WAGENINGEN
UNIVERSITY & RESEARCH

Exploring the conceptualisation of urban greenhouse farming.

Wageningen, 2024

Bas Hendriks

1. INTRODUCTION

2. METHODS

3. FINDINGS

4. CONCLUSION

Feeding urban populations will become difficult, this Honours card identifies urban greenhouse farming as a trend and highlights the lack of a clear conceptualization.

Urban Greenhouse Farming

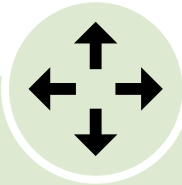
FUTURE PROOF

In light of **climate change** and **rapid urbanization**, how we feed urban areas in the future is a **large challenge**. There is a trend of bringing food production **closer to cities**. Within this trend, the potential role of covered cultivation methods has received **little exploration** so far, while there is movement.

Climate change

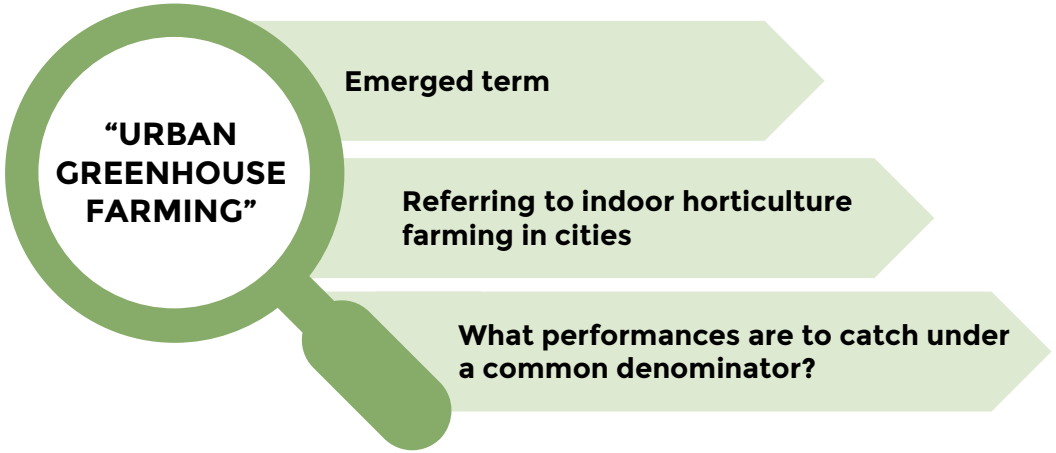
Rapid urbanization

HOW TO FEED URBAN AREAS IN THE FUTURE?



MOVE FOOD PRODUCTION

Shifting food production closer to urban areas reduces costs, carbon footprint and ensure fresher produce. This could solve the issue mentioned.



THE TERM

The term **urban greenhouse farming** emerged within this movement, referring to indoor horticulture farming in cities. This term covers a wide range of performances while there is **no clear conceptualization** at present. This Honours card explores how urban greenhouse farming is performed in practice and aims to investigate whether the different performances are to catch under a **common denominator**.

1. INTRODUCTION

2. METHODS

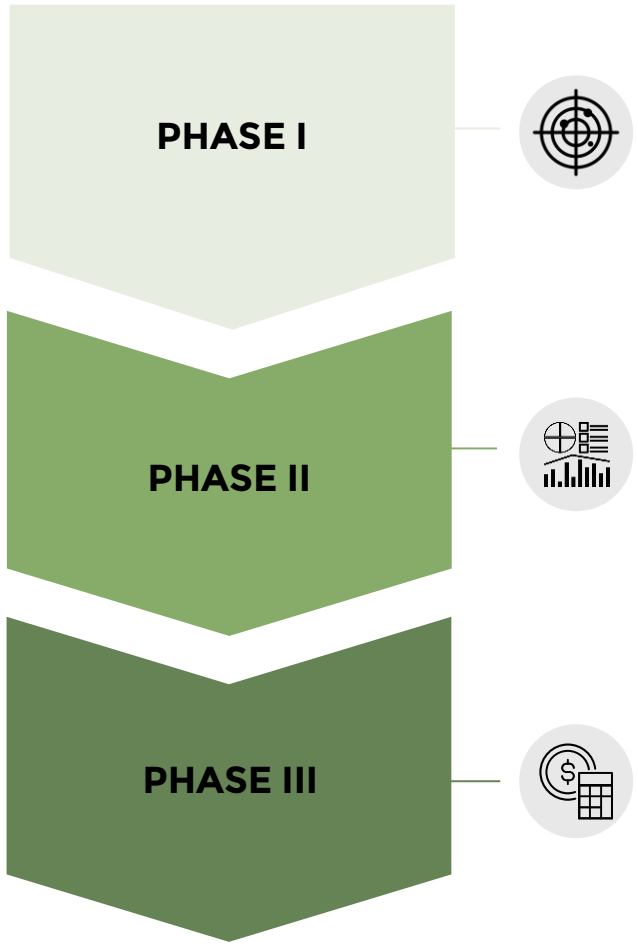
3. FINDINGS

4. CONCLUSION

Methods

In three phases, various forms of urban greenhouse farming and results of interviews are analyzed to conclude on the main question.

Phasing



LITERATURE STUDY

- At the start of this research, a **literature study** is carried out to see how urban greenhouse farming emerges in **academic literature**.

EMPERICAL FIELDWORK AND INTERVIEWS

- In the second phase, visits are made to **six case studies** to observe the urban greenhouse farming performance.
- At every case study, at least **one individual is interviewed** about the ins and outs of the case.
- The different performances are compared with the help of **Social Practice Theory**.

DRAWING CONCLUSIONS

- In the third phase, the findings are **summarized** and **analyzed** to conclude on the research.
- The main **takeaways** and **significance** of the research in understanding urban greenhouse farming are projected.

1. INTRODUCTION

2. METHODS

3. FINDINGS

4. CONCLUSION

The results of the desk research and interviews are mapped with help of the Social Practice Theory, two clusters appear.

Mapping of results

FINDINGS

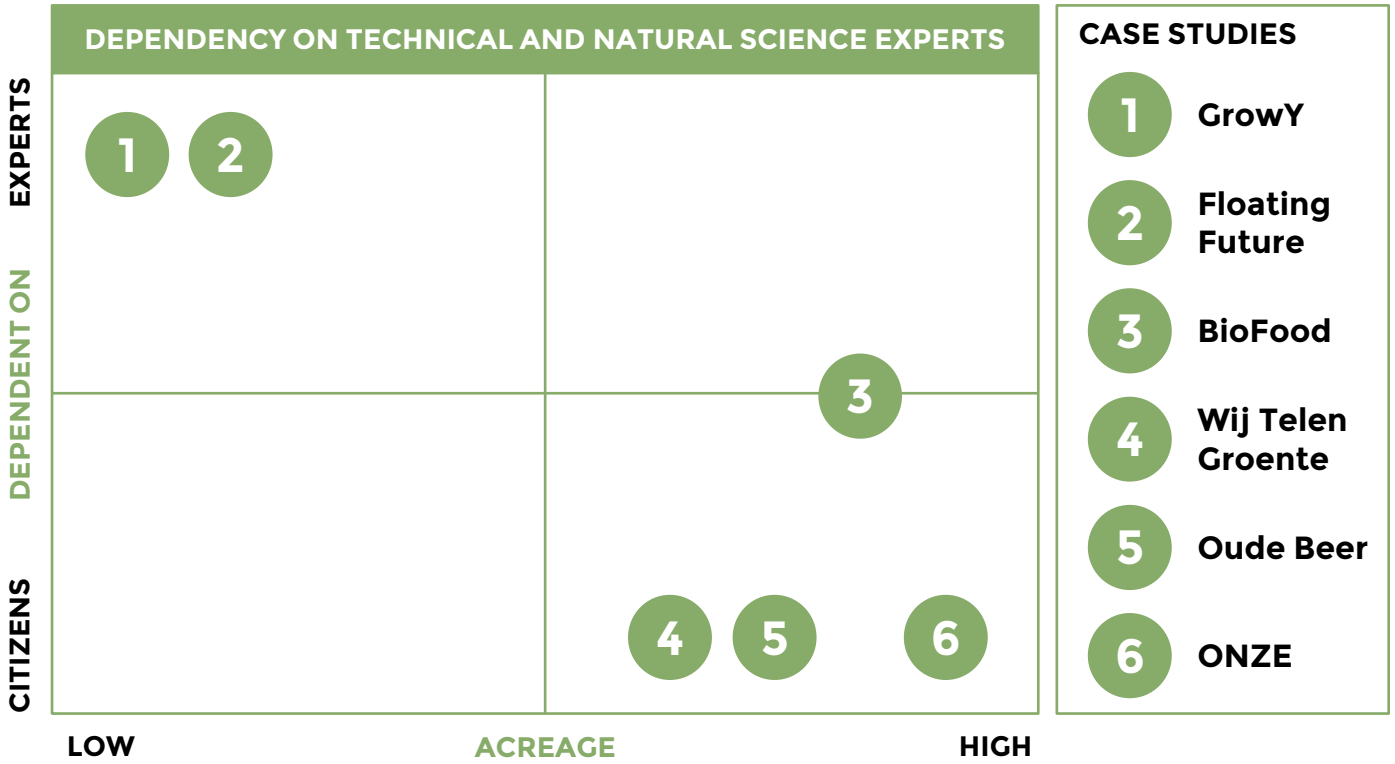
- After the literature study and the fieldwork where **six experts** in urban food production of Dutch case studies are **interviewed**, the case studies are are **mapped** on two axis:

1. Dependency on citizens
2. Acreage

MAIN INSIGHTS

Two dominant performances of urban greenhouse farming emerged from the results:

1. **Process optimisation** urban greenhouse farming
2. **Community-driven** urban greenhouse farming



EXPLANATION GRAPH

- The scores are **interpretative estimations** to visualise the urban greenhouse farming performances.
- In practice, differences among the case studies are **more nuanced**.

Findings

The first cluster is based on process optimisation within urban greenhouse farming,it involves high-tech and is characterized by resource efficiency.

Process optimisation

PROCESS OPTIMISATION BASED

Urban greenhouse farming practice with **relatively high entry** due to capital costs for technologies and the required expertise. It is space-efficient and might ensure **food-related securities**.

SOCIAL CONTEXT

The practice of urban farming does **not rely strongly on social context**, practitioners aim to make urban greenhouses **replicable** in various regional contexts and **ensure food safety** to contribute to global food consumption.

HUMAN RESOURCES

Entrepreneurs, technical- and natural science **experts**. There is expertise to further optimise the process and they **dare to fail**. This group enjoys the process of **experimenting** and **exploring** to optimise food production process.

PROCESS OPTIMISATION URBAN GREENHOUSE FARMING

TECH USED	Harvesting machines, various sensors and advanced irrigation systems.
CONSTRUCTION	Constructed the last couple of years.
YIELD	Characterized by high yields and resource efficiency with hydroponics.
ACREAGE	Acreage is ranging from 120 m^2 to 150 m^2.

The second cluster is community-driven, it involves lower-tech methods and citizen participation while focusing on sustainable and social relationships.

Community-driven

COMMUNITY-DRIVEN BASED

When **social interaction** and **citizen involvement** in cultivating foods is valued, this might be interesting. Food production tends to be **lower** and **more urban land** would be necessary. However, it demands **less costs** and **specific expertise**.

SOCIAL CONTEXT

This type of urban greenhouse farming relies on the **active involvement** of citizens who act as volunteers in the performance. The urban greenhouse farming performance is thus **explicitly bound to the social context.**

HUMAN RESOURCES

Horticulturists, coordinators, and citizens who act as **volunteers**. They form a **community** that cultivates food for the city region. The horticulturists provide **guidance** to citizens on the important matters.

COMMUNITY-DRIVEN URBAN GREENHOUSE FARMING

TECH USED	Manually steered irrigation systems and hand tools.
CONSTRUCTION	Constructed over a decade ago and first served another destination.
YIELD	Food production output is lower.
ACREAGE	Acreage of 2,000 m^2 or more.

Findings

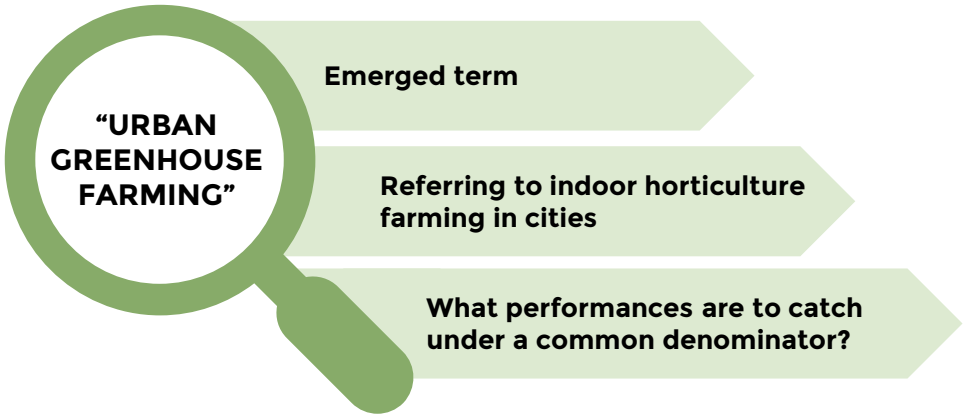
While both forms of urban greenhouse farming are distinct, they overlap in certain aspects too.

Comparison

MAIN INSIGHTS

The results show that urban greenhouse farming is **not unequivocal**. Two dominant practice forms of urban greenhouse farming are put forward. These types have **different goals**, require **various competences**, and are enacted by **different practitioners**. It is, therefore, stated to look **more nuanced** at urban greenhouse farming since the performances are not to catch under a common denominator.

Urban greenhouse farming can be viewed as an **emerging food production practice**. Both types of urban greenhouse farming are in their **early stages** and have the potential to evolve into **more established** and **recognizable** forms of urban greenhouse



TECH USED	High-tech	Low-tech
CONSTRUCTION	Couple of years ago	Decade ago
YIELD	Higher	Lower
ACREAGE	150 m^2	2,000 m^2
HUMAN RESOURCES	Entrepreneurs, technical- and natural experts.	Horticulturists, coordinators and citizens.
SOCIAL CONTEXT	Relies not on social context.	Relies on active involvement of citizens

1. INTRODUCTION

2. METHODS

3. FINDINGS

4. CONCLUSION

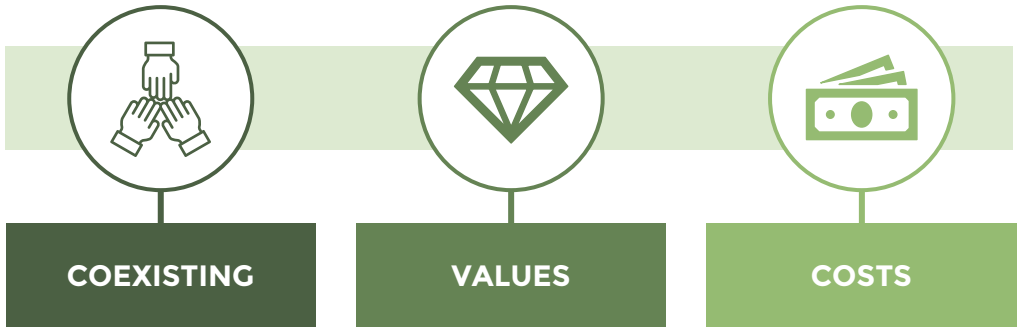
No clear definition could be found, but understanding the emerging types of urban farming can contribute to a broader debate of food production in urban areas.

CONCLUSION

It appeared that the **context** of the urban greenhouse is **crucial** for the emergence of this practice. In the Netherlands, the community-driven type, which is more **strongly embedded** in the social context, seems to be **taking off more in society** compared to the other type. However, in regions that have to deal with **limited arable** farmland or **resource** insecurities, the **process optimisation** type is more likely to emerge.

COEXISTING

The two emerging urban greenhouse farming types can **coexist**; however, they serve **different goals** and have **different connections** to urban areas. For policy and research purposes, the described types of urban greenhouse farming might help us better understand urban greenhouse farming. Additionally, the exploration of urban greenhouse farming might **advance debates** about whether food production should be organized **in urban regions**, and how to do so.



COEXISTING

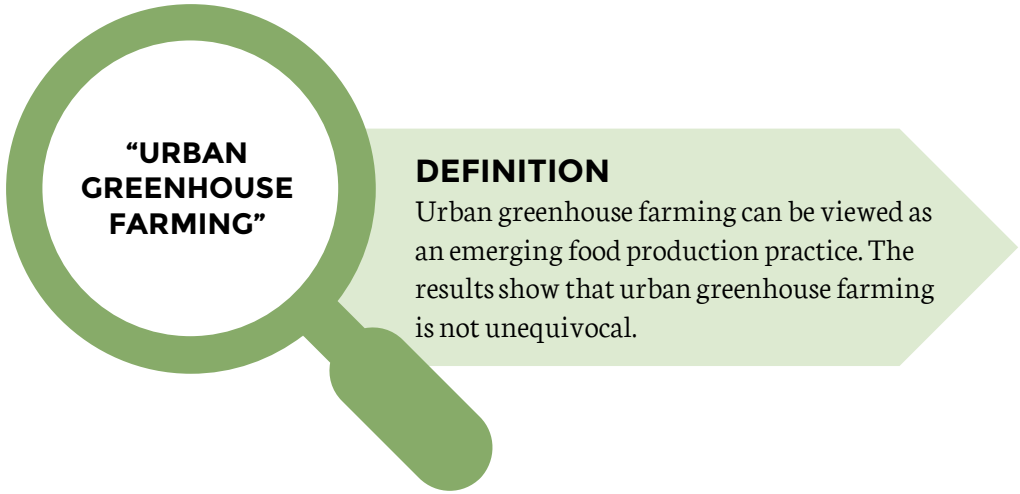
Although the two urban greenhouse farming types serve different goals, they can coexist.

VALUES

Based on the geography of the greenhouse, other values could be of importance for the community.

COSTS

The geography of the greenhouse could play an important role on the amount of costs for the greenhouse type.



DEFINITION

Urban greenhouse farming can be viewed as an emerging food production practice. The results show that urban greenhouse farming is not unequivocal.