Urban Agricultural Transformation Signals in Europe

Weak signals of urban agricultural transformation can be systematically identified and analyzed by examining changes across four dimensions: business models, spatial planning, socio-economic arrangements, and resilience approaches in European cities.

Abstract

Urban agriculture in European cities shows measurable signs of transformation in the post-pandemic era. Studies report that diverse signals can be identified by examining four key dimensions:

1. Business models and value propositions. Ten urban agriculture model types emerge, including regionalized food systems, multifunctional agriculture, circular economy approaches, high-tech urban farming, community-supported models, rooftop initiatives, digital platforms, entrepreneurial ventures, social enterprises, and agroecological practices. These models report shorter supply chains, improved resource efficiency, and enhanced social engagement.
2. Spatial and institutional adaptations. Several studies document the integration of urban agriculture into city planning, the establishment of food policy councils, and the adoption of multistakeholder governance. Cities implement regulatory changes for rooftop gardens and develop urban agricultural parks, all of which signal strong shifts in urban land use.
3. Socio-economic integration. Case studies and surveys highlight clear trends in community engagement, educational integration, job creation, and food justice. Urban agriculture is credited with boosting food democracy, preserving local heritage, and diversifying local economies.
4. Post-pandemic resilience mechanisms. Research shows that localized food supply chains, digital adaptations in food markets, diversified production and distribution strategies, and adaptive governance practices have reinforced urban food systems during crises.

These findings consistently indicate that weak signals of urban agricultural transformation may be systematically identified and analyzed by tracking changes in business models, spatial planning, socio-economic arrangements, and resilience approaches across varying European urban contexts.

Paper search

Using your research question "How can weak signals of urban agricultural transformation be systematically identified and analyzed across different European urban contexts in the post-pandemic period?", we searched across over 126 million academic papers from the Semantic Scholar corpus. We retrieved the 498 papers most relevant to the query.

Screening

We screened in papers that met these criteria:

- **Geographic Context**: Does the study focus on urban areas within European cities/regions?
- **Agricultural Focus**: Does the study examine transformations in urban agriculture practices, policies, or systems (e.g., urban food production, community gardens, vertical farming)?
- **Temporal Coverage**: Does the study include data or analysis from March 2020 or later (post-COVID-19 onset)?

- **Study Design**: Is the study an empirical research, systematic review, meta-analysis, or mixed-method study with systematic analysis and evidence (not purely opinion-based)?
- **Systems Analysis**: Does the study analyze broader systemic changes or trends in urban agricultural systems (beyond individual farm units)?
- **Stakeholder Perspectives**: Does the study incorporate perspectives from relevant stakeholders (e.g., urban planners, policy makers, agricultural practitioners, or community organizations)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **Study Design Type**:

  Identify the primary research approach used in the study. Categorize as:

- Qualitative study
- Mixed methods study
- Case study
- Comparative study
- Survey-based research

Look in the methods section for explicit description of research design. If multiple approaches are used, list all in order of prominence. If unclear, note "Design not clearly specified".

- **Geographic Context and Urban Settings**:

  Extract specific details about:

- Cities/urban areas studied
- Countries represented
- Specific urban agricultural contexts (e.g., allotment gardens, community gardens, closed-space agriculture)

Prioritize precise location information. If multiple locations are studied, list all. If geographic boundaries are described differently (city region, metropolitan area), capture those nuanced descriptions.

- **Weak Signals of Urban Agricultural Transformation**:

  Identify and extract:

- Emerging business models
- Innovative value propositions
- Adaptive strategies in urban agriculture
- Systemic changes in urban food production

Look in results and discussion sections for explicit mentions of novel approaches, emerging trends, or transformative elements. If signals are not directly labeled, use interpretive analysis from the text to identify potential transformation indicators.

- **Policy and Institutional Responses**:

  Extract information about:

- Municipal policy instruments supporting urban agriculture
- Regulatory tools or frameworks
- Institutional adaptations
- Governance approaches to urban agricultural development

Prioritize direct quotes or specific policy descriptions. If multiple policy approaches are mentioned, list comprehensively. Note any explicit connections to post-pandemic context.

- **COVID-19 Pandemic Impact**:

  Identify specific references to:

- Pandemic-induced changes in urban agriculture
- Resilience strategies
- Shifts in food system organization
- Alternative food network responses

Look for explicit discussions of pandemic effects in introduction, methods, results, and discussion sections. Capture both challenges and opportunities highlighted by the pandemic context.

Results

Characteristics of Included Studies

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Arciniegas et al., 2022	Copenhagen City Region, Denmark	Urban food demand, regional food supply, land use change	Case study	Participatory tool for assessing land footprint in city-region food systems	Yes
Bartolomé et al., 2022	Urban areas in Castilla y Leon region, Spain	Urban agriculture digital planning	Quantitative study	Digital tools can help predict and manage urban agriculture potential	Yes
Borges and Matthiesen, 2024	Multiple Nordic cities (e.g., Stockholm, Helsinki)	Urban agriculture for resilient future	Case study	Innovative urban agriculture models across Nordic countries	Yes

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Boukharta et al., 2024	Rouen metropolis, France	Implementation of urban agricultural projects	Qualitative study	Polycentric governance in urban agriculture implementation	Yes
Callau-Berenguer et al., 2021	Barcelona Metropolitan Region, Spain	Local food supply during pandemic	Case study; Qualitative study	Peri-urban areas crucial for ensuring food supply during crisis	Yes
Camps-Calvet et al., 2015	Barcelona, Spain	Urban gardening movements	Case study, Qualitative study	Urban gardens enhance community resilience and contestation	Yes
Cattivelli et al., 2022	Milan and Naples, Italy	Metropolitan agricultural parks during COVID-19	Comparative study, Case study, Qualitative study	Parks showed resilience and adapted activities during lockdown	Yes
Cavallo and Olivieri, 2022	Rome, Italy	Sustainable local development and agri-food system	Case study; Mixed methods study	Agri-Food Plan as a tool for sustainable urban development	Yes
Corsi et al., 2023	Milan, Italy	Ecosystem services value in peri-urban farming	Case study	Multifunctional agriculture provides multiple ecosystem services	No
Cruz et al., 2024	Madrid, Spain	COVID impact on consumers' food strategies	Survey-based research	Increased consumption of local and organic products during pandemic	No
Delgado-Serrano et al., "As raízes da cidade"	Multiple European small cities	Creative food systems in small towns	Case study	Bottom-up initiatives for sustainable urban food agendas	Yes

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Delgado-Serrano et al., 2020	Multiple European small cities	Creative food systems in small towns	Comparative study	Local initiatives for sustainable food production and distribution	Yes
Duží et al., 2022	Prato Province, Italy	Local agrifood initiatives within territorial system	Case study, Mixed methods study	Diverse, locally focused agrifood initiatives emerging	No
Fantini, 2016	Spain, Italy	Urban and peri-urban agriculture as transformation practice	Comparative study	Urban agriculture as multidimen-sional transformation tool	No
Farhangi et al., 2020	Amsterdam, Netherlands	High-tech urban agriculture	Case study	Barriers in embedding high-tech urban agriculture in urban planning processes	Yes
Fattibene et al., 2023	100 municipalities across Italy	Food policies in Italian urban agendas	Mixed methods study; Survey-based research	Emerging models of urban food policies within broader agendas	Yes
Fava et al., 2022	Sant Feliu de Guíxols, Spain	COVID-19 impact on municipal food markets	Mixed methods study	Resilience and innovation in municipal markets during pandemic	Yes
Frantzeskaki et al., 2016	Milan, Rotterdam, Freiburg	Urban agriculture initiatives	Comparative study, Case study, Qualitative study	Urban agriculture initiatives as drivers of urban transitions	No

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Grigorescu et al., 2022	Bucharest Metropolitan Area, Romania	Resilience of sub-urban small farming during COVID-19	Mixed methods study	Organic farms showed highest resilience during pandemic	No
Gómez-Villarino and Ruiz-Garcia, 2020	Lugo, Spain	Adaptive design model for urban agriculture	Case study	Transdisciplinary approach for integrating urban agriculture in sustainable development	Yes
Kumar and Yadav, 2023	Multiple countries (China, India, Brazil, etc.)	Urban and peri-urban farming research trends	Mixed methods study	Emerging trends in urban and peri-urban farming research including IoT, CEA, vertical farming	No
Lever and Sonnino, 2022	Northern England	Food system transformation for sustainable city-regions	Case study, Qualitative study	Potential of circular food economies in city-regions	Yes
López Cifuentes and Fiala, 2022	Vienna, Austria	COVID-19 impact on food democracy in cities	Case study, Qualitative study	Varied responses of regime and niche actors to pandemic	No
Marini et al., 2023	Barcelona, Lyon, Trieste, Udine	Local policy instruments for urban agriculture	Mixed methods study	Diverse policy tools employed to support urban agriculture/CEA	No
Millard et al., 2022	12 European countries	COVID-19 effect on households and city-region food systems	Survey-based research	Small city scale most resilient during pandemic	Yes
Moschitz et al., 2018	Basel, Switzerland	Urban food system analysis	Mixed methods study	Research as boundary object in food system transformation	No

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Mourre et al., 2024	Paris region, France	Local food as inclusive practice in urban areas	Mixed methods study	Gap between supply and population's usage patterns in local food	No
Nikolaidou, 2021	Athens, Greece	Peri-urban agriculture and alternative food networks	Mixed methods study	Alternative food networks reflect dynamics of agriculture, food-chain, and land use	Yes
Nikologianni et al., 2022	Gothenburg, Trento, Birmingham	Urban farming models and climate change adaptation	Case study	Different models of urban agriculture across European cities	Yes
Nowysz and Simón-Rojo, 2023	Madrid, Spain	Transforming urban food systems through agroecology	Case study	Agroecological projects' potential in transforming food systems	Yes
Rusciano and Gatto, 2022	Milan and Naples, Italy	COVID-19 impact on metropolitan agricultural parks	Mixed methods study, Case study, Comparative study, Survey-based research	Parks showed resilience and adapted activities during lockdown	Yes
Sarabia et al., 2021	Valencia, Spain	Transition to agri-food sustainability	Case study, Qualitative study	Accelerators and triggers for sustainability transition	No
Sartison and Artmann, 2020	Andernach, Haar, Munich, Germany	Edible cities as nature-based solution	Case study	Edible cities as multifunctional nature-based solutions	No
Schoen et al., 2021	France, Germany, Poland, UK, USA	COVID-19 effects on community and allotment gardens	Mixed methods study, Case study	Gardens adapted to provide food and social benefits during pandemic	Yes

Study	Study Context	Research Focus	Methodology	Key Findings	Full text retrieved
Vicente-Vicente et al., 2023	Berlin, Germany	Agroecology for food system transformation	Qualitative study	CSA farms transitioning to advanced agroecological models	No
Vittuari et al., 2021	Multiple European countries	Future of European food systems post-COVID	Mixed methods study	Need for transition toward localized food production systems	Yes
Voglhuber-Slavinsky et al., 2021	Graz, Austria	Measures to increase local food supply	Comparative study, Mixed methods study	Scenario-based analysis of measures for local food systems	Yes
Wiśniewska-Paluszak et al., 2023	Poland and Italy	Urban agriculture business models and value propositions	Qualitative study, Comparative study	Three urban farming business strategies identified	No
Zambrano-Prado et al., 2021	Barcelona, Berlin, Bologna, Paris	Rooftop urban agriculture potential	Mixed methods study	Key factors, policies, and barriers for rooftop agriculture	Yes
Zollet et al., 2021	Italy, Rome city region	Grassroots responses to COVID-19 in food systems	Mixed methods study, Survey-based research	Resilience of small-scale, sustainable farming during pandemic	No

Our analysis of the included studies on urban agriculture in Europe revealed:

- Geographic focus: The studies covered various European countries, with Spain and Italy being the most represented.
- Research focus: Common themes included food systems, COVID-19 impact, planning/policy, initiatives, and resilience.
- Key findings: The studies frequently highlighted crisis response/resilience, tool/model development, initiatives, policy implications, and transformation.

This analysis suggests a diverse research landscape for urban agriculture in Europe, with a recent emphasis on food system resilience, particularly in the context of the COVID-19 pandemic.

Thematic Analysis

Emerging Business Models and Value Propositions

Model Type	Key Features	Context Specificity	Transformation Indicators
Regionalized and sustainable food systems	Short supply chains, local production	Adaptable to various urban contexts	Increased food sovereignty, reduced environmental impact
Multifunctional agriculture	Integration of food production, environmental services, and social benefits	Suitable for peri-urban areas	Diversification of farm income, enhanced ecosystem services
Circular economy models	Waste reduction, resource efficiency	Applicable in dense urban areas	Closed-loop systems, reduced urban ecological footprint
High-tech urban agriculture	Vertical farming, controlled environment agriculture	More prevalent in technologically advanced cities	Increased productivity, year-round production
Community-supported agriculture	Direct producer-consumer relationships	Strong in areas with engaged local communities	Enhanced food democracy, social cohesion
Rooftop urban agriculture	Utilization of unused urban spaces	Suitable for cities with appropriate building stock	Improved urban land use efficiency, greening of cities
Digital platforms for local distribution	Online marketplaces for local produce	Requires digital infrastructure and literacy	Improved market access for small producers, consumer convenience
Entrepreneurial urban farming	Small-scale commercial vegetable production	Varies based on local regulations and market demand	Job creation, local economic development
Social enterprise models	Combining social goals with business approaches	Effective in areas with strong social support systems	Addressing food insecurity, community empowerment
Agroecological farming	Ecological principles in food production	Adaptable to various climatic and social contexts	Enhanced biodiversity, reduced chemical inputs

The studies we analyzed presented 10 distinct urban agriculture model types, each represented by one study in the table. Key features of these models varied widely, from local production aspects to environmental considerations and technological components. The context specificity of the models showed diverse applicability, ranging from adaptable to various contexts to suited for specific urban environments or dependent on social factors.

Spatial and Institutional Adaptations

Adaptation Type	Urban Context	Implementation Status	Signal Strength
Integration of urban agriculture in urban planning	Multiple European cities	Ongoing, varies by city	Strong
Creation of food policy councils	Graz, Austria	Implemented	Moderate
Multistakeholder governance approaches	Milan, Italy	Implemented	Strong
Regulatory changes for rooftop agriculture	Barcelona, Paris	In progress	Moderate
Development of urban agricultural parks	Milan, Naples	Established	Strong
Incorporation of urban agriculture in climate action plans	Barcelona	Implemented	Moderate
Participatory planning processes	Copenhagen	Ongoing	Moderate
Creation of urban food strategies	Rome	Implemented	Strong
Establishment of farmers' incubators	Gothenburg	Implemented	Moderate
Integration of agroecology in urban policies	Madrid	In progress	Moderate

The studies we analyzed presented a range of urban agriculture adaptation types across European cities. The most common implementation status was "implemented," suggesting that many cities have moved beyond the planning stage in their urban agriculture initiatives. The signal strength for these adaptations was predominantly moderate to strong, indicating that these urban agriculture initiatives are showing promising results or potential in the studies.

Social-Economic Integration Patterns

The analysis of social-economic integration patterns reveals several key trends in how urban agriculture is being woven into the fabric of European cities:

- Community Engagement: Many cities are seeing increased community participation in urban agriculture initiatives. For instance, in Barcelona, community gardens have become spaces for social cohesion and collective action.
- Educational Integration: There's a rising trend of integrating urban agriculture into educational programs. The case of Campus Roslagen in Sweden demonstrates how aquaponics education is being incorporated into academic curricula.
- Employment Opportunities: Urban agriculture is emerging as a source of new employment, particularly for small-scale entrepreneurs. Gothenburg's Farmers Incubator program is an example of how cities are fostering new agricultural businesses in urban settings.

- Food Justice Initiatives: Several studies highlight the role of urban agriculture in addressing food insecurity and promoting food justice. For example, in Rome, initiatives are focusing on managing food surpluses to combat food waste and poverty.
- Cultural Integration: Urban agriculture is increasingly being recognized for its cultural value. In Athens, for instance, alternative food networks are not just about food production but also about preserving agricultural heritage and promoting new rural-urban relations.
- Economic Diversification: Urban farms are diversifying their economic models, often combining food production with other services such as education, tourism, or ecosystem services. This is evident in the multifunctional agriculture model observed in Milan.
- Digital Integration: The rise of digital platforms for local food distribution, as seen in the Barcelona Metropolitan Region, indicates a growing integration of urban agriculture with the digital economy.
- Health and Wellbeing: Several studies note the increasing recognition of urban agriculture's role in promoting public health and wellbeing, particularly in the context of the COVID-19 pandemic.

Post-Pandemic Resilience Mechanisms

The analysis of the included studies highlights several key resilience mechanisms that have emerged or been strengthened in the post-pandemic period:

1. Localization of Food Supply Chains: Many cities have seen a shift towards more localized food production and distribution. For instance, in Madrid, there was an increased consumption of local and organic products during the pandemic.
2. Digital Adaptation: The pandemic accelerated the adoption of digital technologies in urban food systems. In Sant Feliu de Guíxols, municipal food markets rapidly developed e-commerce and food delivery services.
3. Diversification of Production and Distribution: Urban farms and gardens demonstrated resilience through diversification. In the Bucharest Metropolitan Area, organic farms showed the highest resilience during the pandemic, partly due to their ability to adapt production and distribution methods.
4. Community-Based Initiatives: Grassroots and community-led food initiatives played a crucial role in ensuring food access during the crisis. In Italy, small-scale, sustainable family farming and spatially embedded food systems showed remarkable resilience.
5. Policy Adaptations: Some cities rapidly adapted their policies to support urban agriculture. For example, in New York City, administrative support for permits and equipment was streamlined to facilitate urban gardening.
6. Multi-functional Spaces: The pandemic highlighted the value of multi-functional urban agricultural spaces. Metropolitan agricultural parks in Milan and Naples adapted their activities to continue providing both food and social benefits during lockdowns.
7. Increased Recognition of Urban Agriculture's Role: The crisis led to greater recognition of urban agriculture's potential in enhancing city resilience. This is reflected in the increased policy support and public interest in urban farming initiatives across various European cities.

8. Innovation in Resource Use: Some urban farms demonstrated resilience through innovative resource management. For instance, the emphasis on circular resource systems in Longyearbyen shows how urban agriculture can adapt to resource constraints.
9. Strengthened Producer-Consumer Relationships: Direct marketing channels and community-supported agriculture models gained strength during the pandemic, as seen in Berlin. These models provided stability for producers and food security for consumers.
10. Adaptive Governance: Cities like Vienna showed how different actors (regime and niche) in the food system could adapt to the crisis, highlighting the importance of flexible and responsive governance in building resilience.

Cross-Context Analysis

Regional Variation Patterns

The analysis of urban agricultural transformation across different European contexts reveals several distinct regional variation patterns:

1. North-South Divide: Northern European cities, such as those in Sweden and Finland, tend to focus more on high-tech solutions and innovative models like aquaponics and rooftop farming. Southern European cities, like those in Spain and Italy, often emphasize traditional peri-urban agriculture and the preservation of agricultural heritage.
2. East-West Differences: Eastern European cities, represented by studies from Romania and Poland, show a stronger focus on the resilience of small-scale farming and the transition from post-socialist urban structures. Western European cities, particularly in countries like the Netherlands and Germany, tend to have more advanced integration of urban agriculture into city planning and policy.
3. Urban Scale Variations: Larger metropolitan areas like Barcelona, Milan, and Paris demonstrate more complex and multi-layered approaches to urban agriculture, often involving metropolitan-scale planning and governance. Smaller cities and towns, as studied in the AGRI-URBAN project, show more community-based and bottom-up initiatives.
4. Policy Integration Levels: Cities in countries with strong national or regional support for urban agriculture, such as France and Italy, show more advanced policy integration and institutional adaptations. In contrast, cities in countries with less centralized support may rely more on local initiatives and grassroots movements.
5. Technological Adoption: There's a notable variation in the adoption of technology in urban agriculture. Cities like Amsterdam are at the forefront of high-tech urban agriculture, while others focus more on low-tech, community-oriented approaches.
6. Cultural and Historical Contexts: Cities with strong agricultural traditions, like those in Mediterranean countries, often emphasize the cultural aspects of urban agriculture and its role in preserving local food heritage. In contrast, cities with more industrial histories may focus on urban agriculture as a means of urban regeneration.
7. Climate-Related Adaptations: Northern European cities often focus on solutions for year-round production in harsh climates, such as indoor farming and controlled environment agriculture. Southern European cities may emphasize water-efficient farming techniques and drought-resistant crops.

8. Post-Crisis Responses: While the COVID-19 pandemic affected all European cities, the responses and adaptations in urban agriculture varied. Some cities, like Madrid, saw increased demand for local and organic products, while others, like Vienna, experienced varied responses from different actors in the food system.
9. Governance Approaches: There's variation in governance models, with some cities adopting top-down approaches through formal policy instruments, while others rely more on participatory and collaborative governance models.
10. Integration with Urban Planning: The level of integration of urban agriculture into broader urban planning and development strategies varies significantly. Some cities, like Barcelona, have incorporated urban agriculture into their climate action plans, while in others, it remains a more peripheral concern.

Common Transformation Trajectories

Despite the regional variations, several common transformation trajectories can be identified across European urban contexts:

1. Shift Towards Localization: Across various cities, there's a clear trend towards localizing food production and distribution systems. This is evident in the increased focus on short food supply chains and the development of local food strategies, as seen in Rome and Madrid.
2. Integration of Technology: While the level of technological adoption varies, there's a common trajectory towards incorporating more technology in urban agriculture. This ranges from high-tech solutions like vertical farming in Amsterdam to the use of digital platforms for local food distribution in Barcelona.
3. Multifunctionality: Urban agricultural spaces are increasingly being designed and managed for multiple purposes beyond food production. This includes ecosystem services, education, and social cohesion, as demonstrated in the multifunctional agriculture model in Milan.
4. Policy Recognition: There's a growing trend of formal policy recognition for urban agriculture. This is manifested in the creation of food policy councils, as in Graz, and the integration of urban agriculture into climate action plans, as in Barcelona.
5. Participatory Approaches: Many cities are adopting more participatory approaches to urban agriculture planning and implementation. This is seen in the stakeholder engagement processes in Copenhagen and the community-based initiatives in Barcelona.
6. Circular Economy Integration: There's a common trajectory towards integrating urban agriculture into circular economy models, focusing on waste reduction and resource efficiency. This is particularly evident in initiatives in small European towns.
7. Resilience Building: Post-pandemic, there's an increased focus on urban agriculture as a tool for enhancing city resilience. This is reflected in the adaptations made by community gardens and allotments across various European countries during the COVID-19 crisis.
8. Professionalization of UrbanFarming: There's a trend towards more professional and business-oriented approaches to urban agriculture, as seen in the development of entrepreneurial models in Gothenburg and the emergence of new urban agriculture business strategies.
9. Educational Integration: Many cities are integrating urban agriculture into educational programs, from school gardens to university-level courses, as exemplified by the aquaponics education initiatives

in Nordic countries.

10. Agroecological Transition: There's a growing emphasis on agroecological principles in urban agriculture, moving towards more sustainable and ecologically sound practices. This is particularly evident in cities like Madrid and Berlin.

11. Spatial Reconfiguration: Cities are increasingly reconfiguring urban spaces to accommodate agriculture, from rooftop gardens to the conversion of vacant lots. This spatial adaptation is seen across various European cities, including Barcelona, Berlin, Bologna, and Paris.

12. Governance Innovation: There's a common trajectory towards more innovative governance models for urban food systems, including multistakeholder approaches and the creation of specialized bodies to oversee urban agriculture initiatives.

These common trajectories suggest that while the specific manifestations may vary, there is a broader shift across European cities towards more sustainable, integrated, and resilient urban food systems. Urban agriculture is increasingly being recognized not just as a means of food production, but as a multifaceted tool for addressing various urban challenges, from climate change adaptation to social cohesion and economic development.

References

A. Bartolomé, D. Carpio, and B. Urbano. "Urban Agriculture Digital Planning for the European Union s Green Deal." *Www.amfiteatrueconomic.ro*, 2022.

A. Cavallo, and F. Olivieri. "Sustainable Local Development and Agri-Food System in the Post Covid Crisis: The Case of Rome." *Cities*, 2022.

A. Nikologianni, A. Betta, M. Andreola, Angelica Pianegonda, Gian Antonio Battistel, Anna Ternell, and A. Gretter. "Urban Farming Models, Ecosystems and Climate Change Adaptation in Urban Environments: The Case of SATURN Pan European Programme." *Athens Journal of Sciences*, 2022.

Aleksandra Nowysz, and Marian Simón-Rojo. "Transforming Urban Food Systems Through Agroecology – a Review of Agroecological Projects in Madrid in Terms of MUFPP Framework." *Acta Scientiarum Polonorum. Architectura*, 2023.

Andrea Fantini. "Cultivando Ciudades. La Agricultura Urbana y Periurbana Como Práctica de Transformación Territorial, Económica, Social y Política," 2016.

Ariane Voglhuber-Slavinsky, H. Derler, B. Møller, E. Dönitz, E. Bahrs, and Simon Berner. "Measures to Increase Local Food Supply in the Context of European Framework Scenarios for the Agri-Food Sector." *Sustainability*, 2021.

B. Duží, David Fanfani, and Stanislav Martinát. "Evolving Local Agrifood Initiatives Within a Territorial Agrifood System: The Case of Prato Province, Italy." *Agroecology and Sustainable Food Systems*, 2022.

Daniele Fattibene, Giampiero Mazzocchi, M. Antonelli, D. Marino, and L. Romagnoli. "Modelling Food Policies in Italian Urban Agendas in the Time of Covid-19: Experiences, Challenges and Opportunities." *Cities*, 2023.

Gustavo Arciniegas, D. Wascher, Poppy Eyre, M. Sylla, J. Vicente-Vicente, M. Świąder, Tina Unger, et al. "A Participatory Tool for Assessing Land Footprint in City-Region Food Systems—A Case Study from Metropolitan Copenhagen." *Frontiers in Sustainable Food Systems*, 2022.

H. Moschitz, J. Landert, C. Schader, and Rebekka Frick. "From Urban Agriculture to Urban Food: A Food System Analysis Based on Interaction Between Research, Policy, and Society," 2018.

I. Grigorescu, E. Popovici, N. Damian, M. Dumitrașcu, M. Sima, B. Mitrică, and I. Mocanu. "THE RESILIENCE OF SUB-URBAN SMALL FARMING IN BUCHAREST METROPOLITAN AREA IN RESPONSE TO THE COVID-19 PANDEMIC." *Land Use Policy*, 2022.

J. Lever, and R. Sonnino. "Food System Transformation for Sustainable City-Regions: Exploring the Potential of Circular Economies." *Regional Studies*, 2022.

J. Millard, Alberto Sturla, Zdeňka Smutná, B. Duží, Meike Janssen, and J. Vávra. "European Food Systems in a Regional Perspective: A Comparative Study of the Effect of COVID-19 on Households and City-Region Food Systems." *Frontiers in Sustainable Food Systems*, 2022.

J. Vicente-Vicente, Julius Borderieux, Katrina Martens, Manuel González-Rosado, and Beatrice Walthall. "Scaling Agroecology for Food System Transformation in Metropolitan Areas: Agroecological Characterization and Role of Knowledge in Community-Supported Agriculture Farms Connected to a Food Hub in Berlin, Germany." *Agroecology and Sustainable Food Systems*, 2023.

J. Wiśniewska-Paluszak, G. Paluszak, M. Fiore, A. Coticchio, A. Galati, and J. Lira. "Urban Agriculture Business Models and Value Propositions: Mixed Methods Approach Based on Evidence from Polish and Italian Case Studies." *Land Use Policy*, 2023.

José Luis Cruz, González- Azcárate Mario, Hewitt Richard, Hernández Verónica, and Bardají Isabel. "COVID and Consumers' Food Strategies in Madrid, Spain: Towards a Resilient City-Region Food System Approach." *Heliyon*, 2024.

Katharina Sartison, and M. Artmann. "Edible Cities – An Innovative Nature-Based Solution for Urban Sustainability Transformation? An Explorative Study of Urban Food Production in German Cities," 2020.

Luciane Aguiar Borges, and Hannah Matthiesen. "Urban Agriculture for a Resilient Future," 2024.

M. M. Delgado-Serrano, A. Zafra, and M. Sousa. "The Roots of the City. Creative Food Systems in European Small Towns," 2020.

M. Marini, D. Caro, and M. Thomsen. "Investigating Local Policy Instruments for Different Types of Urban Agriculture in Four European Cities: A Case Study Analysis on the Use and Effectiveness of the Applied Policy Instruments." *Land Use Policy*, 2023.

M. T. Gómez-Villarino, and L. Ruiz-Garcia. "Adaptive Design Model for the Integration of Urban Agriculture in the Sustainable Development of Cities. A Case Study in Northern Spain," 2020.

M. Vittuari, G. Bazzocchi, S. Blasioli, F. Cirone, A. Maggio, F. Orsini, J. Penca, et al. "Envisioning the Future of European Food Systems: Approaches and Research Priorities After COVID-19." *Frontiers in Sustainable Food Systems*, 2021.

María del Mar Delgado-Serrano, A. Zafra, and Miguel Sousa. "As Raízes Da Cidade. Sistemas Alimentares Criativos Nas Pequenas Cidades Europeias," 2020.

Marie-Laure Mourre, Christine Gonzalez, and Amina Djedidi. "Can Local Food Become an Inclusive Practice in Urban Areas? A Community Provisioning Systems Approach." *Recherche Et Applications En Marketing (English Edition)*, 2024.

Marta Camps-Calvet, Johannes Langemeyer, Laura Calvet-Mir, E. Gómez-Baggethun, and H. March. "Sowing Resilience and Contestation in Times of Crises: The Case of Urban Gardening Movements in Barcelona," 2015.

Marta López Cifuentes, and Valentin Fiala. "Covid-19 as a Chance for More Food Democracy in European Cities? The Responses of Actors Within Vienna's Urban Food System to the Pandemic." *Cities*, 2022.

Mohsen H. Farhangi, Margherita E. Turvani, Arnold van der Valk, and G. Carsjens. "High-Tech Urban Agriculture in Amsterdam: An Actor Network Analysis," 2020.

N. Fava, Valentina Rosa Laganà, and A. Nicolosi. "The Impact of COVID-19 on Municipal Food Markets: Resilience or Innovative Attitude?" *Journal of Open Innovation: Technology, Market and Complexity*,

2022.

N. Frantzeskaki, Philippe Spaeth, Steffen Maschmeyer, and G. Silvestri. "Building Resilience Bottom-up via Multi-Scale Urban Transitions Can Urban Agriculture Initiatives in European Cities Foster Urban Resilience and Propel Urban Sustainability Transitions?" 2016.

Nancy Sarabia, J. Peris, and Sergio Segura. "Transition to Agri-Food Sustainability, Assessing Accelerators and Triggers for Transformation: Case Study in Valencia, Spain." *Journal of Cleaner Production*, 2021.

O. Boukharta, Loïc Sauvée, Leticia Chico-Santamarta, Fabiana Pena-Fabri, and L. Navas-Gracia. "Reality Vs. Expectations in the Implementation of Urban Agricultural Projects—A Polycentric Governance Analysis." *Urban Science*, 2024.

Perla Zambrano-Prado, F. Orsini, J. Rieradevall, A. Josa, and X. Gabarrell. "Potential Key Factors, Policies, and Barriers for Rooftop Agriculture in EU Cities: Barcelona, Berlin, Bologna, and Paris." *Frontiers in Sustainable Food Systems*, 2021.

S. Corsi, Marta Dell'Ovo, C. Dezio, A. Longo, and A. Oppio. "Beyond Food: Framing Ecosystem Services Value in Peri-Urban Farming in the Post-Covid Era with a Multidimensional Perspective. The Case of Cascina Biblioteca in Milan (Italy)." *Cities*, 2023.

S. Kumar, and Vineeta Yadav. "An Integrated Literature Review on Urban and Peri-Urban Farming: Exploring Research Themes and Future Directions." *Sustainable Cities and Society*, 2023.

Simona Zollet, L. Colombo, Paola De Meo, D. Marino, Steven R. McGreevy, N. Mckeon, and Simona Tarra. "Towards Territorially Embedded, Equitable and Resilient Food Systems? Insights from Grassroots Responses to COVID-19 in Italy and the City Region of Rome." *Sustainability*, 2021.

Sofia Nikolaidou. "Peri-Urban Agriculture and Alternative Food Networks in Athens: Solidarity Dynamics, Spatial Planning Challenges and Institutional Reforms." *Cahiers de La Méditerranée*, 2021.

Sònia Callau-Berenguer, Anna Roca-Torrent, Josep Montasell-Dorda, and S. Ricart. "How to Guarantee Food Supply During Pandemics? Rethinking Local Food Systems from Peri-Urban Strategic Agents' Behaviour: The Case Study of the Barcelona Metropolitan Region." *Investigaciones Geográficas*, 2021.

V. Schoen, C. Blythe, S. Caputo, R. Fox-Kämper, K. Specht, A. Fargue-Lelièvre, N. Cohen, Lidia Poniży, and Konstancja Fedeńczak. ""We Have Been Part of the Response": The Effects of COVID-19 on Community and Allotment Gardens in the Global North." *Frontiers in Sustainable Food Systems*, 2021.

Valentina Cattivelli, Vincenzo Rusciano, and A. Gatto. "Effects of the COVID-19 Outbreak on the Use and Perceptions of Metropolitan Agricultural Parks. Evidence from Milan and Naples," 2022.

Vincenzo Rusciano, and Andrea Gatto. "Effects of the COVID-19 Outbreak on the Use and Perceptions of Metropolitan Agricultural Parks—Evidence from Milan and Naples of Urban and Environmental Resilience." *Sustainability*, 2022.