of land.
d. It has a high fragmentation of plots.
e. It is subject to pressure by an intense social use, which can generate incompatibilities with agricultural activity.

2. All peri-urban agricultural activity must comply with the following conditions:

a. To produce food and forest products, both in terms of goods and services.
b. To contribute to the quality of the environment and to offer environmental and forestry services.
c. To be a professional activity.
d. To contribute social and cultural values.

3. The department responsible for agriculture and rural development must identify and delimit the areas with peri-urban agricultural activity, taking into account the factors listed in article 6.4.a, and must ensure that all the specific agricultural sectorial territorial plans recognize the existing agricultural parks or other new protection initiatives that may be proposed.

4. Areas with peri-urban agricultural activity must be taken into account when programming measures to promote agricultural activity and rural development, in order to guarantee that the viability of the farms is not compromised as a result of their location.

5. Peri-urban agricultural plots that, due to abandonment, are covered by forest cover can be recovered as agricultural land with the required authorization.

It will take time for these regulations to be implemented in the municipalities, although some municipalities have begun to draw up ordinances and their corresponding Municipal Urban Development Plans (POUM) provide for the development of peri-urban agriculture, both in terms of the occupation of public and private land, or as complements to a certain "green" architecture on th.

*Limited access to productive resources*

In addition to access to land, access to water and nutrients (especially plants and good quality compost) is also crucial for urban farmers. In some North American cities, there are compost production programs, but the compost that results from this process is not suitable for food

cultivation. The use of water sources is often informal (for example, taking advantage of wastewater canonized and disposal canals). It is necessary to implement measures to improve access to these productive resources if the potential of UA is to be realized.

*Lack of support services and adequate technologies*

Since policy makers generally have little knowledge of the potential of UA, urban farmers are considered a group that needs to receive support services such as agricultural training and extension, veterinary services, technical assistance and credit services, or infrastructure support such as water points and market facilities. Urban farmers are particularly concerned about the lack of access to credit. However, with innovations such as crowd funding, urban producers have the means to secure the capital they need.

Projects oriented to the development of urban agriculture are very scarce. There is a great need for easy-to-use and low-cost technologies to recycle urban biological waste and there is a need to improve the supply of adequate support services to increase the productivity and economic viability of urban agriculture. Although these support services exist, they are usually oriented to relatively large farms and more commercial peri-urban farms. The participation of small farms and disadvantaged population groups in urban agriculture programs will require specific planning and policies. Gender equity and social inclusion must be taken into account.

*Potential health and environmental risks*

Urban agriculture can have negative impacts on health and the environment. Soil erosion can occur and groundwater can be polluted if production methods are poor or produced in inadequate locations. If large quantities of fertilizers and pesticides are used in the UA, there may be health impacts, especially for the applicators.

When contaminated wastewater (not treated or insufficiently treated) is used to irrigate food crops (mainly green vegetables) or when fresh organic waste (not composted or not adequately composted) is produced and used as fertilizer, contaminated food can be produced, processed and marketed and the health of agricultural workers can be negatively affected. Some diseases can be transmitted from animals to humans if adequate precautions are not taken. The development of safe and sustainable forms of urban agriculture must be promoted, reducing the health and environmental risks associated with urban agriculture.

## 1.9. Diversity and role of the population interested in urban agriculture

*Who is interested in urban agriculture?*

All people (and by extension, organizations) who play a role (directly or indirectly) in the production, processing and marketing of food and other agricultural products in or around urban areas. This includes people who influence or may influence a decision, as well as those affected.

Therefore, the parts interested in urban agriculture include, among others:

- Urban farmers, all those who participate in the production process and those who depend on it.
- Those who supply inputs, resources and services to urban farmers.
- Processors, distributors, marketers, recyclers who are in some way responsible for the products resulting from UA.
- Those who establish modifications or implement the different frameworks (judicial, regulatory, political, economic, socio-cultural) that allow or hinder the activities of urban farmers.

This seems to be an endless list. Why are so many sectors of the population taken into account when talking about urban agriculture? How can we plan urban agricultural activities and adequately account for all the people and institutions involved in these activities?

To develop new urban farming techniques, farmers may need support from research institutes or agricultural extension services. To ensure that consumers get their fruits (and vegetables) from the urban farmer, it is necessary to deal with any entity that can serve as a mediator between producer and consumer.

There are different levels of involvement in urban agriculture. It can be especially useful to distinguish between direct stakeholders (different types of urban farmers and organizations or categories of the population with a strong interest in practicing urban agriculture) and indirect stakeholders (people or organizations that play a role in the development of urban agriculture).

### 1.9.1. Directly concerned population: Urban producers

The first point to consider is the role of the urban farmer in the urban farm, the garden, the orchard or the production area. In this productive zone, the actors that we can collectively refer to as urban producers or farmers or gardeners play a multitude of roles. Farmers are workers, but they can also be:

- Managers (planning and coordinating actions related to production),
- Buyers (acquiring inputs, resources and services needed in the production process),
- Marketers (who offer their products and convince customers to buy them),
- Distributors (transporting these products to their destinations),
- Supervisors (directing other workers in any part of the process of acquisition, generation or elimination of their products),
- Communicators (transmitting information about their products and their value),
- Recyclers (converting waste into subproducts of their activity),
- Technicians (building and transmitting the knowledge that allows them to undertake and improve productive activities).

The way in which urban producers are organized is another important variable. We can try to decipher what is the unit of production in each context. Even in a garden of a wealthy family, where a variety of ornamentals, aromatic plants and vegetables are planted. In a garden like this, you also have to determine who does what, when and how. This involves deciding on the organization of space, time and work, among other things.

If an urban farm or an orchard is considered as a production unit, one of the questions that immediately arises is at what scale it is worked. There are different types of production units:

- Individual farms,
- Family farms,
- Cooperatives,
- Small farms,
- Medium scale operators,
- Large agribusiness,
- International agribusiness.

Ownership is interesting because it belongs both to time and space. It helps to define the relationship of the urban producer with the land. One of the most significant variables among urban producers is whether it is a landowner, a long lease holder or a short lease producer. This variable determines the producer's commitment to his activity and has many repercussions on the activity.

Depending on the basic orientation (central purpose), we distinguish between organizations that are socially, economically or politically oriented. Therefore, it must be taken into account that the objective of each organization will influence the decisions it takes.

### 1.9.2. Indirectly interested population

In chapter 6 of Smit, Nasr and Ratta's urban agriculture, "the organizations that influence urban agriculture" are classified as follows:

- Support organizations: these include farmers associations and NGOs;
- Governments and public authorities: local and national governments should be highlighted, but other intermediate levels (such as regional governments) should also be considered;
- Public and semi-public institutions (research institutes);
- Private sector entities;
- International development agencies;
- Other interested parties.

### 1.9.3. Vulnerability and capacity of stakeholders

It is important to consider which sectors of the population require special consideration when developing urban agriculture projects and policies. It is essential to pay specific attention to the social inclusion of vulnerable individuals and groups. These groups can be considered vulnerable from the following perspectives:

- Poverty
- Gender
- Race
- Class
- Age
- Origin
- Disability or illness

In the metropolitan area of Barcelona there is a project called Tomaliers. It is a project of active training in agronomy, biodiversity and participatory communication led by young people from Sant Vicenç dels Horts. The same young people were the ones who proposed the name of this project, mixing the terms tomato and sommelier. This is an educational and research project that studies the adaptation of a hundred varieties of tomato to the soils of Sant Vicenç dels Horts.

The project is the result of the shared will of three agents: a group of young people from the municipality who are interested in agronomy; the Sant Vicenç dels Horts Town Council, concerned about the agricultural sector, employment and training of local people; and the Miquel Agustí Foundation, a research center whose objective is to bring traditional varieties back to a new local agriculture.

Tomaliers pursues three complementary objectives: to provide training in agronomy, horticulture and agrobiodiversity; to work on social communication with the municipality, making young people the protagonists of the whole process and of the messages generated; to achieve the research objective of selecting the most suitable traditional varieties to offer them to farmers.

It is an apprenticeship-service project, an educational proposal that combines learning and community service processes in a single project. It is a methodology that opts for the acquisition of knowledge through experience and practice and that invites students to commit themselves through action to the specific problems of their social context.

It is a model of horizontal solidarity that puts in relation two communities, two active parts that will take advantage of their knowledge to complement each other: The group of young Tomaliers is the beneficiary of an experiential training in agriculture and communication thanks to which it will be able to contribute to the town some of the most appropriate traditional flavors to its soils. With the apprenticeship-servei the young people learn while contributing to improve their environment for the benefit of all.

Due to this project a documentary was filmed, accessible through the following link:
http://tomaliers.cat/2015/10/05/documental-de-tomaliers/

# 2. From multifunctionality to the ecosystem services of urban agriculture.

## 2.1. Concepts of multifunctionality and ecosystem services

Urban agriculture has many positive impacts. Over the last twenty years, the analysis based mainly on functions has evolved towards the concept of services.

The main idea of ecological economics is that "to protect something we have to give it a value", but it is difficult to evaluate ecosystem services in dynamic systems. Nevertheless, the monetary valuation of ecosystem services is problematic, since it has a very strong influence on political decisions.

### 2.1.1. Multifunctionality

The concept of multifunctionality integrates all the other functions of agriculture beyond the production of agricultural products. The identification and valorization of non-productive functions is crucial for the acceptance and recognition of urban agriculture in development contexts and projects. Externalities are the physical and social transformations caused by agricultural activity beyond the production system. The concept of multifunctionality in urban agriculture aims to integrate all the positive externalities.
Optional material:
https://www.youtube.com/watch?v=yOGMJvkSbGo
https://www.ruaf.org/ua-magazine-no-15-multiple-functions-urban-agriculture

### 2.1.2. Ecosystem concept

The ecosystem consists of an environment (biotop) and a community of living beings (biocenosis) that interact as a functional unit and allow life to develop. The ecosystem is evaluated according to the goods and services it provides to humans, with the objective of maintaining or increasing these services while conserving space.
The definition of ecosystem is complex and can vary according to the author (ecologist or user), the spatial and temporal scale. One way to define ecosystems is to answer two questions about a specific ecosystem:

- Is the ecosystem sustainable? Is it vulnerable? Why?
- Does the ecosystem respond to the expected ecosystem services?

The urban ecosystem is identified as one of the 17 global ecosystems. Considered by ecologists as a particular ecosystem, it is anthropological, created by people and for the benefit of people. The city, in its origin, is not an ecosystem.
In this constantly evolving ecosystem, nature has a predominant place, in unusual forms, with interactions, balances and dynamics between species that are certainly different from an unperturbed ecosystem. Considering the city as an ecosystem means making a commitment to a viable and sustainable city.

### 2.1.3. Integration in the use of ecosystem services

Ecosystem services define the services that ecosystems offer to people (MEA, 2005) and are estimated as the goods (benefits) or harms that they can produce.

The notion of benefits requires two conditions: a function and a use. If these two conditions are not fulfilled, the components of the ecosystem will not provide the expected benefit to the ecosystem.

The notion of service is linked to the use and benefit of the user. It is particularly important in ecosystems where people are dominant, with strong evolutionary changes that cause permanent instability, and where the durability of these services has to be taken into account within the framework of three pillars of sustainable development: economic, environmental and social. To live in an urban area, people need services provided by natural spaces (for example, forests). For any kind of landscaping, we should value the services, which will benefit people. Urban agriculture is one of the components of landscape projects that can guarantee the sustainability of an urban area.

Optional material:

https://www.youtube.com/watch?v=PZpLrVa5jBc

## 2.2. Urban agriculture services

MEA suggests linking ecosystem services to agricultural practices, thus associating them with agri-environmental policy. Agriculture benefits from the ecosystem services of the system it is in, but it can also provide some services.

There is not always a strict correspondence between services, functions and benefits; within functions there can be many services and a benefit can include several services.

### 2.2.1. Supply services

*Food supply*

The original service of agriculture is to produce food. Urban agriculture provides especially fresh products thanks to its proximity to consumption centers and contributes to food safety and dietary balance. However, the exact impact of urban agriculture is questioned in terms of food safety (Zecca & Tasciotti, 2010; Badami & Ramankutty, 2015). A high level of food self-reliance of some cities seems possible, but a significant commitment would be needed (Grewal & Grewal, 2012).

*Greener cities, improvement of the urban environment and landscaping*

The quality, aesthetics and planning of urban spaces promote rest, relaxation, social life and ultimately well-being. The different functions converge in a common service linked to the viability of people in urban spaces. Urban agriculture can contribute to this service if there are rational and coherent policies.

*Energy*

Urban and peri-urban agriculture is a source of energy derived from the city and used in a short cycle by the city. This service is related to various functions and uses, such as the production of

compost, the production of biomass for trees and shrubs, or the production of energy by enclosed urban greenhouses.

### 2.2.2. Regulatory services

*Water and flood risk regulation*

Cities are often located near rivers or are flooded by them. Therefore, they are exposed to flooding due to the risks of storms or occasional events. Cultivated areas, generally in the lowlands, represent a buffer zone. They allow water infiltration while the built-up areas are artificialized and waterproofed. In case of floods, they act as expansion zones and therefore protect the populations. Within Antananarivo (Madagascar), rice production areas have been protected by urban development for their role as a buffer in case of flooding (Aubry et al., 2012).

*Climate regulation*

Urban agriculture plays an important role in mitigating the negative effects of climate change in cities and especially in moderating the effects of the urban heat wave. Agricultural land together with other urban green spaces actively reduce solar radiation, increase evapotranspiration, provide shade, facilitate faster cooling at night and reduce energy consumption.

*Regulation of the expansion of the city*

Urbanization is increasing rapidly. The trend in cities is to increase their land area by eliminating agricultural areas. Cities have realized that continuous expansion is not sustainable and are beginning to consider peri-urban agriculture as a way to help limit their own expansion, forcing them to find new models of city development. Urbanism needs to incorporate services and facilities provided by peri-urban agricultural land, as assessed by Brinkley (2012).

*Liquid and solid waste management*

Urban agriculture is an intensive production system that tries to find alternative fertilizers derived from different types of waste (solid waste, horticultural and agricultural waste, agro-industrial waste, sludge, bio-waste and wastewater). However, the use of urban waste and wastewater for food production requires prior treatment to prevent risks to human and environmental health.

*Energy conservation*

Since agricultural products are produced in or around the city, the energy needed to transport goods to the city is reduced, as is the amount of packaging.

*Biodiversity preservation*

Biodiversity is a regulatory service of flora and fauna, soil and atmosphere. It is also a support service of an anthropological ecosystem, which was previously presented within the framework of the definition of an ecosystem. This raises the question of biodiversity conservation and its growth or decline. In the process of regulation, services must promote balance. In the uses, biodiversity conservation is materialized through ecological passages. Urban agriculture can be an ecological corridor if environmentally friendly practices are implemented, with a wide plant diversity.

### 2.2.3. Social and cultural services and equipment

*Monetary income and poverty alleviation*

Urban agriculture provides employment for farmers, thus providing jobs for urban unemployed people and contributing to the local economy. Several studies affirm that urban agriculture has a significant impact on poverty reduction. In a set of 15 developing countries around the world, the share of urban households earning income from agriculture varies from 11% to 70% (Zezza and Tasciotti, 2010). However, the share of income from urban agriculture ranges from 1 to 27% (the maximum) in Africa, it should be emphasized that the potential of UA to alleviate poverty should not be overestimated. Urban agriculture can also be an indicator of increasing poverty: since the economic crisis began in 2008, horticulture has increased significantly in Europe.

*Social insertion of disadvantaged people*

Urban agriculture provides jobs for unskilled people. Moreover, many projects are not only oriented to the production of goods, but also integrate social objectives, such as the participation of people with disabilities in the production process. It contributes to reducing inequalities. In some situations, urban agriculture promotes gender equality because women have access to activities and income while providing food for the family.

*Community building and socialization*

The sense of community is at risk in some cities. Gardening and agriculture provide social activities and contribute to community building, especially in increasingly ethnically diverse cities. The exchange of knowledge, food and labor in gardens at the foot of buildings creates bonds between inhabitants and fosters insertion through the development of social networks.

*Education of children and adults*

Children and adults learn about plant cultivation and food production, but they also learn about topics such as nutrition and cooking, food waste management, environment, economy and sustainability of the city. Participatory activities help to transform the consumer into a responsible actor. Many societies can be vulnerable, as people have lost the knowledge of how to grow food, in the case of a crisis it could lead to dramatic situations. Community gardens and other participatory forms of urban agriculture help to transmit this knowledge.

*Human health (physical, psychological)*

Human health is a state of complete physical, mental and social well-being, not just an absence of disease (World Health Organization, 1946). Horticulture is a positive activity for human health. Therapeutic gardens are built in hospital centers specifically for this purpose. Urban agriculture is like a great therapeutic garden for the health of the patient and all the people involved.

*Cultural heritage*

Agriculture in and around the cities is part of the history and identity of the cities. Some traditional events and local festivals are an example of this relationship. In reality, the peri-urban farmers were the first settlers. As the inhabitants are of diverse origins, urban agriculture can provide diverse ethnic foods and, therefore, a link to culture.

*Leisure and recreation*

Participatory, collective, community, associative and workers' gardens are part of urban agriculture. They are places for leisure and exchange with neighbors. They can integrate rest and entertainment areas among the production spaces.

The various services offered by urban agriculture are crucial for promoting viable urban development. Urban agriculture must be considered as an essential infrastructure of cities, as well as roads or gas and electricity networks or internet, urban agriculture contributes to reduce the ecological scarcity of the city.

### 2.2.4. Urban agriculture may represent potential risks

While there are still difficulties in promoting service-based urban agriculture, its risks would have to be assessed (Lin et al., 2015). The risks can be associated with the sanitary quality of the food produced: heavy metal content from contaminated soils and the atmosphere, bacteriological contamination of water or wastewater are the two main concerns. The increase in biodiversity and a favorable environment such as permanent water can favor the spread of pests and the transmission of diseases through an increase in the mosquito population. Finally, the scarcity of water in some situations can lead to competition for water between agricultural and human use.

The objective is to reduce risks. A risk management procedure should be developed, which is a challenge, since agricultural types and practices are diverse. This procedure must be based on the analysis of competences and the training of professional farmers, but also of horticulturists and new urban farmers.

## 2.3. Sustainable development of urban agriculture

Sustainable development will meet the needs of the present without compromising the ability of future generations to meet their own needs. The principle of sustainable development applied to urban agriculture is a process in which resources are used in a specific way to meet future needs. The sustainability of urban agriculture depends on costs (inputs and outputs) and benefits, but also on access to resources. Compared to conventional agriculture, it is necessary to combine multiple services to achieve sustainable urban agriculture.

The dimensions of sustainability are economic, social and environmental, but also spatial and temporal.

Aubry et al. (2012) consider that urban agriculture presents two types of sustainability:

- Internal sustainability of the farm itself: respect for the environment, economic viability and social acceptance of the agricultural activity and the production system.
- External sustainability in the territory: contribution of agriculture to the sustainable development of a territory.

## 2.4. A framework for analyzing urban agriculture

The identification and evaluation of the various services is important to understand the role that agriculture plays in the urban environment, in order to make urban development more rational. This point of view provides a framework for a cost-benefit analysis of urban

agriculture to quantify the social, economic and environmental impacts (Nugent, 1999). On the other hand, this analysis must also take into account the non-monetary and non-quantifiable values of UA. The objective is to establish a diagnosis and provide information to the various stakeholders (extension services, urban planners, inhabitants) and policy makers.

The costs can be divided into two classes:

- *inputs: natural resources (land, water), manpower ( salaries, voluntary or unemployed labor), capital and primary materials (wastes, fertilizers, pesticides, machinery and energy).*
- *outputs (related to damages): possible pollution and waste generation.*

Identifying the right indicators according to the objective is crucial for this type of analysis. Depending on each case, the indicators vary, for example, soil fertility, Shannon fertility index, water bacterial load, m-2 yield.

## 3. Evolution of urban agriculture

There are different examples of urban agriculture around the world. Some of these examples are shown below.

Asian cities have grown faster than any other urban area in the world. In fact, urban planning has often been ignored. Whereas in 1950 there was only one large city on the entire continent (Tòquio), in 2015 there were 12 and in 2025 there are expected to be 21 (ADB, 2016).

Failure to plan for urbanization brings with it a number of disadvantages. Slums and congestion are among the most apparent characteristics of Asian cities. Living in a city entails higher costs for housing, child rearing and health care. In addition, income inequality and crime rates are higher than in rural areas.

Asia has already faced enormous environmental challenges. Three of the top five CO2 emitting countries are Asian, 11 of the 20 most polluted cities in the world are in Asia.

The situation is especially worrying in poor cities experiencing rapid growth, where pollution is becoming a major problem and basic public services such as water connections and solid waste disposal do not reach the majority. In addition, many habitats live in marginal lands at risk of flooding, diseases, etc.

Urbanization increases vulnerability because the loss of life and resources is much greater in cities than in rural cities when disaster strikes. In this context, climate change is particularly relevant to cities. It has been proven that climate change is the cause of rising sea levels and that the climate is becoming more extreme every day. The current challenge is real and imminent, and different cities will have to face it urgently.

The poorest cities, those below sea level, are the most susceptible to sea level rise and intense flooding. This is especially true in cities like Bangladesh. Many Asian cities, and especially some large cities, have been built on the banks of major rivers where ports could connect the cities to the global economy. This makes them susceptible to flooding. In fact, some of these cities may have had severe flooding experiences. These cities will have to develop mechanisms to protect themselves from these phenomena in the future.

In Melaka, Malaysia, historic neighborhoods with pedestrian areas are developing and growing with less need for automobiles. The city's culture and history are being protected, in addition to making it more livable.

The Melaka River, formerly a polluted drainage channel, has been transformed into a tourist attraction and pleasant green space for the city's residents (Photos).

The city is also developing projects on the integration of solar energy and other renewable energies, with the aim of keeping the air clean. All these actions are underway or are planned in the Melaka Green City Action Plan.

Similar actions can be found in the city of Hue, Vietnam. An old historic colonial neighborhood is being preserved and revitalized as a pedestrian area for the city's inhabitants and also as a tourist attraction. They are planting trees and creating more green spaces, encouraging small businesses instead of large factories. In India, the government has rehabilitated the pumping stations at the Upper Bhopal Lake. In addition to providing six million gallons of water a day for the city of Bhopal, it is also a tourist attraction and a green area for the inhabitants.

If these innovative urban policies are applied throughout Asia, there will be a major impact on the viability of future cities. Instead of polluted rivers, there will be green spaces and tourist attractions. Cities will be designed for pedestrians and vehicle traffic will be reduced. The whole city will become more disaster resilient, the air will be cleaner and the environmental impact will be reduced.

# 4. Types of urban agriculture activities

## 4.1. Criteria for different types of urban agriculture analysis

Urban agriculture is a multidimensional activity, and as such, the analysis of this type of agriculture can be multilayered and complex.

### 4.1.1. Relevant dimensions of urban agriculture

Thinking about the different dimensions of urban agriculture, we can get a picture of what urban agriculture is and what its potential is. Some work carried out by RUAF, COST Action Urban Agriculture in Europe, Urban Green Train and the SUPURBFOOD project has resulted in different typologies that are being developed on how we can classify the different production systems of small and medium enterprises (SMEs). In order to identify different types and models, many factors related to the activity must be taken into account. Urban Green Train identifies some relevant dimensions recognizing the diversity of urban agriculture enterprises. This includes:

- Market orientation (domestic consumption, direct marketing, anonymous markets)
- Product quality (generic, specific, labeled quality)
- Single or multiple products and services
- Degree of dedication (hobby, professional, part-time, full-time)
- Business / community-based (individual, family, community-based)
- Location (inner city, peri-urban, multiple locations)
- Technological level / production method (low tech / high tech)
- Traditional / Innovative (established methods / new and innovative methods)
- Public or private
- Horticulture based (specialized horticulture, horticulture as a secondary activity)
- Pertinence to an area
- Building delimitation (land, vertical wall or industrial enclosure)
- Open field
- Type of financing
- Use of resources / (re)use of inputs / outputs
- Type of transport

The type of urban agriculture practiced will dictate what indicators may be of value when an analysis is made; for example, someone who farms around the house will not be affected by market orientation, financing or transportation. However, for a small or medium-sized company, many of these dimensions will be relevant.

Previous work by COST Action Urban Agriculture in Europe identified a typology to help categorize urban agriculture activity geographically. The idea of a continuum is introduced to help identify what the urban agriculture project may look like and how it relates to its geographical location in relation to the city and its surroundings. As shown in this scheme:

When we examine the different types of urban agriculture, these dimensions will help us understand the motivation behind the activity and what potential they may have.

## 4.2. Diversity and typology of urban agriculture production systems

The types of production used in urban agriculture will be differentiated. The concepts of multifunctionality and specialization have grown. Finally, 6 business models conceived by the Urban Green Train have been introduced.

There are many different types of urban farms that we can identify. COST Action Urban Agriculture in Europe lists the following types of urban farms:

- Local food + farms
- Recreation farms
- Educational farms
- Experimental farms
- Social farms
- Therapeutic farms
- Agro-environmental farms
- Heritage farms

The business models of these farms are driven by the fact of being close to large markets. Often, in peri-urban areas, these farms have been converted from their previous use as conventional agriculture farms. As this process takes place, the production systems will change and so will the business. A conventional farm would usually specialize in bulk production of a few crops. The new peri-urban farms try to reach directly the consumers who live in the cities closer to the farms, this type of farm orients its production towards the demand of this consumer, diversifying its production and offering different services.

It is likely that multifunctionality is present in many urban farms. For example, leisure farms, apart from the production and transformation of crops, want to provide an experience to visitors and make the visit to this farm as pleasant as possible. They are telling a story and go beyond what a traditional farm sells. Social farms provide many benefits. Eta Beta offers therapeutic and rehabilitative programming to promote social inclusion. Moestuin Maarschalkerweer offers services for people with mental health problems so that they can integrate into the labor market.

It is likely that there will be specialization in many of these companies. The farms will try to differentiate their product. This can be done in different ways. Market niches can be found through the production of unusual products or specializing in traditional varieties.

The diagram starts in the intra-urban zone, at the lower left and gravitates around the rural areas. The suburban and peri-urban areas are the dynamic place where new production systems emerge, as they adapt to the demands of consumers.

Urban Green Train has modified the work of COST and others, reaching 6 different commercial forms:

1. Cost efficiency (low cost, bulk production)
2. Product differentiation (market niches)
3. Business diversification (multifunctional agriculture)
4. Shared economy (social inclusion, participation)
5. Experimental (new production methods, innovation)
6. Experiential (selling a story instead of a product)

It should be taken into account that it is rare that a SME is perfectly adapted to a single category.

## 4.3. Practical cases

The Urban Green Train project carried out an inventory of existing urban agriculture businesses. Twenty-seven businesses were identified, and this inventory includes a full description of each case, as well as YouTube videos for many of them.

The studies provide an introduction to the 6 business models proposed by Urban Green Train. It presents an image of each company using the following aspects:

- Key participants
- Key activities
- Key resources
- Value proposition
- Customer relationships
- Market segments
- Marketing channels

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