



Food Systems in European Cities

Deliverable 7.10 Practice Abstracts, First Set of 10 PAs

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Table of contents

1. Introduction.....	5
2. Methodology	5
3. Practice Abstracts (PAs).....	6
PA N°1: How to bring innovation to City/Region food systems.....	6
PA N°2: Features and functions of multifunctional urban agriculture in the global north: A review	7
PA N°3: Identifying potential applications for residual biomass from urban agriculture through eco-ideation: Tomato stems from rooftop greenhouses.....	8
PA N°4: Innovative digital technologies for purchasing and consumption in urban and regional agro-food systems: A systematic review	9
PA N°5: More than the sum of the parts: System analysis of the usability of roofs in housing estates	10
PA N°6: Envisioning the future of European food systems: Approaches and research priorities after Covid-19	11
PA N°7: Sustainable use of resources in plant factories with artificial lightning	12
PA N°8: Formalising objectives and criteria for urban agriculture sustainability with a participatory approach	13
PA N°9: Reviewing chemical and biological risks in urban agriculture: A comprehensive framework for a food safety assessment of City/Region Food Systems	14
PA N°10: Ecosystem services of urban agriculture: perceptions of project leaders, stakeholders and the general public	15

1. Introduction

The interactive innovation approach under the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) fosters the development of demand-driven innovation, turning creative new ideas into practical applications thanks to interactions between partners, the sharing of knowledge and effective intermediation and dissemination.

The knowledge sharing is facilitated, amongst others, by the development and distribution of easily accessible end-user materials that follow a common format - practice abstracts. A practice abstract is a summary describing the main recommendations, information and practice that can serve farmers, advisers, researchers and all other actors across the EU in their practice.

In the context of FoodE, WP7 develops a series of practice abstracts which will feed into the EIP-AGRI website for broad dissemination of the insights gained throughout the implementation of the project. Ultimately, the goal would be to contribute to underlying objective of FoodE: acceleration of the growth of sustainable citizen-led City/Region Food Systems.

2. Methodology

The practice abstracts are based on scientific articles by the FoodE partners developed in the context of the project that cover topics related to the City/Region Food Systems (CFRS).

Following the EIP-AGRI common format, the practice abstracts do not exceed 1500 characters and aim at providing information related to:

- The main results/outcomes of the activity.
- The main practical recommendation(s) highlighting the main added value and opportunities to the end-user if the generated knowledge is implemented.



3. Practice Abstracts (PAs)

PA N°1: How to bring innovation to City/Region food systems

In collaboration with the University of Bologna, FoodE brings together a consortium of 24 organisations. The project aims to accelerate the development of sustainable and resilient City/Region Food Systems (CRFS) by bringing together citizen-led local food initiatives across Europe. Global challenges that threaten food security are considered through a “Think Global, Eat Local” perspective. The themes on the agenda include 1) improving food production, 2) reducing food waste, and 3) creating sustainable cities.

Different ways to improve food production are using underexplored urban spaces such as flat rooftops, also known as Rooftop Agriculture (RA). Also, integrated-Rooftop Greenhouses (i-RTGs) contribute to this matter through plant farming in a protected greenhouse environment on rooftops. The last example is aquaponics, which favours the recovery of urban green spaces to allow sustainable food production.

Research shows that fertilisers for Urban Agriculture (UA) are effective in reducing food waste. Existing organic waste management initiatives should be supported. Waste management reduces the workload of public systems and improves food security in marginal communities.

One of the recommendations is the usage of mobile applications to promote sustainable cities. Apps can encourage urban and regional food purchases and consumption and stimulate sustainable behaviour. In addition, apps help instil a sense of community and reduce the gap between farmer and consumer.

[Link to scientific publication](#)



PA N°2: Features and functions of multifunctional urban agriculture in the global north: A review

Urban agriculture (UA) is blooming throughout the world, especially in the so-called Global North (Europe, North America, and Oceania), or developed countries. UA is defined as the “plant cultivation and animal rearing (including aquaculture) within cities and towns and in their immediate surroundings”. It also includes related activities such as the production and sale of agro foods. As a result, urban farming brings together existing knowledge and creates a new set of skills, tools, and strategies, thereby diversifying ecosystem services (ES).

In the Global North, UA’s main ES are food provision, health function, social inclusion and justice, and contribution to ecological and environmental sustainability. These are affected by contamination risks, climate, land access, available resources, and legal frameworks. UA fosters food security, contributes to sustainability in the city, and creates a sense of community. Moreover, climate challenges are tackled as it reduces the environmental footprint.

UA plays a crucial role in city environmental sustainability. To decrease contamination risks and tackle climate change, it is advisable to operate on small surfaces (below 10ha). It is recommended to analyse the soil and quantify risks before starting the cultivation. Once contamination risk is confirmed, the soil should be amended or agronomic practices should be adopted – e.g. potting soil or usage of alternative soils such as coffee grounds.

[Link to the scientific publication](#)

PA N°3: Identifying potential applications for residual biomass from urban agriculture through eco-ideation: Tomato stems from rooftop greenhouses

As urban agriculture (UA) is becoming more popular, waste reduction in urban areas must be thought through. Waste management, according to the European Union includes prevention followed by preparation for reuse, recycling, and recovery and finally disposal. Eco-ideation helps to close the life cycle of UA allowing it to continue with its great number of benefits and, thus, stimulate a circular economy.

Agro-urban solid waste (AUSW), such as tomato stems, can be reused or upcycled. The latter is becoming more well-known since 1990 and describes the creation of a new product from an existing product. Applying this to urban farming, Rooftop Greenhouses (RTG) are a great example. RTG provide soilless cultivation systems using hydroponic techniques to grow food on top of buildings. Through RTG and Circular Economy (CE) the value of products, materials and resources can be sustained for as long as possible.

Apart from environmental advantages, upcycling also leads to local socio-cultural benefits, e.g., implementation of workshops or courses on the creation of your own eco-products. In addition, it helps to raise awareness on reducing waste in cities and becoming self-sufficient through urban farming.

Recommendations to boost the eco-ideation ideas are:

- Focus on research
- Experimentation
- Participation projects
- Creative session

[Link to the scientific publication](#)

PA N°4: Innovative digital technologies for purchasing and consumption in urban and regional agro-food systems: A systematic review

The use of digital technologies in the agro-food sector is growing worldwide. This goes hand in hand with the augmenting number of applications in the urban and regional food systems. The Food and Agriculture Organisation (FAO) reported that digital technologies contribute in a positive way to the challenges that the agricultural sector faces by improving the speed, efficiency, and information distribution along the value chain.

Digital technologies influence both purchasing and consumption in urban and regional agro-food systems. Through City/Region Food Systems (CRFS), cities implement food policies to support sustainable initiatives at a local level. Regarding e-commerce, 5% of the European population purchased food on the internet compared to 15% in 2018. The Covid-19 pandemic boosted this trend and doubled this number due to lockdowns.

It is recommended to use digital technologies, such as mobile applications, to strengthen urban-regional links. Why?

- They provide consumers with information on consumption, production and distribution.
- Digital technologies reinforce the connection between urban and regional food systems as they allow direct contact between producer and consumer.
- Online communities strengthen the relationship between farmers and consumers, making it a pleasant shopping experience for both.
- Digital technologies make it easier for consumers to find local producers.

[Link to scientific publication](#)



PA N°5: More than the sum of the parts: System analysis of the usability of roofs in housing estates

In the contemporary world, cities are known for their housing estates, i.e., mass social housing characterised by high- and medium-rise apartment blocks. As most of these estates are in low-cost areas, many households deal with food-energy-water (FEW) poverty.

Consumption of energy and water in housing estates is much higher when energy and water supply are scarce. Also, types of family units influence energy and water consumptions. FEW-poverty can be correlated with low-income households, low energy efficiency among households and high energy prices. As a result, crops cannot grow sufficiently, resulting in food poverty. Therefore, systems that irrigate crops with rainwater will be a solution.

Rooftops made fit for urban farming improve self-sufficiency and vegetable consumption by 53%. Understanding the housing estates is therefore vital as it provides knowledge on socio-economic and environmental issues of the urban areas. As a result, rooftops can be adjusted to this information, resulting in more robust, self-sufficient, and useful roof usages. This can be done using the MuSIASEM method – a matrix that can estimate losses and values of conventional systems. It is recommended to do so to better understand human activity and metabolic rates. Once the concerns are identified, rooftops can be adjusted.

[Link to scientific publication](#)



PA N°6: Envisioning the future of European food systems: Approaches and research priorities after Covid-19

Concerns about food systems' resilience have grown throughout Europe in the wake of the Covid-19 crisis. A review was carried out to identify the most critical food system areas, production, distribution, and consumption, affected by the Covid-19 pandemic.

The pandemic showed how citizens would accept and support a transition towards more localised food productions systems. Bottom-up actions by producers and consumers proposals prove to be in line with the emerging Europe Policy Agenda.

To improve the resilience in food supply chains governments should consider to:

- Encourage the diversification in food provision, including local food production.
- Promote open discussion tables and forums, partnerships, and reciprocal learning to ensure cross-pollination and best practices exchange among City/Region Food Systems (CRFSs).
- Address schools as a central re-starting point. The early involvement of teachers, families, and students in defining sustainable diet patterns, along with the promotion of food educational campaigns and responsible shopping choices can help transform consumers' opportunistic behaviors into long-lasting habits.
- Ensure that the development of policy tools covers the evaluations on different sustainability dimensions of the food chain.

[Link to scientific publication](#)

PA N°7: Sustainable use of resources in plant factories with artificial lightning

Plant Factories with Artificial Lighting (PFALs) also called indoor farms or Vertical Farms with Artificial Lighting (VFALs), are closed plant production systems where environmental factors (e.g., temperature, humidity, light, CO₂) are controlled, minimizing the interactions with the external climate.

In comparison to conventional agriculture, PFAL systems offer the potential to improve water and land surface use efficiency. They also enable yearly stable food production, pesticides use reduction and reduced distance from consumption centres. For PFAL to be viable, a comprehensive approach integrating most recent advances in LED technology, hydroponics and climate control systems is needed.

The main sustainability challenges of PFAL pertain to the high energy requirements resulting in elevated economic costs and environmental impacts.

Recommendations to improve the sustainability of PFAL include:

- Reduction of greenhouse gas emissions of PFAL systems by the adoption of innovative and renewable energy technologies;
- Profiling optimal lighting management strategies in terms of light quality, intensity and duration;
- Substitution of common heat pumps with co-generation equipment or tri-generation equipment;
- Use heat pumps or adsorption methods to save and reintroduce air humidity generated by plant transpiration into the system to increase water use efficiency.

[Link to scientific publication](#)



PA N°8: Formalising objectives and criteria for urban agriculture sustainability with a participatory approach

This study identified sustainability objectives and criteria applicable to professional intra-urban farms (PIUA).

PIUA sustainability fits into the trends observed in Europe, or Hong Kong, with an emphasis on external sustainability aspects, aiming at environmental, social and economic benefits for the global society, and pushing aside food production.

Differences were identified between the ratings from the urban farmers and decision makers, highlighting that decision makers were more focused on projects' external sustainability. Because they also paid attention to the urban farmer agricultural background, suggesting that they rely on urban farmers to ensure the internal sustainability of the farm. It also pointed out that in most cases, external stakeholders played an important role in supporting the projects, which supports the finding about the willingness of decision makers to fund PIUA initiatives.

Recommendations to improve the sustainability criteria of professional intra-urban agriculture (PIUA) are:

- To minimize the environmental impacts.
- To participate in urban metabolism and valorize the link to the city.
- To have an economical and ethical meaning.
- To participate in consumer/producer connection.
- To maximize the socio-territorial services.

[Link to the scientific publication](#)

PA N°9: Reviewing chemical and biological risks in urban agriculture: A comprehensive framework for a food safety assessment of City/Region Food Systems

Short food supply-chain, including produce from urban agriculture (UA) initiatives, should not meet a lower food safety standard than traditional large-scale retail trade products, for which regulations and controls are broadly in place.

The most critical environmental aspects for the categorization of urban agriculture production systems are:

- The use of natural soil rather than artificial media
- Exposure to pests, air pollution and/or atmospheric fallout
- The use of waste or by-products harbouring biological and/or chemical risks.

To use the food safety index, 15 indicators for food safety have to be assessed and calculated for each initiative by averaging the indicator scores. Indicators to use to measure the food safety are:

- Implementation of biological control
- Food exposed to uncontrolled fauna
- Food exposed to growing media harbouring media risk
- Food biologically altered during processing
- Food exposed to waste harbouring chemical risk
- Food exposed to particulate, smog and/or atmospheric deposition
- Food exposed to pharmaceuticals
- Food exposed to regulated chemicals such as additives
- Food accumulating by potentially hazardous elements or nutrients
- Food exposed to undesired or hazardous materials and substances such as micro-plastics and asbestos
- Food contained by toxics
- Food adulteration, tampering and accidents
- High food safety education level of business operators
- Implementation of food quality systems
- Safety controls and non-compliance

[Link to scientific publication](#)



PA N°10: Ecosystem services of urban agriculture: perceptions of project leaders, stakeholders and the general public

For the sustainable management of urban green spaces, understanding the values that stakeholders subscribe to is a valuable approach to gain insights into the drivers and constraints before engaging in the generation of ecosystems.

Different societal groups (project leaders, stakeholders and the general public) showed a very positive perception of urban agriculture by highlighting its positive contribution to multiple environmental and socio-cultural ecosystems.

Food production was overall not the most valued ecosystem amongst societal groups. The potential benefits should be further explored in policymaking to identify policies that could enhance the development of urban agriculture with wide social acceptance and satisfy urban needs.

To promote its highly positive contributions, urban agriculture should be integrated in:

- Policies and programs
- Training and other forms of education
- Pollination and biodiversity
- Mental and physical health

Not only the project leaders themselves but also the general public, as well as local stakeholders recognize the high potential that UA entails regarding the improvement of the quality of urban living and the environment. It paves the way for the future development of urban agriculture and opens the field for policy and planning interventions to strengthen the role of urban agriculture, as this is supported by society.

[Link to scientific publication](#)