Improving Urban Green Spaces with Urban Food Forestry

How nut trees in urban green spaces might affect food security

Olle McFaul

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Swedish University of Agricultural Sciences, SLU
Department of Landscape Architecture, planning and management
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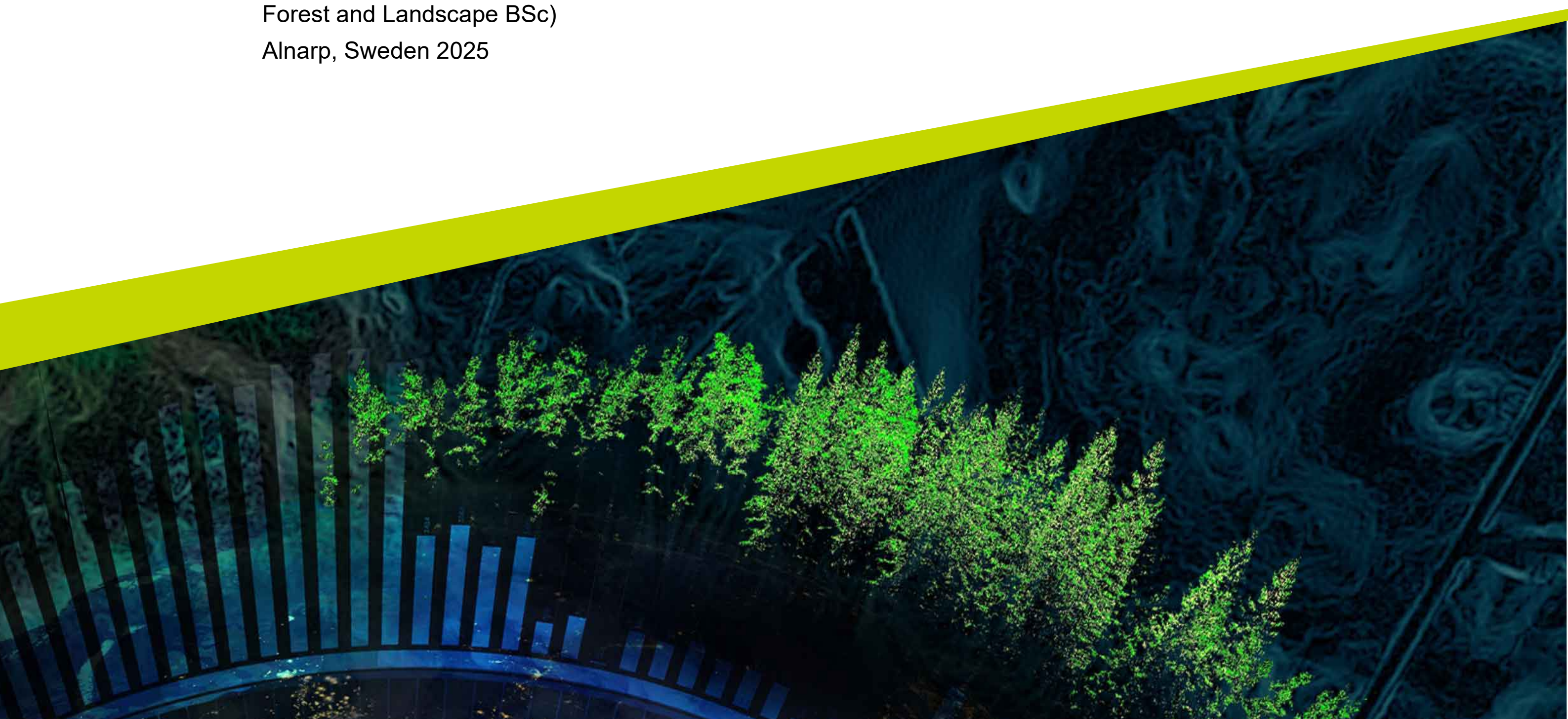

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Supervisor:	**Anna Peterson, Swedish University of Agricultural Sciences, Department of Landscape Architecture, planning and management**
Examiner:	Helena Mellqvist, Swedish University of Agricultural Sciences, Department of Landscape Architecture, planning and management

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Swedish University of Agricultural Sciences
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“The best time to plant a nut tree was 20 years ago. The second-best time is now.”

- Old Chinese proverb (adjusted by author)

Abstract

Urban Green Spaces are important elements in the urban fabric. They provide essential ecosystem services that are becoming increasingly necessary and valuable as climate change and biodiversity loss progress toward the sixth mass extinction. One aspect of ecosystem services is, however, largely overlooked by urban planners and policy makers, designing the UGS strategies in Swedish cities and abroad. Namely, the provisional ecosystem service of trees, shrubs and other perennials to provide nutrient dense foods such as nuts, fruit, berries and more. Incorporating and prioritizing food producing perennials into urban green space plans could add yet another important service to the long list provided by urban greenery, without necessarily diminishing any other.

This thesis explored the potential of providing hyper-local, nutrient dense food in urban environments, by shifting focus from ornamental species toward food-producing species.

The results showed that there are both challenges and opportunities associated with this shift in focus. The main challenges were the increased likelihood of contaminated soils in urban areas, potential increase of rodents and pests, and that maintenance costs might increase. But the opportunities associated with nut trees in urban environments, including increased urban food security and reducing reliance on global supply chains, should encourage further investigation and experimentation.

Keywords: Urban Forestry, Urban Agriculture, Urban Green Space, Ecosystem Services, Climate Change, Food Security, Urban Food Forestry, Sustainable Urban Development

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Abbreviations

UGS	Urban Green Space(s)
UA	Urban Agriculture
ES	Ecosystem Service(s)
UFF	Urban Food Forestry
DRI	Daily Recommended Intake
kcal	Kilo Calories

Introduction

In the decade since the Paris Agreement, which saw 196 nations pledge to limit global average temperature increases to no more than 1.5°C above pre-industrial levels, each year has successively set a new record for the hottest temperatures ever observed. Despite some progress, emissions are still rising, making the 1.5°C warming limit increasingly unlikely since emissions needed to peak by 2025 and drop 43% by 2030 (UNFCCC, 2015; IPCC, 2022; WMO, 2025). Simultaneously, rapid urbanization and population growth intensify pressures and dependencies on energy and natural resources, including food, flowing into cities from global supply chains. This results in land use changes that affect areas far greater than the local city boundaries, making cities incredibly vulnerable to disturbances to these supply chains (Grimm et al., 2008). Furthermore, impacts from climate change might lead to increased geopolitical tensions, energy shortages and disruptions to transportation and supply chains, which in turn risks inducing positive feedback loops that further escalate the climate crisis and hinder international cooperation (Bertolozzi-Caredio et al., 2023). These bleak potential futures demand innovative, forward-looking and holistic strategies that emphasize increased resilience and sustainability across all ecological, social and economic scales within and around the urban landscape.

The city of Malmö, in Sweden, is a good example of a city that has a high level of ambition regarding sustainable urban development. Malmö is the third largest and the fastest growing city in Sweden. Its population is expected to increase from 360.000 today, to around 500.000 by 2050 (Malmö stad, 2020). Malmö has adopted a range of sustainability initiatives designed to make the city more attractive for residents and businesses, while also boosting its ability to withstand the impacts of climate change. One such initiative is its comprehensive tree plan that seeks to increase the city's tree canopy cover from the current level of about 15% to between 25% and 30%, while also enhancing the diversity of tree species throughout the city. This goal stems from the growing recognition of the wide range of ecosystem services that trees and urban green spaces provide (Malmö Stad, 2024a). The recognition of the ecosystem services of trees has, however, stopped short of realizing one fundamental provisioning aspect. The production of food from trees.

This thesis will be based on a case study analysis of Malmö's comprehensive tree inventory, to ascertain the prevalence of nut-producing trees growing in the city, and their potential to increase Malmö's food security and climate resilience.

Hypothesis

The current comprehensive tree plan of Malmö is ambitious and extensive but it is aimed mainly at increasing species diversity and aesthetic values, missing a potentially crucial opportunity to increase the city's food security and climate resilience through the latent food-provisioning ecosystem service of nut trees and other food-producing species. A slight adjustment to the current plan, prioritising food-producing species over ornamental ones, could add an additional important dimension to the ecosystem services provided by the city's green spaces, while not necessarily diminishing others.

Research Questions

- What level of food security can the nut trees currently growing in Malmö potentially provide its citizens?
- How would an increased proportion of nut trees raise this level?

- How can Urban Food Forestry matter for sustainable urban development?

Background

Urbanization refers to the process by which an increasing proportion of a population moves from rural to urban areas, leading to the growth and expansion of cities. More than 55% of the global population now lives in cities and this number is projected to increase to 68% by 2050 (UNDESA, 2019). One consequence of this process is that cities often expand outwards, transforming forests and farmland on the periphery into buildings, roads, and other infrastructure, in a process called "urban sprawl". Densification can help cities counteract this by making better use of existing urban spaces through mixed-use developments, higher-density housing, and efficient public transportation, becoming more efficient in the use of energy and materials (Haaland & Konijnendijk, 2015). While denser cities are more resource efficient, their populations are still heavily reliant on inputs, especially food and energy, from regional and global supply chains, and vulnerability to disruptions along the supply chains persist (Grimm et al., 2008).

For cities to achieve sustainable development through densification, careful planning and long-term consideration of green infrastructure are essential. This involves making plans for **Urban Green Spaces** (UGS) which perform vital, multifunctional tasks that address numerous challenges related to social, environmental and economic problems in urban landscapes. UGS commonly refers to a variety of land types, such as public parks, gardens, street greenery, greenways, nature reserves, playgrounds, cemeteries, and private gardens. They are an increasingly important element of consideration for urban planners and policymakers because of the wide range of ecosystem services (ES) they provide. These include regulating and supporting services such as stormwater management, temperature regulation, carbon sequestration, air quality improvement, wildlife habitat, soil formation and nutrient cycling. And they also offer important cultural services, encouraging social interactions, education, recreation and providing aesthetic qualities and inspiration (Haaland & Konijnendijk, 2015; Farkas et al., 2023).

By modifying land-use activities in UGS, particularly in parks, residential areas and gardens, food security and resilience in cities can be enhanced through **Urban Agriculture** (UA). Agricultural activities suitable to these areas include allotment gardens and community gardens. They can provide some similar regulating and supporting ecosystem services as other UGS types, but also includes the provisioning service of food production as well as social cohesion arising from collaborative activities (Saint-Ges & Vergès, 2023). During the 1940's "Victory gardens" were promoted by the government in the United States as a solution to food shortages and food rationing while also boosting morale (USDA, 1943). Over 20 million victory gardens subsequently generated around 40% of the fresh produce in the US during the second world war (Dobele & Zvirbule, 2020). This example shows the impact urban agriculture can have on food security during crises. Another crisis, the COVID-19 pandemic, also increased the interest in, and utilization of, UA (Mead et al., 2021; Bieri et al., 2024). UA often expand and become more prominent as a short-term reaction to crises and typically decline again once the crisis is averted, indicating that UA is usually a coping strategy for food and income when formal systems fail (Daneshyar, 2024).

The potential risk of accelerating the interacting positive feedback loops between climate change, geopolitics and urbanization situates cities as both partial causes and partial solutions to many problems facing the planet. National and local governments around the globe need to take steps to increase the self-reliance of their cities and citizens, especially when it comes to essential resources like healthy and nutritious food.

In 2018 the Swedish Civil Contingency Agency (MSB) sent a brochure to every household in Sweden warning of the dangers of an increasingly unstable geopolitical climate. It gives instructions on how to prepare for worst case scenarios like war, a higher likelyhood of extreme weather events due to climate change, and pathogen outbreaks. This brochure was updated in 2024 following Russia's invasion of Ukraine and the perceived deterioration of international cooperation (MSB, 2024). Since the 1990's Sweden has seen its agricultural self-sufficiency plummet from 75% to 50% and the country's food crisis preparedness is now reliant on voluntary agreements with private companies and european solidarity. Sweden is only completely self-sufficient in a few agricultural products (Stewart, 2021; Cederberg, 2019; *RISE Research Institutes of Sweden*. n.d.). This makes the country, and its population, incredibly vulnerable to the societal disruptions resulting from events outlined in the brochure.

One venue for combatting the issue of food security in cities in case of crisis is to alter the urban green infrastructure and tree plans in cities to incorporate food-producing tree species, and prioritise them over ornamental species. **Urban Food Forestry** (UFF) combines attributes and aspects of UA, urban forestry and agroforestry into one concept through the provisional ES of nut trees, fruit-trees and berry bushes in order to increase the multifunctionality of UGS. The term "urban food forestry" was introduced to the academic literature in 2013 and while it is still a niche subject with limited adoption, it has been promoted by many researchers and organizations as an innovative and holistic sustainable urban development strategy (Clark & Nicholas, 2013; UNECE, 2024; Oncini et al., 2024; Thwaites et al., 2025)

Malmö Case Study

Malmö is a city that has set very ambitious goals for sustainable urban development including the previously explained concepts of densification and its relationship with UGS and UA.

In 1984 the aggressive dutch elm disease (DED) causing pathogen "*Ophiostoma novo-ulmi*" was detected in Malmö. This pathogen had, and still has, a catastrophic effect on the elm populations in Europe including all three elm species (*Ulmus glabra, U. Minor, and U. laevis*) present in Sweden. The wych elm (*Ulmus glabra*) was one of the most prominent city trees in Malmö for a long time, making up around 25% of the city's tree population. The elm population was quickly reduced from around 40.000 trees to only 400, registered as living in 2018 (Suneson, 2020). The loss of the elm population prompted the city to start working to significantly increase the diversity and spatial distribution of the urban tree population according to two formulas, the "10-20-30" rule and the "3-30-300" rule. These formulas will be explained further in the discussion section. The city has since developed one the most diverse tree species collections in northern Europe (*International society of arboriculture*, 2015; Konijnendijk, 2022; Malmö Stad, 2024a; Santamour, 2002). In 2020, Malmö, among 210 other cities around the globe, has been recognized as a "Tree city of the world" (Malmö Stad, 2024b; *Tree cities of the world*, n.d.). Apart from Malmö's comprehensive tree plan, the city is also part of the european union's "NetZeroCities" project which works to reduce the carbon foot print of cities in the European Union (City of Malmö, 2023). So, Malmö has already adopted very ambitious commitments through it's green infrastructure planning and comprehensive tree plan. And the city also has 15 active urban agriculture projects which are managed by local community associations and promoted in various ways by the city as important sources of recreation, biodiversity, public health, and education about nature (Stadsodling Malmö, n. d.; Malmö Stad, n. d.).

These projects, plans, and frameworks make Malmö a very interesting subject to investigate in relation to UFF and the possibility to amend their comprehensive tree plan and develop it into an urban <u>food</u> forestry plan. A plan that might further the city's agenda as a global leader in sustainable urban development as well as furthering the national provisioning preparedness strategy which has been stated as an important part of the reconstruction of the country's total defence strategy (*Försörjningsberedskap*, n.d.).

Methodology

The methodology for this case study was developed specifically for this research but follows the framework outlined in “A Case Study Method for Landscape Architecture”, which provides a structured approach to case study research in the field (Francis, 1999). The Methodological approach to this thesis is a case study focusing on the city of Malmö and it’s work in sustainable urban development. A clear description follows below.

The method is divided into three separate parts arriving at a shared discussion on the potential importance of nut-producing tree species for urban food security, and how a slight amendment to the current comprehensive tree plan could affect the city’s food security.

The first part is a broad literature review that collected many primary sources and reserach articles that cover many different aspects relating to urban food security and urban planning with and without specific relation to Malmö.

The second part analyzes a large subset of Malmö’s comprehensive tree inventory. It was carried out through a species selection in QGIS and simple calculations based on this data.

The third part is a questionnaire, containing five quesitons related to “food-producing perennials” in the city. The questionnaire was sent to urban planning professionals working in Malmö.

These parts will be explained thoroughly in the following sections.

Literature review

The literature review was conducted through searches of terms like urbanization, urban food security, urban green space planning, urban agriculture, and urban food forestry, in search engines such as Google Scholar and Ecosia, and also the Swedish University of Agriculture’s (SLU) library database “Primo”. More focused searches of specific aspects related to Malmö’s and Sweden’s context were also used, including the “3-30-300 rule” and “dutch elm disease”.

Analysis of the tree list

The analysis was conducted by making simple calculations based on data from three sources.

First, the comprehensive tree inventory subset, henceforth referred to as “the tree list”, which contains all trees growing on public land in Malmö. This list was provided by Malmö’s Property and Streets Department (fastighets- och gatukontoret) through personal communication.

Second, the average values of the daily recommended intake (DRI) of kcal and nuts respectively, sourced from the Swedish Food Agency (Livsmedelsverket 2025a; 2025b).

Third, the average nutritional values and expected harvest volumes (pages 278 and 279) sourced from the encyclopedic book “The Nutgrower’s Manual” (Weiss, 2022).

Species	Production (kg per tree per year)	Energy (kcal per 100g)	carbohydrates	fat	protein
Araucaria araucana	12-24 (18)	297,1	64%	1%	8%
Carya illinoinensis	45	691	14%	72%	9%
Castanea sativa	“up to” 50	196	44%	1%	2%
Corylus avellana	3-15 (9)	628	17%	48-70% (59%)	10-22% (16%)
Corylus colurna	15	>550	n/a	43-56% (49,5%)	13-21% (17%)
Juglans nigra	75	619	10%	59%	24%
Juglans regia	60-100 (80)	654	14%	65%	15%
Juglans cinerea	9-35 (22)	612	12%	57%	25%
Prunus dulcis	15	579	22%	50%	21%
Average	(36,5)	(536,2)	(21,9%)	(45,9%)	(15,2%)

Table 1: Harvest volumes and Nutritional values from The Nutgrower’s Manual (expanded on by calculating averages).

Species Selection

The species selection was conducted through cross-referencing the nut-producing tree species contained in the tree list with the data available for these species in the nutritional value and harvest volume tables, using a selection query QGIS (see figure 1). QGIS was also used to compare and visualize the spatial distribution of "regular" trees and nut producing trees in Malmö (see appendix 3).

```
"vet_namn" LIKE 'Araucaria araucana%' OR "vet_namn" LIKE
'Carya illinoinensis%' OR "vet_namn" LIKE 'Castanea sativa%' OR
"vet_namn" LIKE 'Corylus avellana%' OR "vet_namn" LIKE
'Corylus colurna%' OR "vet_namn" LIKE 'Juglans cinerea%' OR
"vet_namn" LIKE 'Juglans nigra%' OR "vet_namn" LIKE 'Juglans
regi%' OR "vet_namn" LIKE 'Prunus dulcis%'
```

Figure 1: Tree species selection query from the comprehensive tree inventory

Calculations

The calculations (see appendix 3) followed five simple equations of division, multiplication and unit conversion. The first two equations assessed the number of people that Malmö's existing nut-producing trees could sustain for a year, calculated using the DRI for kcal and nuts respectively. The subsequent three equations explored various scenarios, considering both how increases in the proportion of nut trees might affect harvest volumes and assuming nuts provide only 25% of a person's annual caloric intake. These basic calculations were carried out to demonstrate how increasing nut-producing trees could enhance the latent food production of Malmö's urban green spaces and thereby influencing food security now and in times of crisis.

Disclaimer

One important nut-producing genus, *Quercus* (oak), was omitted from the selection despite its prevalence in the tree list, 5.509 oak trees (6.18% of the total) are listed. Although their acorns are edible and some species are included in the Nutgrower's Handbook, oaks were excluded due to the extensive processing required to remove tannins, which makes acorns less appealing as a readily available food source.

Only nine specific nut tree species were analyzed for several reasons: nuts are nutrient-dense and can serve as staple foods, they are less damaged than most fruits when falling to the ground, and they store well. Additionally, only these nine species had sufficient data on nutritional value and production volume for the calculations.

Limiting the analysis to these selected species means the food produced by trees and shrubs is higher, so the city's current food security potential, especially considering acorns, is underestimated in this thesis.

The Nutgrower's Manual does not address the urban viability of these nut trees and only their current presence in Malmö is used for assuming viability.

Harvest volumes are only estimates and vary with location, weather, variety, and tree age. The Nutgrower's Manual also does not specify whether harvest weights refer to dry weight or include shells.

While the Nutgrower's Manual provides some data on the age of productive trees and the tree list provides data on planting years, these were not further analyzed; calculations use average figures and should be seen as rough estimates.

Questionnaire

A questionnaire (see appendix 2) containing five questions regarding food producing perennials in Malmö, including nut, fruit and berry producing trees and shrubs, was sent to urban planning professionals working in the city.

Two responses were received which were regarded as insufficient to make prognostications and conclusions from. But the answers were well thought-out and highlighted both opportunities and challenges concerning the viability and potential of nut trees, fruit-trees, berry bushes and other food producing perennials. These answers will support the analysis section.
The questions and answers can be found in (appendix 2). The names and titles of the respondents will be omitted for privacy reasons and they will be referred to as respondent one and respondent two henceforth.

Disclaimer

The use of the term "food-producing perennials" turned out to be a bit too vague. The intention of the term was for it to encompass not only nut trees, which in hindsight would probably have been a suitable delimitation, but also consider fruit trees, berry bushes and other food-producing plants that could in theory replace many non-food-producing species in the general UGS planning and the comprehensive tree plan in Malmö.

Most answers from respondent one, therefore, came to revolve around the advantages and disadvantages of more general UA concepts like community gardens. Problematizing them in relation to other spatial elements like playgrounds, "space for recreation", and dog parks. However, these features could be, and are, located underneath the canopy of trees. Therefore some answers will be disregarded.

Some aspects of the misinterpretation, or rather, non-suitable use of terms in the questions, shone a light on other aspects that can, just as well, be discussed in relation to nuts, fruits and berries growing on trees and shrubs on public land. These answers had to do with theft, vandalism, right to harvest, and who bears the responsibility of the quality of produce. These aspects will be discussed in the analysis.

Results and analysis

This section will disclose and analyse the results from the calculations, and the questionnaire.

Results from the Calculations

The trees in the list contained all trees located on public land in Malmö. The number of trees in this list is 89.140. From this list, 988 nut bearing trees from nine species were found and analysed for their potential yield, to estimate the number of people they might sustain according to DRI of kcal as well as DRI of nuts per person per year. The complete calculations are available in the appendix (see appendix 1).

Species	Number of Trees	Estimated number of people getting 100% of their DRI of kcal per year
Araucaria araucana (Monkey Puzzle Tree)	5	0,3
Carya illinoinensis (Pecan Nut Tree)	4	1,42
Castanea sativa (Sweet Chestnut)	134	15
Corylus avellana (Common Hazel)	121	7,8
Corylus colurna (Turkish Hazel)	257	24,2
Juglans cinerea (Grey Walnut)	12	1,8
Juglans nigra (Black Walnut)	107	56,7
Juglans regia (Persian Walnut)	281	167,8
Prunus dulcis (Almond Tree)	67	6,5

Table 2: Results from calculation 1. Showing the number of each tree and the estimated number of people that might be sustained for one year

The first calculation was meant to investigate how many people that could potentially source 100% of their DRI of kcal (averaged to 2400 per person) for one whole year until the next harvest season, from only the nut trees curerntly growing in Malmö. The intention was to illustrate the nutritional density of different nuts and how, if they were prioritised, they could constitute a foundation of urban food security in the event of societal crises that might disrupt supply chains from near and far.
These results show that persian walnut (*Juglans regia*) is currently the most common nut-tree species in Malmö, and from the harvest volume and nutritional value tables it is found that it has the best kg/year to kcal/100g ratio. Societal crises like these are highly unlikely and events that would require people to

sustain themselves solely on nuts even more unlikely. But the calculation might inform which of the species should be of highest priority if the goal is to increase food security.

Calculation ID	Number of trees	Percent of trees	Average DRI kcal per day	Average DRI nuts per day	Number of people	Percent of population
1	988	1,1%	2400kcal	n/a	281,5	0,078%
2	988	1,1%	n/a	25g	3.952	1,098%
3a	17.828	20%	n/a	25g	71.312	19,81%
3b	44.570	50%	n/a	25g	178.280	49,52%
4a	24.760	20%	n/a	25g	99.044	27,51%
4b	61.901,5	50%	n/a	25g	247.606	68,78%
5	61.901,5	50%	600kcal	n/a	55.319	11,06%
Legend	Based on the tree list (89.140)		Based on the comprehensive inventory (123.803)	Based on current population (360.000)	Based on Projected population by 2050 (500.000)	

Table 3: Results from "calculations 1-5" and showing the combined result from calculation 1

Calculation number two investigated how many people might be able to meet their DRI of, specifically, nuts according to the Swedish Food Agency. This result showed that, from the nut trees currently growing on public land in Malmö, which makes up approximately 1,1% of the total number of trees in the list, 3.952 people could theoretically meet their DRI of nuts for an entire year.

The next three calculations use the number of trees from the comprehensive tree inventory. Since the full species list was unavailable, the species selection, and thus the average production and nutritional values, remained unchanged, though the inventory may include additional species. The final calculation again investigated how many people might potentially be sustained on the basis of DRI of kcal. However, this scenario imagined that only 25% of the DRI of kcal came from nuts. It assumed the comprehensive inventory tree count and envisioned a nut-tree proportion of 50%. It also assumed the projected future population of 500.000 people by 2050. This resulted in 55.319 people, or 11%, of the population, being able to source 25% of their DRI of kcal from nuts only. Once again this is probably not adviceable for many different reasons, but if emergency calls...

Questionnaire Generals

Both respondent one and two indicated that Malmö does incorporate food-producing perennials in urban planning, though not extensively. Respondent two states that selection of woody perennials like fruit and nut trees are sometimes prioritized over purely aesthetic choices, mostly in locations where maintenance issues from fruits or nuts would be considered low. The maintenance of food-producing trees and bushes need not differ much from the maintenance of non food-producing species provided that species are well-matched with their planting locations. The responses suggest that expanding the use of nut trees, fruit trees, and berry bushes in Malmö's urban environment is both feasible and beneficial for food security and social cohesion.

Opportunities

Respondent two believes that the integration of more edible perennials like nuts, fruits and berries, could be a significant asset to food security during societal crises that might disrupt supply chains. They could also strengthen civil society and community resilience even outside of crisis scenarios. Respondent two also shared a more optimistic aspect of a warming climate, stating that increased temperatures might increase the availability of suitable food-producing species including exotic fruits and more sensitive nut-varieties. Respondent one also acknowledges potential long-term benefits if more food-producing perennials are planted, especially in light of future needs and possible societal disruptions.

Respondent two believes that Malmö's residents would make use of an increased access to free food in urban landscapes, as this is already occurring in some locations. But perceived negative consequences include damage to plants from careless harvesting and the risk of increased food waste attracting rats and other species considered as pests.

Challenges

While respondent one answered the questions mostly from the perspective of community gardens and more traditional UA, they highlighted some challenges that are interesting to apply to the concept of urban food forestry as well. These challenges included theft, vandalism, policy considerations, and potential toxins in the ground and air that might affect the edibility of fruits, nuts and berries.

According to the Swedish environmental agency (Naturvårdsverket) harvesting nuts from living trees is excluded from the right to public access (Allemansrätten), even on public land, without the landowners permission (Naturvårdsverket, 2021, p. 39). However, it is allowed to pick a small amount, maybe 25g or so, from the ground. But this would likely be difficult to enforce in the urban landscape.

One of the most challenging aspects of food-producing species in the urban environment are potential soil and air contaminants affecting the quality of the produce. Various heavy metals and toxic organic compounds like aflatoxins have been associated with nuts, fruits and berries even outside of the urban environment (Bielecka et al., 2021; Ebrahimi et al., 2022), and respondent one stated that “there are many contaminants in the ground”.

Discussion

This section discusses and ties together the results from the literature review, the tree list analysis and the questionnaire.

Food Security and Crisis Preparedness in Sweden

Since the end of the Cold War, Sweden's approach to food security has shifted significantly. The country moved from a state-led system with large government food reserves to a market-based model that relies on private businesses, international trade, and EU solidarity to ensure food supplies during emergencies. As a result, Sweden's food self-sufficiency has dropped from around 75% in the early 1990s to about 50% today (Stewart, 2021). The nation is now highly dependent on food imports and imported agricultural inputs, such as machinery and fertilizers, and is only fully self-sufficient in a few products like carrots, sugar, and cereals (*RISE Research Institutes of Sweden*. n.d).

This heavy reliance on global supply chains leaves Sweden vulnerable to disruptions caused by crises, conflicts, or logistical failures. Recognizing these risks, the Swedish Civil Contingencies Agency (MSB) distributes the "In Case of Crisis or War" brochure to every household, encouraging citizens to prepare for potential shortages and highlighting the importance of both individual and collective resilience. This initiative underscores the urgent need for increased domestic food production and local preparedness to strengthen Sweden's food security in uncertain times (MSB, 2024).

In addition to these vulnerabilities, Sweden's dependence on imported food has significant environmental implications. Much of the environmental impact associated with Swedish food consumption, such as greenhouse gas emissions and land-use change, occurs outside the country due to imports. While Swedish agriculture is relatively sustainable, the environmental effects of food imports, including deforestation and pollution, are outsourced to other countries. This situation highlights the importance of developing policies that address not only national food security and sustainability but also the global environmental consequences of Swedish food consumption (Cederberg et al., 2019).

Crisis as Opportunity: Lessons from Dutch Elm Disease in Malmö

The outbreak of Dutch Elm Disease (*Ophiostoma novo-ulmi*) dramatically altered Malmö's urban landscape, decimating one of the city's most prominent tree species and significantly reducing canopy cover (Suneson, 2020). This crisis, along with the introduction of other pathogens and ongoing challenges such as climate change and urbanization, prompted Malmö to fundamentally reconsider its approach to urban green space (UGS) planning and sustainable urban development (SUD) strategy (*International Society of Arboriculture, 2015*).

Malmö is widely recognized for its ambitious sustainability goals and aims to become one of Europe's leading climate-neutral cities. In partnership with the EU's "NetZeroCities" program, Malmö and Copenhagen are working to establish one of the world's first cross-border climate-neutral zones (City of Malmö, 2023). Central to Malmö's sustainable urban development plan is a comprehensive tree strategy guided by two key principles (Malmö Stad, 2024a).

The first, the "10-20-30" rule, limits plantings to no more than 10% of any single species, 20% of any genus, and 30% of any family, reducing vulnerability to pathogens by promoting diversity (Santamour, 2002; Malmö Stad, 2024a).

The second, the "3-30-300 rule," sets targets for urban greenery: every resident should see at least three trees from their home, school, hospital, or office; a minimum of 30% tree canopy cover should be distributed across all neighborhoods; and every point in the city should be within 300 meters of a park or green space of at least one hectare. Introduced by Cecil C. Konijnendijk (2022), this evidence-based guideline has become a global benchmark for creating greener, healthier, and more resilient urban environments (Croeser et al., 2024; Lahoti et al., 2025; Vesuviano et al., 2025).

Since 2020, Malmö has been recognized as a "Tree City of the World" by the UN FAO and Arbor Day Foundation, reflecting its commitment to developing urban tree infrastructure and promoting the value of green spaces (Tree Cities of the World, n.d.; Malmö Stad, 2024b). The city aims to plant 1,000 trees from 50 different species annually, targeting at least 25% crown cover and a total of 1,000 species citywide, with a particular focus on under-canopied districts. Currently, Malmö's crown cover is 15.6%, though distribution remains uneven, with some districts exceeding 30% and others having almost none (Malmö Stad, 2017; Malmö Stad, 2024a). Malmö's experience demonstrates how crises can drive innovation in urban planning. The city's response to Dutch Elm Disease went beyond simply replacing lost trees; it prompted a rethinking of species diversity and resilience in the urban landscape.

Challenges to Urban Food Forestry

While food-producing trees and shrubs offer many benefits to urban landscapes, several important challenges must be addressed. The foremost concern is soil contamination, which can affect the safety of nuts, fruits, and berries and pose public health risks, a problem highlighted in numerous studies referenced in this thesis. Research on four nut tree species included in this case study (almonds, hazelnuts, pecans, and walnuts) shows that these trees can absorb heavy metals such as cadmium, arsenic, lead, and mercury, with uptake levels varying by species. For instance, pecan nuts (*Carya illinoinensis*) from the United States were found to have significantly elevated lead content (Bielecka et al., 2021). Although this study did not specifically examine urban-grown nuts, it indicates that contaminated urban soils could similarly compromise nut quality.

Additionally, many nuts are susceptible to toxic organic compounds produced by aflatoxin-producing fungi. Aflatoxins are potent carcinogens strictly regulated worldwide, and their risk increases with improper harvest and storage (Ebrahimi et al., 2022). Addressing aflatoxin risks in Malmö's future food forests will require new policies for monitoring contamination and educating the public on safe nut harvesting and storage (Ebrahimi et al., 2022; Petroczi et al., 2011). Both questionnaire respondents also noted that more food sources could attract rodents and pests, necessitating further research and proactive prevention strategies. Despite these challenges, urban planners should not be discouraged from integrating food-producing species. Ensuring clean soils and fostering public awareness can help mitigate health risks, while eager nut-picking by residents may reduce nuts as a food source for rodents.

Opportunities of Urban Food Forestry

Due to the loss of urban tree cover in Malmö from pathogenic pressures, and the city's comprehensive tree plan to restore it, Malmö now has a unique opportunity to shape the future composition of its urban canopy. Rather than replacing individual trees, the city can strategically select a diverse range of species in a short period. By shifting focus from ornamental trees to species that provide sustainable and regenerative calories, Malmö's future canopy could significantly enhance stormwater retention, biodiversity, pollution reduction, recreation, education, aesthetics, <u>and food production</u> (Clark & Nicholas, 2013; Malmö Stad, 2024a).

Currently, only 8% of Swedish adults and 1% of adolescents meet the recommended daily intake of nuts. Expanding opportunities to forage for healthy, nutritious, and free nuts within urban environments could improve public health and reduce the environmental footprint associated with food imports (Livsmedelsverket, 2025b; Oncini et al., 2024).

Responses to the questionnaire indicate that while the integration of food-producing perennials is occurring in Malmö, it remains limited. This finding aligns with the nut species selection results and is echoed in the UNECE guide (2024), which notes that food forest projects are rarely incorporated into city or national policies for urban green infrastructure. Nevertheless, both respondents acknowledged the potential of food-producing perennials to enhance urban food security and ecosystem services, even if their enthusiasm and definitions varied. These perspectives, supported by the study's calculations and the systematic literature review by Thwaites et al. (2025), reinforce the multiple beneficial aspects of urban food forestry.

Taken together, the literature review, case study calculations, and questionnaire responses demonstrate significant potential for nut tree-based food production in Malmö's urban landscape. Simply adjusting the current tree plan to prioritize nut trees would provide a strong foundation for broader policy and management efforts to improve food resilience and public health. Such an approach would further strengthen Malmö's reputation for progressive sustainable urban development and climate policy (International Society of Arboriculture, 2015; City of Malmö, 2023).

Limitations of the study

As partly stated in the methods section, this study has multiple limitations. First and foremost are the potential harvest volumes used to make the calculations. These volumes are subjected to many different variables including weather, planting location suitability, variety selection, and many more.

It assumes the averages of the stated harvest volumes described in the Nutgrower's Manual (2022), but this book does not specifically target urban trees.

Furthermore, the main literature sources used to argue the importance, potential and beneficial aspects, as well as the challenges of urban food forestry, have all been largely in favour of the planning concept. They are published in reputable journals or come from reputable organizations. However, since this urban planning concept is still rather niche and not broadly utilized, only few examples exist that might inform suitable practices, meaning more research and policy developments are needed.

Conclusion

This thesis has tried to describe many concepts, including food security, sustainable urban development, human nutrition, urban green space design and planning and historical aspects of these concepts to the best ability of the author, but every one concept is, of course, a whole field of research unto itself, and making general recommendations or conclusions will require much more research and evaluation before broad application can be considered. This thesis, then, serves more as a broad investigation into the potential food production capabilities of adjusted urban forestry plans. However, the current geopolitical instability, climatic instability and run-away species extinction, , especially considering expanding urban populations.

Research Answers

What level of food security can the nut trees currently growing in Malmö potentially provide its citizens?
Answer: Currently they could potentially meet the complete yearly requirement of kilo calories for 281 people, but this would not be very healthy. Instead, the nut trees currently growing on public land in Malmö could potentially sustain the average daily recommended intake of nuts (25 grams) of 3.952 people for one year.

How would an increased proportion of nut trees raise this level?
Answer: If the proportion of nut trees were increased by 20% or 50% according to the two scenarios (calculations 3a, 3b) the number of people potentially meeting their yearly requirements of nuts would increase to 71.312, and 178.280 people respectively. This proportional increase in nut trees coincidentally scaled very close with the proportion of the city's population that they could sustain. Furthermore, in scenarios 4a and 4b, 20% and 50% the comprehensive tree inventory number of trees in malmö (123.803) was used to alter the number of nut trees in the calculation. This resulted in 99.044 and 247.606 people sustained for a year. Finally, scenario 5 again investigated the number of people getting 25% of their daily recommended kilo calories from nuts using a proportion of nut trees of 50% of the comprehensive tree inventory tree count. This resulted in 55.319 people partially sustained for one year.

How can Urban Food Forestry matter for sustainable urban development?
Population growth, urbanization, geopolitical instability, climate change, and species extinction are all incredibly relevant societal problems that particularly affect growing urban populations. These challenges demand an extensive redesign of the current development strategies across the globe, in all economic, social and ecological aspects. Urban Food Forestry can add the important provisioning ecosystem service of food-production, to the long list of other benefits provided by trees in urban environments. A contribution that might prove important as these societal challenges heat up.

Further Research

Given the seriousness of the current geopolitical and global-local environmental challenges humanity is faced with, every potential solution to sustainable urban development and food security should be considered.

Malmö is already exceptionally ambitious regarding its tree plan and its general commitment to sustainable development and by slightly adjusting the current tree plan in favour of more food-producing species, the city might become a global leader in yet another innovative and holistic UGS planning paradigm.

More research is, however, needed into most topics reviewed in this document. Soil contamination and pollutant uptake by nut trees, rodent prevention and policy development are the most pressing topics identified in this thesis that need further inquiry. Another important aspect needing attention is the systematic investigation of nut-tree species that are suitable for the urban environment.

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Appendix 1: Calculations

Calculation nr 1a – 1i.

How many people can currently be sustained for a year from each nut-tree species in DRI of kcal?

The Swedish Food Agency's (Livsmedelsverket) daily recommended intake (DRI) of Kilo Calories (kcal) vary depending on gender, age, and lifestyle (Livsmedelsverket, 2024a). This calculation will assume the average value as 2400kcal per person per day.

The calculation inserts the number of trees from each species in successive calculations. Then, this number will be multiplied with the estimated yearly production (in kg) of the same species. Then the kcal per 100g of the species will be multiplied by ten in order to convert this value to kg. Then the kcal per kg is multiplied with the estimated yearly production volume of the species. The DRI per person is then multiplied by 365 to find the DRIkcal per year. Finally, the total annual production of kcal is divided by the annual DRI requirements to find out how many people could be sustained for one year.

$$\text{(number of trees) x (yearly prod. in kg)} = \text{(total yearly prod. in kg)}$$
$$\text{(Kcal per 100g) x (10)= (kcal per kg)}$$
$$\text{(kcal per kg) x (total yearly prod. in kg)} = \text{(total yearly prod. of kcal)}$$
$$\text{(DRIkcal per person)x (365)} = \text{(DRIkcal per year)}$$
$$\text{(total yearly prod. of kcal)} \div \text{(DRIkcal per year)} = \text{(number personyear)}$$

Calculation nr 1a – 1i.

Araucaria araucana (Monkey Puzzle Tree) = 0,3 people fed for an entire year

$$5 \text{ x } 18\text{kg/year} = 90\text{kg/year}$$
$$297{,}1 \text{ kcal/100g x } 10 = 2.971 \text{ kcal/kg}$$
$$2.971\ x\ 90\text{kg/year} = 267.390\ kcal$$
$$2400\ kcal/person \text{ x } 365 \approx 876.000 \text{ kcal/year}$$
$$267.390 \div 876.000 \approx 0{,}3$$

Carya illinoinensis (Pecan Nut Tree) = 1,42 people fed for an entire year

$$4 \text{ x } 45\text{kg/year} = 180\text{kg/year}$$
$$691 \text{ kcal/100g x } 10 = 6.910 \text{ kcal/kg}$$
$$6{,}910\ x\ 180 kg/year = 1.243.800 kcal/year$$
$$2400\text{kcal/person x } 365 \approx 876.000 kcal/year$$
$$1.243.800 \div 876.000 \approx 1{,}42$$

Castanea sativa (Sweet Chestnut) = 15 people fed for an entire year

$$134 \text{ x } 50\text{kg/year} = 6700\text{kg/year}$$
$$196 \text{ kcal/100g x } 10 = 1960 \text{ kcal/kg}$$
$$1.960 \text{ x } 6.700\text{kg/year} = 13.132.000 \text{ kcal/year}$$
$$2400\ kcal/person\ x\ 365 \approx 876.000\ kcal/year$$
$$13.132.000 \div 876.000 \approx 15$$

Corylus avellana (Common Hazel) = 7,8 people fed for an entire year
121 x 9kg = 1089kg/year
628 kcal/100g x 10 = 6.280kcal/kg
$6.280\ x\ 1089 kg/year = 6.838.920 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
6.838.920 ÷ 876.000 ≈ 7,8

Corylus colurna (Turkish Hazel) = 24,2 people fed for an entire year
257 x 15kg = 3855kg/year
550 kcal/100g x 10 = 5.500kcal/kg
$5.500\ x\ 3.855 kg/year = 21.202.500 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
21.202.500 ÷ 876.000 ≈ 24,2

Juglans cinerea (Grey Walnut) = 1,8 people fed for an entire year
12 x 22kg = 264kg/year
612 kcal/100g x 10 = 6.120kcal/kg
$6.120\ x\ 264 kg/year = 1.615.680 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
1.615.680 ÷ 876.000 ≈ 1,8

Juglans nigra (Black Walnut) = 56,7 people fed for an entire year
107 x 75kg = 8025kg/year
619 kcal/100g x 10 = 6.190kcal/kg
$6.190\ x\ 8.025 kg/year = 49.674.750 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
49.674.750 ÷ 876.000 ≈ 56,7

Juglans regia (Persian Walnut) = 167,2 people fed for an entire year
281 x 80kg = 22.480kg/year
654 kcal/100g x 10 = 6.540kcal/kg
$6.540\ x\ 22.480 kg/year = 147.019.200 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
147.019.200 ÷ 876.000 ≈ 167,8

Prunus dulcis (Almond Tree) = 6,5 people fed for an entire year
67 x 15 =1.005kg/year
579 kcal/100g x 10 =5.790kcal/kg
$5.790\ x\ 1.005 kg/year = 5.818.950 kcal/year$
2400kcal/person x 365 ≈ 876.000kcal/year
5.818.950 ÷ 876.000 ≈ 6,6

Calculation nr 2.

How many people could meet their DRI of nuts?

The second calculation was carried out to assess how many people could meet their DRI of specifically nuts. The DRI of nuts according to the Swedish Food Agency is 20-30g per person per day (Livsmedelsverket, 2024b). This calculation will assume the average (25g per person per day). It will also combine the estimated production volume of all the nut-tree species into one average (≈36,5kg per tree per year).

There are 988 nut trees in the selection. This number is multiplied with the average production volume and directly converted to grams by multiplying by 1000. The average production volume in grams is then divided the the average DRI per person (25g) to find the person-days. Finally this number is divided again by 365 to find the number of people meeting their yearly DRI of nuts.

$$\text{(all nut trees) x (average prod. vol. in kg) x (1000)} = \text{(total prod. in g)}$$
$$\text{(prod. vol. in g)} \div \text{(DRI of nuts)} = \text{(number persondays)}$$
$$\text{(persondays)} \div (365) = \text{(number personyear)}$$

Calculation nr 2.

$$988\ x\ 36{,}5kg = 36.062kg/year$$
$$36.062kg\ x\ 1000 = 36.062.000\ grams$$
$$36.062.000\ \div 25 = 1.442.480\ personDRI$$
$$1.442.480\ \div 365 = 3.952\ personDRI\ per\ year$$

Calculation nr 3a and 3b.

How many people could meet their DRI of nuts if the proportion of nut trees increased?

This calculation is similar to the previous one but investigates a scenario where the total number nut trees is increased to 20% and 50% respectively of the entire tree count in the list of 89140 trees.

Instead of the selected 988 nut trees, the full tree count in the list is inserted and multiplied by 0,2 or 0,5 to find the number of trees making up the respective proportion. Then this number is inserted into the calculation in a similar manner to the previous calculation.

$$\text{(number of trees in the list) x (0,20 or 0,50)}$$
$$\text{(20\% or 50\% of trees) x (average prod. vol. in kg) x (1000)} = \text{(total prod. in g)}$$
$$\text{(prod. vol. in g)} \div \text{(DRI of nuts)} = \text{(number persondays)}$$
$$\text{(persondays)} \div (365) = \text{(number personyear)}$$

Calculation nr 3a.

$$\text{89.140 x 0,20} = \text{17.828 trees}$$
$$\text{17.828 trees x 36,5kg x 1000} = \text{650.722.000g}$$
$$\text{650.722.000g} \div \text{25g} = \text{26.028.880 personDRI}$$
$$\text{26.028.880} \div 365 = \text{71.312 personDRI per year}$$

Calculation nr 3b.

$$89.140 \text{ x } 0{,}50 = 44.570 \text{ trees}$$
$$44.570 \text{ trees x } 36{,}5\text{kg x } 1000 = 1.626.805.000\text{g}$$
$$1.626.805.000\text{g } \div 25\text{g} = 65.072.200 \text{ personDRI}$$
$$65.072.200 \div 365 = 178.280 \text{ personDRI per year}$$

Calculation nr 4a and 4b.

How many people could meet their DRI of nuts using the number of trees from comprehensive tree inventory?

This calculation is again similar to the previous two calculations, but the number of trees is again increased but this time based on the total amount of trees in the comprehensive tree inventory of Malmö, 123.803 trees. This calculation again imagines the two proportional increases 20% and 50% and again considers the DRI of nuts.

$$(\text{number of trees in the comprehensive inventory}) \text{ x } (0{,}20 \text{ or } 0{,}50)$$
$$(20\% \text{ or } 50\% \text{ of trees}) \text{ x } (\text{average prod. vol. in kg}) \text{ x } (1000) = (\text{total prod. in g})$$
$$(\text{prod. vol. in g}) \div (\text{DRI of nuts}) = (\text{number persondays})$$
$$(\text{persondays}) \div (365) = (\text{number personyear})$$

Calculation 4a.

$$123.803 \text{ x } 0{,}20 \approx 24.761 \text{ trees}$$
$$24.761 \text{ trees x } 36{,}5\text{kg x } 1000 = 903.776.500\text{g}$$
$$903.776.500\text{g} \div 25\text{g} = 36.151.060 \text{ personDRI}$$
$$36.151.060 \div 365 = 99.044 \text{ personDRI per year}$$

Calculation 4b.

$$123.803\ x\ 0{,}50\ \approx 61.901{,}5\ trees$$
$$61.901{,}5\ trees\ x\ 36{,}5\ x\ 1000 = 2.259.404.750$$
$$2.259.404.750 \div 25 = 90.376.190\ personDRI$$
$$90.376.190 \div 365 = 247.606\ personDRI\ per\ year$$

Calculation nr 5.

How many people could meet 25% of their DRI of kcal using the number of trees in the comprehensive tree inventory?

The final calculation is similar to the first one but assumes much grander proportions of nut trees and more modest requirements for kcal per person. If 50% of all trees in the comprehensive tree list were nut trees and only 25% of the DRI of kcal is to be met, amounting to 600 kcal from nuts instead of the full 2,400 kcal. This calculation uses the average production volume from the tree species.

$$(\text{total number of trees in the comprehensive inventory}) \text{x } (0{,}50) = (50\% \text{ of trees})$$
$$(50\% \text{ of trees}) \text{x } (\text{yearly prod. in kg}) = (\text{total yearly prod. in kg})$$
$$(\text{Kcal per 100g}) \text{ x } (10) = (\text{kcal per kg})$$
$$(\text{kcal per kg}) \text{ x } (\text{total yearly prod. in kg}) = (\text{total yearly prod. of kcal})$$
$$(25\% \text{ of DRIkcal per person}) \text{x } (365) = (25\% \text{ of DRIkcal per year})$$
$$(\text{total yearly prod. of kcal}) \div (25\% \text{ DRIkcal per year}) = (\text{number of people})$$

Calculation nr 5.

$$123.803 \text{ x } 0{,}50 = 61.901{,}5 \text{ trees}$$
$$61.901{,}5\ x\ 36{,}5 kg/year = 2.259.404{,}75 kg/year$$
$$536{,}2 \text{ kcal/100g x } 10 = 5.362 \text{kcal/kg}$$
$$5.362 kcal/kg\ x\ 2.259.404{,}75 kg/year = 12.114.928.270 kcal/year$$
$$600 \text{kcal/person x } 365 \approx 219.000 \text{kcal/year}$$
$$12.114.928.270 \div 219.000 \approx 55.319{,}3$$

Appendix 2: Questionnaire Q&A

Respondent 1

Enkätundersökning om Malmö's livsmedelsberedskap i relation till stadens träd och grönyteplan

1. Enligt din erfarenhet, integrerar Malmö aktivt livsmedelsproducerande perenner i stadsplaneringen av grönområden? Och i så fall, hur och i vilken utsträckning?

   Ätbara perenner har varit en del av några enstaka projekt, som till exempel ett blomsterprogram med tema ätbart, och i stadsparken Hyllievångsparken. Vissa projekt har även planerat in stadsodlingar som ska skötas av föreningar. Det finns stort intresse för odlingslotter och nya områden har lagts till.

2. Hur tror du att integrationen av fler matproducerande perenner i Malmös befintliga stadsplanering kan påverka livsmedelsberedskapen i staden, särskilt i händelse av klimatmässiga, sociala och/eller ekonomiska samhällsstörningar?

   Det finns potentiella vinster med att ha mer matproducerande perenner i staden med hänsyn till framtidens behov.

3. Hur tror du att planerings- och skötselutmaningar skulle kunna skilja sig mellan den befintliga grönområdesplanen och grönområden planerade med högre andel livsmedelsproducerande perenner?

   Det finns intressekonflikter eftersom ytor är begränsade och det behövs ytor för rekreation, planteringar, lekplatser, andra typer av aktiviteter, hundar, mm så att en viss prioritering behöver göras. Utmaningen är vem som sköter ätbara perenner, vem som har lov att skörda, vandalism, stölder, renhållning, och vilken standard på kvalitén det ska finnas för ätbara växter, och vem som bär ansvar för risk för hälsan om miljöfarliga ämnen upptäcks. Det finns många föroreningar i marken.

4. Vilka policy- eller lagändringar skulle du rekommendera för att stödja utvecklingen av perenna livsmedelsproducerande grönområden och förbättra den övergripande livsmedelsberedskapen i Malmö?

   Fler odlingslotter och stadsodlingar där det finns tydlig ansvarsfördelning och jord med bra kvalité.
   Eventuellt satsa på nya områden och sanera marken så att man kan odla direkt i marken, men det krävs resurser.

5. Tror du att stadens invånare skulle utnyttja en ökad tillgång till "gratis" livsmedel i urbana landskap? Och vidare, kan du identifiera eventuella negativa konsekvenser som skulle kunna leda till motstånd mot sådana initiativ?

   Ja, men det finns risk för vandalism och stölder. Vem sköter matproduktionen och ansvarar för kvalitén? Om det är staden som sköter allt finns det risk att medborgare inte vill stötta produktion som inte är storskalig och mer effektiv. Om det är medborgare som sköter handlar det mest om att hitta engagerade medborgare som kan driva en odling på fritiden och sköta den så att den blir hållbar på sikt.

Respondent 2

Enkätundersökning om Malmö's livsmedelsberedskap i relation till stadens träd och grönyteplan

1. Enligt din erfarenhet, integrerar Malmö aktivt livsmedelsproducerande perenner i stadsplaneringen av grönområden? Och i så fall, hur och i vilken utsträckning?

   Svar:
   Till viss del upplever jag att man gör det, vad det gäller vedartat växtmaterial, inte till någon större utsträckning de perenna örtartade växterna. Det kan till exempel vara att välja frukt och nötträd i första hand – istället för att bara prioritera estetiska värden, på de platser där frukt/nötter inte utgör ett skötselproblem.

2. Hur tror du att integrationen av fler matproducerande perenner i Malmös befintliga stadsplanering kan påverka livsmedelsberedskapen i staden, särskilt i händelse av klimatmässiga, sociala och/eller ekonomiska samhällsstörningar?

   Svar:
   Jag tror att det kan utgöra en väsentlig beståndsdel av näringstillgången vid en krissituation med störda livsmedelskedjor. Klimatförändringar ger såklart också ännu varmare ståndorter med större möjligheter för att odla exotiska frukter och känsligare nöt/kastanjearter. Även utan en krissituation så kan denna typ av inslag av växter i de allmänna planteringarna ligga till grund för sociala utbyten tex valnötsplockardagar, gör-äppelmust-tillsammans-dagar, osv. vilket i sin tur stärker civilsamhället inför en ev händelse av kris.

3. Hur tror du att planerings- och skötselutmaningar kunna skilja sig mellan den befintliga grönområdesplanen och grönområden planerade med högre andel livsmedelsproducerande perenner?

   Svar: I grunden behöver de inte skilja sig nämnvärt förutsatt att växterna är valda för rätt plats där frukt och nötter etc inte utgör ett skötselproblem även ifall de inte blir omhändertagna. Om högavkastande odlingar önskas så krävs givetvis beskärnings- och skötselinsatser därefter.

4. Vilka policy- eller lagändringar skulle du rekommendera för att stödja utvecklingen av perenna livsmedelsproducerande grönområden och förbättra den övergripande livsmedelsberedskapen i Malmö?

   Svar: Vet ej.

5. Tror du att stadens invånare skulle utnyttja en ökad tillgång till "gratis" livsmedel i urbana landskap? Och vidare, kan du identifiera eventuella negativa konsekvenser som skulle kunna leda till motstånd mot sådana initiativ?

   Svar: Jag tror att invånarna absolut skulle fortsätta utnyttja (man gör det redan, återkom gärna till mig om du vill ha exempel på platser/bilder där det nyttjas) tillgången till gratis livsmedel.
   Exempel på negativa konsekvenser är ju oönskat slitage på växtmaterialet (knäckta grenar, avsliten bark osv) till följd av ovarsam skörd av nötter, frukt osv. Eventuellt skulle en ökad mängd fallfrukt/ej omhändertagna nötter kunna utgöra födokälla för råttor etc som i sin tur kunde utgöra ett bekymmer.

Appendix 3: Spatial distribution of trees in the list

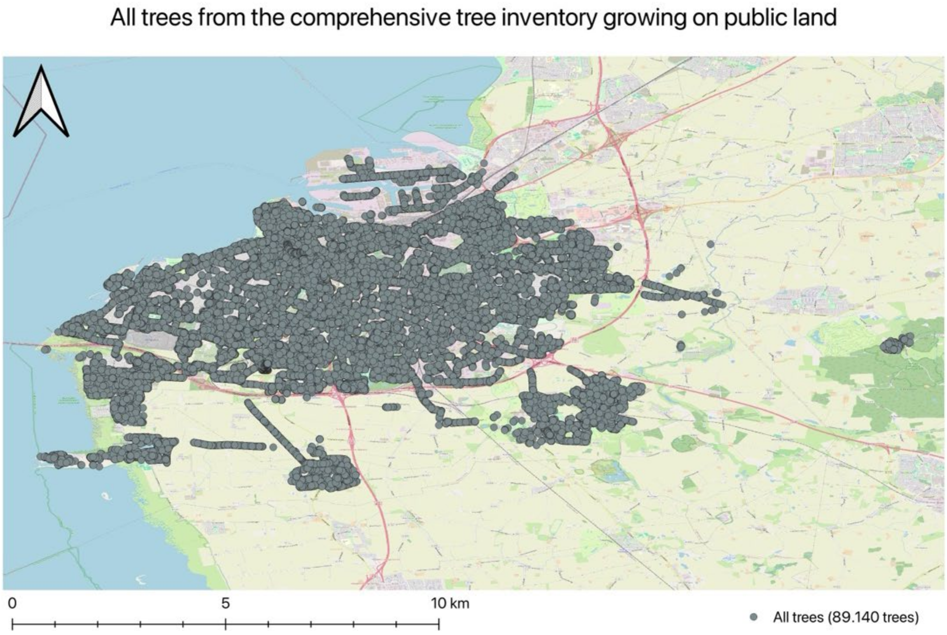

Figure 2: Spatial distribution of all trees growing on public land

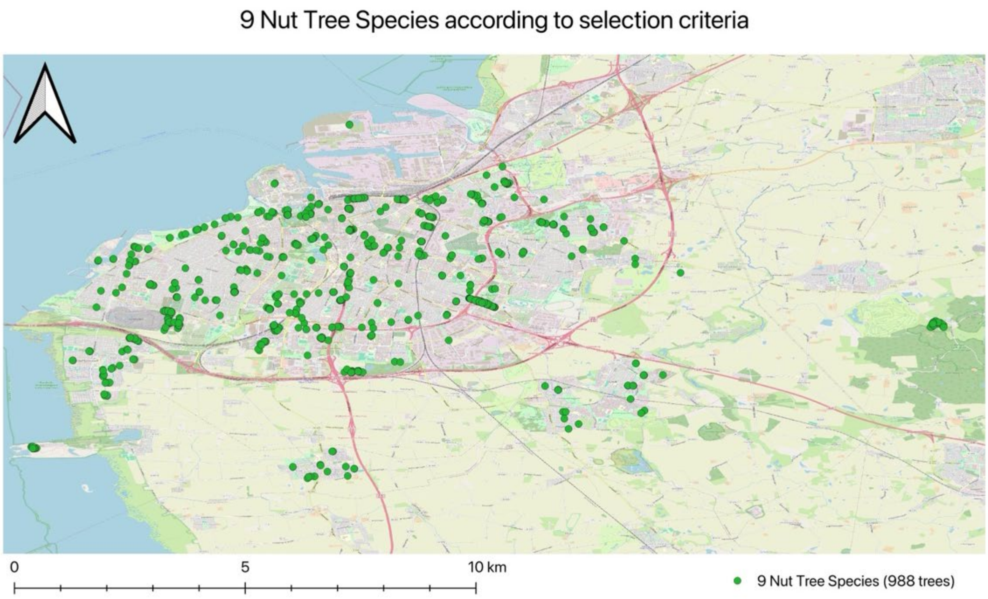

Figure 3: Spatial distribution of all nut trees growing on public land

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