



Deliverable 4.3

Lesson learned on urban gardening phenomenon

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1. Introduction

1.1 Objectives

The phenomenon of urban gardening from environmental and socio-economic point of view is a research objective in WP 4. Due to rather specific characteristics (e.g. characteristics of highly self-sufficient), the bottom up approach research which is mainly possible in this WP is most appropriate one.

The main aim was to analyse the phenomenon of urban gardening depended on local natural resources and to examine the socio-economic benefits of urban gardening beyond the provision of food and the specific positive and negative externalities that the urban gardening are bringing to their metropolitan areas.

The urban gardening phenomenon will be studied via literature review, spatial analyses of natural resources, analyses of crop growing technologies, working with focus groups and surveys with questionnaires, and will resulted in comparative analyses (i.e. Lesson learned) of the case studies.

1.2 Description of work and roles of partners

Partners (MM): DLO-1, ZALF-1, UCOV-1, UMIL-1, UL-3, UONBI-2, BV: 0.5, FOL: 0.5, D&K: 0.5, SUS: 0.5, GO: 0.5, AGR: 0.5, Gpr: 0.5, proC: 0.5

a.) Guide Physical Mapping of Urban Gardening structures and elements in case studies (CS).

In cooperation with CS leaders, we will define availability of: (1) satellite and aerial photo imagery for research areas and (2) national journals and reports in English language dealing with gardening. Further, with remote sensing we will analyse land use patterns of urban gardening structures and elements typical for individual CS. Spatial analyses will be supported with the literature and reports review and analyses. The maps will be discussed with stakeholders on the first local workshop, as well as smaller structures and elements (not possible to define via remote sensing).

b.) Develop Typology of Urban Gardening on the basis of CS.

We will develop typology based on literature review (international national literature, published in English speaking journals and reports). Analyses based on the literature will be prepared and discuss on the first stakeholder's workshop.

c.) The 10 selected stories from each CS according to a common script book complemented with pictures provided by stakeholders.

d.) Semi-structured interviews will be applied for the purpose to obtain the information on the profile of actors engaged into urban gardening. The questionnaire will be created on the basis of literature review and preliminary discussions with selected stakeholders which will enable the identification of most relevant topics of further research. Approximately 10-15 persons will be interviewed per each case study. Information obtained through the interviews will be explained in accordance with interpretative approaches established in qualitative research of social sciences and humanities like narrative data and discourse analysis, thematic network analysis, constant comparison analysis.



Figure 1: FOODMETRES project case study metropolitan regions

2. Urban Agriculture and gardening

Urban agriculture is defined as food production within and around the city. It provides an opportunity for better management of organic waste, because it has the potential to close nutrients cycles and make cities more sustainable. Chapter 2.1 to 2.4 are based on the work of Foodmetres Rotterdam Case Study report (Anastasiou A et al., 2014)

2.1 Definition and characteristics of urban agriculture

It is not easy to define urban agriculture because a large variety of urban farming systems is encountered, based on the local socio-economic, geographical and political situation (ETC, 2003). According to World Food and Agriculture Organization (FAO, 2007) urban agriculture is defined as “the growing of plants and the raising of animals for food and other uses within and around cities and towns, and related activities such as the production and delivery of inputs, processing and marketing of products”. Veenhuizen (2006), reported that urban agriculture is generally characterized by closeness to markets, competition for land, limited space, and use of urban resources such as urban organic wastes, water, and others. In this report urban agriculture is defined as: *all food production (both animals and plants) in the urban and peri-urban area.*

Farming in and around the city is not the same as farming in the rural region in many aspects. It is possible to use various agricultural inputs such as artificial fertilizers, pesticide, insecticide, water (waste and/or fresh), soil and others however it needs firm regulation and inspection. Hence, to implement urban agriculture in and around the city specific conditions/policies are required such as institutional regulations, physical infrastructure, availability of space, and others in order to expand urban agriculture as well as to avoid the potential risks of contamination of produce (Mougeot, 2000).

2.2 History and trends in urban agriculture

Urban agriculture has a long history throughout the world, but recently the phenomenon has gained more attention in several cities for various reasons (Smith *et al.*, 2001). The oasis towns of Iran are an early example of urban agriculture. The towns and cities of early civilizations on Java and in the Indus valley showed traces of urban agriculture practice (for example: raised-bed farming systems). The most important historic evidence of urban agriculture was discovered in Latin America: Aztec, Mayan, and Incan cities were self-sufficient in perishable fruits and vegetables that were produced in and around the cities (Smith *et al.*, 2001).

Each farming tradition is highly connected in local societal and cultural practices. During the 1980s and 1990s, the importance of urban agriculture increased throughout the world in both developed and developing countries. A study in Moscow in 1970 and 1991 indicated that a shift of families engaged in urban agriculture from 20% to 65%. Similarly surveys in Dar es Salaam, Tanzania in 1967 and 1991 showed an increase of urban family agriculture from 18 to 67 %. Reports from three cities such as Kinshasa, Kampala, and Maputo also indicated that a large change of urban land from open space to agricultural production. In Kenya and Tanzania, most families (three out of five families) in towns and cities are engaged in urban agriculture (Smith *et al.*, 2001).

The percentage of urban families engaged in agriculture varies from fewer than 10% (in North America) as many as 80% (in some Asian cities) (Smith *et al.*, 2001). In other cities like Cairo and London respectively 20% and 14% of the people are involved in urban agriculture. In the United States of America (USA) 25% of the households are involved in urban agriculture (Urban green-blue grids, 2014).

A survey in Bangkok found that 60% of the land was used for urban agriculture. In Havana, Cuba, one of the strongest and well established urban agriculture systems is located which covers 12% of the city area and is providing jobs for many people (Wortman and Lovell, 2013). In Berlin, more than 800,000 community gardeners are using municipal land (Deelstra and Girardet, 1987). In China, 14 big cities produced more than 85% of fresh vegetable (Urban green-blue grids, 2014). Singapore is self-sufficient in meat production and produces about 25% of the city vegetable demands (Deelstra and Girardet, 1987).

With the rise of urbanisation, agricultural production also increases within metropolitan and adjacent areas (Smith *et al.*, 2001; Deelstra and Girardet, 1987). According to UN report (2010), nowadays, 15-20% of world

food is produced in the city and this percentage will be doubled in the next 20 years. But, the development of urban agriculture farming is highly variable through the world. Urban agriculture throughout the world is changing in response to political, economic, environmental, and technological developments. Consequently, many variable forms of urban agricultural production systems exist. According to Mougeot (2000), urban farming systems can be classified by location (e.g. roof, road side, unused lots, river bank, etc), type of crops cultivated (e.g. vegetables, spices, fruits, etc), tenure modality, scale of production (e.g. commercial, community, etc) and product destination (e.g. local market, own use).

2.3 Urban gardening

Urban gardens or the so-called allotment gardens are in the world and also in Europe increasingly popular. Although this phenomenon is not new, they experience great attention from media as well as from policy makers and experts from various scientific disciplines. The beginnings of urban gardens date back to Europe in the early 18th century as a response to urbanization and industrialisation of the cities. White people immigrating at the beginning of the 19th century this habit began to spread to other continents (Irvine et al., 1999). At that time, were the main reasons for gardens in the urban areas mitigation of socio-economic hardships, poverty of the working class as well as the overall weak supply of vegetables in urban areas. The most recent "boom" in gardening is connected with solving many of the urban areas problems, which are not always related to food security but rather relate to social and health problems of the population, their limited access to green spaces and the economic and cultural revitalisation of degraded urban areas. However, the recent increased interest in gardening is also linked to the increasing concern of the population about food quality and costs as well as food insecurity and self-supply (Corrigan, 2011, Evers 2011).

Multipurpose importance of gardens is also reflected in the scientific literature of the last twenty-five years (Guitart et al., 2012). They are addressed in different fields of research: geography (28%), spatial planning and the environment (24%), society and culture (23%), health (12%), education (9%), economy (3%) and natural sciences (1%). Part of sociological papers on urban gardens in so called North (Europe, USA, Canada and Australia) discusses the concept of the so-called "Alternative food networks", where gardening (together with the farmers and consumers of locally produced foods (eg. boxes system) is treated as the opposition - environmentally conscious and advanced toward the social objective-oriented group - against the dominant neo-liberal system of industrial agriculture (Jarosz, 2008 Johnston et al., 2009, Evers, 2011, Tregear, 2011, Veen et al., 2012). However, this "alternative" movement is associated with neoliberal economy also from the opposite point of view. Critical social scientists see in urban gardens support to neo-liberal economy and politics when with their programs of voluntary activities (eg. vulnerable social groups), that include or even go beyond food production, fill the vacuum created by the withdrawal of the State's responsibility in the provision of social welfare of the population (McClintock et al., 2013, Ghose and Pettygrove, 2014). In the context of studying gardening social practices in post-socialist Europe, the authors deal with concepts such as "survival strategies of the urban poor" and "quiet sustainability" (Smith and Jehlička 2103), created in response to the thesis of Albert and Kohler (2008) about different motivations of gardeners. In Eastern Europe, this should be a lack of food supply and poverty and in Western Europe amateur (hobby) activity. Based on their findings the authors of these two concepts state that gardeners in the post-socialist countries cultivate their gardens mainly from their own need for fresh food and recreation and pleasure of socialising, and not because of "political programs and economic objectives", and certainly not because they were poor. Even more they "accidentally" contribute to favourable environmental and social impact.

This brief review of the scientific studies about garden plots shows that debate in the social sciences is very vibrant and it seems not yet completed. To a lesser extent, as already noted, were far less represented environmental aspects and natural science disciplines (Guitart et al. 2012, Taylor and Taylor Lovell, 2014). Research interest emphasises under the influence of the recently initiated discussions on the economy of "zero miles" and "zero carbon footprint" as well as assumptions about the contribution of local agri-food systems for sustainable and resilient society (Feagan, 2007; Pearson and Bailey, 2009, Toulaitos 2011). In this context, a project of the 7th Framework Programme of the European Commission FOODMETRES, which follows the program Europe 2020 in priorities of sustainable growth by promoting more efficient use of resources, includes among their studies of innovative examples also (urban) gardening plots as a form of short food chain. Urban gardening contributes to saving resources by lowering the carbon footprint for food consumption in urban areas (Wascher et al., 2013). Within the framework of this project has been carried out research on urban gardens in

FOODMETRES project case study metropolitan areas, which is presented below in Methodology, Results and Conclusion chapters.

2.4 Opportunities of Urban Agriculture

Urban Agriculture is much more than growing food. It can bring multiple benefits in health, social, economic and ecological issues. Urban agriculture enhances urban food security and nutrition, local economic development, poverty alleviation and social inclusion of disadvantaged groups and sustainable environmental management in the cities (Cohen *et al.*, 2012). Some benefits of urban agriculture are:

Health

Urban agriculture increases food security and decreases malnutrition, self-produced food in cities provides nutritious food (Bakker *et al.*, 2000). People are motivated through involvement urban agriculture to consume fresh vegetables and fruits.

Social

Urban gardens provide public space, where people have the opportunity to meet each other. They also provide recreation opportunities and aesthetic appeal to the neighbourhoods. Some host public events such as music festivals, movie screenings or barbecues (Cohen *et al.*, 2012). The contribution of urban agriculture to environmental education is also important. Many workshops are organised in urban gardens for school students and young people. Urban agriculture enhances gender equality, because many women participate in it (Cohen *et al.*, 2012).

Economic

Citizens can also have economic benefits from urban agriculture. It is a source of self-provision found to benefit households (Mougeot 2000). Local residents who grow food in their backyards or in local community gardens, they can sell it in local markets, shops, or restaurants (Cohen *et al.*, 2012). Some community gardens hire people to help them to organize the market, where they sell their products. In many cities poor people work and collect organic waste from households, vegetable markets and agro-industries in order to produce compost or animal feed. Many young people who want to develop their environmental, agricultural and food careers are trained in urban gardens (Cohen *et al.*, 2012).

Ecological

Urban gardens increase greening in the cities and promote healthy eating. Green spaces improve air circulation, reduce summer temperatures and storm water runoff in the cities (Cohen *et al.*, 2012). Urban agriculture enhances plant biodiversity in the city (Pretty *et al.*, 2005). The potential of urban agriculture to recycle wastewater and organic materials contribute to solving waste disposal problems (Smit and Nasr, 1992). Capturing and reusing water by urban gardeners reduces rainwater floods in the city. Re-using of organic waste reduces the amount of trash in the cities (Cohen *et al.*, 2012). Some of the urban gardeners turn food waste into compost for food crops production instead of using chemical fertilisers. So, they prevent problems related to the contamination of groundwater. However further studies are needed to ensure the protection of human health. An additional ecological benefit of urban agriculture is the low amount of energy spending for food packaging and transportation (Cohen *et al.*, 2012).

2.5 Challenges of urban agriculture

Even though urban agriculture provides many opportunities and benefits, there is still a knowledge gap in food crop production in urban ecosystems including risks of soil pollution, compost quality and water scarcity and security. Urban agriculture faces multiple challenges which need to be studied further (Wortman and Lovell, 2013; Cohen *et al.*, 2012).

Soil contamination is a risk for the safety of food from urban agriculture. The improvement and monitoring of the soil quality of compost is a challenge (Corey and Routley, 2013). The potential soil contaminants consist of Lead (Pb), Arsenic (As), Mercury (Hg), Cadmium (Cd) and polycyclic aromatic hydrocarbons (PAHs) in urban soils (Wortman and Lovell, 2013). Roadside soils are highly contaminated with Pb (Kay *et al.*, 2008). Studies found that most of the edible plant tissues in most species have low concentrations of Pb, but the Pb ingestion

through aerosols is still a threat for urban gardeners and farmers. However, appropriate management practices for urban gardening can reduce these risks (USEPA, 2011). PAH's in the urban soil are delivered from the atmospheric deposition, but they can be mitigated through compost amendment and other management practices (Mumtaz and George, 1995, USEPA 2011).

Vegetables produced in cities, especially on places next to intensively used roads, appeared to have high concentrations of several heavy metals. This pollution mainly comes from traffic, the area of 50 next to the roads is often heavily polluted. At distances of more than 100 meter it is considered there is no increased pollution. Air pollution is often not considered a problem for urban agriculture, because these pollutants can be washed of the vegetables before consumption (Verhaeghe, 2014). For some vegetables, especially leafy vegetables, contamination risks are still relevant because the pollutant accumulate in the leaf tissue (Van Reemst *et al.*, 2013).

Water availability and security are other challenges for urban agriculture. Climate variability and the urban heat island effect, the effect where temperatures in cities are on average higher compared to rural areas, affect water inventories (O'Neill and Dobrowolski, 2011). In cities in the USA, many food crops are irrigated with rainwater from the rooftops, grey water (waste water from non-toilet domestic activities such as showering, dishwashing, and laundry), reclaimed wastewater, and stormwater (Li *et al.*, 2009). The different water sources require the maintenance and improvement of water safety (Wortman and Lovell, 2013).

Policy about urban agriculture has to be improved for the enhancement of urban agriculture benefits as well as the reduction of the risks associated with public health and environmental hazards. Policy integration should pay attention to issues such as urban land use planning, health, waste management, social housing, slum upgrading, park and nature management (Dubbeling and Zeeuw, 2011). The improvement of urban policy and planning could enhance the collaboration of different stakeholders (Dubbeling *et al.* 2010). Many urban gardeners want to expand their growing space, this is not an easy task because many different stakeholders are involved in land ownership or there is a lack of space (Cohen *et al.*, 2012). Identifying suitable spaces for urban agriculture contributes to solving these problems (Cohen *et al.*, 2012). In some cities of the United States and in the city of Ottawa in Canada, the integration of urban agriculture into zoning by-law provides both municipal staffs and citizens with clarity about what is, and what it is not, a permitted agricultural land use within the city (Corey and Routley, 2013). Funding initiatives to establish new urban agriculture projects is an additional issue that should be included in urban policy (Cohen *et al.*, 2012).

3. Methodology for defining urban gardening

3.1 Typology criteria for selected urban gardening stories

This report includes a short description of typical urban gardens types for each of the case study metropolitan region. Description includes explanation in terms of physical location of growing space, substrate, ownership, governance, growing method and supply chain. This typology was used as certain types of urban gardens may have the same name but criteria that define this type are different in different study region

The typology of the urban gardening (UG) was based on this list of criteria. Individual case study region had to look in these criteria to define types of urban gardens.

Location of growing:

(Location = physical location of food growing space in relation to the natural soil)

- Natural soil in the open (natural soil)
- Natural soil covered in a protected structure (glasshouse, polytunnel)
- Topsoil filled in over contaminated land
- Raised beds on concrete
- Underground (tunnel)
- Wall
- Roof
- Garden floating on water
- Baskets/containers outdoor open
- Baskets/containers outdoor in a protected structure
- Indoor plants (office spaces, private spaces) in baskets/containers
- Other

Type of growing substrate:

- Natural soil
- Substrate soil based and with various renewable organic materials
- Substrate not soil based (fossil fuel based material or manufactured substances)
- Hydroponic
- Other

Legal method of growing:

- Bio-dynamic certified to legal public standard
- Organic certified to legal public standard
- Other certification scheme (public or private standard)
- Organic (not certified) e.g. following Garden Organic guidelines
- Permaculture
- Hydroponic
- Other
- No specific defined growing method

Growing in relation to other plants:

- Foraging wild plants
- In urban woodland (Forest garden)
- In urban parkland
- In urban orchard
- Agroforestry
- Together with amenity garden (art or pleasure)
- In therapy garden (horticultural therapy)

- Permaculture
- Other

Ownership of the growing space:

- Private on own land
- Private on rented land
- Community on own land
- Community on public land
- Owned
- Other

Legal (governance) type of growing activity:

- Private
- Family farm business
- Community business ownership
- Cooperate business (Ltd. Plc...)
- Pubic enterprise
- Social enterprise
- Charity or volunteer based
- Mixed form
- Other

Supply chain of the food produced:

- Urban gardening for self-supply / private consumption (subsistence)
- Urban gardening for commercial purposes
- Consumer-producer-partnerships/cooperatives
- Direct sales/marketing on-farm to the private consumer
- Direct sales/marketing off-farm to the private consumer
- Sale to regional enterprises like retail or hospitality industry (not UG)
- Sale to public procurement and public catering (not UG)
- AgroParks / Metropolitan Food Clusters (not UG)

3.2 Urban gardening socio-economic survey – semi-structured interviews/questionnaires

The purpose of this questionnaire was to analyse the phenomenon of urban gardening depended on local natural resources and to examine the socio-economic benefits of urban gardening beyond the provision of food. Additionally, the aim of this questionnaire was to get insight into specific positive and negative externalities that the urban gardening is bringing to their metropolitan areas. Questioner has 33 questions on UG and 8 questions on general typology of the gardeners. The survey was performed via internet questioners and in some cases also with on-site interviews. Questionnaire itself can be found in Annex 1 of this document.

Questions were grouped in 7 sub-groups addressing different perspectives of urban gardening:

A. About your growing space

We ask urban gardeners some questions about where they grow their own food. We refer questionnaire to the space where they grow food as a 'plot'. A plot could be their home growing space (e.g. garden or patio) or their allotment or community garden. Gardeners were also asked about, means of transfer to the plot, if they hire plot and pay rent, size of a garden and what and how much do they produce.

B. Your Growing Methods

Gardeners were asked about type of cultivation method, time spend at the garden, if they have help, type of fertilisers, and origin of seed and seedlings, use of heritage crop varieties, irrigation and water source, difficulties in growing food and how do they solve and manage them.

C. Skills and knowledge

Gardeners were asked about source of their knowledge on growing food.

D. Motivations for gardening

Gardeners were asked about how long they grow good and what inspired them, what are the reasons for growing food and if they have enough space for growing food.

E. A contribution of gardening to food supply and household budget

Gardeners were asked about proportions of households need covered by own grown food, expenditure or costs per year for growing food and sharing growing surpluses.

F. The impacts of home growing

Gardeners we asked about influence of gardening on intrapersonal relationships, socialisations, skills, environment, water quality, growing methods, healthiness and taste of own grow food and appearance of the area.

G. About you and your household

Gardeners were asked about household number of family members, budget earmarked to food supply, yearly income, other sources of food, do the by organic or conventional food, if they are part of any association, what do they do in spare time, gender, age, ethnic group, education, working status, type of job and housing type.

3.3 Urban gardening agro-economic analysis methodology

We evaluated economic impact of urban gardens in four urban centres of metropolitan regions (Ljubljana, London, Milano and Nairobi). We included in to the analysis 221 garden plots – 127 from Ljubljana, 42 from London, 42 from Milano and 10 from Nairobi. In the case of London we also included data gathered via current project called Harvest-o-meter.

- (1) Firstly we calculated area of an average garden from the data gathered with questionnaires.
- (2) Questionnaires supplied us with data on vegetable varieties grown in an average garden (kg, m²). We extracted 5 to 10 most grown vegetables by an area in an average garden and calculated share of each. Then we calculated average annual harvested yield in kg per m² for each of the most common vegetables. This enabled us to multiply share and average yield of most common vegetables in to Yield in kg per area of average garden.
- (3) In the third step we obtained average retail prices in EUR per kg for most common vegetables from statistical office.
- (4) In the fourth step we calculated revenue, cost and gross margin for average garden size.

Revenue for average garden (EUR/year) was calculated by multiplying yield (kg per average garden) and retail price (kg).

Cost of gardening production were gathered from questionnaires (total cost for garden per year) or estimated via agricultural production calculation manual for individual vegetable (multiplication between costs in euros per m², share of vegetable (%) and area of average garden).

Gross margin in euros per average garden was calculated as total revenue (EUR) multiplied by total cost (EUR).

- (5) Fifth step is recalculation of revenue, cost and gross margin number to arbitrary area 1 m², 100 m², 1 ha, municipality designated area for gardening or total gardening area observed from aerial images. This numbers give us a powerful tool to estimate influence of urban gardening on food supply chain in metropolitan cities.

Table 1: Example of spreadsheet for calculation of gross margin for urban gardening (*number are fictional*)

1) Area (average by questioner)						
By type of vegetable gardens	Allotment garden		Private houses			Average
Area (m2)	100		100		=	100
2) Crops/vegetable (average for interviewed gardeners in 2014) (TOP 5-10 vegetables)						
Average most common varieties in gardens	tomato	potato	salad	carrot		
Share (%)	10	40	40	10		
Yield average annual harvested (kg/m2)	7	4	6	4		
Yield (kg per area of average garden)*	70	160	240	40		
*Yield = Average Area × (Share/100) × Yield (kg/ m ²)						
3) Retail price (statistical average in 2014) (Statistical office data for TOP 5-10 vegetables)						
Price by vegetable (€/kg)	1	0.5	1	1.2		
4) Calculation for average garden (100 m ²)						
Revenue						
Varieties	tomato	potato	salad	carrot		
Revenue by veg. var. (€/year)*	70	80	240	48		
Revenue total (€/year)	= 438					
*Revenue = Yield × Price						
Costs (€/m2 year) (interviews; other option - agricultural production calculation manual for your country – usually used for direct payments when farmers apply for investments on the farm)						
seedling plants of tomato: seeds potato: seedling plants of salad: seeds carrot: fertiliser: plant protection	0.48 : 0.25 : 0.22 : 0.09 : 0.034 : 0.15					
Costs by varieties (€/year)*	4.80 : 10 : 8.8 : 0.9 : 3.4 : 15					
Costs total (€/year)	= 42.9					
*Costs= Area × (Share/100) × Costs (€/m ²)						
Gross Margin (Coverage) (€) per 100m ²	= 395.1					
*Gross Margin (Coverage) = Revenue total – Costs total						
5) Calculation for the Metropolitan Region gardening area (50 ha) - EXAMPLE						
Area of calculation →	1 hectare		50 hectares			
	€/ha		€/50 ha			
Revenue €/year	43,800		2,190,000			
Costs €/year	4,290		214,500			
Gross Margin (Coverage) €/year	39,510		1,975,500			

4. Results by Case Study Metropolitan Region

4.1 Berlin Metropolitan Region (BMR)

4.1.1 Typology of urban gardening in Berlin

<p>1. Home gardens pertain to the land (private or public) situated nearby the detached houses or multi-apartment houses in the city area. Its cultivation is organised and maintained individually by the dwellers of indicated houses. As a rule, the use of this land is free of charge, often private owned by the user. New projects of urban gardening are also supported by larger housing administration companies that support creation of community gardens by the tenants.</p>	 <p>Creation of a raised bed community home garden in Berlin multi apartment housing</p>
<p>2. Garden plot away from home on public land is situated on various areas at the city fringe. The owner of that land is the city - local authorities. For a new form of professionally trained community gardens – so called self harvesting gardens, the local authorities give contracts for use to young entrepreneurs with agricultural education, who prepare the basic tillage and seeding and rent subplots to community members. Training and maintenance services are offered. The renting contract between local administration and city farmer is limited to several, the contract between farmer and gardeners to one year. The latter secures seasonal food supply for a couple or small family.</p>	 <p>Bauerngarten (www.bauerngarten.net) as one very successful example of a self harvesting initiative with certified organic gardening.</p>

<p>3. Garden plot away from home on private land is situated on various areas within the city or at the city fringe. Allotment gardening is a traditional form going back to the beginning of the 19th century. Legal basis is formed by national (BKleingG), 28. Februar 1983 (BGBI. I S. 210) and 19.9.2006 (BGBI. I S. 2146). With rd. 3.000 ha they hold a share of rd. 3 % of the total urban area, out of which 75% are owned by the Berlin State. Users have to pay a rent.</p>	 <p>Allotment garden in Berlin, a parcel with hut.</p>
<p>4. Garden plot away from home on the land of the other owners (e.g. temporarily unused plots, post-industrial plots, set aside land...) is situated in the city centre in gaps between buildings or temporarily abandoned land. The owner of land is either the city - local authorities, the state or business entities which however do not take any part in organising and maintaining such land areas. Since the land is abandoned its usage is not charged and paid by their users (e.g. guerrilla gardeners), or rented under short term conditions (one year). Generally this type is run as community garden with sub types like intercultural gardens.</p>	 <p>Prinzessinnen Garten, a temporary multicultural garden in the centre of Berlin Kreuzberg, developed quickly to a famous spot with high presence as well in neighbourhood as in media.</p>
<p>5. Other: eventual other types of garden plots, please specify: (Semi-) professional gardening in the very near proximity to individual dwellings, often accompanied by intense contact between gardener/ farmer and dwellers. Often coming across with social gardening (care, voluntary or rehabilitation). Primarily occurring at the fringe, kind of transition form from peri-urban farming.</p>	 <p>Horticultural use in the discontinuous urban settlement pattern of Potsdam by Berlin.</p>

4.1.2 Map of urban gardening areas in the urban area of Berlin



Figure 2: Allotment gardens (UA Type 3) and green spaces in Berlin (2011) in total 3,018 Hectares.

Table 2: Allotment gardens of Berlin (State in April 2013)

Local administration unit	Allotment gardens			amongst those, covered by construction planning		
	in total					
	Units	Parcels	ha	Units	Parcels	ha
Mitte	31	2,031	65.2	15	939	31.3
Friedrichshain- Kreuzberg	2	122	4.1	1	47	1.2
Pankow	92	10,508	499.6	0	0	0
Charlottenburg- Wilmersdorf	114	8,653	300.5	5	382	10.6
Spandau	77	4,373	185.3	21	1,113	42.4
Steglitz-Zehlendorf	78	5,545	198.1	27	3,152	112.5
Tempelhof- Schöneberg	93	7,072	239.1	24	1,579	61.5
Neukölln	91	9,442	391.4	6	352	14.4
Treptow-Köpenick	159	9,245	407.4	3	148	6.4
Marzahn-Hellersdorf	41	3,324	171.9	2	848	44.1
Lichtenberg	58	6,271	286.8	4	136	6.5
Reinickendorf	89	6,848	269.1	26	1,997	83.2
Berlin Total	925	73,426	3,018.3	134	10,693	414.1

Data reference: <http://fbinter.stadt-berlin.de/fb/index.jsp?loginkey=zoomStart¢er=22266,23060&width=7000&height=7000&mapId=kleing@sensstadt>



Figure 3: Urban gardening (UA Type 4) in Berlin

4.1.3 Selected urban gardening stories from Berlin

1. Berolina tenants Urban gardening 2.0 project

Tenants from a block of flats owned by the Apartment administration company “Berolina” in Berlin followed a call for urban gardening initiatives funded in the context of the science year 2012. With their idea for a multi-generation community garden they won the competition and learnt how to build a group of raised seed beds (galions system), and became trained in basic principles of gardening, e.g. neighbourhood effects between vegetable varieties or composting. Main crops produced are herbs, salads, tomatoes, green beans, chard beet and strawberries. The herbs and vegetables are grown in a community activity and used for self-supply. The initiative continued on their own based on the acquired knowledge with a gardening project for children in cooperation with two kindergartens in the neighbourhood. The costs for the gardening project were in total 2000 Euro.

<http://projekt.will-pflanzen.de/index.php/aktion/nachbarschaftsgarten>

<http://projekt.will-pflanzen.de/images/dokuberolina1.pdf>



2. “Bunte Beete”, as a representative for others like Prinzessinnengarten, Almende Kontor, Laskerweise

Like the majority of urban gardening initiatives in Berlin, also “**Bunte Beete**” (colourful plots) has negotiated a contract for temporary use of a set aside plot of land near a school with the district government. Run since year 2003 as an intercultural garden, spaces for community use and for individual use coexist. Community activities created recreation spaces, compost piles and a clay oven for baking bread. EU funds contributed to the plantation of hedgerows and orchards. Organic production is obligatory, and aims at high diversity in varieties. Plots are managed individually, for self-supply mainly. Rd 30 gardeners share the garden area of 1200 m² within which rd. 400m² are used for vegetable growing. The initiative is financed by membership fees.

<http://buntebeete.wordpress.com/>,

<http://www.stadtacker.net/Lists/Projekte/DispFormNew.aspx?ID=13&Source=http%3A%2F%2Fwww.stadtacker.net%2FLists%2FProjekte%2FPraxisprojekte.aspx&ContentTypeId=0x01009B1DA313FC5863489D81C5632375B24900EF01BE6446BCCF43BDA988F3AC2AF79E>

<http://www.stadtacker.net/Lists/Projekte/Praxisprojekte.aspx?FilterField1=Bundesland&FilterValue1=Berlin>



3. “Ton Steine Gärten”

An example for the progressing formal establishment of a community garden on previously occupied or used land under unclear legal situations is the intercultural community garden **“Ton Steine Gärten”** in Berlin Kreuzberg (photo: another world is plantable).

The garden with an area of 2100 m² exists since 2007, 40-60 gardeners are actively participating in the production of vegetables, herbs and flowers for self supply only.

Civic participation in governance and planning of integrated greening concept for the area runs since 2007

(<http://bethanien.stadtteilausschuss-kreuzberg.de/>)

<http://gaerten-am-mariannenplatz.blogspot.de/>

<http://www.stadtacker.net/Lists/Projekte/DispFormNew.aspx?ID=16&Source=http%3A%2F%2Fwww.stadtacker.net%2FLists%2FProjekte%2FPraxisprojekte.aspx&ContentTypeId=0x01009B1DA313FC5863489D81C5632375B24900EF01BE6446BCCF43BDA988F3AC2AF79E>



4. “Bauerngarten”

“Bauerngarten” is an agricultural start-up enterprise lease land to urban consumers for own production. At three sites in Berlin near the urban fringe, the concept is run, ca. 500 individuals participate. Annual contracting arrangements between landowners (farmers, public), entrepreneur and individuals (consumers=tenants) are made. The gardens are certified according to organic (e. g. Bioland) farming conditions, the entrepreneur is an academic farmer by training. Gardeners/ consumer are obliged to follow the principles/guidelines.

This concept is tailored towards metropolitan regions for entrepreneurs who do not own the land, but rent it from other farmers or public land and has no farm buildings =>reduce capital intensity of the enterprise.

Service orientation meets urban dwellers demands: the entrepreneur offers full-service: tillage, seed, irrigation, all tools, advisory, workshops. It secures a broad range of vegetables sufficient for full self-supply for a family during growing season. Commodities grown are vegetables, herbs, maize and flowers.

<http://www.bauerngarten.net/>



6. HAVITA GmbH

Located on the urban fringe in direct neighbourhood to row housing and multi-story dwelling:
Vegetable production, focus on a variety of salads, own processing (washing, packaging) on the production site
(50.000m² total area, halls for washing, processing and logistics 2.600m², convenience production 2000m²).
Amongst other certification schemes also organic.

http://www.havita.de/03_03_02_berlin.htm



4.2 Ljubljana Metropolitan Region (LjMR - Slovenia)

4.1.1 Typology of urban gardening in Ljubljana

1. Home gardens pertain to the land (private or public) situated nearby the detached houses or multi-apartment houses in the city area. Its cultivation is organised and maintained individually by the dwellers of indicated houses. As a rule, the use of this land is free of charge.



2. Garden plot away from home on public land is situated on various areas within the city or at the city fringe. The owner of that land is the city - local authorities who also organises and maintains the activities related to gardening. Moreover, this type of plot can be organised and maintained also by community groups. The use of land can be free of charge (for selected social groups: elderly, socially excluded, vulnerable groups) or paid by plots' holders most frequently on a yearly basis.



3. Garden plot away from home on private land is situated on various areas within the city or at the city fringe. The owners of that land are mostly farmers but can also be other entities. This type of plots are organised and maintained by farmers/other owners who give land for rent but also by associations of plot gardeners and enterprises (e.g. landscape architects bureau). The use of land is charged and is paid by plots' holders most often on a yearly basis.



4. Garden plot away from home on the land of the other owners (e.g. nearby railways, roadsides,...) is situated at the city fringe most frequently on abandoned land. The owner of land is either the city - local authorities, the state or business entities which however do not take any part in organising and maintaining such land areas. Since the land is abandoned its usage is not charged and paid by their users (e.g. guerrilla gardeners).
- Guerrilla



4.1.2 Map of urban gardening areas in the urban area

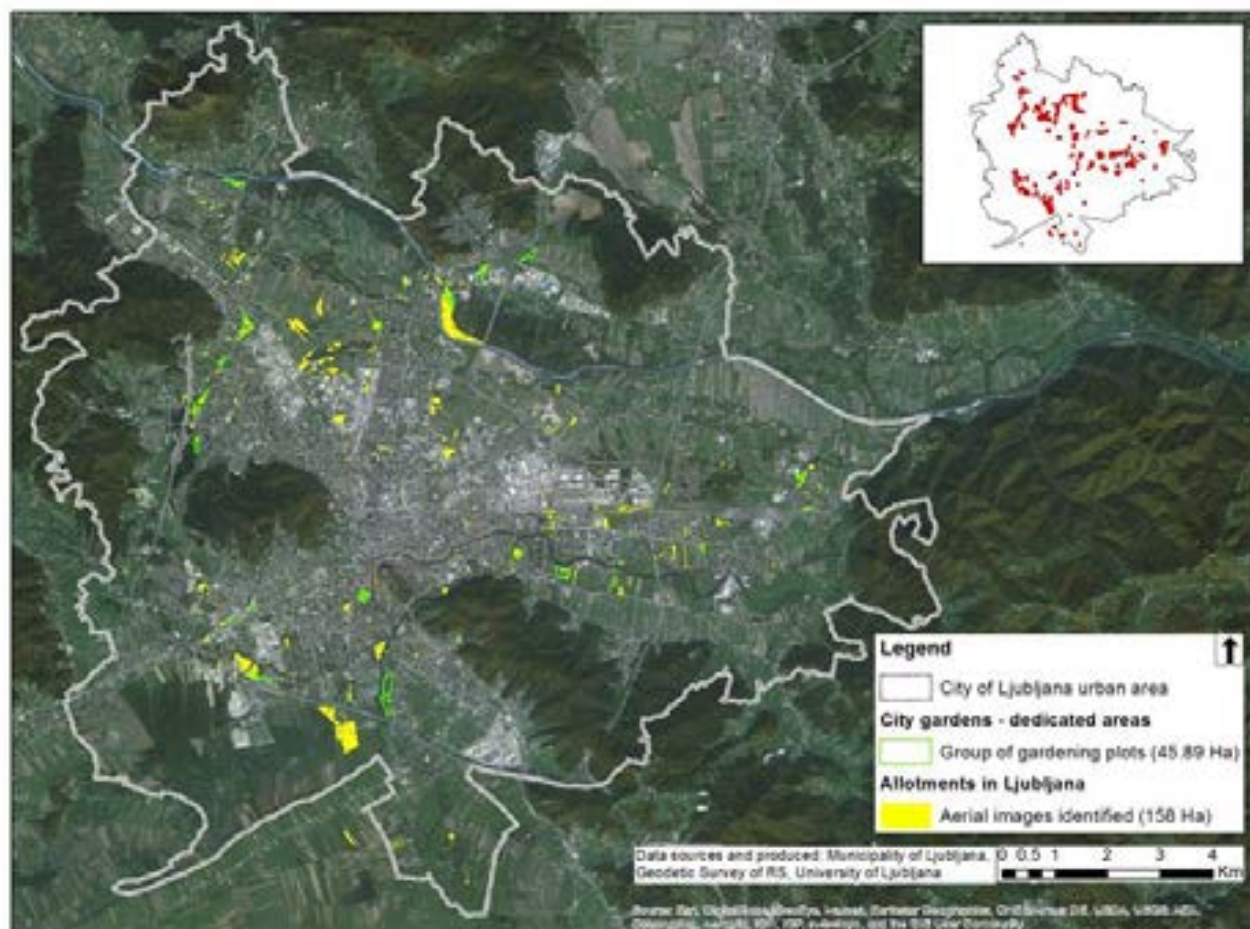


Figure 4: Map of Ljubljana urban area allotment gardens

4.1.3 Selected urban gardening stories from Ljubljana

1. Branjevka/Costermonger // Selling at city market

Small family farm. Small producer of seedling plants, vegetable and herbs in Ljubljana. Daily present on the city market. They are present on the market for more than 70 years. They sell on traditional Trnovo trolleys (ciza) and continue the tradition of the legendary Trnovo and Krakov vegetable ladies, which are specialty of Ljubljana. The speciality is Ljubljana Iceberg salad. We stay in contact with buyers also after the purchase. We garden without artificial chemical plant protection products. We garden with usage of seed calendar of Maria Thun. Consumers can buy only home, fresh, quality and locally produced crops.

<http://www.trnovskazelisca.si/kmetija-cuda-jani.html>



2. Private house with a garden for self-supply

Small family gardens of about 50 to 100 m² are must at almost all family houses in Ljubljana. They serve as self-supply garden for family members. Vegetable is produced from March to November. In peak summer season are surpluses shared among neighbours and wider family. Main crops produced are early potato, salad, radicchio, cabbage, cauliflower, broccoli, onion, garlic, leeks, tomato, low and high green beans, cucumbers, pumpkins, herbs and also fruits (berries, apples, grapes).



3. Pridelaj.si /Grow yourself

The idea of the network of eco-fields where can non-farmers grow their own vegetables, fruits and herbs, was realized when the project leader had to find space for gardening. At the same time she realized that many people have similar needs. In addition she realized that beside the land the knowledge is necessary for a successful food production.

To be able to create as many urban gardens and include as many people, I am also co-founder of Mule Society, which implements projects for marginalized groups. The gardens are also the result of experience in project management abundance Garden, Garden Heart Expanding horizons in prison, Food Gardens to enjoy - FIGS in association Mule.

The portal offers tenants to hire a garden plot in three different locations around Ljubljana.

<http://pridelaj.si/>



4. Mestni vrtički/City allotment gardens

The Municipality of Ljubljana have set a goal that by 2020 every local community of the city will have at least one public allotment area.

The city of Ljubljana has in total of 400 plots with city regulated allotment gardens. Size of garden plots ranges between 50 and 150 m² of land. They are located in consideration of relevant deviations from watercourses, roads, cemeteries and sites for industry. Price of garden plot is 1 EUR/m². Each location also has organised green spaces for socializing and children's playgrounds. Allotment gardens in MOL can be hired for a period of one to five years. Only residents MOL can hire a plot, giving priority to applicants over the age of 60 years and those whose household income does not exceed a certain share of earnings. All plots must be managed organically.

<http://www.ljubljana.si/en/green-capital/green-merits/20-sustainable-projects/urban-gardens/>



5. Onkraj Gradbišča/Beyond the construction site

A Community-Based Garden Intervention in a Degraded Urban Space in Ljubljana. In collaboration with neighbourhood residents and other interested people, we have been transforming a long-fenced-off plot of land near Resljeva Street in Ljubljana into a community space intended for urban gardens, socializing, education, and culture. In this way we are examining and showing the potential of degraded urban areas and the possibility of their receiving new value through temporary use and community-based interventions. Parallel to this the project enhances and promotes possibilities for urban gardening as well as more active inclusion of inhabitants in decision making about the planning, development, and management of the city spaces.

Currently around 100 people take care of ca 40 gardens and take part in different public and community based events.

<https://onkrajgradbisca.wordpress.com/english/>



6. Ob progi/ Beside rail tracks

In the spring of 2013 a team of enthusiasts from the nearby Botanical Garden, in collaboration with the TV show Good morning Slovenia decided to cultivate a part of the wild overgrown space at railway line in to the gardening plots. They invited the volunteers to help, who are in exchange for free use of the gardens helped to grow vegetables and also participate in weekly editions from the garden for a television show. Together they cleaned the area of invasive plants and turned it into gardens, Gardens are every season more beautiful and fertile.

<http://prostorisodelovanja.si/vrticki-ob-zeleznici/>



7. Ob Gradaščici / At Gradščica river // guerrilla gardening

Guerrilla gardens at Gradaščica are on the site for decades. They are arranged on the land of the former nurseries, currently owned by the Town Museums and Galleries of Ljubljana. Plans for the new building of the museum is not currently implemented so gardeners are not prosecuted. The area was reduced by new city road, but gardens persist. Gardeners come and go without a specific order and occupy empty and new plots. A closer look reveals that the area was discovered by new hobby gardeners, young social activists and students. They arranged gardens below at the bank of Gradaščica, where the terrain is less fertile. They can't be discourage from gardening, because their motive is empowerment, self-supply and non-commercial spending of leisure time.

<http://prostorisodelovanja.si/vrticki-ob-gradascici/>



8. Sneberje farmers / Farms on the outskirts of the city

The Sneberje area is located in the eastern part of the city Ljubljana, where a group of land owners is farming. They are dealing especially with vegetable production and animal husbandry (dairy). As the demand for fresh vegetables in the city is large and because the properties of the soil are favorable is majority of farmers shifted to growing vegetables. Vegetables are sold at home in their shops, at the market in the city or to large distribution/retail chain companies.



9. Šampinjoni /Button Mushrooms

Button mushroom production at this producer has started in 1991. As mushrooms doesn't require sunlight are easily grown in the urban areas. The producer has 1800m² of growing area. It produces 350 tonnes of mushrooms per year. The production is sold directly to customers, to retail and whole sale companies.



10. Kalčki / Sprouts producer

Sprouts are small plants that grow in 5 to 14 days. You can find numerous types of sprouts, however only 15 species is grown for human consumption. On the world scale are the most widespread sprouts of mungo beans and alfalfa (the healthiest). They are most commonly used as addition to salads. They must be fresh and are produced base on the market needs.

This producer has started its production in 1991. The total area of production is 150m². On a yearly basis they produce 10 tonnes of sprouts. The sprouts are sold to retail and whole-sale chains, hotels, restaurants, kinder gardens, schools. They also export to other countries.



4.2.4 Land management regulations for allotment gardens in the city

The City of Ljubljana has two documents regulating allotment gardens in the ownership of Municipality of Ljubljana:

- The decree on the organization and delivery of gardens in to the lease (83/2009)
- Regulation for management of the allotment garden areas in the Municipality of Ljubljana (28/2009)

Definition of the allotment garden and gardening in Regulation and Decree:

- Allotment garden in the decree, land is intended for the production of vegetables and fruits, and cultivation of ornamental plants for its own purposes.
- Allotment gardening is a leisure activity that involves the cultivation of vegetables and fruits, and cultivation of ornamental plants with the aim of self-sufficiency and non-economical production.

Allotment gardens owned by the Municipality of Ljubljana are given in to lease to persons resident in the area of the Municipality of Ljubljana, which do not own land in the Municipality of Ljubljana, suitable for allotment garden, and also if such land is not owned by anyone of the other household members.

Allotment garden can be rented for a minimum period of one year and a maximum of five years. Leasehold relationship can be extended at the request of a tenant after the expiry of the lease period for a period of one to five years, unless the Municipality of Ljubljana needs the land for other purposes.

At the garden may only be used for plant protection products and fertilisers allowed by regulations for organic production. At the garden, which are in water protection areas is permitted production of vegetables, fruits and ornamental plants growing only in a manner which is prescribed by the regulations in force for this area. Tenants are obliged at all times to allow sampling of soil and plants to control the use of plant protection products and fertilisers. For watering allotment garden is primarily used rainwater collected in a uniform format storage tanks or containers to collect water



4.2.5 Soil analysis of vegetable gardens in Ljubljana metropolitan region

For the purpose of this research we interviewed more than 186 gardeners with 193 garden plots all over Ljubljana Metropolitan Region, which covers entire area of the Slovenia in 2014 (Table 5). We wanted to check their environmental footprint? For this purpose we collected soil samples from the gardens of all interviewed gardeners. This analysis of soil monitoring data included phosphorus, potassium, organic matter, pH and heavy metals revealed environmental behaviour of the gardeners.

Soil samples were collected from all interviewed gardeners to analyse the content of phosphorus, potassium, organic matter and heavy metals (Table 4, Figures 6-12). The results for phosphorus, potassium and organic matter show that gardeners often over- fertilise their plots (although with organic fertilisers) (Tables 5-8). This does not negatively impact too much on the environment but it is not so good for plant resistance (unbalance in soil minerals) and is at least unnecessary causing additional cost. Concentrations of cadmium, lead and zinc are below limit values mainly, which are as follows: Cd = 1 mg/kg of dry soil; Pb = 85 mg/kg of dry soil; Zn = 200 mg/kg of dry soil, although in some cases can exceed it (Table 9). This means that in some cases soil fertility could be reduced and there is possibly some risk from vegetable consumption from these locations. Interviewed gardeners were informed about the results of soil analyses and warned about soil quality if necessary. Although 95% of gardeners report that they cultivate their gardens in organic, integrated or permaculture ways, only 5% of them have made soil tests and less than 1% have knowledge about heavy metals in their gardens soils.



Figure 5: Locations of vegetable gardens included in soil sampling in Ljubljana Metropolitan Region

Table 3: Average characteristics of 193 analysed vegetable gardens soil samples from Ljubljana Metropolitan Region

Parameter values	Normal-expected	Measured average			
		Average	Minimal	Maximal	Standard deviation
pH in CaCl ₂	6.8 - 7.2	6.90	5.10	7.60	0.50
P ₂ O ₅ (mg/100g)	6 - 12	102.84	3.40	430.80	79.80
K ₂ O (mg/100g)	20 - 33	41.66	6.10	125.90	22.53
Organic matter (%)	2 - 4	7.39	0.90	58.70	5.34
Carbon (%)	/	4.28	0.50	34.00	3.10
Mo (mg/kg)	<10	1.33	0.30	14.30	1.37
Cu (mg/kg)	<60	40.67	14.50	182.80	24.03
Pb (mg/kg)	<85	53.72	18.80	443.50	48.49
Zn (mg/kg)	<200	161.39	46.00	1416.00	170.49
Ag (mg/kg)	/	0.19	0.10	1.10	0.18
Ni (mg/kg)	<50	32.52	9.40	308.40	31.74
Co (mg/kg)	<20	14.30	3.50	40.40	6.97
Mn (mg/kg)	/	1088.37	149.00	3253.00	518.74
Fe (mg/kg)	/	2.59	1.28	4.37	0.62
As (mg/kg)	<20	12.27	3.10	42.60	5.44
Au (mg/kg)	/	18.52	0.70	118.90	18.40
Cd (mg/kg)	<1	1.04	0.20	13.00	1.21
Hg (mg/kg)	<0.8	0.24	0.03	3.20	0.36
Ca (mg/kg)	/	2.97	0.14	21.89	3.11

Table 4: Soil alkalinity or acidity based on pH value (Mihelič et al., 2010)

Soil status	pH
Alkaline	> 7.2
Neutral	6.8 - 7.2
Moderately acidic	5.6 - 6.7
Acidic	4.5 - 5.5
Strongly acidic	< 4.5

Table 5: The division of agricultural soil in relation to the organic matter content or humus (Mihelič et al., 2010)

Soil status	% of organic matter in agricultural soil
Poor in humus	<1
Moderately poor humus content	1 - 2
Average humus content	2 - 4
Strong humus content	4 - 8
Very strong humus content	8 - 15

Table 6: Limit values and norms of phosphorus fertilizer by AL-method in the intensive agriculture in the layers of soil to a depth of ploughing (Mihelič et al., 2010)

Content level of AL- P_2O_5 in soil			Fertilisation rate (example for average outtake 70 kg P_2O_5 /ha)
Soil mark	mg P_2O_5 /100g soil	Content status	kg P_2O_5 /ha
A	< 6	impoverished	100 - 120 (70 + 30 to 50)
B	6 - 12	medium	90 - 100 (70 + 20 to 30)
C	13 - 25	good (objective achieved)	70 (70 + 0)
D	26 - 40	excessive	40 (1/2 outtake)
E	> 40	extremely	0 (till next analysis)

Table 7: Limit values and norms of potassium fertilizer by AL-method in the intensive agriculture in the layers of soil to a depth of ploughing (Mihelič et al., 2010)

Content level of AL- K ₂ O in soil				Fertilisation rate (example for average outtake 200 kg K ₂ O/ha)
Soil mark	mg K ₂ O/100g soil (texture dependable)		Content status	kg K ₂ O/ha
	light do medium soil	heavy soil		
A	< 10	< 12	impoverished	240 to 260 (200 + 40 to 60)
B	10 - 19	12 - 22	medium	220 to 230 (200 + 20 to 30)
C	20 - 30	23 - 33	good (objective achieved)	200 (200 + 0)
D	31 - 40	34 - 45	excessive	100 (1/2 outtake)
E	> 40	> 45	extremely	0 (till next analysis)

Table 8: Limit, warning and critical values of heavy metals in soils in Slovenia (Official journal RS 68/96, No. 5774)

Heavy metal	Limit value (mg/kg dry soil)	Warning value (mg/kg dry soil)	Critical value (mg/kg dry soil)
Cadmium (Cd)	1	2	12
Copper (Cu)	60	100	300
Nickel (Ni)	50	70	210
Lead (Pb)	85	100	530
Zinc (Zn)	200	300	720
Chrome (Cr)	100	150	380
Mercury (Hg)	0.8	2	10
Cobalt (Co)	20	50	240
Molybdenum (mo)	10	40	200
Arsenic (As)	20	30	55

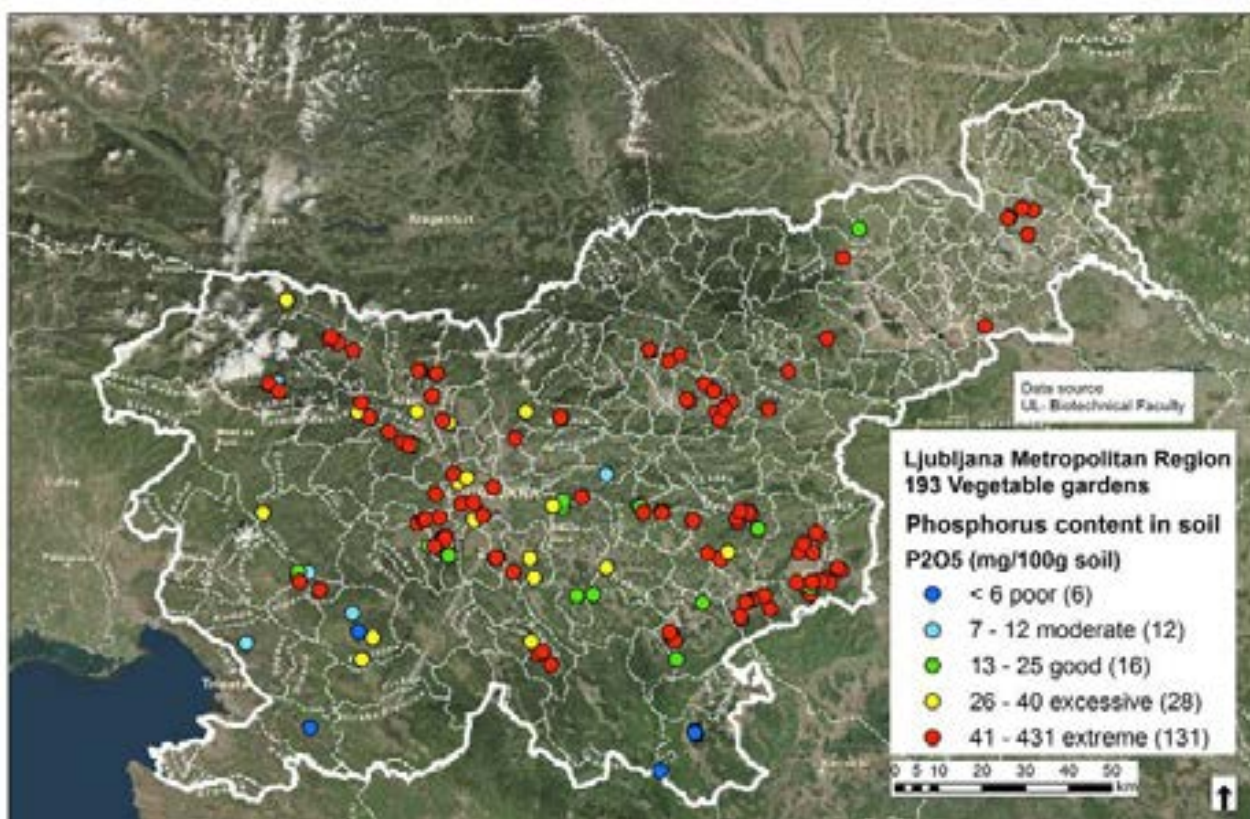


Figure 6: Phosphorus (P_2O_5) content in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

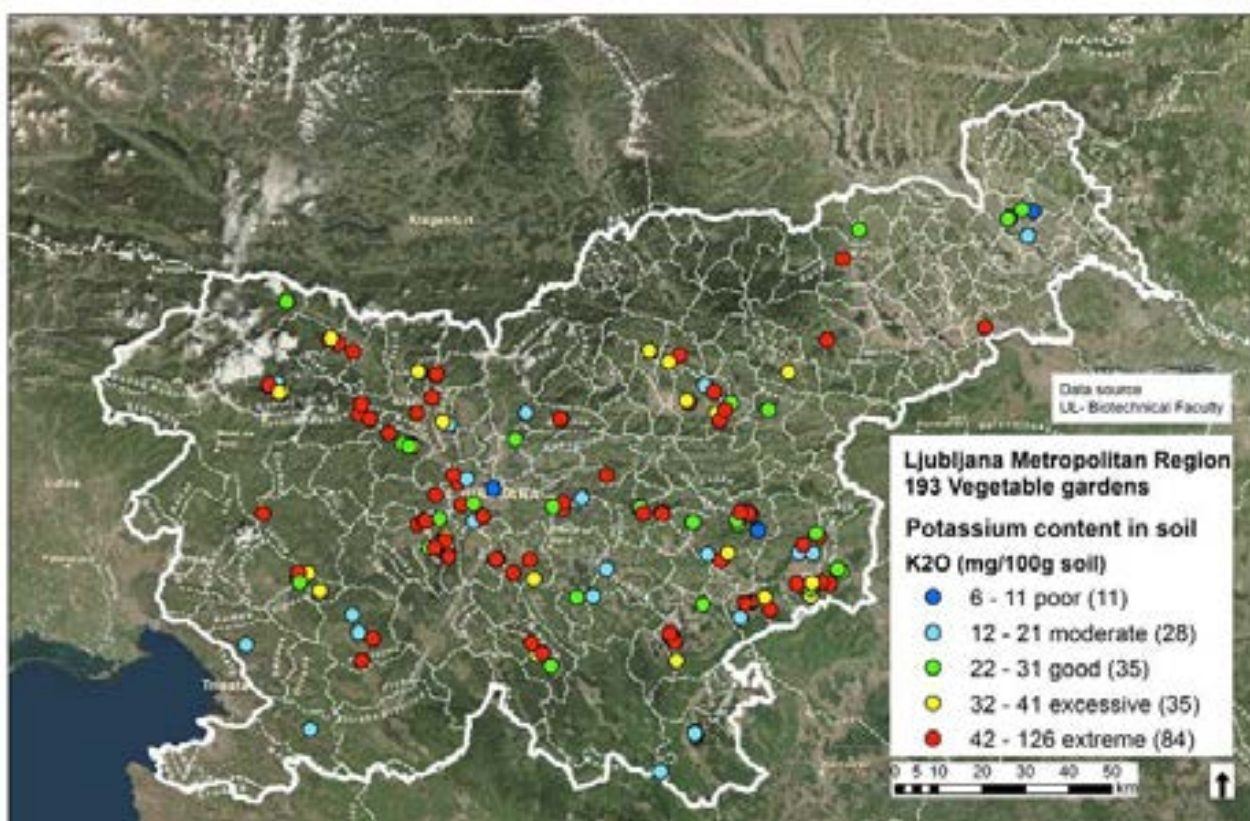


Figure 7: Potassium (K_2O) content in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

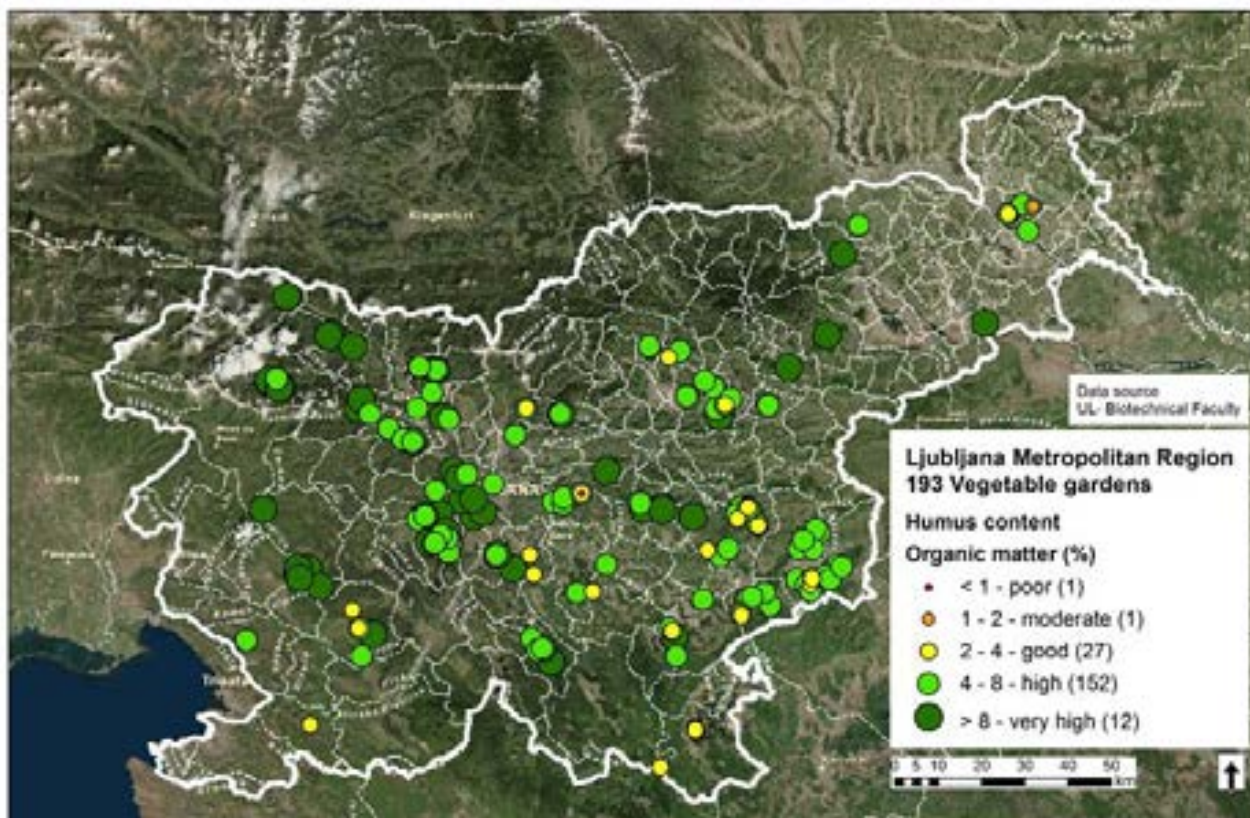


Figure 8: Organic matter content (%) in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

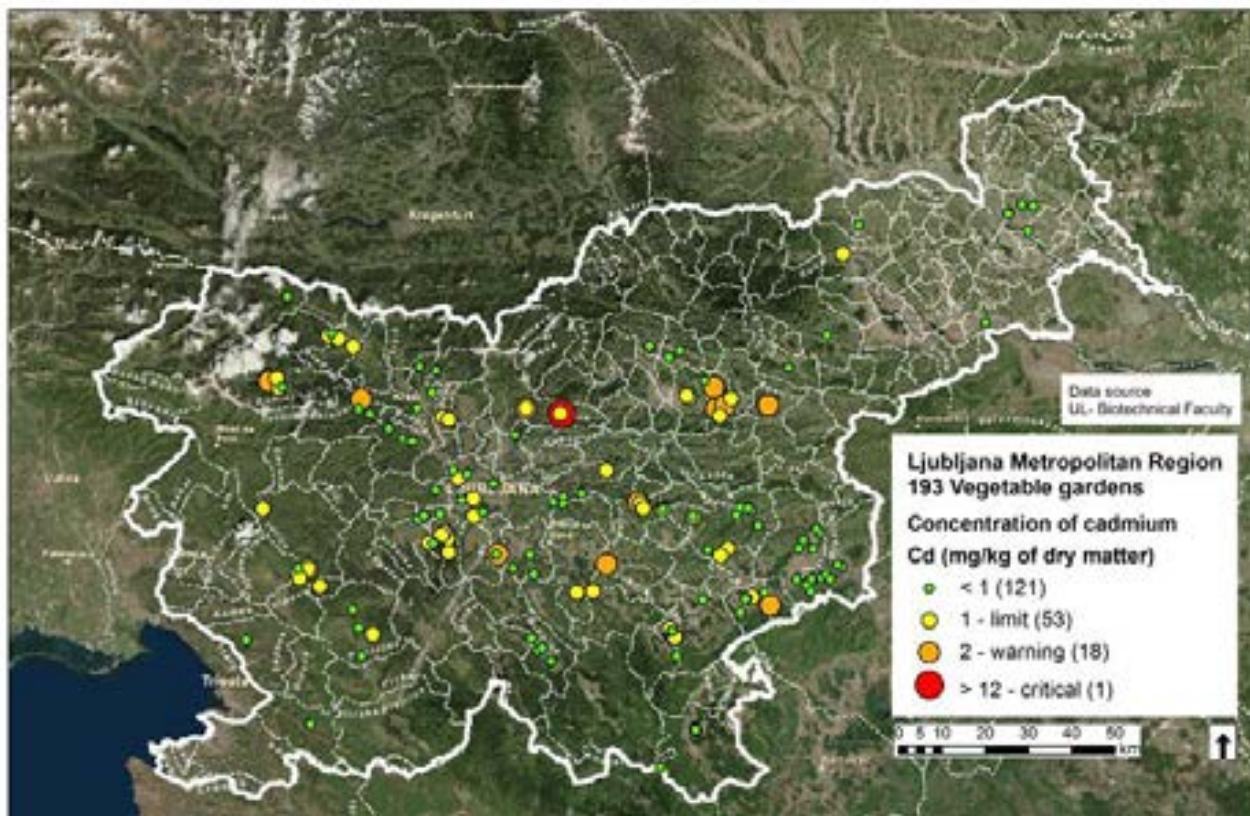


Figure 9: Cadmium (Cd) content in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

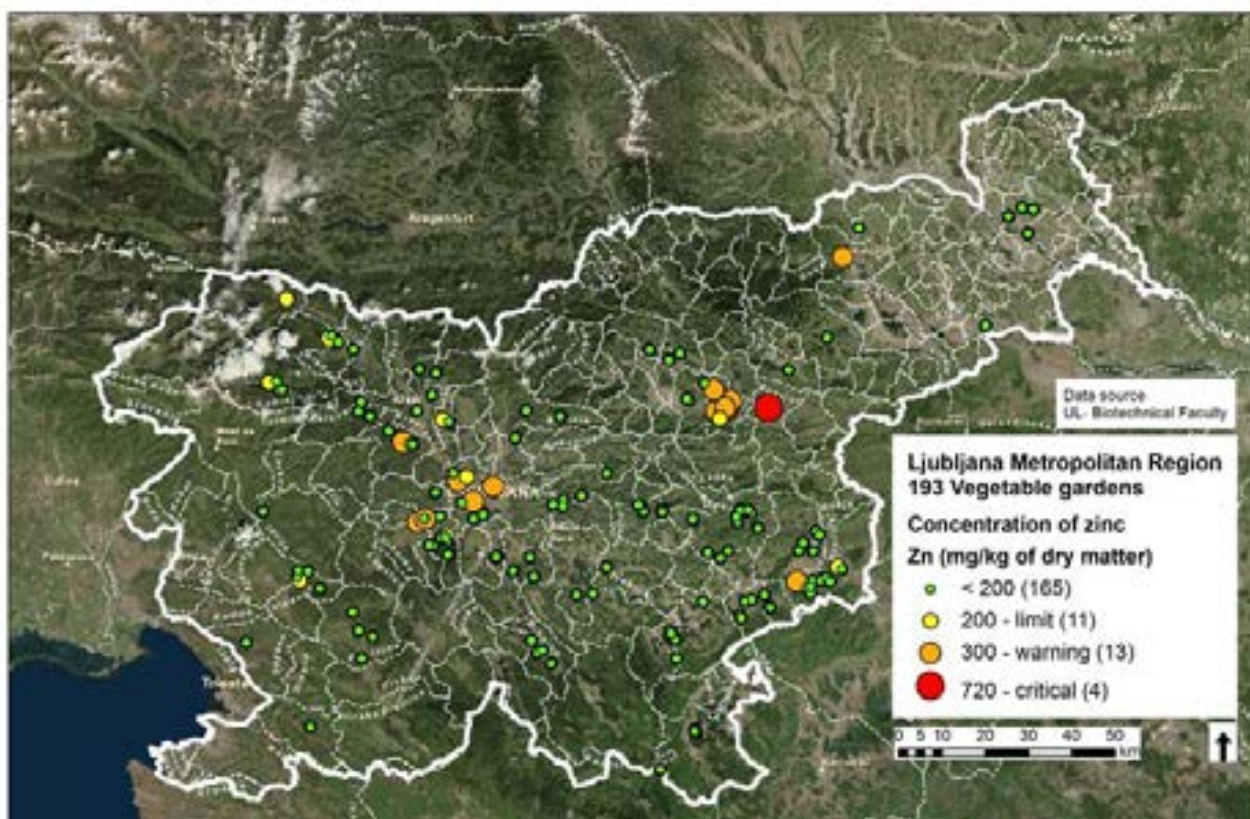


Figure 10: Zinc (Zn) content in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

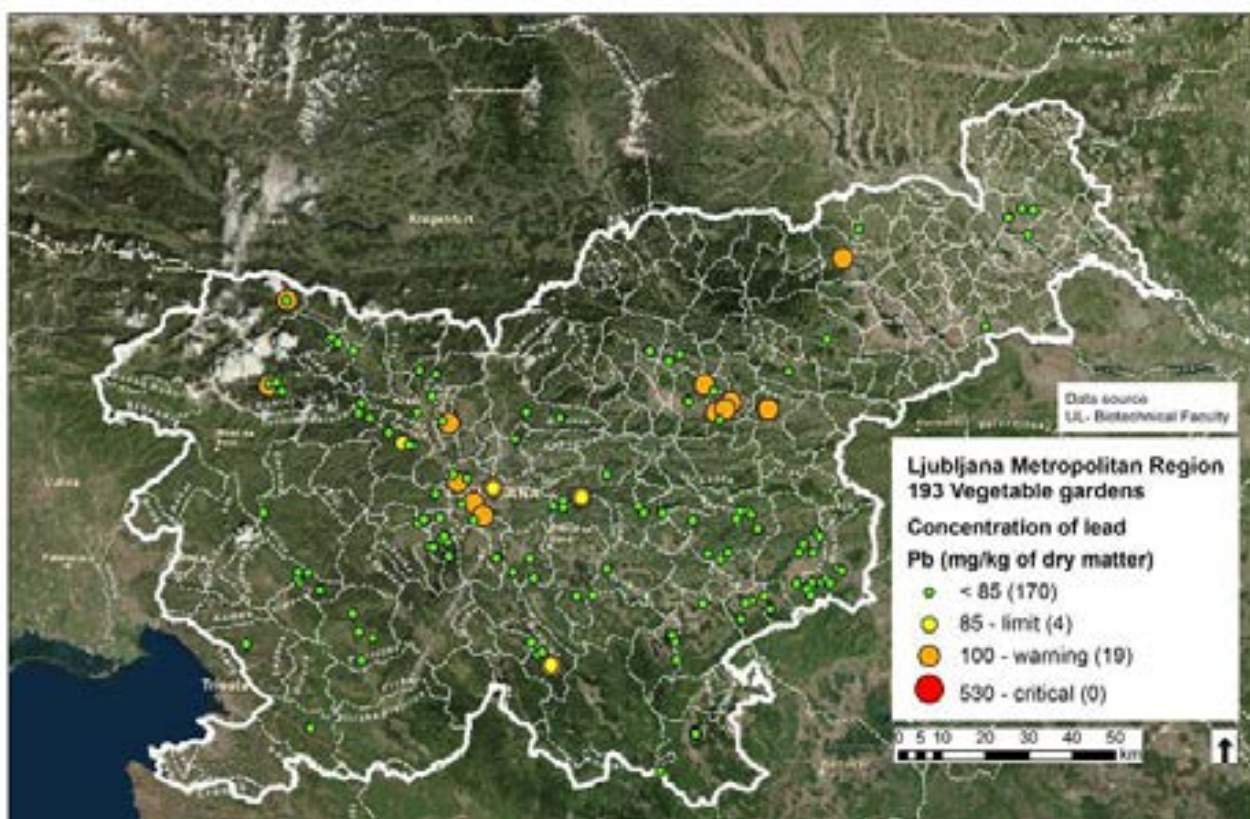


Figure 11: Lead (Pb) content in soil samples from 193 vegetable gardens in Ljubljana Metropolitan Region in 2014

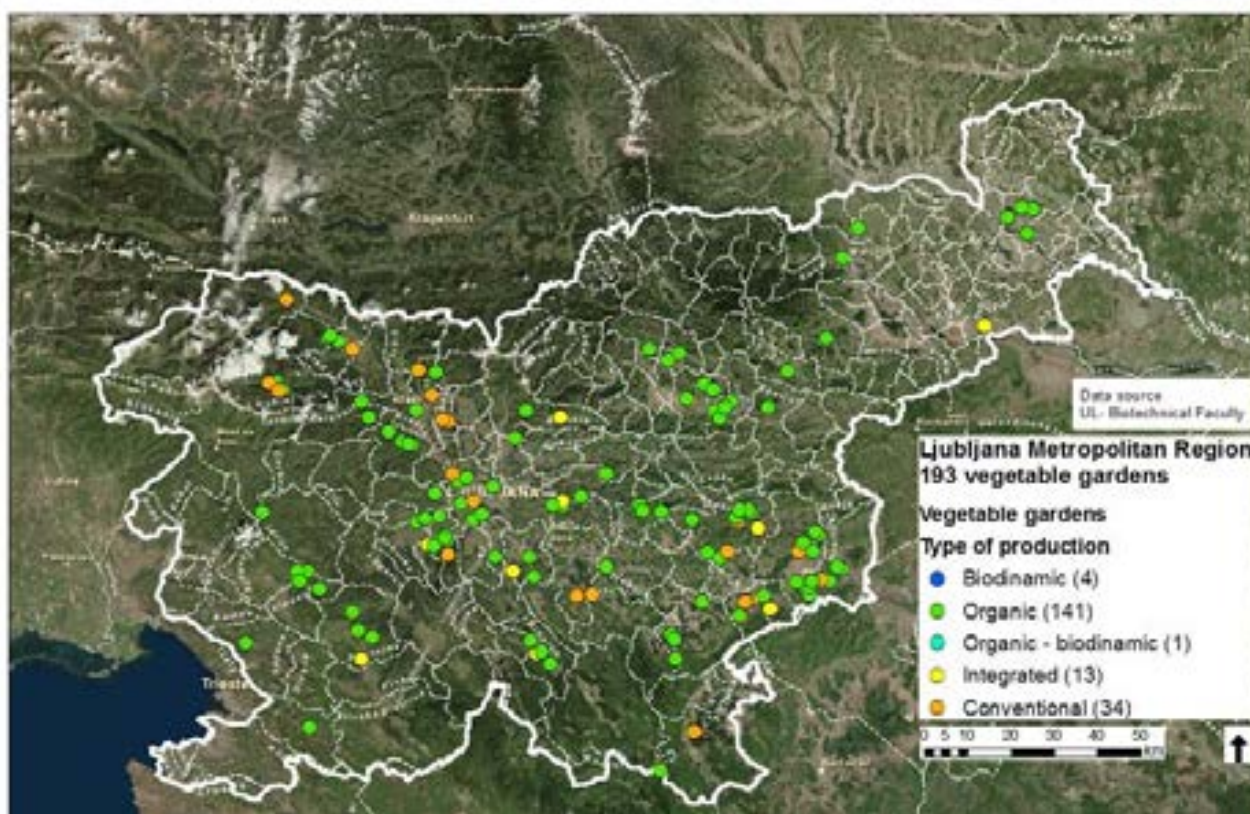


Figure 12: Type of vegetable production in 193 vegetable gardens reported by garden plot holders in Ljubljana Metropolitan Region in 2014

4.3 London Metropolitan Region (LoMR)

4.3.1 Typology of Urban Gardening in London

1. Home gardens: an individual home's private garden or a garden on private property shared by the residents of the property e.g. London's Garden squares were the gardens are a private amenity for the residents of the houses in the square.



www.earthworkdesign.co.uk



www.opensquares.org/detail/Merrick.html

2. Community garden: defined as garden where people share the basic resources of land, water and sunlight. The community garden is tended collectively by a group of people. Community gardens are often organised around a particular institution such as particular community, school, workplace, faith organisation, hospitals, or residential space for example.¹ Community gardens provide fresh produce as well as satisfying labour, neighbourhood improvement, sense of community and connection to the environment. They are publicly functioning in terms of ownership, access, and management, as well as typically owned in trust by local governments or not for profit associations.² Community gardens can also operate somewhat 'illegally' or temporarily on disused space.

www.brixtonbuzz.com

www.loughboroughjunction.org

www.belwotheriver.co.uk



¹ MacNair, E., 2002. The Garden City Handbook: How to Create and Protect Community Gardens in Greater Victoria. Polis Project on Ecological Governance. University of Victoria, Victoria BC, Canada.)

² Hannah, A.K.; & Oh, P., 2000. Rethinking Urban Poverty: A look at Community Gardens. Bulletin of Science, Technology and & Society. 20(3). 207-216.)

3. Allotment: a small area of land, let out at a nominal yearly rent by a private or local authority landlord (usually combined with association membership) for individuals to grow their own food. Allotments can be dated back to the Anglo-Saxon times and are measured using the traditional unit of poles or rods – 10 rods or 250m² is a standard size of an allotment³. Such plots are formed by subdividing a piece of land into a few or up to several hundreds of plots that are assigned to individuals or families; such plots are cultivated individually but can be maintained by a community group for example, sharing both the work and the produce from the plot. Allotment sites can therefore comprise a range of individually or communally owned plots. Allotments can be in urban and rural locations and due to a high demand there are waiting lists for plots across the country.⁴ Members of an allotment association sometimes have social events where they cook produce from allotment or join together for another type of activity.⁵ Councils have a statutory duty to provide a sufficient number of plots if there is demand for allotments.⁶



³ <http://www.nsalg.org.uk/allotment-info/>

⁴ (source: MacNair, E., 2002. The Garden City Handbook: How to Create and Protect Community Gardens in Greater Victoria. Polis Project on Ecological Governance. University of Victoria, Victoria BC, Canada.

⁵ source: <http://www.axbridgeallotment.btck.co.uk/>

⁶ <http://www.allotmoreallotments.org.uk/legislation.htm>

4. City farms: usually community-run projects in urban areas, which involve people interacting and working with plants and / or animals. Operating at various scales, they aim to improve community relationships and offer an awareness of agriculture and farming to people who live in built-up areas, with a particular focus for some on engaging children. They vary in size from smaller plots on housing estates to larger farms that occupy a number of hectares. In the UK it is estimated that more than three million people visit city farms each year and around half a million people work on them as volunteers. Although some city farms have paid employees, most rely heavily on volunteer labour, and some are run by volunteers alone, others operate as partnerships with local authorities. In London the city farms now have a show at the agricultural college Capel Manor every September.⁷ www.gardenvisit.com



5. Green roofs (roof gardens, roof top farming): a roof garden is any garden on the roof of a building. Rooftop farming is usually done using containers with soil/substrate mixtures so called container gardens. There also other forms such as growing in soil or on a membranes. In addition soil-less production systems like hydroponics, aeroponics or air-dynaponics systems have been developed. All systems can be in the open or covered by greenhouses, which is usually the case for soil-less systems.



www.foodfromthesky.org.uk



www.tiredoflondontiredoflife.com

⁷ (source: Pinderhughes, Raquel. Alternative urban futures: planning for sustainable development in cities throughout the world. Lanham: Rowman & Littlefield. pp. 185–217. Retrieved January 15, 2012.)

6. Food growing resource hub: A central resource point for the local community, which supports a number of community food projects by providing free resources, advice, mentoring and support. Cooking and other activities may also take place at these hubs. The hub acts as a knowledge point for the community to access, but also allows for support and mentoring to take place at individual projects sites in the community, facilitating a two-way exchange. A relatively innovative model is in the Borough of Lambeth, with the operation of 4 food hubs.



Myatt's Fields Park.

www.myattsfoodgroup.wordpress.com

7. Guerilla Gardening: the illicit cultivation of 'neglected' public or unused land / space (mainly in urban areas) where flowers or edible crops are grown for the public to enjoy and harvest freely.⁸

www.guerrillagardening.org



⁸ www.guerrillagardening.org

4.3.2 Map of urban gardening areas in the urban area of London

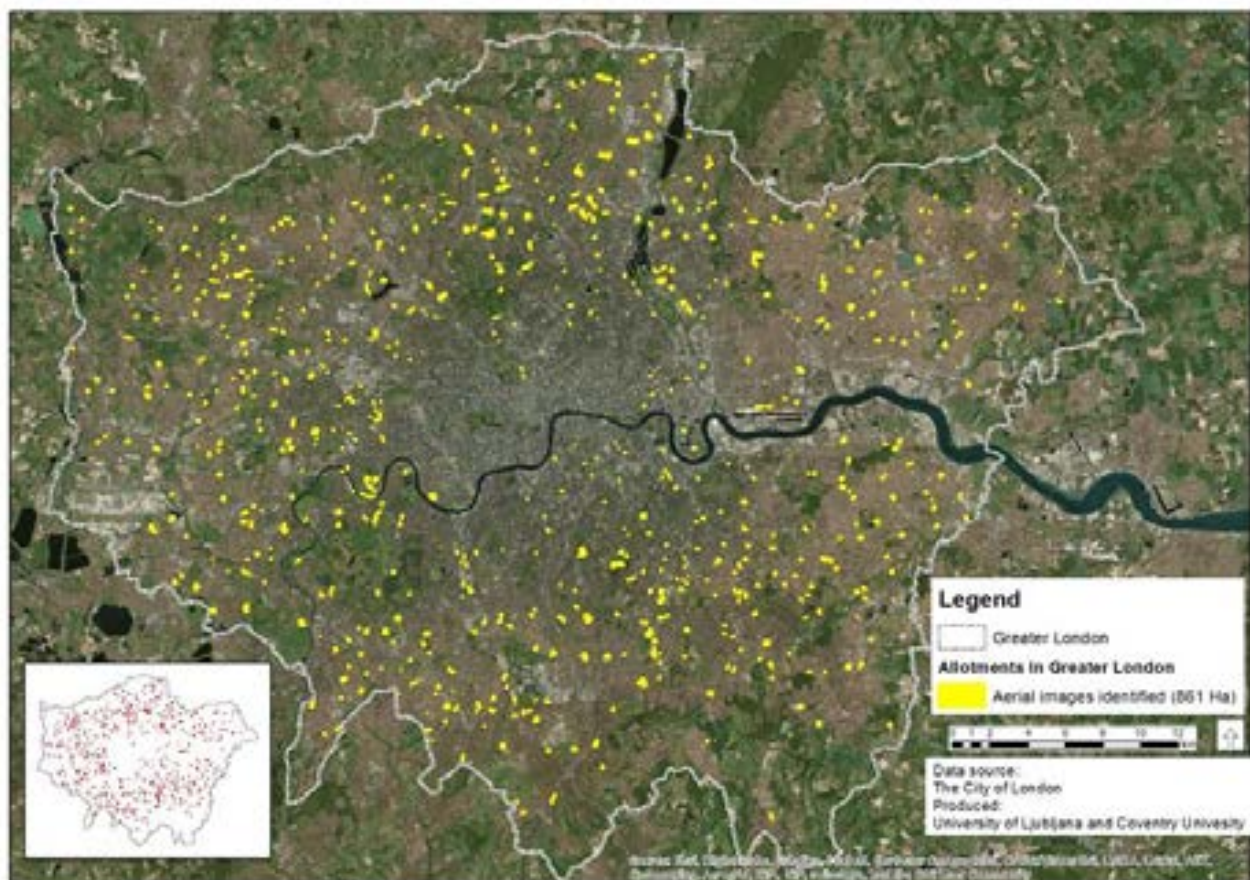


Figure 13: Map of 861 Hectares of urban allotments gardens identified in London based on 2013 aerial image.

4.3.3 Selected urban gardening stories from London

1. Community Food Growing Hubs in Lambeth

The borough of Lambeth currently has four community food growing hubs situated in different areas around the borough.

1. **Myatt's Fields Park** is a 5.7 hectare (14 acre) Victorian park, which underwent renovation in 2010, improving the area's reputation. The community (via the charity Myatt's Fields Park Project) uses the greenhouse in the park to grow a variety of fruit and vegetables, and use this for cooking projects and to supply the café at the park. Ten local community food-growing groups are supported by Myatt's Fields Park via a community grower. The greenhouse is used to grow seedlings for the community groups for example, and there are also other resources stored at the park to support the community groups. The community grower based at the greenhouse also visits the community groups at their sites to assist them with growing by providing practical advice and support. The aim of the project is to improve people's access to high quality, affordable and locally grown food and to celebrate local food cultures. Myatt's Fields Park Project also runs a number of other community based food and non-food projects aimed at community development.



2. **Brockwell Park Community Greenhouses** is a space comprising two commercial sized greenhouses as well as outside space for herb, medicinal, dye, vegetable, fruit and forest gardens, used by the local community. Twenty years ago this space was a disused municipal plant nursery, which is now managed by volunteers and part time staff. The aim of the project is to offer the local community and visitors a relaxed and tranquil environment where they can learn about the environment, wildlife and ornamental and crop plants from around the world.
3. **Rosendale Allotments** is an allotment association, which has a diverse membership. The allotments have been managed as an association since 1921 and occupy a 7.3 hectare (18 acre) sloping site. Some of the food grown is sold in the community building, which also holds meetings, workshops and courses. Currently a voluntary committee manages the allotments, staff was previously employed. The project aims to use the expertise and experience of members to develop information, advice and workshops on horticulture in its widest sense and to broaden the interest in and commitment to sustainable food growing in the local community.
4. **Streatham Common Community Garden** is a historic walled garden. Formally it was a kitchen garden of the Rookery (the last manor house that stood at the top of the hill, built in 1786), later the garden was also used as a Council nursery, supplying plants for parks and green spaces across Lambeth, before falling in to a state of neglect. In June 2011, the garden committee worked with hundreds of volunteers to bring the old walled nursery back to productive use, continuing a history of gardening on the site going back at least 230 years. The project has a number of aims around restoration, being a community resource, protecting wildlife and improving biodiversity, to provide training around organic growing and to support other community groups, and to be welcoming to all.

Further info and pictures: www.incredibleediblelambeth.org/

2. Lambeth Poly: community food growing on housing estates (LAS)

Lambeth Poly was a prototype project to explore what can be grown and marketed in Lambeth, and how growing can be used to train and employ local people. The protected environment of a polytunnel can increase

productivity and extend the period in which fresh vegetables can be produced in the city. The polytunnel project was proposed by local horticulturist, trainer and Garden Organic Master Gardener Fiona Law. The Innovation Fund paid for time to develop, implement and coordinate the project and some of the start-up running costs. The company Veolia sponsored the tunnel and the materials. The tunnel is un-heated and was erected in July 2012. It is a 27.5 m² (5 x 5.5m or 16 x 18 foot) steel tunnel covered with polyethylene foil. It is sited on Tulse Hill Estate, Brixton (Lambeth, London) on a green in the middle of a public housing estate.

Since construction in July 2012 local volunteers have been trained and inducted in growing in the tunnel and several other ‘ambassadors’ from the estate are active.

Baby leaf vegetables and salads and herb pots are sold to local restaurants in Brixton (e.g. Cornercopia) using the local Brixton currency the Brixton-Pound (£B) and to the local vegetable box scheme Local Greens and, to a small extent, residents. In addition, workshop events have been held and volunteers on the project have had three wider learning opportunities. And the project won the Capital Growth’s Enterprise award in its Olympic year Grow for Gold competition

The business plan focused initially on the crop production or financial side of the enterprise producing a plan for a financially viable horticultural enterprise with commercial labour rates and professional marketing. As the aim of Lambeth Poly is a social enterprise, the financial return on investment will always be only one part of the output mix.

Fixed assets

Polytunnel 5 x 5.5m (16 x 18 ft) = 27.50 m² tunnel sited on Tulse Hill Estate, Brixton, on a green in the middle of public housing estate. Lambeth Poly has run this tunnel since July 2012.

Machinery and tools: growing benches, black mulch, wooden seed dippers, plastic trays, watering cans

Variable assets

Compost - currently bought in as peat-free organic bags 20 kg New Horizon Seed and Growing (includes blood and bone meal hence not a vegan product) and reused 2-3 times. This is a major cost input and more recycling and using own garden and or food/kitchen waste compost would be a major step to reduce inputs, costs and increase recycling (short to medium term action).

Seeds - currently bought in from seed merchants as organic or non-organic seed. Own seed production is possible once the enterprise has 5 or more tunnels. Then one can be dedicated to seed production including heritage seed varieties. Seed production is expensive however it adds another level of skill for the training and workers and not all seeds have to home produced (medium to long term action)

Irrigation water - currently using tap water. Rainwater harvesting and other grey water use would reduce costs and increase recycling (short to medium term action).

Labour and skills – the main labour tasks are preparing planting trays by filling in with compost, planting seeds with wooden dipper, managing cropping and irrigation of seeds during growing phase, harvest of seeds, cutting plants, packing in bags, labelling, cleaning trays for next batch. Transport to customer locally currently by car ideally with bicycle trailer or electric vehicle (Short to medium term action compost preparation and rainwater collection).

Outputs

The following commodities are produced or could be produced within the business model of Lambeth Poly

- 1) Vegetables like tomatoes and chillies, squashes or beans
- 2) Fruit like apple and soft fruit
- 3) Salad leafs like Swiss chard
- 4) Herbs like basil
- 5) Exotic vegetables like mizuma and others

Currently the following crops are produced at *Lambeth Poly*:

- Swiss Chard red, Mizuma Red Baron, Oriental Mizuma
- Mustard Red Giant, Mustard Pizzo
- Wild Rocket, Perilla/Shiso Green
- Oak Leaf Lettuce, Radish
- Spring Onion, Basil Puck, Red Pac Choi Rubi-F1

- Giant Sunflower, Squashes, Beans

Further info and pictures:

<http://vivekagardens.com/lambeth-poly-community-cropping>



3. Crystal Palace's Patchwork Farm

The Patchwork Farm is a Crystal Palace Transition Town initiative. Crystal Palace is located in South London in the borough of Lambeth.

The aim of the patchwork farm is to expand the production and sale of local fruit, vegetables, herbs and other produce (including local processing). There is a year-round weekly stall at the Crystal Palace Food Market, every Saturday. On the Patchwork Farm stall fruit, vegetables and herbs are sold and swapped from more than forty 'farms' in SE19 and further afield.

The produce we marketed as "fresh, healthy and cheap". The production follows organic principles but is not certified or labelled as organic. Reducing food waste and offering low prices to local consumers is an important social motivation as mainly volunteer labour is used. As well as selling to the general public the farm also supplies local food producers and restaurants.

Among the 40 different growing spaces ('farm' sites) are

- * Crystal Palace Transition Town's five community gardens
- * Local garden spaces that managed on a land-share basis.
- * Sold, swapped or donated by local household or allotment growers who have a glut of produce.

The profits made from the Patchwork Farm stall go into the expansion of the growing spaces and into seeds, tools and other professional equipment needed. All of the people working on the project are volunteers committed to increasing the production of healthy, cheap, local food.

There are various schemes the public can interact with the patchwork farm:

'Grow and sell': Patchwork farm pays for locally produced food. If you grow or produce local food already and would like to sell, swap or donate it, bring it to the stall on a Saturday.

'Share your land': Patchwork farm runs a local land-share scheme where people with a garden or piece of land that isn't being used can share it. Patchwork farm makes the space productive and shares the produce with you.

'Friday farmer': Every Friday Patchwork farm harvests produce from our growing spaces ready for the market stall on Saturday, and sow and plant new crops. As the social enterprise is expanding rapidly it needs new farmers to volunteer.

'Help on the stall': The Patchwork Farm stall takes place from 10am-3pm each Saturday at the Crystal Palace Food Market.

Further info and pictures:

www.crystalpalacefoodmarket.co.uk/patchwork-farm



4. Loughborough Farm

Loughborough Farm, a community food-growing project, was initiated by the Loughborough Junction Action Group (LJAG - Loughborough Junction is an area in Lambeth). The aim of the LJAG is to build a network of growing spaces around Loughborough Junction on derelict or underused land. The first site - The x hectare (x acre), Triangle site was established in 2013 and is open to volunteers to drop in on Tuesdays, Thursdays and Saturdays. The focus of the space is to grow food collectively rather than on individual plots. Volunteers take home produce at the end of sessions, and local people and business are also given produce for a small donation. The main focus of the project is food growing, but also do-it-yourself, art and crafts, cooking, community events, selling and planning. The project offers free training sessions, developing new skills, the opportunity to meet others from the community as well as contributing to developing the local area and benefitting the community.

The project has temporary permission from the council to use The Triangle site; the land is probably awaiting development. Food is therefore grown in large movable builders bags. A second reason is that the project currently cannot pay for the land to be assessed for potential soil contamination (it was previously used for industrial purposes). Due to its location on a busy main road the project often attracts passers-by, and enables the volunteers there an opportunity to meet others from the area.

Further info and pictures:

www.loughboroughjunction.org/loughborough-farm-a-patchwork-of-community-growing-spaces



5. Southbank roof garden

In Spring 2011, the 'Grounded' gardening team from Providence Row Housing Association worked with members of the Eden Project to create a Roof Garden at the Southbank Arts Centre in central London. The Garden opened to the public from May to September 2011, as part of the Southbank Centre's 60th Anniversary, celebrating the 'Festival of Britain'.

The Garden is a partnership between Southbank Centre and the Eden Project. It is located on the roof of the Queen Elizabeth Hall, and contains small allotments and wild flowers in 'raised beds'. The 1,200m² plot provides the missing piece of the Southbank site labelled in 1951 on the original concrete architect's plans as "Sun Deck" – it was never fully developed. The Garden was built from scratch, using tons of gravel, logs and sand. Unusual foods such as blue potatoes, narga peppers (an essential ingredient in Bangladeshi cooking) as well as a mini olive grove are grown. Also adding more greenery to Southbank Centre concrete walls like training vines and hops.

'Grounded' is made up of service users, tenants and former tenants who have suffered homelessness. Some members of 'Grounded' have gone on to gain employment in horticulture and related roles. Fiona Humphrey from the Providence Row Housing Association, praised the results "especially in involving former homeless people and people with mental health problems to regain confidence and build up skills for the future." The 'Grounded' team was also awarded a major grant by 'Ecominds', a project funded by mental health charity 'Mind' and the Big Lottery. The project aims to create opportunities for people affected by mental health issues to get

involved in gardening and other outdoor projects.

In the years since 2011 the team continues to produce fresh vegetables and herbs from its raised beds and allotment area, and its wildflower meadow is thriving. Visiting is free and the Garden remains open to the public during the summer season.

Further info and pictures:

www.groundedproject.org

www.southbankcentre.co.uk/whatson/festivals-series/festival-of-love/installations/roof-garden



6. King's Cross Skip Garden

The Skip Garden is a movable community garden, situated at 'King's Cross' railway station in central London, grows food in 'skips' – large open topped portable waste containers designed for loading on to a special type of lorry. The Skip Garden is part of a new development at the north of King's Cross train station – which together with the nearby International station St Pancras form a major transport hub in the city. In Victorian times this area was an important industrial heartland; infrastructural work began in 2007 to develop the derelict area. Rich in history, the 27 hectare (67 acre) site is now being transformed into a new part of the city with homes, shops, offices, galleries, bars, restaurants, schools and a university.

The King's Cross Skip Garden project is run by Global Generation, a charity giving young people opportunities to create a sustainable future. The garden is part-funded by the Big Lottery and the site and materials have been provided by The King's Cross Partnership, BAM Nuttall, Carillion and Kier. The garden uses local material from the construction and building that has taken place on the King's Cross site. Therefore, skips have been used for planting, and the polytunnel was made from spare water pipes, scaffold netting and planks. The young people involved in the project work with Global Generation to manage and maintain it. The project brings together people of all ages and backgrounds; those involved have learnt about sustainability, construction, how to grow food, as well as how to market and sell their produce. The fruit and vegetables grown at the Skip Garden are sold to local cafés and restaurants including the Guardian canteen (the Guardian is a national newspaper). A line of jams and chutneys has been created, there's a honey club, and the young people have made making furniture from reclaimed timber from one of the buildings.

Using skips (filled with soil and compost substrates) to grow food has the advantage that the growing site can be moved during the completion of the building work. As the construction work can take years or decades, the

unused brownfield land can be made into productive growing space. As the land will eventually be used for construction, production in the soil and building up soil fertility is not a viable option and the skips will eventually move to another brownfield site, taking the soil fertility build up during years with them. During the years many skips have been covered with polytunnels becoming effectively small little portable greenhouses. Protected cropping increases the range of crops that can be grown and during the mild winters of London's inner-city microclimate it can provide local, fresh food all year round.

Further info and pictures:

www.kingscross.co.uk/skip-garden and www.globalgeneration.org.uk



7. Urban Orchard Project

The Urban Orchard Project is a charity and acquired charitable status in December 2010. The charity is dedicated to creating skilled communities to plant, care for and harvest fruit trees, connection urban communities and increasing the access to fruit. The charity has a specific focus on people living in poorer, inner city areas of London. The charity has an annual turnover of over £140k and major funding comes from the City Bridge Trust, the Esmée Fairbairn Foundation and The Big Tree Plant.



One of the major activities in 2013/14 was planting 14 new community orchards in London with 365 fruit trees in total and training (orchard planting, pruning, organic management techniques, juicing) community groups associated with each orchard working with over 1,400 volunteers (85% of the new orchards are located in inner-London boroughs in the most deprived parts of London). This reaches a large and diverse group from different social and ethnic background and also involves children, students, young offenders, people with mental health problems and people with learning disabilities in planting new orchards. The aim is to use community orchard projects as a mechanism for improving community cohesion and bringing about wider social outcomes. The basic premise is to ensure that the people planting and learning about the fruit trees are the people who live locally and are hence motivated to both look after them and use the fruit. The charity has also worked to increase the safety of tree planting projects, which includes purchasing a cable avoidance tool to survey the ground prior

to planting and a desk study to research the contamination and urban fruit growing, which is often a barrier local groups face with local authorities when developing orchard-planting projects. Currently the survival rate for the new trees is 93% (much higher than most other tree planting projects) and the projected lifespan is 80-120 years.

The other major activities are restoring London's existing orchards and celebrating the harvested produce. Traditional orchards have a rich cultural, environmental and economic history in London but this important habitat is now under serious threat from development pressures and lack of awareness. Over 11 workshops were held on 4 sites across London training new communities of Londoners to be able to assess, plan and carry out pruning to restore and rejuvenate neglected heritage orchards. To harvest and celebrate London's orchard produce another 30+ events and training days on a variety of topics were held. Topics include: fruit processing, the 'orchardisation' of the City, harvesting, pruning fruit trees, apple juicing, wassails, juicing pears and installing a pop-up orchard. Further info and pictures: www.theurbanorchardproject.org

8. Growing Communities

Based in Hackney, North London, 'Growing Communities' aims to transform food and farming through community-led trade. Growing Communities is a social enterprise an organisation that works to bring about the environmental, social and economic change it desires directly through its trading activity; surplus made is invested back into the organisation.

The aim is to build "community led alternatives to the current damaging food system". Growing Communities runs an organic fruit and vegetable box scheme, and Stoke Newington Farmer's Market as well as organically certified urban market gardens, which grow produce for sale through the box scheme. Their patchwork farm in Hackney also provides food for the box scheme grown in back gardens, on church land and on estates.

Their urban growing sites also provide training for apprentice growers and volunteers and they have a 1.6 hectare (4 acre) 'Starter Farm' in Dagenham to grow a wider variety of vegetables on a larger scale. The box scheme and Farmer's Market supports local, sustainable farms by giving them a regular guaranteed income and helping them to create jobs in their communities. Box scheme members are encouraged to attend meetings and have a say in how the box scheme is run. One of their aims is to help other communities to transform their food through community-led box schemes through their 'start-up' programme.

The Growing Communities 'Food Zones' diagram demonstrates a conceptual framework and a vision of what a sustainable and resilient food and farming system might look like, and incorporates the urban, peri-urban and rural hinterland and shows what type of foods could best come from where. The concept therefore combines local agri-food systems (LAS) with metropolitan ones (MAS) in a conceptual and strategy way.

Further info and pictures:

www.growingcommunities.org

www.growingcommunities.org/start-ups/what-is-gc/manifesto-feeding-cities/explore-food-zones/



9. Ethnic vegetables

Migrant communities in the UK and especially in London have brought new lifestyles and diets. Some of the food crops to prepare those diets have to be imported from overseas (Asia, Africa, South America) using long supply chains. Now more ethnic communities try to grow some of these crops in the UK and especially in and around London. This is a significant shortening of food supply chains both in length and also in terms of intermediates, as many crops are professionally grown on allotments for home consumption and other crops have moved to the field scale. Growing successful crops, usually from Mediterranean, sub-tropical or tropical climates, is a great agronomic challenge and requires considerable product innovation and horticultural skills. We highlight 3 sub-story lines each operating on a different scale from urban (1), to peri-urban (2) to large scale in the metropolitan region (3) of London.

(1) Garden Organic's 'Sowing New Seeds Project' works with these communities and collects seeds and knowledge of ethnic crops grown in immigrant communities to safeguard them for future generations and make them available to everybody. Through the 'Master Gardener program' this project is active in many boroughs of London growing in urban home gardens, allotments and community growing spaces.

(2) Another example is David Mwanaka ('The White Maize Farmer') who has a farm shop in the outer London borough of Enfield and grows his own white maize and other crops on a small farm in the peri-urban fringe of London. White maize is a crop enjoyed by many African and Caribbean communities, it has a higher starch content than sweet corn. It can be roasted, boiled or made into a porridge called 'Sadza' in Zimbabwe or 'Pap' in South Africa. David's farm shop in Enfield also sells home grown white sweetcorn, chou moellier kale, rape, green mustard leaves, sweet potatoes and pumpkin leaves.

(3) Another large-scale example is Mau Farm, a 16 ha vegetable farm with polytunnels and glasshouses in Maidstone, Kent in the metropolitan region of London (Called "China's Garden of England" by the Financial Times). The farm grows pak choy, Chinese broccoli and choy sum, pea shoots, purple amaranth, Chinese celery, garland chrysanthemum, water spinach, mustard greens, Chinese garlic chives and watercress. Mau and his wife are first generation immigrants from Southern China and bought the land in 1986. They have been supplying Chinese shops and restaurants in Greater London with extraordinary fresh produce ever since.

Further info and pictures:

www.sowingnewseeds.org.uk/news/mwanaka.html

www.mwanakafreshfarmfoods.com

www.ft.com/cms/s/2/711343aa-ef4b-11e2-bb27-00144feabdc0.html#axzz2g6QE6Lf



10. Forty Hall farm and community vineyard

Forty Hall Forty Hall Farm is an organic farm in Enfield, on the outskirts of London. It is run by Capel Manor College, the only further education college in London specialising in learning about the environment. Forty Hall is a mixed farm with a variety of animals, including many rare breeds. It is home to London's only organic commercial vineyard, the Forty Hall Community Vineyard, as well as a thriving community orchard, a forest

garden and a new market garden. The Farm provides educational opportunities for Capel Manor's students, as well as hosting events like our annual Lambing Weekend. There is a plan to make Forty Hall Farm a centre that promotes and celebrates local, sustainable food.

Forty Hall Orchard

The farm orchard occupies a 0.47 ha (1 acre) site, alongside Forty Hall's walled garden. The Orchard is being developed as a demonstration project, where local people can come together to learn how to grow fruit and to share in its eating. Since October 2011, over 120 fruit trees and over 300 fruiting hedgerow trees have been planted, including a wide variety of different stone fruit and some soft fruit, and including heritage varieties that are local to London and Middlesex.

Forty Hall Farm

As part of the 'Garden Enfield' initiative, led by the London borough of Enfield and funded through the Mayor of London's Outer London fund, a number of new developments have been taken place at Forty Hall. They include the launch of Enfield Veg Co. an organic vegetable box scheme, in November 2013, which is fast growing and supplying over 60 customers with vegetables that is grown on site as well as purchased from two other local organic farms. The veg box is also being supported through the Growing Communities start up programme (see earlier story line on Growing Communities), which provides mentoring and shares its own experience and systems, developed as a result of setting up and running a community led box scheme in Hackney over the last 20 years. Forty Hall Farm is cultivating salad, soft fruit and other vegetables on 2 ha (5 acres) of the farm under the lead of a head grower and two assistants, to supply the box scheme. They have also been able to sell surplus through local retailers including a small franchise supermarket (Budgens) a local shop, as well as two local cafés, and a local online retailer. The produce ranges from beetroot to borage and potatoes to peas, and is completely organic. The farm has introduced some traditional farming approaches, such as the use of hotbeds to heat propagation areas and its experiments with making its own woodchip compost. There are plans to open a farm shop in spring to sell produce from the market garden, as well as other items sourced locally and from the farm. As part of the commitment to training and education, Forty Hall have been able to take on paid horticultural growers, apprentices and volunteers as part of a training scheme.

Community Vineyard

The community vineyard is on the same site but has been developed, planted and cared for by a social enterprise, which has established a new 4 ha (10 acre) organic vineyard in north London. Run and managed by local people, the vineyard is thought to be the first commercial scale vineyard in London since the Middle Ages.

In 2011 the first vines were planted on the farm and the first harvest was in the autumn of 2013. This led to the production of the vineyards first white wine in May 2014 and the first London sparkling wine, which will be ready in August 2015. In recent years English Wine is scooping up awards and medals in international competitions against the best of the rest. At Forty Hall, five grape varieties are grown, Ortega and Bacchus for white wines and the three Champagne varieties Pinot Noir, Pinot Meunier and Chardonnay for traditional-method sparkling wines. The winemaker, who runs Davenport Vineyards in Kent, has won gold medals and commendations since 2009 for wine made from organic grapes.

Further info and pictures: www.fortyhallfarm.org.uk, www.enfieldveg.co.uk, www.growingcommunities.org/start-ups, www.fortyhallvineyard.org.uk



11. Capital Growth

In recent years growing food has become increasingly popular – nowhere more so than in London, where Capital Growth has been supporting Londoners to grow their own since 2008. Back then, they started out with the bold aim of establishing 2,012 new community food growing spaces in London in time for 2012, the Olympic year. They were responding to the upsurge of interest in healthy and home-grown food, the sometimes decades-long waiting lists for local authority allotments, and also reports from individuals and local groups about how hard it had been for them to gain access to land when they had tried to do so by themselves. By joining forces, they could tackle the barriers together. Their aim was bold, but they rolled up our sleeves and we succeeded, celebrating the 2,012th new food growing space in December 2012. Over 150,000 Londoners from diverse backgrounds, including many people living on a low income, have now been involved in food growing in these new spaces, which – they tell them through their surveys and research – enhance their diets, their physical and mental health, contact with nature and community connections. Since 2012, Capital Growth has gone on to become the network for community food growers throughout London.

‘Growing a Million Meals for London’ was a campaign launched by Capital Growth in 2013, with the aim of helping and inspiring more Londoners to grow delicious, healthy food in their growing spaces, schools or back gardens. Inspired by Vertical Veg4, whose founder had grown £600 of food on his balcony in one summer, they wanted to investigate how much fresh and healthy food could potentially be grown in London, particularly in time of recession and cutbacks, with many people struggling to feed their families due to rising food prices, job losses and changes to the social security system. The campaign encouraged people to pledge to grow a number of meals towards the overall target. We also provided an online tool, named the Harvest-o-meter, which has proved to be very popular. It stores and calculates the financial value of the harvest, in order to encourage people to record their harvest data. This was added to our existing data on the different types of food growing spaces that are part of the Capital Growth network, and their size in square metres. Spaces vary, for example, from small food growing spaces in schools to larger allotment plots with communal or individual growing, right up to commercial or semi-commercial horticultural sites and farms.

Following the first growing season, the Growing a Million Meals for London campaign has achieved good participation and produced useful data to help understand more about yields and the financial value of the fresh food being grown by members of the Capital Growth network.

- 160 community food growing spaces in London were helped to record data on their harvest, using the online Harvest-o-meter, collectively recording 21,236 kg (21 tonnes) of produce in one growing season. This equates to: £151,000 in financial value of the food grown, compared with high grade and organic supermarket produce 265,450 meal portions grown.
- The average yield during 2013 growing season for food growing spaces submitting data was approximately 492 grams or 6 meals per square metre, valued at £3.50 per square metre.
- The yield varied between different types of growing spaces – ranging from £1.62 for communal allotment plots to £10.17 per square metre for individual growing plots on community spaces, with farms at £5.00 per square metre and community growing spaces at £2.08 per square metre.
- The most popular produce grown (using total amount grown) included salad leaves, squash, courgette, tomato, potato and onion. The most popular by number of spaces growing, additionally included strawberries, chard and runner beans.
- Using the average yield of the different growing space type and size, our conservative estimate is that the 2,000+ food growing spaces in the Capital Growth network have the potential to produce at least £1.4 million worth of produce, weighing between 313 and 357 tonnes (see next page for what this would look like).
- This could be increased if they were achieving the top end of the potential yield per square metre and our Grow More Food pilot demonstrated that additional support and materials can help food growing spaces to increase their yield.

Q: what
could
the
Capital
Growth
network
grow?

A: **357**
tonnes

(equivalent to
this whole list)



1 million
bags of salad



750,000
tomatoes



300,000
squash and courgettes



150,000
apples and pears



120,000
bags of leafy greens



100,000
eggs



80,000
potatoes



75,000
bags of herbs



75,000
punnets of berries



25,000
cauliflowers and cabbages



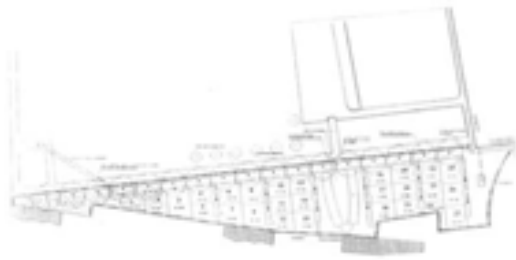
10,000
jars of honey

4.4 Milano Metropolitan Region (MMR)

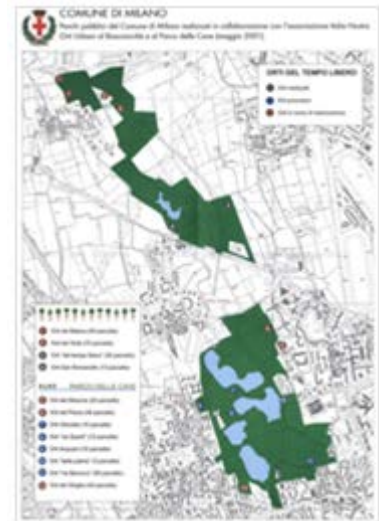
4.4.1 Typology of Urban gardening in Milano

1. Municipal allotments

Gardens plots situated on public and municipal-owned land, loaned for 5 years to individuals or associations winners of a specific notice of assignment, exclusively intended for horticultural use and private consumption. The use of the plots is subject to an appropriate municipal regulation and to the payment of a yearly fee, with the possibility to pay an additional quota for the use of water, if provided by the municipality.



Source: Comune di Milano



Source: www.cfu.it

2. Other allotments away from home on public land

The Consortium of the regional park Parco Nord Milano, assigns through a competition notice, for a 6-years loan for use, garden plots on its own areas or on public areas given over to the Park. The use of plots is subject to the payment of an yearly fee covering management and maintenance costs.

Photo: <http://www.parks.it/parco.nord.milano/ser.php>



3. Private allotments (garden plots away from home on private land)

Allotments on private land granted by the owner to private parties, according to a waiting list; an annual rent is paid, also including the use of water.



Photos: <http://www.angoliditerra.org/i-nostri-orti-a-milano>

4. Community gardens

Public or private areas organized and managed collectively according to agreed initiatives of different subjects and citizens gathered together into informal structures or into legally recognized associations, who aim to redevelop degraded and vacant green areas by using them for collective gardening (both food and non-food products, e.g. flowers), and possibly providing products for self-consumption.



Photo: Isola pepe verde (Facebook page)

5. Corporate gardens

Cultivated gardens and terraces located at private companies, whose establishment derives from specific corporate policies. They are mainly managed by subordinates and employees, and, beyond providing food products directly to them – even in corporate canteens, they play a role as a space of aggregation and social integration.



Photo: <http://www.teatrofrancoparenti.it/?p=OrtoParenti>

6. Home gardens: backyard and front gardens

Plots pertaining to the land situated nearby (front or back) the detached houses, multi-apartment houses and farmsteads for residential use, both in the inner city and in the urban fringe. The cultivation of these areas are managed by the dwellers of indicated houses.

7. Gardens on semi-public land

Gardens and plots cultivated at public structures, which access is limited to particular users and categories of people, for therapeutic or rehabilitative purposes or for the reintegration into society (e.g. healing and therapeutic gardens at hospitals, gardens at prisons), with the possibility of selling productions.



Photos: therapeutic garden at San Carlo Hospital and <http://www.cascinabollate.org/>




8. Didactic and educational gardens

Gardens used by schools, associations, other public or private entities on both public or private land, with the possibility to be not free of charge.

Gardening becomes an instrument and a chance for teaching and spreading horticultural activities and for promoting the activities of training, aggregation, and raising awareness of environmental issues and nutrition.



Photo: <http://www.agricity.it/orti-nelle-scuole/>

9. Gardens on self-managed or occupied land and/or areas	
<p>Garden plots directly managed by the community/the group that occupies abandoned public or private buildings or areas and vacant lands. Productions are mostly for the self-consumption of the group itself, but the distribution can be extended to people in the neighbourhood.</p>	
<p>1. Other plots - 1</p> <p>Garden plots nearby railways, roadsides and abandoned lands, mostly situated at the city fringe. The owner of land is either the city, the state or business entities which however do not take any part in organising and maintaining such land areas. Users do not paid for using the land.</p>	 <p>Extracts from Google maps</p>
<p>2. Other plots - 2</p> <p>Isolated garden plots in the rural area around the city core and on riverbanks, examples of non-professional agriculture. The holder can be the owner of the land or someone else who cultivates the plot in agreement with the owner (both free of charge or not) or illegally, without corresponding any charge.</p>	 <p>Extracts from Google maps</p>
<p>3. Other plots - 3</p> <p>Garden plots at farmsteads that are also farm centres. Allotments are not part of the main (professional) activity of the farm, but to the private initiative of the professional farmer for private consumption.</p>	 <p>Extract from Google maps</p>
<p>4. Other experiences rather than cultivated plots</p> <p>Other existing experiences of urban gardening, where no land or plots are cultivated, and traceable back to different purposes:</p> <ol style="list-style-type: none"> private balconies, for self-consumption; roof gardens for self-consumption, therapeutic purposes or exhibition; vertical gardens at restaurants and other gardens' productions used at restaurants; botanical gardens, for exhibition and didactic purposes; experiences of guerrilla gardening. 	

4.4.2 Map of urban gardening areas in the Milan urban area

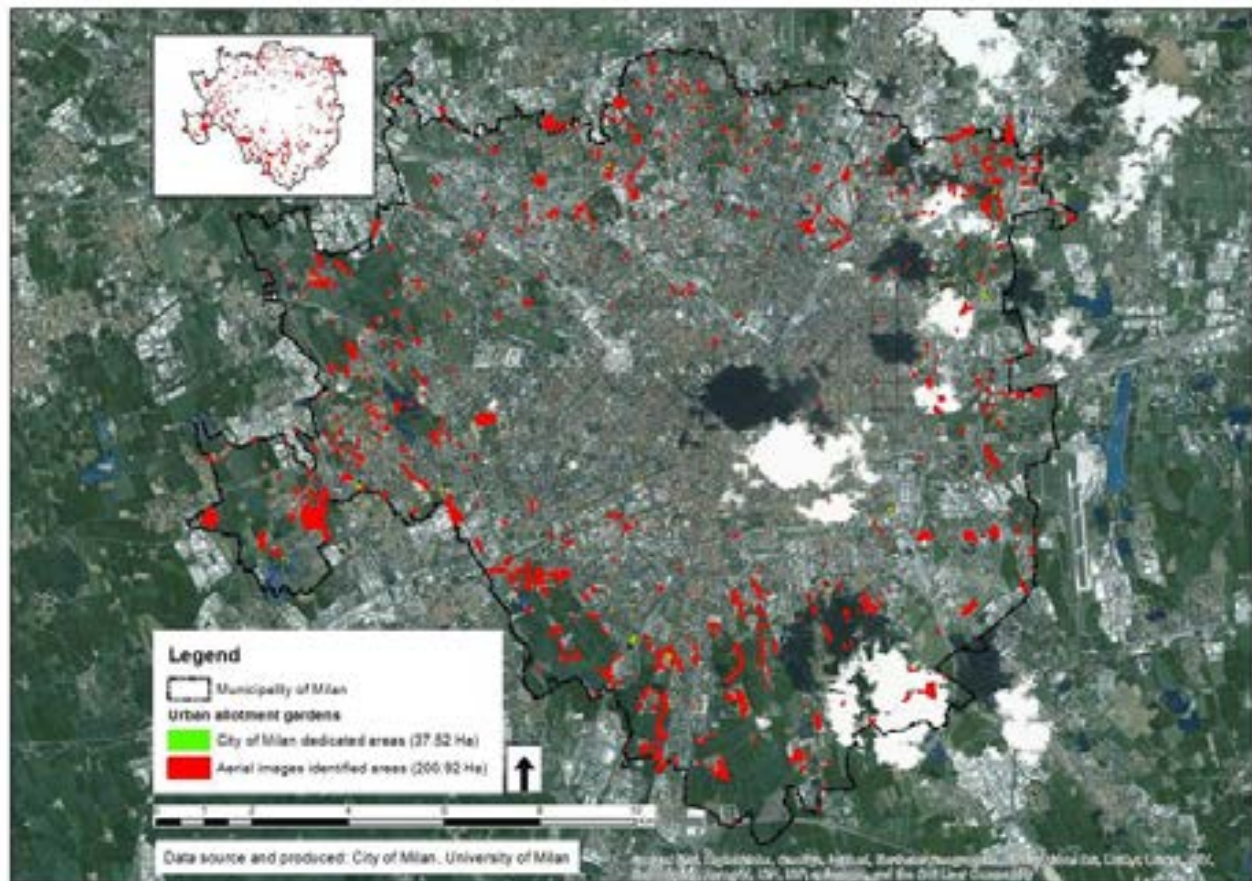


Figure 14: Map of 200 hectares of urban allotment gardens in Milan based on 2014 aerial image

4.4.3 Selected urban gardening stories from Milano

1. Community gardens: ORTOGRATO

Ortograto is one of the first experiences of therapeutic garden in Milan, dedicated to mental and physical disabled persons. In all the services for the people with both cognitive and psychiatric disabilities, in fact, horticulture is widely used for its benefits for patients in terms of welfare, skills increase, rehabilitation and outdoor recreation activities.

The structure is supported by a team of educators and psychologists, who support persons and provide them the chance to be outdoor also with other people and work with the land: some people spend a lot of time in their rooms or other enclosed spaces and it is an opportunity to get fit and meet other people from outside the centre. For each guest it is established a personal educational project, and according to it, the conditions and the motivations of user he/she can be involved in different activities.

Cultivated varieties are selected to not require too much attention, inputs or interventions, to be at the same time aesthetically satisfying and resistant to environmental stress: both flowers and vegetables are cultivated (e.g. sunflowers, irises, lilies, radishes, beans, salad, rocket salad, spinach, chard and other leafy vegetables), planted in boxes within a public park.

According to the main purpose of the initiative, it is not aimed obtaining large quantities of vegetables; productions are not abundant also because no synthetic products are used.



2. Community gardens: IL GIARDINO DEGLI AROMI

The Association *Il Giardino degli Aromi* has over 200 members and it is responsible for accompanying the social reintegration of disadvantaged people, playing their activities in green spaces and in close contact with nature. The association promotes the knowledge, use and dissemination of horticultural, aromatic and medicinal plants, supports the dissemination of activities related to gardens and community gardens, organizes a documentation centre and provides training and research courses open to all citizens.

In 2010, *Il Giardino degli Aromi* was awarded in the category “Community Gardens” of the national competition “Agriculture Civic Award”, recognition dedicated to experiences of “agriculture of the future” allowed by AiCARE (Italian Agency for Countryside and Responsible and Ethic Agriculture).

It operates in the area surrounding the former psychiatric hospital Paolo Pini, a complex of nearly 300,000 m² owned by the Province of Milan and the Local Health Institution, offering several services (e.g. social cooperatives, associations, the Mental Health department of Niguarda Hospital).

Two different gardens are included in this area:

1. Gardens of the Hospice, an area with flowers and ornamental plants;
2. Community garden *Libero Orto*, where some plots are assigned to participants and a further area is dedicated to collective garden and cultivation of organic vegetables, herbs and ancient cultivar.

<http://www.ilgiardinodegliaromi.org/>



3. Community gardens: ISOLA PEPE VERDE

Isola Pepe Verde is an association of private citizens that manage, under an agreement with the City of Milan, a vacant area in order to preserve it from the strong urbanization of that part of the city, which has caused during times the lacking of green, public and accessible areas. It is a bottom-up initiative, born from the private initiative of some inhabitants of the neighbourhood, also with the purpose of contrasting degradation and creates a network a social and shared space. The gardening represents only an activity of the association: currently approximately twenty gardeners and other people deal with related works (e.g. the construction of the caissons), mainly young and between 40 and 50 years-old, and cultivate exclusively organic products for private consumption.

<http://isolapepeverde.wordpress.com>

https://miracoloamilano.wordpress.com/2013/11/19/isola-pepe-verde-un-miracolo-di-giardino-tra-i-palazzi/img_20131119_154131/



4. Gardens on semi-public land: CASCINA BOLLATE

Cascina Bollate is a social cooperative born in December 2007 in the prison of Milano-Bollate. In the structure gardeners and prisoners work together, coordinated by agronomists, learn a profession and are engaged in a quality production that meets the growing demand for unusual plants. The initiative aims on one hand to bring "inside" the prison the same setting of "outside" work, forming professional gardeners; on the other hand employees and their work for quality product are differently considered from the traditional way of thinking of a prison.

The initiative aims on one hand to bring "inside" the prison the same setting of "outside" work, forming professional gardeners; on the other hand, workers and their work for a quality product are considered in a different way compared to the traditional conception of a prison.

Cascina Bollate consists of i) a nursery, inside the prison and accessible to general public with a special permission, where are cultivated perennials, annuals plants and varieties of old roses, ii) an educational garden open to the public where courses of gardening are organized and a iii) a shop for direct sale open to public.

<http://www.cascinabollate.org/cms/>



5. Garden plots away from home on private land: ORTI URBANI DI VIA CHIODI

Urban gardening plots located in the city fringe; the property of the entire area is of an architect and planner who promoted in 2005 the creation, management and assignment of plots to be cultivated as family gardens. The activity is carried out by the owner as a commercial activity that provides the management and the maintenance of the area, combining the entrepreneurial initiative, the collective experience of participants and users and the conservation of the area itself.

The plots are assigned accordingly to the waiting list drawn up by the owner, who enters requests and precedes the assignment chronologically, at the expiration of the contract.

The total area is approximately of 2.5 ha, for 130 plots available for as much as gardeners, who have the possibility, under the payment of an annual fee including the periodic and scheduled use of water, to use a well-equipped plot and share common areas.

<http://www.angoliditerra.org/>



6. Municipal allotments

The municipal gardens are allotments of public land managed by the Municipality for mainly social and aggregative purposes, assigned to private citizens or associations according to a ranking list following a specific announcement. The areas designated for urban gardens are mostly located in the city fringe and outskirts, where also a large amount of land is available. Currently the City organizes and manages the allocation of over 870 plots, distributed in 13 different groups, possibly equipped with community facilities and public areas, for a total of over 43,000 ha dedicated. The beneficiaries of the parcel are required to pay an annual fee and to the observation of a specific regulation of its use, which requires them cultivation solely for private consumption, thus prohibiting the sale of what is harvested.

<http://www.agricity.it/pagina-di-esempio/orti-in-zona/>

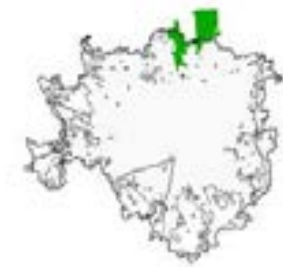


7. Garden allotments on public land: municipal allotments in the PARCO NORD MILANO

At the Northern outskirt of Milan, the Regional Park *Parco Nord Milano* has been operating, since the 1980s to create urban gardens within its own boundaries. The park during time represented and still represents a remarkable element for the redevelopment of both the city borough and the close areas belonging to the different municipalities the Park itself is included in; in this sense urban gardens also contribute in revitalizing these areas. Moreover, since plots are assigned exclusively to retired persons, gardening thus becomes a social activity. The assignment is through a competition notice for garden plots on Park areas or other public areas given over to the Park. The use of plots is subject to the payment of an yearly fee covering management and maintenance costs.

<http://www.parconord.milano.it/spazi-e-attrezzature/170>

<http://www.parconord.milano.it/leggi/2541-il-regolamento-degli-orti>



8. Corporate gardens: BOTTEGA VENETA and TEATRO PARENTI

Two main examples of corporate gardens exist in Milan. The first one is that of the fashion brand *Bottega Veneta*, which installed in its public spaces an organic garden whose productions are used in the corporate canteen.

<http://www.mffashion.com/it/archivio/2014/03/13/bottega-veneta-punta-sull-europa-dopo-il-miliardo>

The second experience is the *OrtoParenti*, a cultivated terrace within the Franco Parenti Theatre, destined to the workers and the public of the theatre itself, also as a space of informal aggregation.

<http://www.teatrofrancoparenti.it/?p=OrtoParenti>

<http://www.giardinigalbiati.it/2013/07/ortoparenti-facciamo-lorto-in-teatro/>



9. Gardens on semi-public land: ERBA BRUSCA – sale at restaurant

Restaurant *L'Erba Brusca*. The cultivated area (approx. 70 m²) is located next to the restaurant.

When the building and the garden of the restaurant were leased, the new tenants realized that they could use the outdoor space as a garden plot. It was then decided to take up all the space available with tanks, caissons and crates where to grow some herbs and leafy vegetables.

No chemicals are used, great attention is paid to the seasonality of the products they use in the kitchen and the quality of the products grown is very high. The garden is a small laboratory for experimenting with and it is decided day by day how to improve productions. The tenants would like to increase the area for gardening, maybe taking advantage of the availability of land existing near and around the restaurant location.

<http://www.erbabrusca.it/>



10. Didactic gardens: GARDENS AT SCHOOLS - Project MiColtivo

The project aims, among other purposes, to create a network of didactic gardens at public schools in Milan. In this sense, in the pilot stage the implementation of standardized structures has been implemented, in order to realize a model replicable and adaptable to any further schoolyard where to adopt the scheme.

The structure includes: - wooden crates, - paving gravel, - fence, - toolbox and kit for horticulture, - compost, - table and benches for outdoor lessons, - illustrative totems of the project.

<http://www.micoltivo.it/>



4.4.4 Land management regulations for allotment gardens in the city

The City of Milan promotes several initiatives and projects concerning the spreading of urban gardening as a social activity and the possibility to cultivate plots within city boundaries, without however the phenomenon of urban gardening itself, meant as non-professional agricultural activity, is (up to now) included in the City Spatial Plan nor in other planning regulations.

These specific regulations refer to:

- i) ***Project “ColtivaMi”***
Initiative of the City for the assignment of public areas for the realization of new garden plots, whose location was defined by a specific Council Resolution., in agreement with non-profit organizations.
- ii) ***“Orti in Zona”***
Each Area of Decentralization (i.e. city boroughs) manages garden plots with social and aggregation purposes. The notice of assignment to which parties interested in the cultivation of plots have to refer, is drawn up by the City Council, but each Area Council can give different scores to the preferential criteria for the assignment of plots, in order to favour particular categories of users. One or two plots per equipped area are reserved for associations, cooperatives, foundations, schools or other organizations operating in the Area.
- iii) ***Project “MiColtivo. Orto a scuola”***
The city of Milan is patron and coordinator of the program, dedicated to kids and children, that aims to encourage a correct and healthy nutrition through the concrete experience of educational gardens in the courtyards of public schools, providing a wider redevelopment of these green spaces.
- iv) ***Collective gardens***
An experimental project promoted by the City aiming at requalifying and valorise degraded and unused green areas. It includes the direct involvement of citizens gathered together in associations to convert the areas into collective gardens (floriculture and/or horticulture) and manage them.
- v) ***Collective garden in the Parco Nord Milano***
Ongoing project aiming at the realization of a collective garden of 0.5 ha within the boundaries of the Regional Park. The consortium will be just the coordinator and the contact entity for the project itself, while the practical aspects will be realized through the direct participation of citizens, associations, neighbourhood committees and already operating urban gardeners.
- vi) ***Project “Urban cooking&Gardening: grow food, grow people, grow communities”***
The project, promoted by the City and funded by the European Fund for Integration, aims to the promotion of practices of land re-appropriation and care, sustainable consumption and food quality issues, through a theoretical and practical training course free of charge about Urban Gardens.
Responding to the purpose of encouraging participation and dialogue between different cultures, it is addressed to a limited number of people emigrated in Milan from other parts of the world (Africa, Central and South America, Far East and Southeast Asia, Eastern Europe and former Soviet Republics, Middle East and Maghreb, Indian Subcontinent) and includes the distribution of kits among them, in order to stimulate the creation of a network of micro-home vegetable gardens.
- vii) ***Food policy and “Urban food policy pact”***
The city is implementing a food policy strategy including policies on nutrition and food exploring these thematic from different points of view (territory, welfare, education, environment, international relationships), also consistently with the topic of the EXPO. In this context, the Major of Milan promoted the idea of creating a network among cities all over the world to define a standard strategy for nutrition in urban areas, going under the name – and signing - of “Urban Food Policy pact”.

4.5 Nairobi Metropolitan Region (NMR)

4.5.1 Typology of Urban gardening in Nairobi

1. Home gardens Where households have extra spaces on their compounds or around their self-owned or rented houses, such spaces are usually put to agricultural use. Agricultural produce generated from such spaces, mostly in the backyard, are mainly used for consumption, although the surplus could be sold within the neighbourhood to earn the farming household some extra income.	
2. Garden plot away from home in public open spaces Carrying out farming in public areas is common in Nairobi city. It is practiced both by groups (i.e. women and youth groups) and individual farmers who usually approach the County Government and seek to use the land on a temporary basis for a specified period of time. This land comprises of unutilized plots, road or railway reserves and normally no charges are levied for the same. Those carrying out farming on such lands do so mainly for commercial purposes. Open space farming contributes to food security in the city besides creating employment opportunities especially to the youths. The major challenges of this type of farming include insecurity of land tenure, exposure of the produce to theft, and lack of adequate water for irrigation.	
	
3. Garden plot away from home on private land Some city residents own land in other parts of the city and on the outskirts away from where they live. Whereas some of these landowners carry out farming on their plots, others choose to give their plots out for rent to interested farmers. Such plots are usually of considerable sizes and able to support commercial farming.	

4. Multi-storey gardens in public open spaces and in backyards.

This method has also been adopted by some city residents to alleviate the problem of land scarcity and to maximize their limited spaces. Multi-storey gardens are portable and can be placed in a variety of places including in open spaces, on verandas, pavements, in the backyards, etc. The set-up of these gardens is fairly complex and requires some training. The gardens are ideal for various crops such as kale, spinach, coriander, etc. It is estimated that one such garden grown with at least three leafy crops could generate up to KES 35,000 (or 350 euros) annually.



5. Use of sacks and tins in open spaces

This method is effective where there is limited land and where the soils of an area may not be appropriate for farming. This practice is less costly to carry out.



6. Garden on institutional land

Some city residents negotiate access to idle land within the compounds of nearby institutions such as schools and churches. Group farming – mostly involving women and youths – is especially common on institutional land. Such land is generally more spacious and often allows commercial farming, and the produce is mostly sold off to the nearby shops. However, some institutions also utilize available land for agricultural purposes to meet part of their food needs and/or for commercial purposes.



7. Gardens on road reserves/foot paths

Owing to land scarcity in the city, residents convert any available space to farming, including road reserves and along foot paths. This type of farming is usually carried out by individual farmers, who produce for home consumption and/or for sale in the neighbourhood.



4.5.2 Map of urban gardening areas in the Nairobi urban area



Figure 15: Areas with urban vegetable production gardens

4.5.3 Selected urban gardening stories from Nairobi

1. City government house with a garden in the backyard – self supply and commercial purposes

Francis Wachira practices farming on a one-quarter acre plot in the backyard of his house, which is located within one of the city government's residential estates. A mixed farmer, Francis grows a wide variety of crops and rears different types of livestock. Among the crops grown on the plot are: carrots, kales, spinach, traditional vegetables, coriander, celery, dill, potatoes, avocados and sugarcane. He also rears chicken, guinea fowl, rabbits and dairy goats. Some of Francis' crop products are consumed at home while the rest are sold either on the farm or to nearby shops and supermarkets.



View of various types of crops



View of goats



view of different types of chicken

2. Private house with a small backyard garden – producing mushrooms for the market and vegetables for self-supply

Miss Asha produces mushrooms and grows vegetables in the small backyard of her dwelling. She sells her mushrooms mainly to nearby shops, hotels and to clients who place advance orders for her produce. She adds value to the mushroom by drying and packaging them. Owing to the limited space, the farmer does not produce enough mushrooms to meet the demand. She also improvises on vegetable production (e.g. by growing vegetables in tins and in won out car tyres. The vegetables are grown for home consumption.



View of the rooms used in various stages of producing the mushroom



View of crops grown in tins

crops grown using vehicle tyres

3. Garden on public land / self-supply away from home

The one-quarter acre plot which Solomon has been cultivating for one year is located a considerable distance from his home on railway land. To get to the plot, the farmer uses public transport. Solomon neither has a contract nor pays rent for the plot. Food crops grown on the plot include kales, onions, spinach and parsley as well as indigenous vegetables like *terere*. Solomon meets most of his household's vegetable needs from the farm and also earns income by selling surplus produce to vegetable vendors on-plot as well as to local shops. He irrigates his plot but not on a full time basis. He also mulches it to conserve moisture. The farmer reportedly earns an estimated KES 20,000 per month during favourable season.



4. Garden on the land owned by railways - self-supply and commercial purposes

For about 10 years, Esther has been cultivating a plot measuring about 100 m by 200 m, which is located on railways land. She cultivates a wide variety of crops on the plot, including leaks, kales, spinach, cassava and tomatoes for both home consumption and mostly for sale. She earns approximately KES 40,000 per month in a good season, and most of her customers come from the neighbourhood. The farmer applies manure on her farm to improve soil quality and obtains seeds and seedlings from the market and irrigates her plot using swamp water from Buruburu estate. Faced with the problems of pests and diseases the farmer also sprays her crops with chemical pesticides and insecticides.



5. Garden on the land owned by other owners i.e. road and railway reserves/ self-supply and commercial purposes

Mr. Rabani Maimba is a producer of seedling plants and vegetables in Mutindwa area of Nairobi. His farm measures approximately 4000m² and is located along the major outer ring road on the road/ railway reserve. The land belongs to the county Government of Nairobi but the farmer has been leased the land for a period of time following the major transformation it has had on the area. The farmer produces various seedling plants which he mainly donates to various institutions e.g. schools and Government offices and the rest he sells to other clients. The farmer also grows various vegetables such as, kale, spinach, coriander, spring onions, traditional vegetables, and carrots among others. The vegetables are either sold off to consumers and the rest is used for self-consumption. Mr. Rabani works together with a group of young people and together they have formed a company which undertakes the farming and other projects as well. According to the farmer, urban farming has improved livelihoods of the youths involved as they are able to earn a living from the sale of the produce. According to him urban farming has also changed the environmental condition of the area especially as a result of all the trees that have been planted hence improving the biodiversity of the area.



Various tree seedlings



Various crops grown on the land



View of multi storey garden and various tree seedlings

6. Vegetable garden on private land on the outskirts of the city – producing for self-supply and for sale to special customers on order

Since 2010, a year after purchasing a two-acre plot on the outskirts of Nairobi, Evaline has been planting different types of crops on her farm, including pumpkins, kales, spinach, maize, and traditional vegetables like *managu*. Employed in the city where she lives, Evaline does not consider farming a full-time occupation. Initially she took up farming for fun, to put her plot to some use before developing it, and as a source of trusted fresh produce for home consumption. She however realized that the produce from the farm was in surplus of the needs of her five-member household and that she could earn some income from the venture. While at the beginning she would grow common vegetables the surplus of which she would easily sell on-plot and/or to groceries, she recently started to produce particular crops for specific customers as requested by them in advance. Currently she earns approximately KES 4,000 per month, and although she irrigates her farm using tap water, the farm is usually productive during the months of July and October.



7. Institutional farming

Sister Bakita is a catholic sister who has devoted her time to farming at the Mary Immaculate school compound. The land where the farming is carried out is about one-eighth of an acre and the main crops grown are vegetables such as Kale, spinach, traditional vegetables, coriander, carrots, maize and sugarcane. The school compound also has a greenhouse which was donated to them and the farmer mainly grows tomatoes and other produce such as kale and spinach. The produce obtained from the school garden is mainly for subsistence use. The school has boarding facilities and some pupils reside there, meaning that the school needs adequate food to feed them. However, if any small amount of produce is left they do sell to nearby shops.



4.5.4 Land management regulations for urban gardening in the city

Until only recently, urban farming was carried out amidst legal uncertainty and contradictions, i.e. while some legislation provided local authorities with the legal framework to allow urban farming, other laws were more stringent and provided the urban authorities with the excuse to restrict and even criminalize urban farming within their jurisdictions. Among relevant laws for urban farming include the following:

The Agriculture Act Cap 18: Section 2 of the Act defines agricultural land as that which is used for the purpose of agriculture and has not been proposed for use for purposes other than those of agriculture. However, this does not rule out the possibility of urban agriculture within a town's boundaries.

Land Control Act Cap 302: According to Section 2 of the Act, a provision is made to allow for urban agriculture since it also defines agricultural land as any land in Nairobi Area or in any municipality, township or urban centre that is declared by the (relevant) Minister to be agricultural land.

The Local Government Act Cap 265 provided the local authorities with full decision-making power in relation to crop cultivation and livestock keeping within the municipal boundaries. Section 144 provided that any land belonging to the local government could be appropriated for any other purpose for which the local authority is authorized to acquire land. In other words, a local authority could invoke this Act to temporarily provide its urban dwellers with land for urban agriculture. Indeed, Section 155 provided that every municipal or town council could engage in agricultural activities and "to require the planting of any specified crops by persons for the support of themselves and their families in areas which in the opinion of the (...) council are suffering from or likely to suffer from shortages of foodstuffs." However, growing crops on unoccupied land and any government land and open public spaces such as road reserves, which is quite common, is illegal (Section 154).

Physical Planning Act Cap 286 provides that each Local authority has the power to:

- Prohibit or control the use and development of land in the interest of proper and orderly development.
- Formulate bylaws to regulate zoning in respect of use and density of development.
- Reserve and maintain all land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical development plan.

The Public Health Act Cap 242: According to section 157 (1) of the Act, it empowers the Minister of Health to regulate or prohibit cultivation or irrigation within and around townships. In case of evidence that such activities were harmful to public health and sanitation, the Minister could, in consultation with the Minister for Agriculture, prohibit cultivation or irrigation activities.

Despite the existence of various legislation that would provide the basis for supporting urban agriculture, until recently, the activity was largely prohibited within the city of Nairobi, and indeed in many other urban centres in Kenya. Urban agriculture was mostly treated by city authorities as a nuisance and public health risk in the city. Consequently, urban gardening was omitted from urban land use planning and as such no specific areas within the city were specifically designated for urban gardening and/or for the establishment of allotment gardens.

Sessional Paper No. 3 on National Land Policy

However, in the *Sessional Paper No. 3 of 2009 on National Land Policy*, the national government officially recognized, for the first time, the significance of urban agriculture to the livelihoods of urban residents and the importance of facilitating and regulating its practice. The policy identifies two principles to guide the practice of urban farming, namely: (a) the promotion of multi-functional urban land use; and (b) putting in place an appropriate legal framework to facilitate and regulate Urban Agriculture and Forestry.

- In the context of urban gardening, the principle of multi-functional urban land use ignores the notion that urban agriculture does not belong in the city nor that it is incompatible with other urban land uses. It also departs from the oft-preferred zoning model that proposes the designation of particular areas as farming zones while excluding agricultural activities from areas designated for other land uses.

- Section 109 (c) of the Sessional Paper states that “the government shall ... encourage development of underutilized land within urban areas”. It must be noted that many urban farmers in Nairobi city cultivate plots in open, undeveloped public spaces but under circumstances of anxiety and uncertainty over land tenure rights.

Subsequent to the Sessional Paper No. 3 of 2009, a *Draft National Urban and Peri-Urban Agriculture and Livestock policy (UPAL)* was published in May 2010, but this would not be concluded following the enactment of a new constitution later in the year that introduced a new governance structure which devolved the agriculture and livestock development functions to the newly introduced county governments.

The Nairobi City County Urban Agriculture Promotion and Regulation Bill, 2014

In August 2014, the County Government of Nairobi published a law – *The Nairobi City County Urban Agriculture Promotion and Regulation Bill, 2014* – which aims to “ensure the inclusion of urban agriculture in the planning process as a component of land use and food policy”.

Among the highlights of the Bill is the County Government’s intention to:

- To identify areas for the expansion or deepening of agricultural activities, provide adequate funding for urban agriculture, and register urban farmers.
- In recognition of the scarcity of public land for agricultural purposes, the proposed law provides that the Nairobi county government “may enter into contracts with land owners, on a voluntary basis, for the use of any vacant, unimproved or blighted lands for small-scale agricultural use within the city”.

4.6 Metropoolregio Rotterdam Den Haag (MRDH)

Within the Metropoolregio Rotterdam Den Haag (MRDH, <http://mrdh.nl/>), researchers investigating the urban agriculture of Den Haag in the direct vicinity of Rotterdam as part of this case study region. This decision was based on a Memorandum of Understanding between project leaders of FOODMETRES and the sister project SUPURBFOOD (“Towards sustainable modes of urban and peri-urban food provisioning”) which also had the case study region in the City-region of Rotterdam. To prevent duplication of research activities in the Rotterdam we extend our work to metropolitan region, precisely to the Den Hague.



Figure 16: Metropoolregio Rotterdam Den Haag

4.6.1 Current situation

During the last decade, urban agriculture has got more attention in cities worldwide as a movement that creates awareness for local food, health and environmental issues. In The Hague part of the Metropoolregio Rotterdam Den Haag (MRDH), this movement arose as well and for example it can be seen in the presence of Youth Food Movement Den Haag, the local youth wing of the international Slowfood movement. The attention for local food is for example visible in the success of Heerlijk Vers, a web-magazine with a digital map of regional food producers in the province of Zuid-Holland. The ‘local food trend’ is also visible in the growing amount of farmers markets, the presence of the Transition movement (Transition Town Den Haag) and the rising attention for *kringlooplandbouw* [English: recycling agriculture] from urban and peri-urban farmers.

These trends stimulated The Hague's citizens and municipality to take more initiative within the sector of local food production. Urban agriculture has been performed in The Hague since the foundation of the first community gardens in 1910. Currently, there are around 100 urban agricultural initiatives in the city, including 17 complexes with community gardens, 20 school gardens, 10 city farms and several other commercial or non-commercial initiatives (Figure 3). Some citizens cultivate edible plants in private gardens or balconies around their houses.

Many initiatives are initiated by individuals, citizen groups and entrepreneurs; some local platforms stimulate these developments with physical or educational support. The municipality followed the 'local food movement' just recently, with the launching of The Hague's Food Strategy. Currently, plans are being developed to start a local food platform that may collaborate all parties involved in the cities' food sector, in order to achieve the Food Strategy goals.

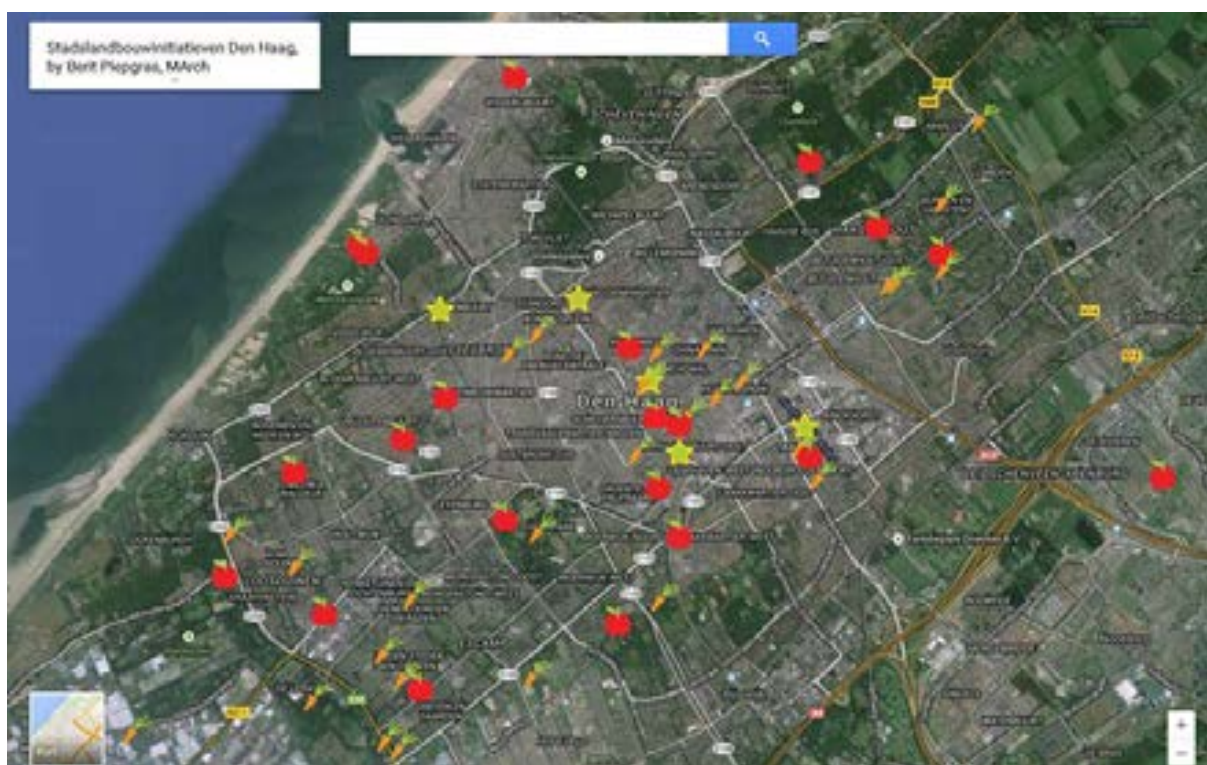


Figure 17: Map of The Hague with Several Urban Agriculture Initiatives

<http://beritpiegras.nl/2012/10/31/stadslandbouw-in-den-haag/>

root = urban agriculture or gardens (realized)

apple = school garden

star = urban agriculture initiation and / or design (not yet realized)

4.6.2 The Hague's Food Strategy

The Hague's Food Strategy was developed on the basis of the initiative proposal "*Sluit de voedselkringloop*" (2010). This report about the regionalisation of food production, distribution and consumption in The Hague and surrounding areas was published by Haags Milieucentrum (HMC) and Gezonde Gronden (GG). They argued that modern ways of food production and consumption generate environmental and social issues and therefore a more regional and sustainable way of food production is needed. Amongst many recommendations, the most important for the urban agricultural sector were:

1. Create a Food Strategy for the municipality of The Hague.
2. Create policy to stimulate citizen to grow their own food (Sufficient land supply in community gardens, school gardens and parks; allowing temporary use of vacant lots and empty office space; stimulate and allow development of edible balconies and rooftop gardens.)
3. Investigate the potentials to reuse urban organic waste for urban gardeners, urban farmers and peri-urban farmers (Compost the urban organic waste and regain phosphates from waste water.)

The municipality used these recommendations for the creation of *voedsel-strategie Den Haag*, Food Strategy The Hague (2013). The main focus in the strategy is on health improvement, greening the city and giving impulses for spatial development and local economies.

A short action plan was integrated in the document:

1. Health improvement: revise nature- and environmental-education programs, fruit and vegetable cultivation on schools and healthy food in sport clubs.
2. Greening the city: stimulate development of rooftop gardens, community gardens, courtyard gardens.
3. Giving impulses for spatial development and local economies: allowing temporary use of vacant lots and empty office space for urban agriculture, stimulate sale of sustainably produced food from urban and peri-urban areas, maintain rural landscape with farms, sustainable buying of municipality.

4.6.3 Stakeholders

Municipality

Since the creation of the Food Strategy (2013), Ed de Jager is assigned by the municipality as responsible person for urban agricultural affairs within the city. The municipal department Natuur- & Milieu-educatie (NME) [English: Nature- & Environmental-education] offers education for The Hague's school children about nature, ecology, environment, landscape and sustainability. The main goal of the education is to create more involved, respectful and environmentally friendly action taking of (young) citizens, for a sustainable and liveable society. NME provides education for children from primary and secondary schools with classroom teaching material and outside locations for practical education. Classroom teaching material and suggestions for nature- and environmental education can be gathered at one of the 3 *milieu service punten* [English: environmental service points]. Outside education is done in 20 school garden complexes, where children have their own garden for a season and learn sewing, planting, maintaining and harvesting crops. The city contains 10 *stadsboerderijen* [English: city farms], that are open for visits from all citizens and function as a place to show daily routines on a farm with animals like goats, sheep, rabbits, chicken and sometimes even cows and pigs.

Platforms

Several platforms in The Hague have a role in and around the urban agriculture sector of The Hague. The four most important platforms in this research are Haags Milieu Centrum, Gezonden Gronden, Eetbaar Den Haag, Duurzaam Den Haag and City Spices.

Haags Milieucentrum (HMC) is a foundation for green and sustainable development of The Hague. With projects about nature, water, mobility, urban planning and sustainable building, the HMC spreads knowledge about sustainability among citizens in order to make it easier for them to live sustainably. Their website contains much information and tips about urban agriculture and how to become an urban farmer. They also give attention to recycling of waste and recommended the municipality to improve the cities' organic waste separation to stimulate nutrient recycling of organic waste and waste water.

Gezonde gronden (GG) is an initiative which supports city programmes to raise the awareness of the citizens about healthy soil and food. This initiative gives courses and trains people about healthy soil, permaculture and producing food on balconies and in the gardens of the city of the Hague. It supports schools programmes for the creation of green playgrounds and people who want to create gardens in public spaces or in their balconies.

Eetbaar Den Haag (EDH) is an informal platform for local organizations and projects that focus on local food, urban agriculture, urban-rural (re)connection and (edible) green in the neighbourhood. Together with HMC and GG, EDH was also involved in the creation of The Hague's Food Strategy and advised the city council on the content of the strategy. In order to stimulate achievement of the Food Strategy-goals, the platform currently attempts to create a local food-platform (Haags Voedselplatform) to stimulate cooperation between local partners and organizations.

Duurzaam Den Haag (DDH) is a platform for citizens, businesses, organisations and municipality to cooperate in the development of a more sustainable city. Among many sustainability projects, DDH promotes urban agriculture by spreading knowledge and a network-overview of urban agriculture initiatives on their website and in the meeting centre.

City Spices (CS) is a platform consisted of several partial projects. Many workshops, events and publications run through this platform. Besides them, City Spices support many locations of urban gardening in The Hague.

4.6.4 Typology of Urban gardening in Den Haag/Rotterdam

1. Home gardens (edible windowsills, balcony garden (edible balconies), private houses (rent or ownership) where cultivation is organised individually by the dwellers. This can be in the soil of the garden, on the balcony of the apartment or on the window of either apartment or house. Because it is in a private place there is no charge.

1.1 Window farm

For those that are interested in growing your own food, but have limited amount of time and space.

<http://www.tuinenbalkon.nl/de-hangende-raamtuin-ook-voor-mensen-zonder-een-buiten>



1.2 Edible balcony

For those that have limited amount of space and still want to grow food very nearby the living quarters. It is mostly for fun and recreational purposes.

<http://www.denhaagdirect.nl/eetbare-balkons-in-mariahoeve-daar-pluk-je-de-vruchten-van/>



1.3 Home garden

Privately owned and maintained food garden in private garden. They are often small scale because of small gardens and limited amount of time to invest. People, often with small children, start these projects for fun (recreational) and with educational intentions.

<https://www.goedboerenindestad.nl/over-goed-boeren-in-de-stad/>



2. School garden (edible schoolyard)

is situated near the school. It can be part of the school grounds (playing area) or it can be part of a nearby allotment complex. In both cases the owner of the land is most often the local city government. The use of land is mostly free of charge when it is part of the school playing ground and there is a small fee when it is part of the allotment complex.

<http://www.eetbaarrotterdam.nl/2011/11/meester-mijn-courgette-is-gestolen/>



3. Rooftop garden (edible roof)

is most often part of a CSA system or a commercial garden. It is still in a pioneering phase. They are mostly used for growing herbs.

Source: Angela Anastasiou, A., Valenca, A. de, Amare, E., Montes de Oca, G., Widyaningrum, I., Bokhorst, K., Liu, S., The Role of Urban Agriculture in Urban Organic Waste Management in The Hague, The Netherlands (2014), Academic Consultancy Training Wageningen University



4. CSA garden / city farm

Ambitious initiative that in practice at this moment in time is small scale. Based on the idea that you can really earn a living by growing food inside the city. Various options are explored. Growing food in empty buildings is one of the more commercial varieties.

<http://stadslandbouwdenhaag.nl>

Source: Angela Anastasiou, A., Valenca, A. de, Amare, E., Montes de Oca, G., Widyaningrum, I., Bokhorst, K., Liu, S., The Role of Urban Agriculture in Urban Organic Waste Management in The Hague, The Netherlands (2014), Academic Consultancy Training Wageningen University



5. Community garden (allotment)

A complex of small gardens which are rented from the owner of the plot (can be private, local government, church). These complexes have grown (in general) in popularity over the past 10 years. They often are situated on pieces of land that were less interesting to develop for housing or commercial activities.

Source: Angela Anastasiou, A., Valenca, A. de, Amare, E., Montes de Oca, G., Widyaningrum, I., Bokhorst, K., Liu, S., The Role of Urban Agriculture in Urban Organic Waste Management in The Hague, The Netherlands (2014), Academic Consultancy Training Wageningen University



6. Permaculture garden

Gezonde Gronden is an initiative that supports city programmes in The Hague to raise awareness of citizens about healthy soils and food. This initiative gives courses and trainings in permaculture and in how to produce food on balconies and gardens in the city of The Hague. Some courses are given in the office of the initiative, in communities, in the balconies and others in the city gardens. They support school programmes for the creation of green playgrounds. They also support people who want to create gardens in public spaces in The Hague and Leiden. They have worked together with Foodprint project 2010 to construct a permaculture garden in the Zuiderpark (managed by Menno Swaak) in The Hague.

Source: Angela Anastasiou, A., Valenca, A. de, Amare, E., Montes de Oca, G., Widyaningrum, I., Bokhorst, K., Liu, S., The Role of Urban Agriculture in Urban Organic Waste Management in The Hague, The Netherlands (2014), Academic Consultancy Training Wageningen University

<https://eetbaardenhaag.wordpress.com/2013/04/04/gezonde-gronden/>



4.6.5 Selected urban gardening stories from Den Haag/Rotterdam

1. City farmer Elemam Musa

Elemam Musa is a city farmer in The Hague and part of Cooperatief Eigenwijzer that guides long-time unemployed citizens of The Hague into independent entrepreneurs with training, coaching and financial support. Musa, a graduate in agriculture and refugee of Sudan, was successful in getting funding (Oranje Fonds) for his the Hague urban agriculture initiative. The main objectives of the initiative are: 1. Produce healthy food for urban citizens, 2. Greening the city, 3. Create awareness about food production and consumption, 4. Education about food production.

Inputs: fertile soil (bought), seeds (bought and some produced in his garden), organic cattle manure (from organic cattle farm) and compost (from organic waste of neighbours).

Production: backyard garden (used for vegetable, seed and compost production), rooftop garden (Kobus restaurant), rooftop garden (no picture).

Output: Kobus restaurant (that uses some crops from the gardens), CSA (members that buy vegetables), school garden (education of school children), social cohesion (once a month, the people from the surrounding neighbourhood gather in the cooperative to eat together). The projects of Elemam have a positive effect on: 1. Health (fresh and healthy crops for the local market), 2. Organic waste management of the neighbourhood, 3. Nutrient recycling, 4. Social cohesion, 5. Education about food production, 6. Citizen participation in gardens and workshops

Production

The produced vegetables, herbs, seedlings are mainly for people from the neighbourhood and restaurants. The retail for people from the neighbourhood is mainly done with the Community Supported Agriculture (CSA). People can get a CSA membership and pay either 250 euro per year in return for dinners and workshops during the year, or pay 11-18 euro per week in return for a bag with vegetables of the week. Besides this, vegetables and seedling can be sold directly in the backyard garden, during week-days.

Compost

Two types of compost are being produced. One is generated from organic waste of organic production; the second is generated from organic waste of conventional production. The main part of the compost is used to improve soil conditions of the backyard garden. The garden soil is sandy and thus poor in nutrients with a high drainage rate. The compost is not sold but given to people from the neighbourhood in exchange for the organic waste they bring to the compost pile. Musa has plans to compost the organic waste of the restaurants that buy his herbs and use the compost for the herb beds in the roof garden, in order to close nutrient cycles as much as possible.

Education

In addition of these products, Musa provides education for school children in cooperation with NME (nature- and environmental education). Besides that, he sometimes gives workshops for people that are interested in urban gardening. Once a month he organizes a cooking workshop for young people from the neighbourhood with a dinner afterwards for elder people, to enhance social cohesion and share knowledge between generations.

Management

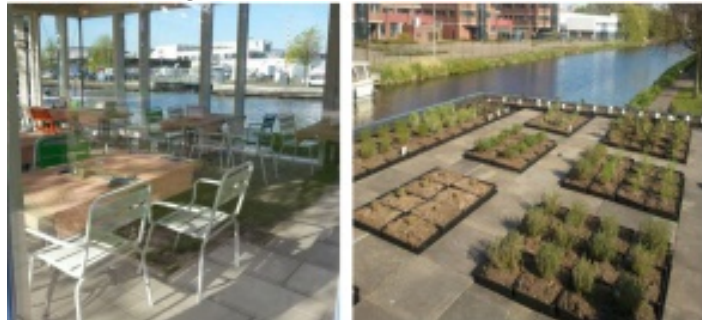
Musa's gardens are managed by three permanent workers and around ten volunteers that come from different backgrounds and participate in various activities of the farm.

Marketing

The only marketing that has been used in the project comes from the website, business card, and personal communication.

1.1 Kobus restaurant rooftop garden

Located in the Laak neighborhood. On the roof herbs are grown which are used in the restaurant.



1.2 Community garden in the neighbourhood Laak.

The community garden has several plots which people can rent. Furthermore, on this location a school garden and a city farm (with cows, sheep and pigs) is located. All these gardens and farms are not part of Musa's activities, but sometimes teaching activities take place in the school garden.



1.3 Cooperatief Eigenwijzer is located at the Ketelstraat

It has several rooms used by Musa together with other initiatives of the Cooperatief Eigenwijzer. At the backyard of the building, is his backyard garden (right picture) and a small greenhouse.



1.4 Greenhouse plans

The production season is 8 months a year, from February till September. Musa has plans to produce year-round with the implementation of greenhouses.

2. Gezonde Gronden

Gezonde Gronden is an initiative that supports city programmes in The Hague to raise awareness of citizens about healthy soils and food. This initiative gives courses and trainings in permaculture and in how to produce food on balconies and gardens in the city of The Hague. They support school programmes for the creation of green playgrounds. They also support people who want to create gardens in public spaces in The Hague and Leiden.

Until 2011 it was a citizen foundation about healthy soils, but from February 2011 it was renamed to a foundation with a board.

Heleen van Haften and Bessie Schadee studied, with the support of Fonds 1818, the willingness of inhabitants of The Hague and the farmers from the surroundings of Leiden to work together.

2.1 Permaculture Garden

There are four main projects where Gezonde Gronden is currently working on.



2.2 Edible Balconies

The Edible Balcony project is the major project of Gezonde Gronden which started in the summer of 2009. It consists a course of seven sessions, there are between 10 and 14 students per course. The courses take place close to the houses of people who are involved. Often these courses are (co-) financed by the municipality, the Housing Corporation (woningbouwcorporatie) or by the support of a fund.



7. Edible Schoolyard

The edible schoolyard project started at the end of 2010 in The Hague and was initiated by Fonds 1818. From 2011 a similar project began in the city of Leiden. Gezonde Gronden supported schools to create green schoolyards. The green schoolyards also include edible vegetables. In this gardens, the children have the opportunity not only to play in a green environment with water and sand, but also to learn about planting, sowing, and harvesting on a healthy soil.



8. Edible Windowsills

The edible windowsill project is a part of the Edible Balcony project. The window sills can be used as a place for growing seedlings or vegetables, herbs and flowers.



9. Edible everywhere

Permablitz De Groene Mus. - Besides to the edible schoolyards and balconies, Gezonde Gronden also supports other projects related to the goals of the organisation, for example “guerrilla gardening” in The Hague and Leiden. Another project that is supported by Gezonde Gronden is the Permablitz De Groene Mus in which residents of the neighbourhood around Meester de Bruinplein, in the center of The Hague, converted a piece of unused land into an edible garden. In this garden there are many fruit trees and a strawberry tower. Many people also use this garden for social reason.



8. Waste: worm composting

Gezonde Gronden introduces worm composting in their balcony courses. They also implement a worm compost bin (Figure 11) in one of their Edible Schoolyard projects. There are mainly three kinds of composting method: hot composting, cold composting and worm composting. The hot composting is fast but takes efforts. And the cold composting is easy but takes time. Comparing to the previous two, worm composting is both quick and easy to compost at home. By worm composting, it only take around 6 weeks to process waste into a fertile soil, worms go up and down in the waste, eat the waste and pull inside. In the end, the manure of the worms contributes to soil production.



5. Results of socio-economic survey

5.1 Socio-environmental perspectives

All together we received 221 questionnaires completed by urban gardeners – 127 from Ljubljana, 42 from London, 42 from Milan and 10 from Nairobi. The data enable insight into a various topics of urban gardening (Figures 17-34). Rotterdam has not been included due to the Memorandum of Understanding between FOODMETRES and SUPURBFOOD. Berlin did not participate because regional actors had been overexposed to research like this during the last years.

5.1.1 About gardener and household

The first one pertains to the socio-economic profile of urban gardeners. Our data show that both genders (Figure 18) are active in this activity. However, there are significant differences among the three cities; while in Ljubljana and London women strongly prevail among gardeners in Milan and Nairobi the opposite holds true. Among gardeners in all four locations older persons prevail (Figure 19), however there are again significant differences among the four cities; while in London the average age of gardener is 46 years and in Nairobi 50 years, it is much higher in Ljubljana (58 years) and particularly in Milan (65 years). Considerable differences among all three cities are found also as regards to education (Figure 20); while in Ljubljana and London among gardeners those with higher education prevails in Milan the great majority of gardeners achieved secondary education and in Nairobi tertiary education. Furthermore, as professional status (Figure 21), is concerned there are again significant differences among the three cities identified; while in Ljubljana and particularly in Milan gardening is mainly the activity of retired persons in London and Nairobi it is occupied predominantly by employed and self-employed persons. For our four subsamples it is also true that gardeners belongs to various income groups (Figure 22), Nairobi gardeners in 50% belong to lowest income group while in London gardeners belong slightly more to lower income groups than this is the case in Ljubljana and Milan where also some persons with relatively high incomes grow their own food. The interesting results relates to the estimation of the share of gardeners' household budget earmarked to food supply (Figure 23). In this respect the similarity among the EU cities (except of some cases in Milan with relatively high values) is much the same regardless of previously identified socio-demographic difference among the four subsamples. As household income of the Nairobi gardeners is the lowest among CS is the lowest also budget earmarked to food supply.

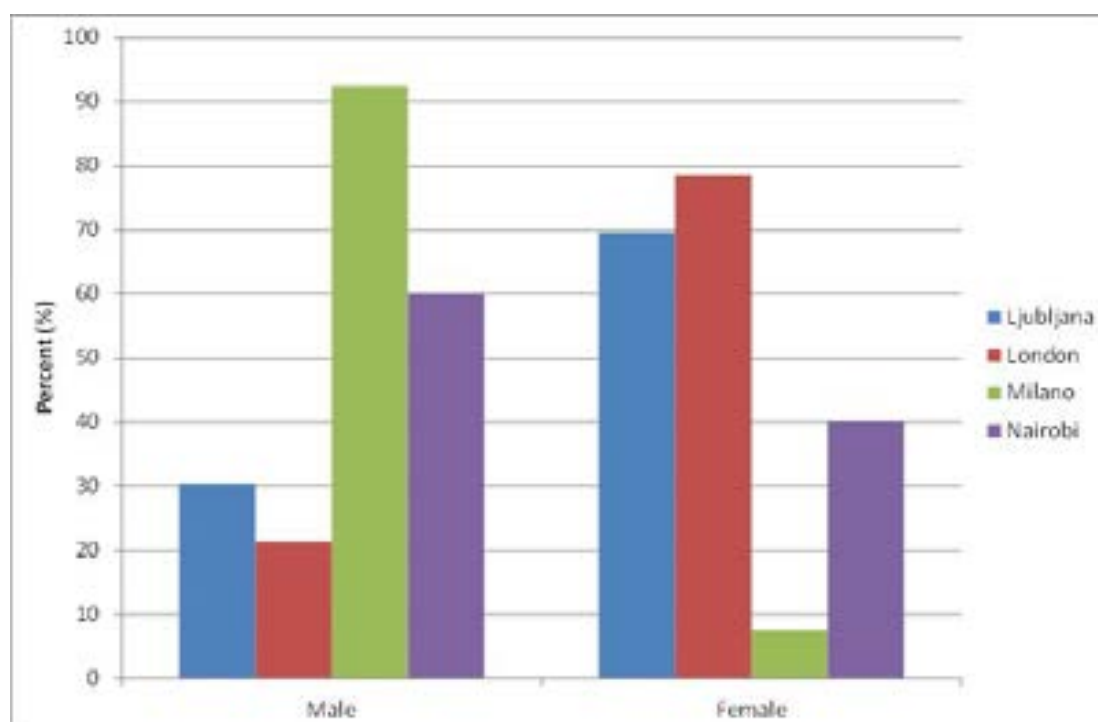


Figure 18: Gender of gardeners (Q37)

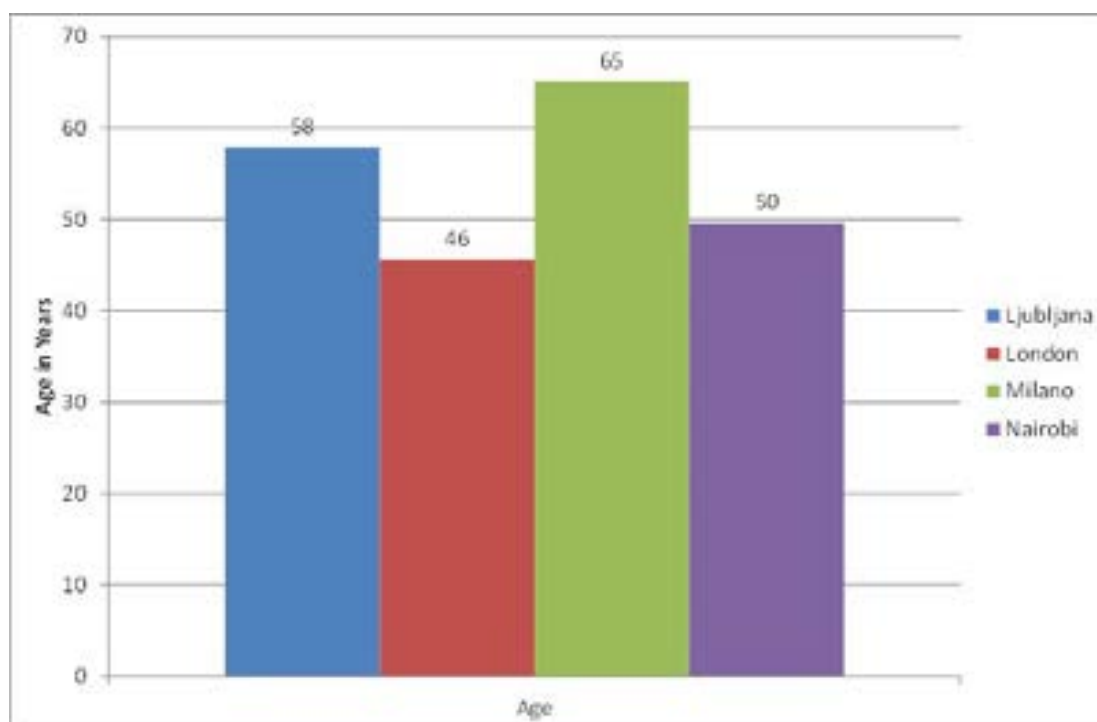


Figure 19: Age of gardeners (Q38)

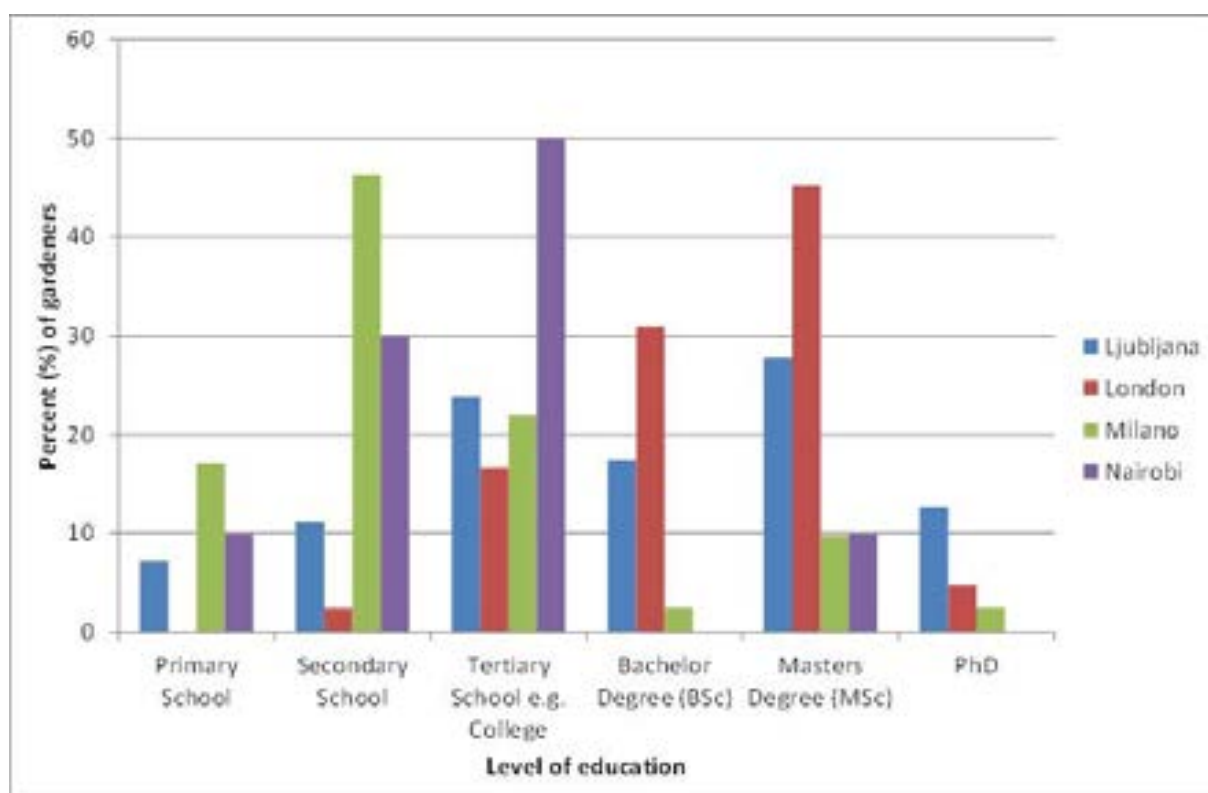


Figure 20: Level of education (Q40)

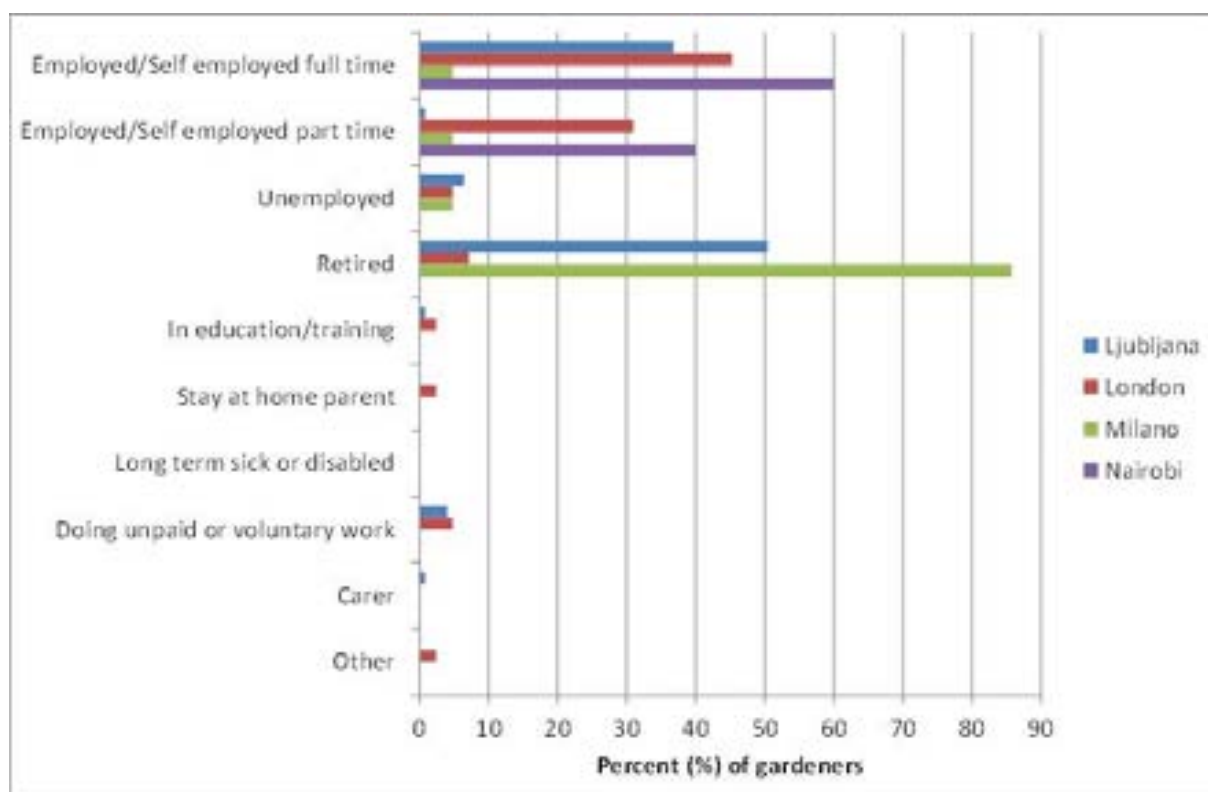


Figure 21: Working status (Q41)

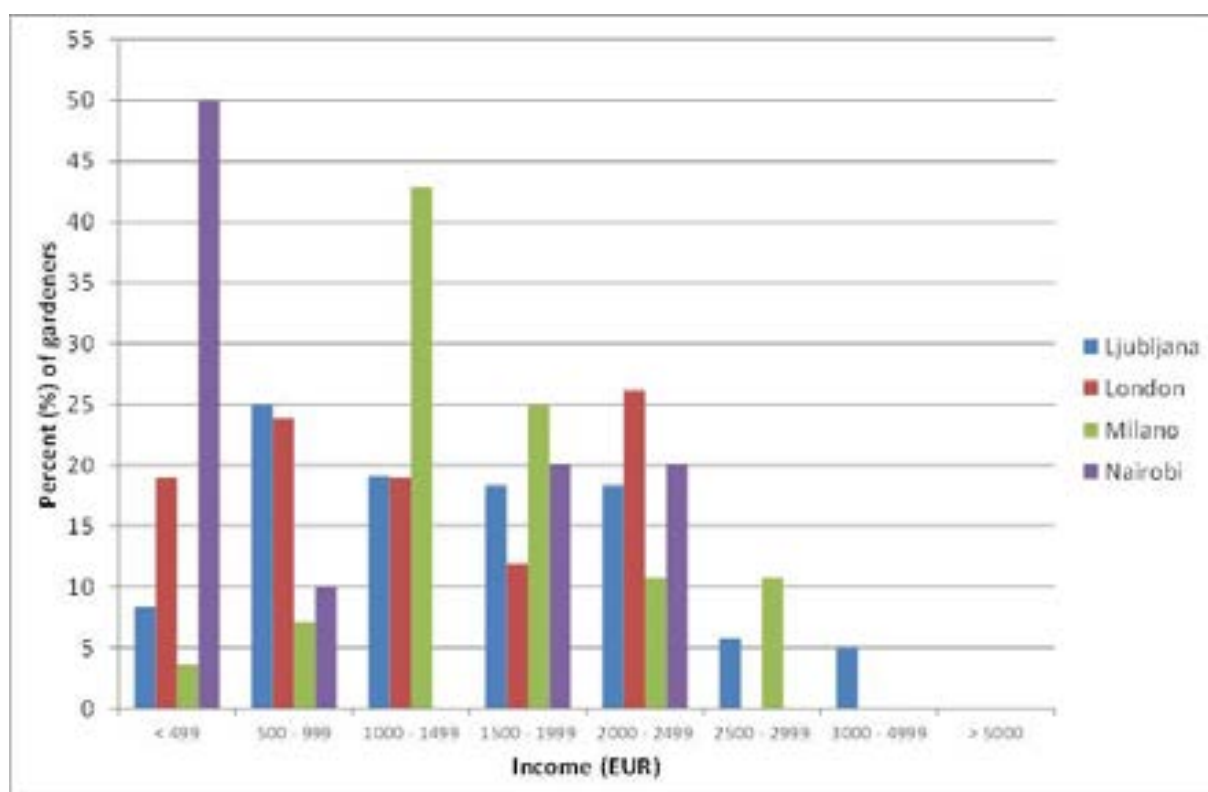


Figure 22: Average monthly household income (Q32)

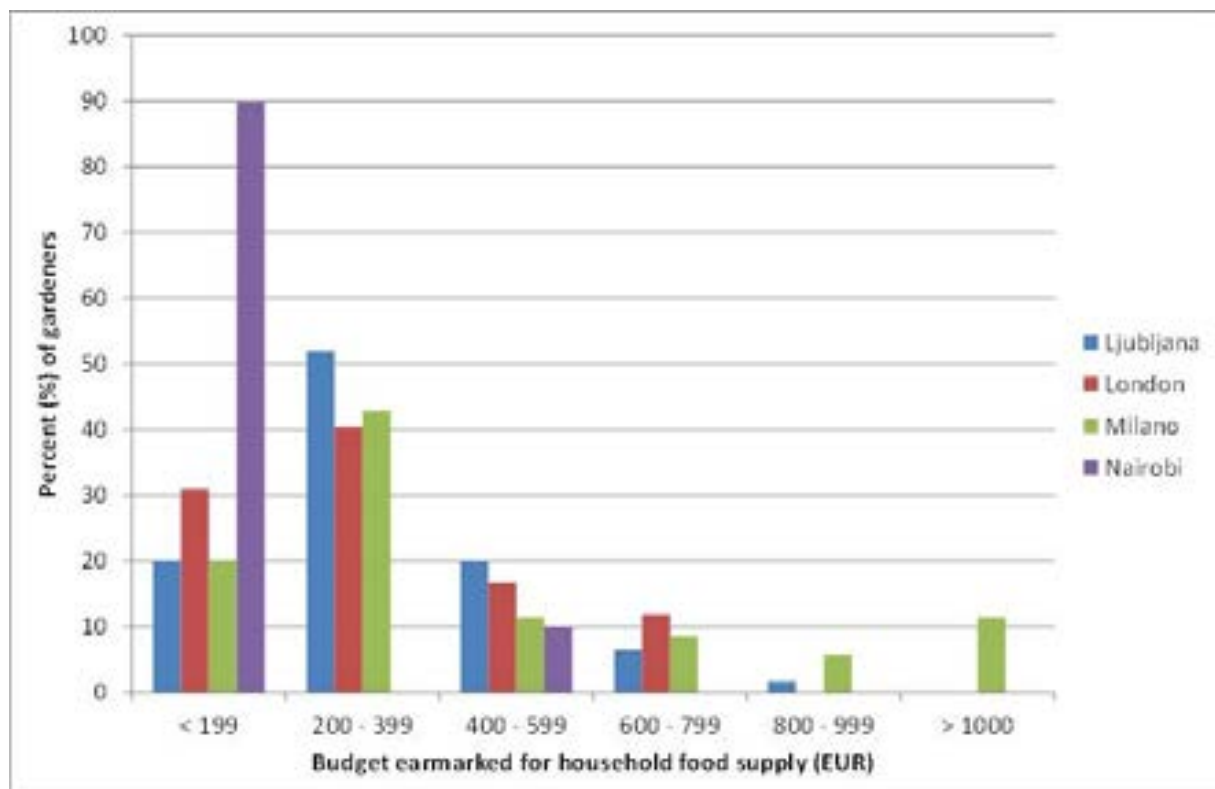


Figure 23: Estimation of the share of gardeners' household budget earmarked to food supply (Q31)

5.1.2 About gardener growing space

The second topic that is observed through the obtained data refers to the working conditions: the location of growing space and the size of growing area (Figure 24 and Figure 25). Considering the location the data show that gardeners work in rather different environments. In Milan the great majority (90%) of gardeners cultivate plots on public land away from their homes. In Nairobi home gardeners and gardens plots away from home on the land of the other owners prevail. In Ljubljana and London the gardening locations are more varied; considerable share of gardeners (40-50%) in both two cities is growing their own food on home gardens, the difference among both two cities appears in respect to gardening plots on private land where the Ljubljana sample shows higher shares (25%) than the London's one (10%). On the other hand Londoners are more likely (14%) than dwellers of Ljubljana (1%) to grow their own food using "atypical" locations (e.g. terraces, balconies, windows, etc.). As regards to the size of the growing area the data show considerable differences among the cities; in Nairobi garden plots are far bigger than in any other EU city. London gardeners have at their disposal much larger plots than the gardeners in Ljubljana and particularly those in Milan. Larger plot in Nairobi mean also more time spend at garden growing food. Average gardeners in London spend less their time gardening that the gardeners in other EU cities, particularly in Milan (Figure 27).

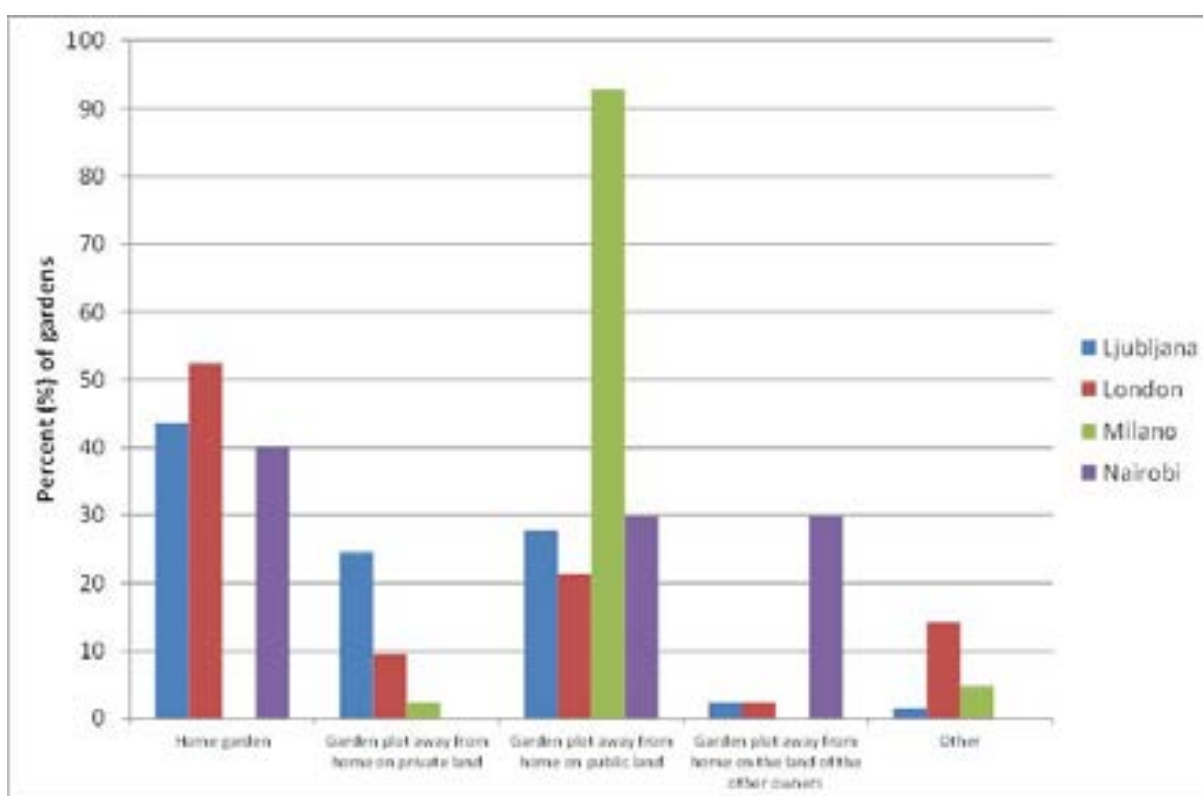


Figure 24: Type of garden (Q1)

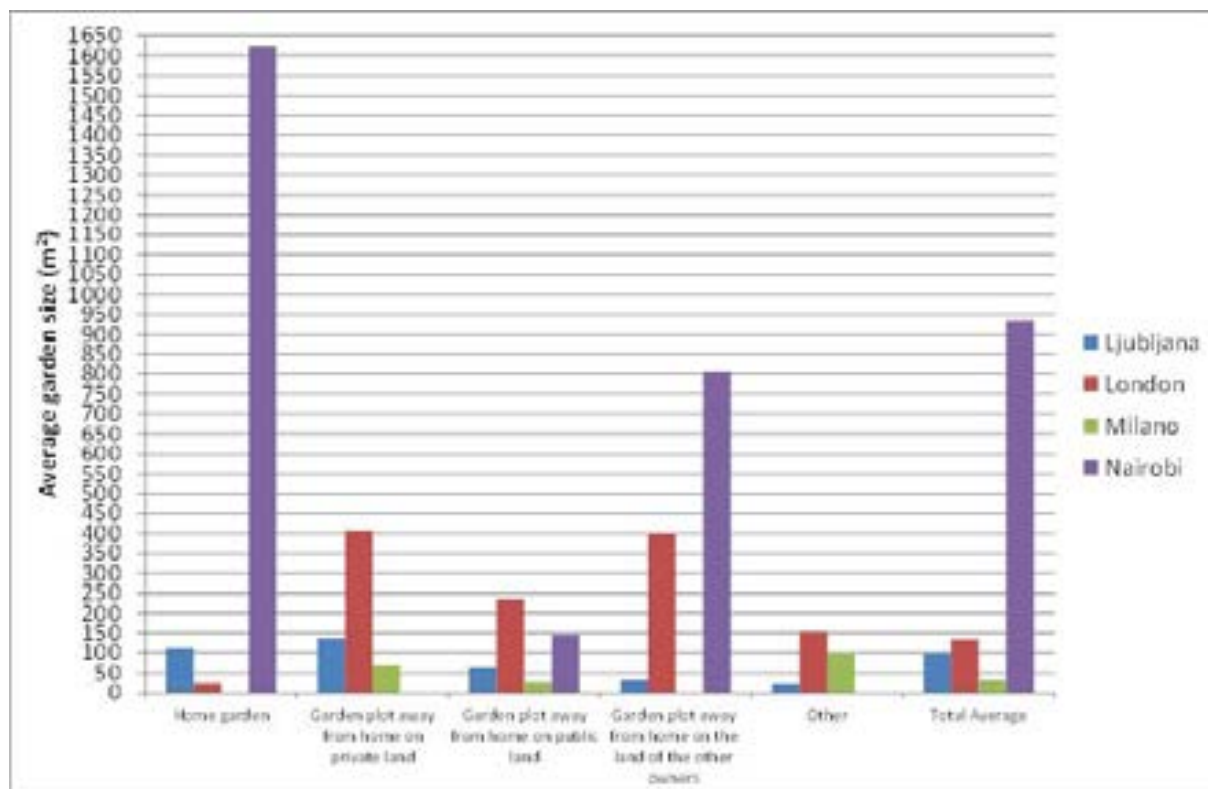


Figure 25: Approximate size of growing area (Q6)

5.1.3 Growing Methods

Another topic refers to the growing methods. The data show that so called environmentally friendly way of gardening in its varied forms (organic, permaculture, biodynamic) is the most frequently practised in all cities (Figure 26). The share of those growing their food conventionally (using mineral fertilizers and pesticides) is the highest in Nairobi and London while the share of those growing their food through so called integrated way (using specially prescribed (limited) amount of artificial subsistence) is the highest in Milan. However, the data on the type of fertilisers the gardeners use in growing their own food show (Figure 28) that the highest share of those using mineral fertilisers is found among the gardeners in Nairobi and Ljubljana. As regards to the type of fertilisers used the data also show significant differences between Ljubljana and London gardeners as more frequent users of homemade compost in comparison with Nairobi and Milano gardeners who are more frequent users of manure. The differences related to the way how gardeners supply themselves with seeds and seedlings (Figure 29) are not very transparent, however there is a tendency that in Ljubljana gardeners get their seeds and seedlings more frequent by exchange with other gardeners than this is the case in other two cities while in Nairobi and Milan buying seeds and seedlings is more common practice and in London gardeners are using own produced ones more frequently than gardeners in the other two cities. However, the differences related to the way how gardeners collect water for their gardens (Figure 30) are more apparent; the data show that gardeners in Milan and London have greater access to tap water than the ones in Ljubljana or Nairobi who in greater share needs to rely on other resources (e.g. nearby rivulets). The data on water supply also show that collecting rain water is not usual practice in Milan whereas it is rather common practice in London and Ljubljana. For Nairobi CS gardeners report of using waste water from kitchen.

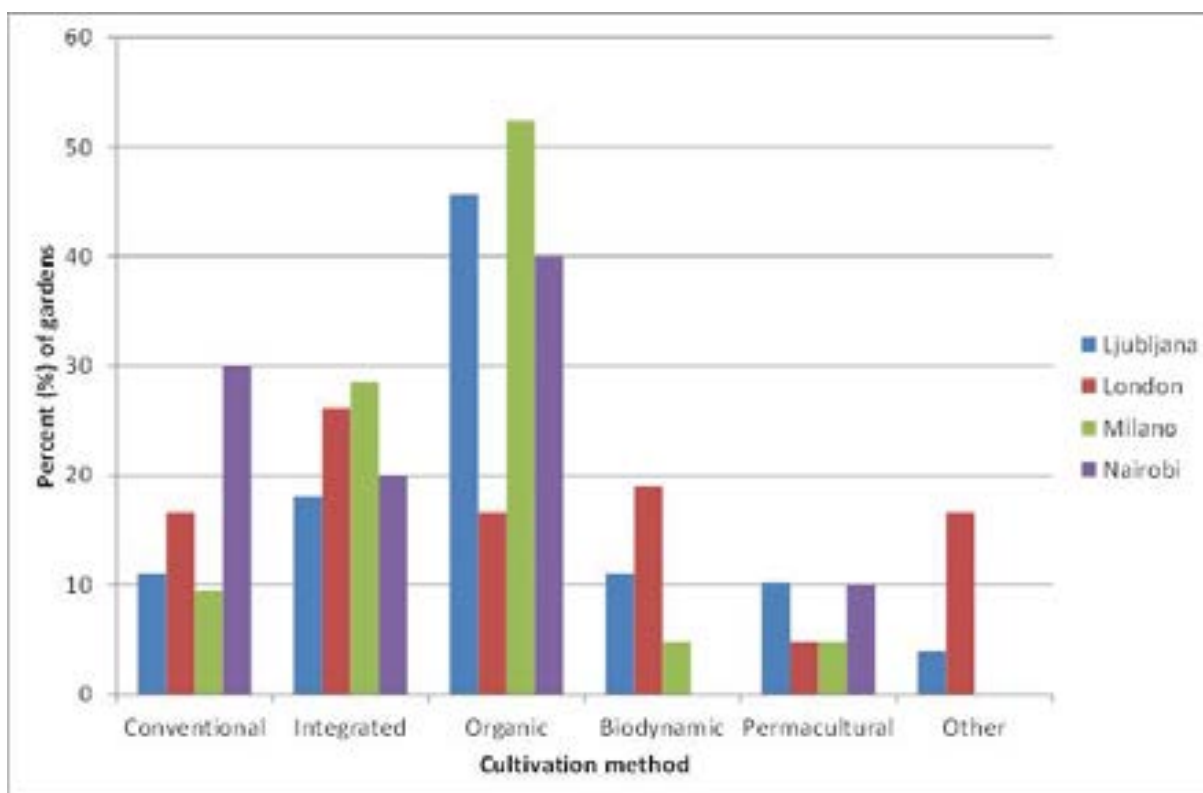


Figure 26: Principal cultivation method of garden plot (Q8)

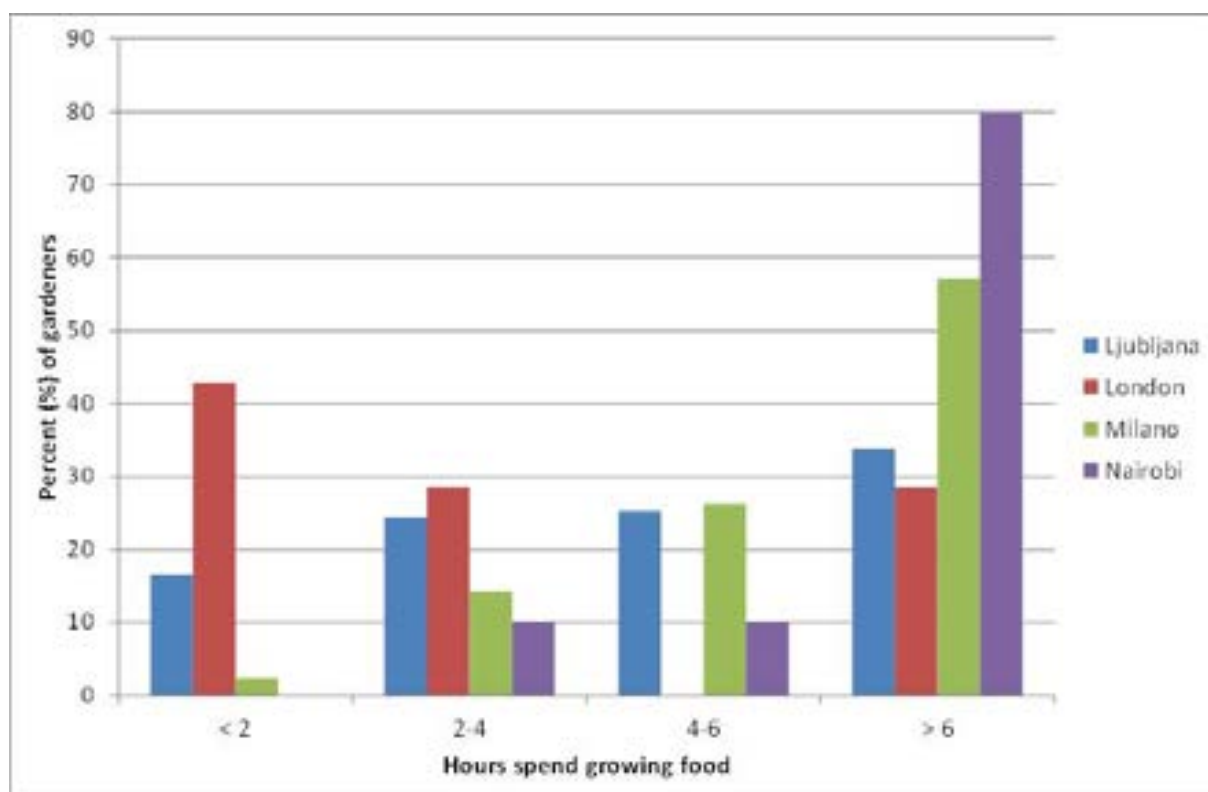


Figure 27: Estimation of hours per week during growing season spend growing food (Q9)

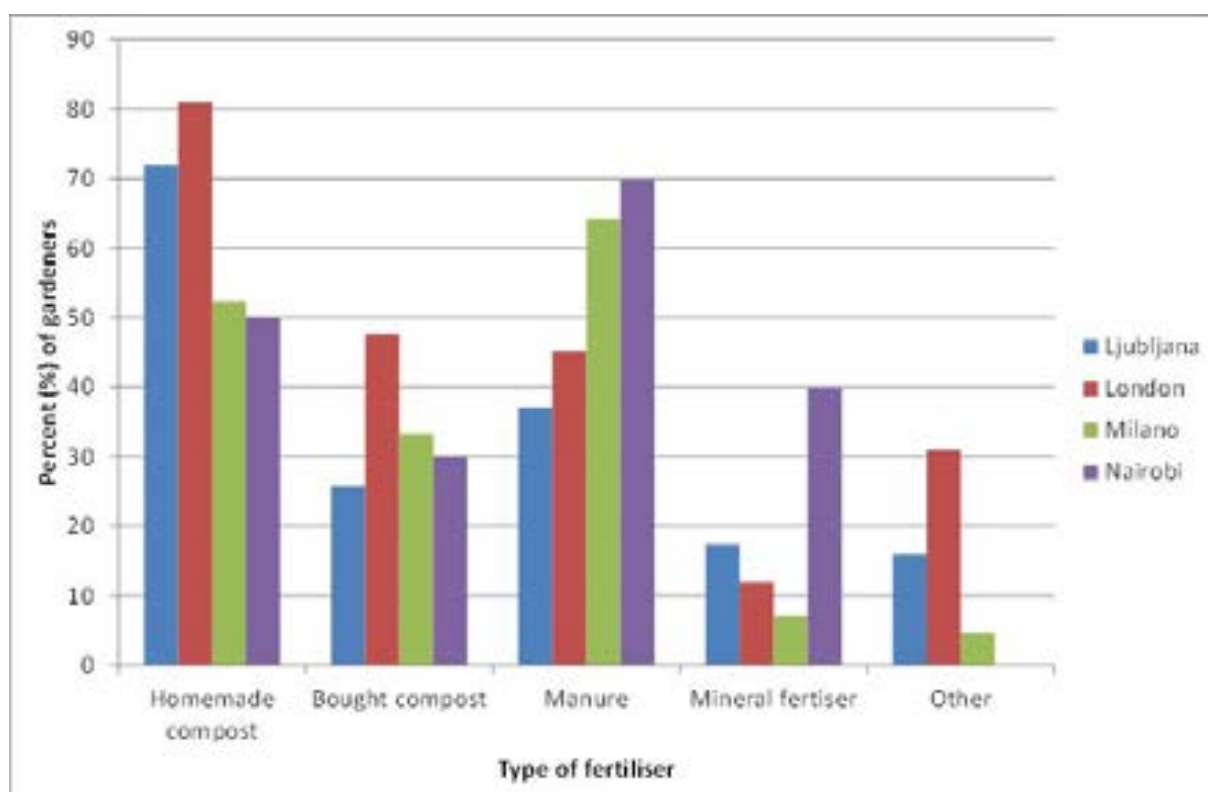


Figure 28: What kind of fertiliser do they use in the garden (Q11)

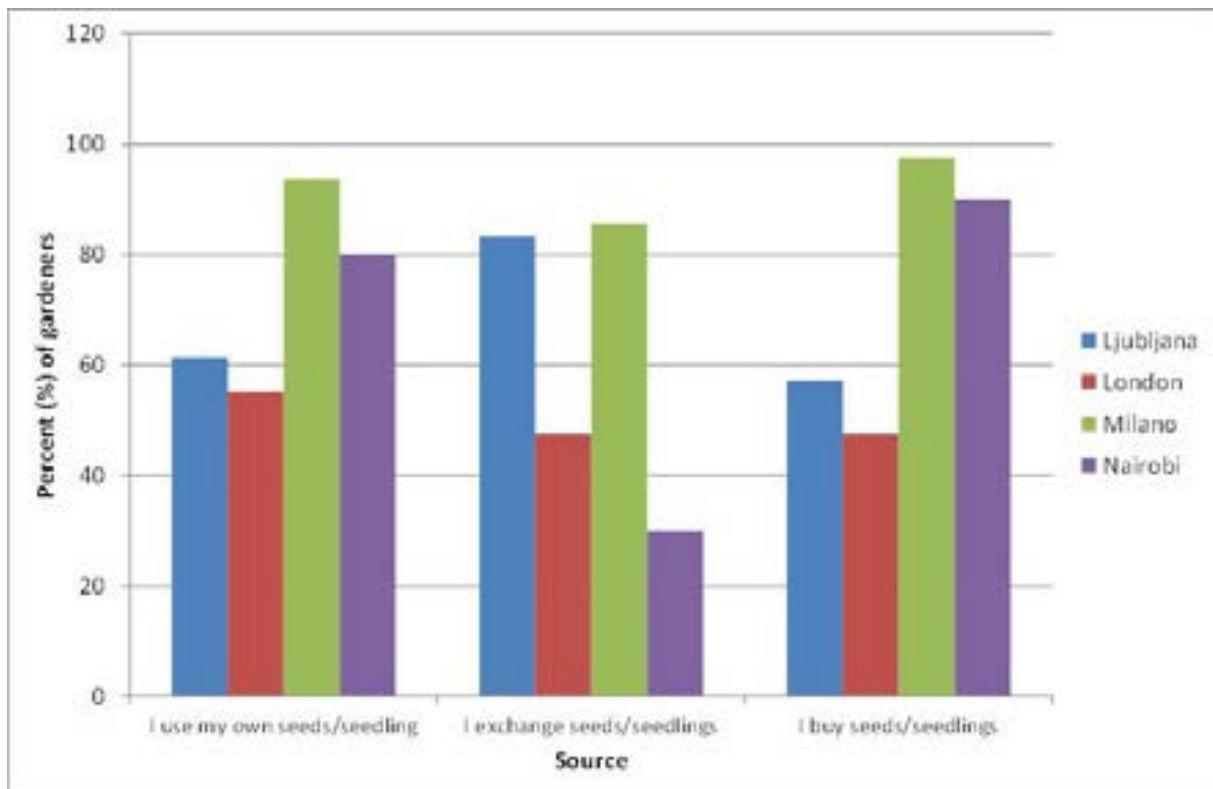


Figure 29: Where do they get seed or seedling plants (Q12)

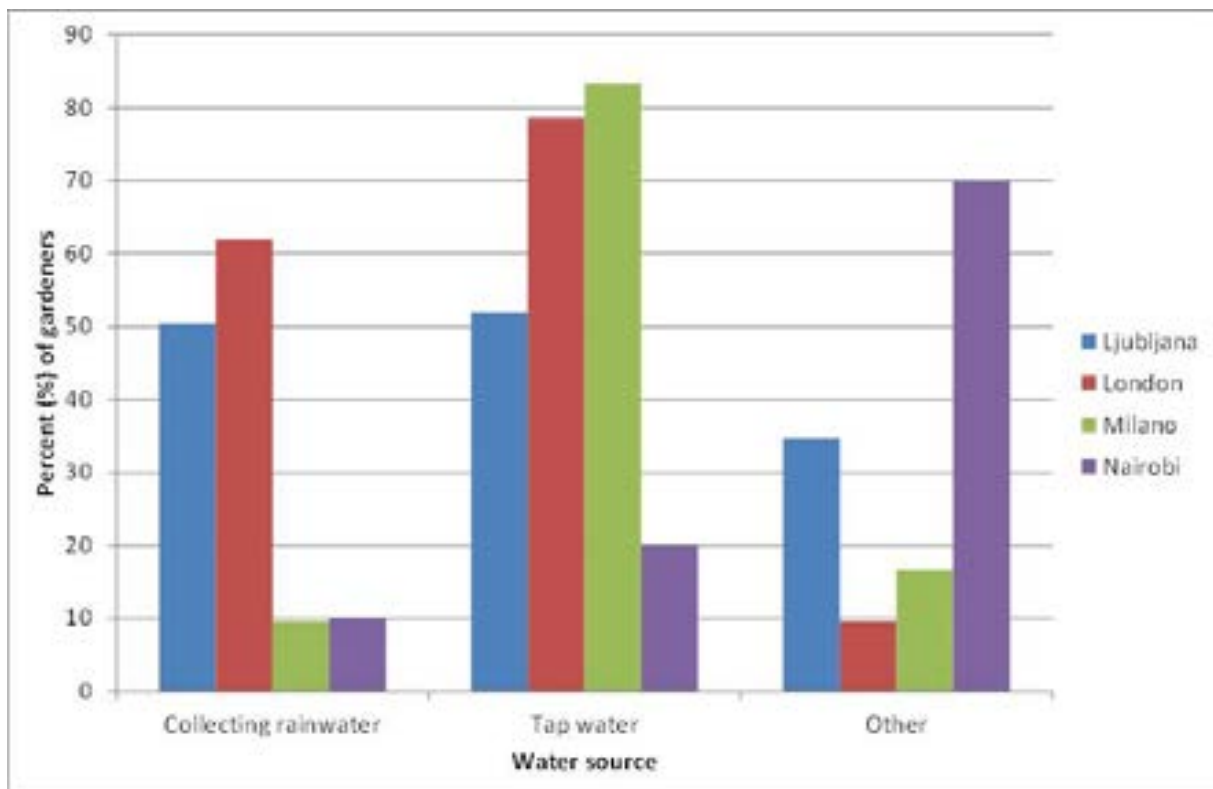


Figure 30: Where do they get water for irrigation (Q16)

5.1.4 Growing skills and knowledge

The data related to the skills and knowledge gardeners already have and/or are gaining through the time show considerable differences among the subsamples. While gardeners in Milan mainly rely on the knowledge received from their family members the gardeners from London and Ljubljana are acquiring their knowledge and skills mainly from books and magazines and personal observations and gardeners from Nairobi from training courses (Figure 31).

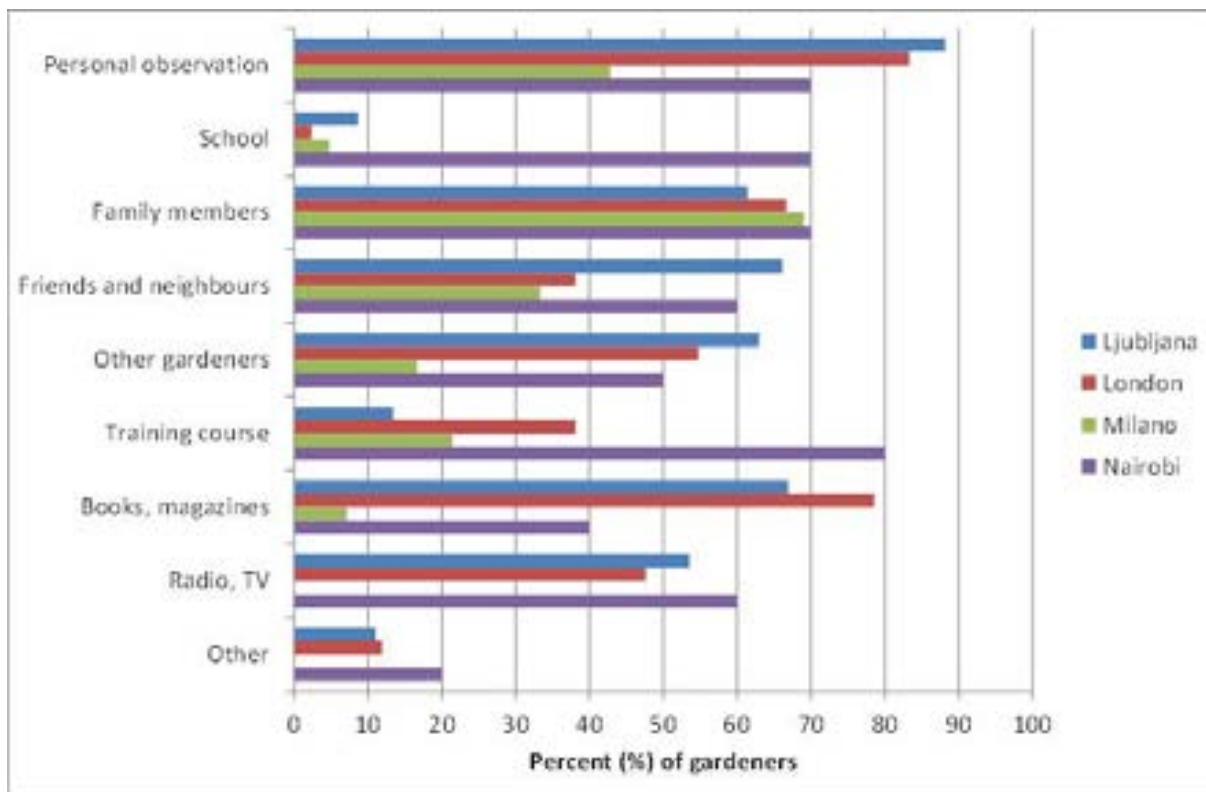


Figure 31: How do they learn to grow their own food (Q19)

5.1.5 Motivation for gardening

Differences among the samples are shown also as regards to motivations for gardening (Figure 32). While among Ljubljana gardeners the most important motives for growing own food are the wish to have access to healthy and safe vegetables and to relax in Milan the motives of gardeners are besides healthy food and recreation most often related to relaxation and socialising. All these stated motives are less strongly expressed by Londoners who however assign similar value as to healthy/safe food and relaxation/recreation also to the improvement of local environment and reduction of environmental impact. In Nairobi motives are mainly to save money, and sell vegetable for higher income of household. Overall, the motives of gardening in EU are rather weakly related to material benefits, i.e. the selling of vegetables and saving money. However, the high share of the first motive is expressed by gardeners from Nairobi and Londoners while the other one by Ljubljana gardeners. These results, particularly the last ones demonstrate that growing own food although related to different motives is in EU predominantly oriented to fulfil quality nutritious, socio-philological and environmental needs of gardeners and in less extend their economic or material needs. While all this is important also in Nairobi case the motive of saving the money has very high rank.

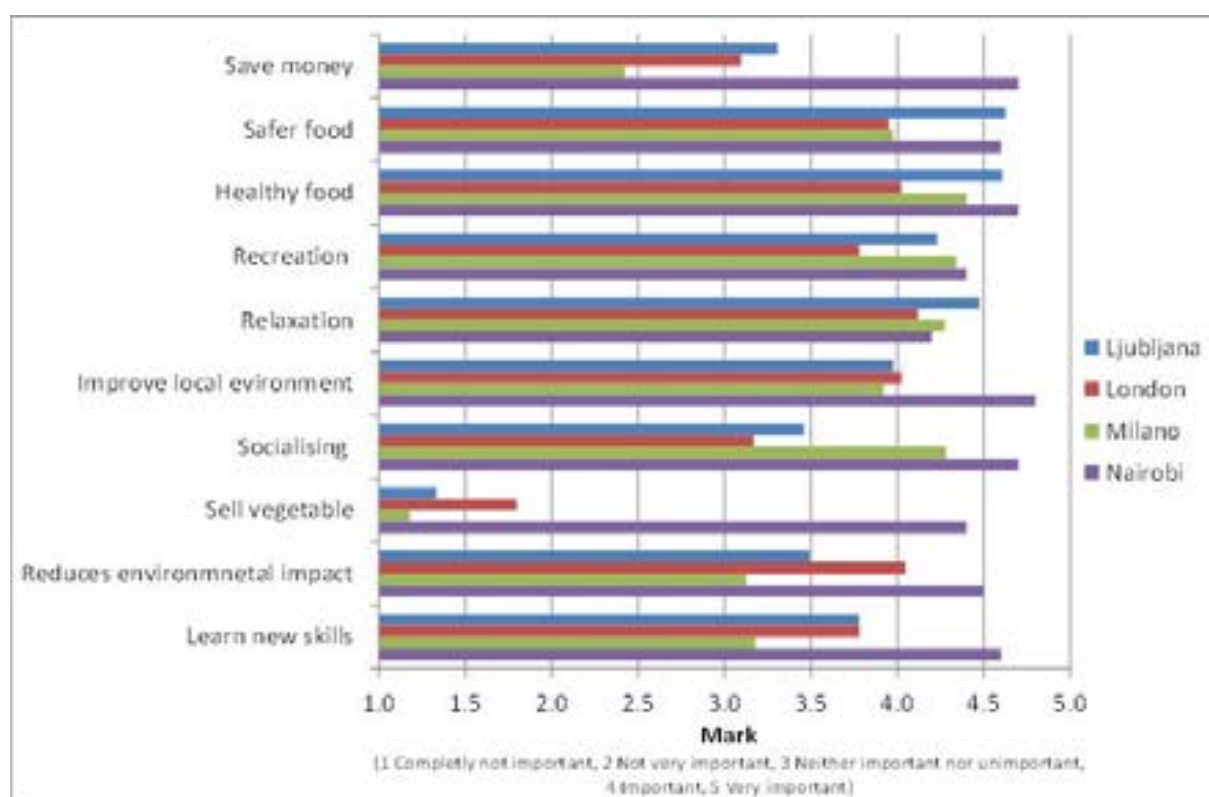


Figure 32: Main motivation for growing the food (Q23)

5.1.6 A contribution of gardening to food supply and household budget

These results on motivations and impact of own growing food are corroborated with the amount of household needs covered by this production. Majority of growers (particularly the Londoners) cover fewer than 50% of their households needs for vegetables (Figure 33) and many of them exchange and donate their surpluses which makes evident the unprofitable nature of urban gardening in EU cities (Figure 32). Gardeners from Nairobi in 60% cover 90% of their needs while they all included in research sell at least some of their production.

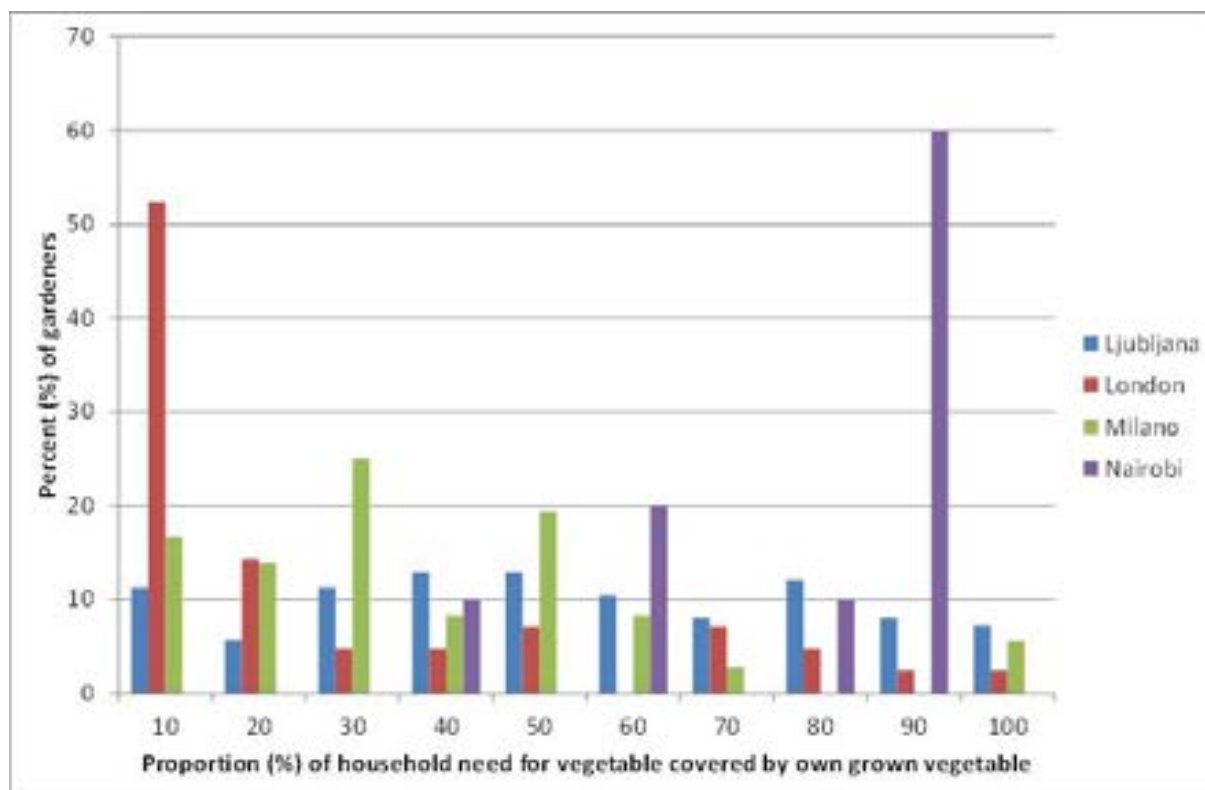


Figure 33: Proportion of household need for vegetable covered by the food grown in the garden (Q25)

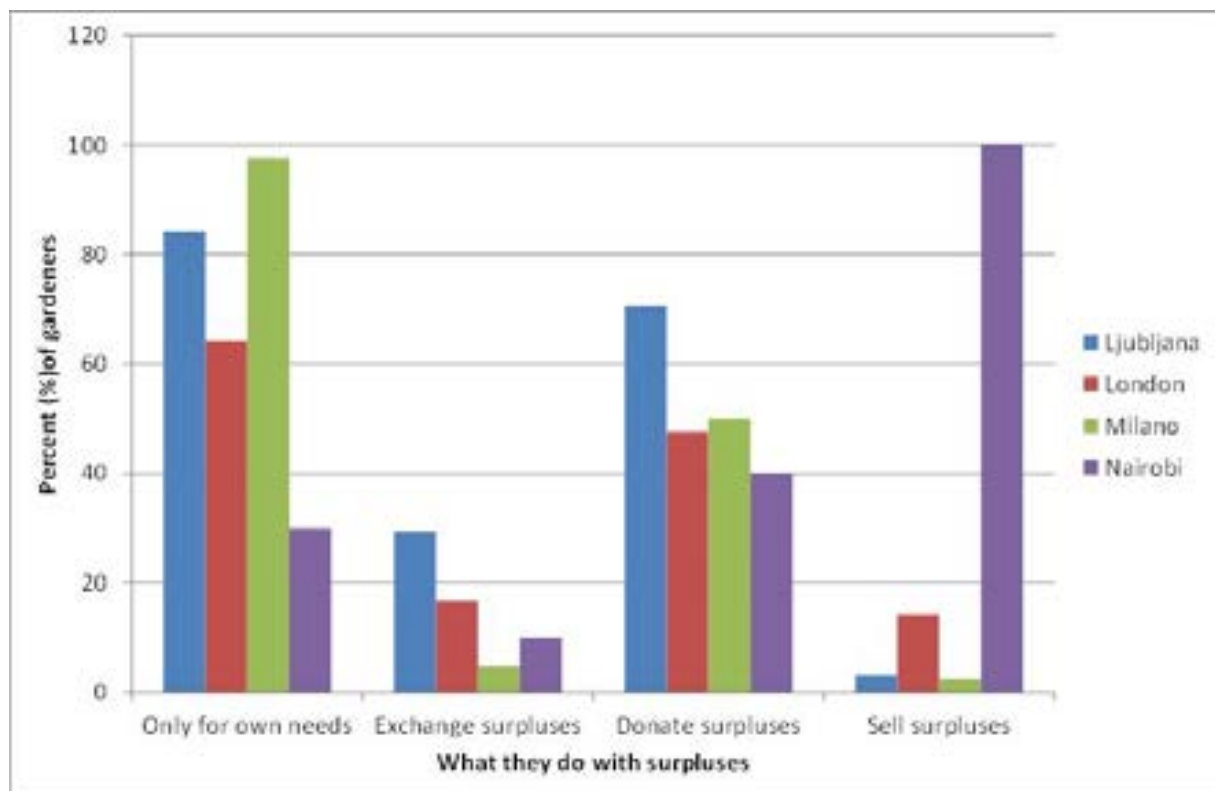


Figure 34: For whom do the gardeners produce (Q28)

5.1.7 The impact of home growing

Observation are further corroborated by data on the impact of growing own food (Figure 35). All gardeners in all cities strongly agree that “home grown vegetable is much tastier than the one bought in the shops”, that “urban gardening strengthens the integration of people in the community” and that “growers create better interpersonal relationships”. Similarly they all also agree that “urban gardeners with using less transport contribute to the clean air”. However, attitudes of gardeners from cities defer considerably in relation to the following statements: “organic agriculture is the only proper way of food production” and “urban garden plot holders are producing healthier food” where Londoners show the lower shares. Moreover, although the agreement with statements as regards “gardeners pollute the environment due to lack of knowledge” and “allotment holder with their huts disfigure the appearance of environment” are relatively modestly expressed in all cities the London and Nairobi gardeners show the lower shares. In spite of these differences overall picture demonstrated by these part of analysis show the strong socio-philological and environmental orientation of gardeners in all cities.

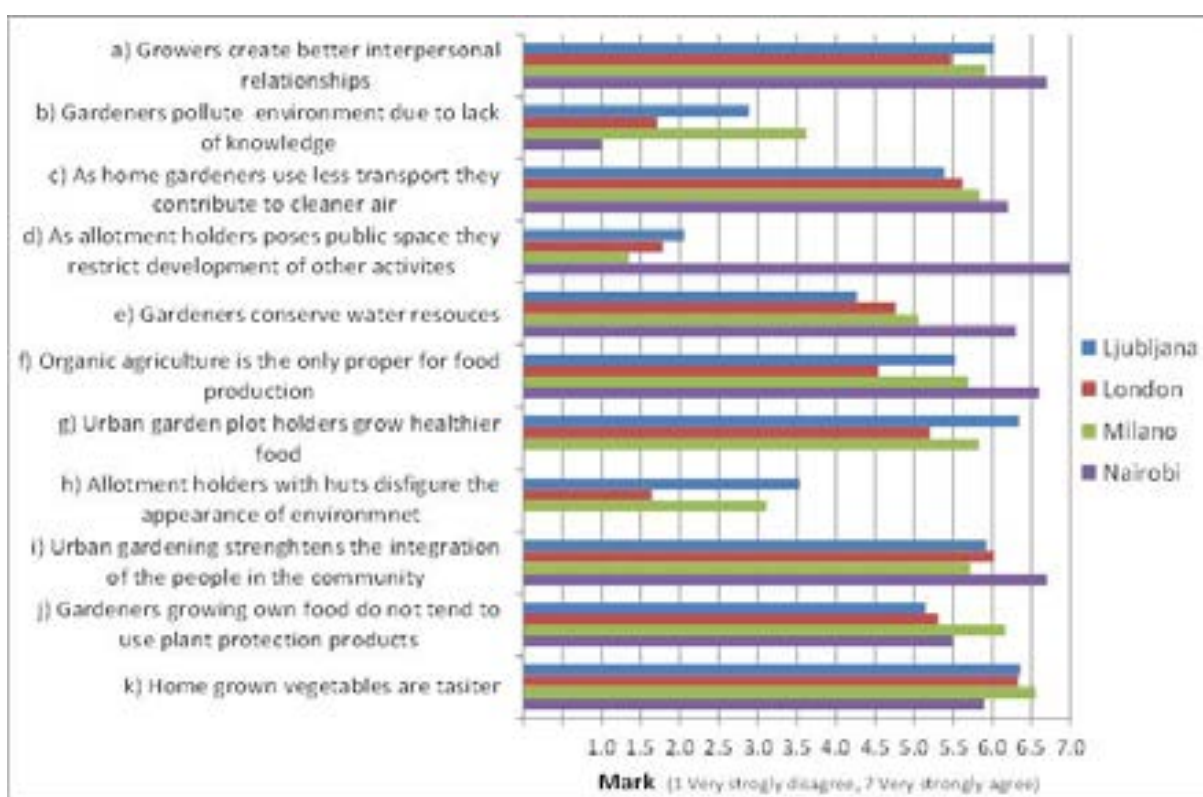


Figure 35: Gardeners indicating to what extent they agree with the given statements in question 29 (Q29)

5.2 Agro-economic perspectives

All together we included in the final calculation 221 growing spaces (garden plots) – 127 from Ljubljana, 42 from London, 42 from Milan and 10 from Nairobi (Tables 9-13). Gardening has also different economic impacts which are related to gardeners' behaviour. Managing the economics of the gardening (private gardens, allotment gardens, etc.) in an aspect which gains on importance especially under rising food prices and unemployment rate. In regard to private gardens, is gardening at public owned gardens is usually regulated from environmental and economic point of view by the city authorities. This leads to uneven conditions which are usually connected with higher production costs. With this analysis we were able to estimate the economic impact of urban gardening on the vegetable supply chain. Results show that the highest revenue (EUR/m²) was reached in London (4.82), followed by Ljubljana (3.69), Milano (3.36) and Nairobi (0.92) (Table 9). The lowest cost (EUR/m²) were reported by Nairobi gardeners (0.14) followed by Ljubljana (1.27), London (1.93) and Milano (3.00). The highest gross margin (EUR/m²) or savings were reached in London (2.89) followed by Ljubljana (2.42), Nairobi (0.77) and Milano (0.36).

We asked 127 gardeners all over the Ljubljana to estimate their yearly production costs (seeds, seedling plants, fertilisers, plant protection etc.) (Table 10). By multiplying yield of the five most common harvested vegetables and the average of their retail price we estimated that production was valued at 3.69 EUR/m². By deducting the production cost (1.27 EUR/m²) from this value we estimated that the average gross margin for gardening production in the MOL was 2.42 EUR/m². The approximate expected economic impact of urban gardening on the vegetable supply chain in the city of Ljubljana expressed as gross margin of the areas currently dedicated for allotment gardens (45.89 ha) is 1,100,000 EUR/year and of the areas identified by aerial images (158 ha) is 3,800,000 EUR/year.

We asked 42 gardeners all over the London to estimate their yearly production costs (seeds, seedling plants, fertilisers, plant protection etc.) (Table 11). By multiplying yield of the five most common harvested vegetables and the average of their retail price we estimated that production was valued at 4.82 EUR/m². By deducting the production cost (1.93 EUR/m²) from this value we estimated that the average gross margin for gardening production in the London was 2.89 EUR/m². The approximate expected economic impact of urban gardening on the vegetable supply chain in the city of London expressed as gross margin of the areas identified by aerial images (861 ha) is 24,889,000 EUR/year.

We asked 42 gardeners all over the Milano to estimate their yearly production costs (seeds, seedling plants, fertilisers, plant protection etc.) (Table 12). By multiplying yield of the five most common harvested vegetables and the average of their retail price we estimated that production was valued at 3.36 EUR/m². By deducting the production cost (3.00 EUR/m²) from this value we estimated that the average gross margin for gardening production in the Milano was 0.36 EUR/m². The approximate expected economic impact of urban gardening on the vegetable supply chain in the city of Milano expressed as gross margin of the areas currently dedicated for allotment gardens (37 ha) is 136,000 EUR/year and of the areas identified by aerial images (190 ha) is 690,000 EUR/year.

We asked 10 gardeners all over the Nairobi to estimate their yearly production costs (seeds, seedling plants, fertilisers, plant protection etc.) (Table 13). By multiplying yield of the five most common harvested vegetables and the average of their retail price we estimated that production was valued at 0.92 EUR/m². By deducting the production cost (0.14 EUR/m²) from this value we estimated that the average gross margin for gardening production in the Nairobi was 0.77 EUR/m².

Table 9: Comparison of agro-economic calculation for 1 m² of growing space (garden plot) between Ljubljana, London, Milano and Nairobi based on questionnaires in 2014

Calculation	Case study urban growing spaces			
	Ljubljana	London	Milano	Nairobi
Revenue (€/year)	3.69	4.82	3.36	0.92
Costs (€/year)	1.27	1.93	3.00	0.14
Gross Margin (€/year)	2.42	2.89	0.36	0.77

5.2.1 Ljubljana agro-economic calculation

Table 10: Ljubljana agro-economic calculation for 127 growing spaces (garden plots)

Ljubljana calculation for 127 growing spaces (garden plots)										
Area (average by interviews)										
By type of vegetable gardens	Home garden	Garden plot away from home on private land		Garden plot away from home on public land		Garden plot away from home on the land of the other owners		Other: Balcony	Average	
Area (m²)	111	63		136		34		1	102	
Crops/vegetable (average for interviewed gardeners in 2014) (Top 10 vegetables)										
Average most common varieties in gardens	Potato	Tomato	Salad	Cabbage	Pumpkin	Carrot	Onion	Peeper	Red beet	Cucumbers
Share (%)	34.58	21.41	10.54	9.6	4.65	4.12	3.96	3.92	3.77	3.54
Yield average annual harvested (kg/m2)	2	4	2.5	3.5	4	4	3	5	4	10
Yield (kg per average garden)*	70.54	87.35	26.88	34.27	18.97	16.81	12.12	19.99	15.38	36.11
<i>*Yield = Average Area × (Share/100) × Yield (kg/m²)</i>										
Retail price (statistical average in 2014) (Statistical office data)										
Price by vegetable (€/kg)	0.63	1.23	1.74	0.9	2.16	0.97	0.92	1.39	0.9	1.02
Calculation for average garden (102 m²)										
Revenue										
Varieties	Potato	Tomato	Salad	Cabbage	Pumpkin	Carrot	Onion	Peeper	Red beet	Cucumbers
Revenue by veg. var. (€/year)*	44.44	107.44	46.77	30.84	40.98	16.31	11.15	27.79	13.84	36.83
Revenue total (€/year)										= 376.39
<i>*Revenue = Yield × Price</i>										
Costs (€/m² year) (by interviews) = 0.76										
Costs include: seedling plants: seeds: fertiliser: plant protection products										
Costs by varieties by official state calculation (€/m²)	0.44	2.84	1.22	0.51	2.3	0.5	0.51	2.18	0.5	2.3
Costs by varieties (official) (€/year)*	15.52	62.02	13.12	4.99	10.91	2.10	2.06	8.72	1.92	8.30
Costs total (official) (€/year)										= 129.66
<i>*Costs= Area × (Share/100) × Costs (€/m²)</i>										
Gross Margin (€) per average garden										= 246.73
<i>*Gross Margin = Revenue total – Costs total</i>										
Calculation for the City of Ljubljana gardening area										
Area of calculation →	1 m²	100 m²	1 hectare	45 ha of city designated area	158 ha of aerial images identified					
	€/m²	€/ 100 m²	€/ha	€/45.89 ha	€/158.056 ha					
Revenue (€/year)	3.69	369	36,901	1,693,397	5,832,459					
Costs (€/year)	1.27	127	12,712	583,361	2,009,233					
Gross Margin (€/year)	2.42	242	24,189	1,110,036	3,823,226					

5.2.2 London agro-economic calculation

Collection and recalculation of economic data for London was modified as SME project partner Sustain obtained from Capital Growth a data via internet project called Harvest-ometer. Capital Growth has developed this simple online way of keeping track of how much food gardeners grow and how much money have saved. It stores their data and converts it into a money value and meal value.

Table 11: London agro-economic calculation for 42 growing spaces (garden plots)

London calculation for 42 growing spaces (garden plots) average size						
Data obtained from questionnaires and Harvest-o-meter project						
http://www.sustainweb.org/publications/reaping_rewards/						
http://www.capitalgrowth.org/millionmeals/harvestometer/						
Area (average by interviews)						
By type of vegetable gardens	Home garden	Garden plot away from home on private land	Garden plot away from home on public land	Garden plot away from home on the land of the other owners	Other	Average
Area (m²)	24	408	235	400	153	133
Harvest-o-meter project data for 43.137 ha of growing spaces was recalculated to a size of average plot of 133 m² identified by questionnaire						
Total land area of 160 growing spaces (m²)				= 43,137		
Total weight of produce recorded (kg)				= 21,236		
Total financial value of produce grown (€)				= 208,026		
Average productivity per m² in weight (kg/m²)				= 0.492		
Average productivity per m² in financial value (€/m²)				= 4.82		
80 g equals 1 meal						
Total number of ‘meal portions’ grown				= 265,458		
Average productivity per m² in number meal portions				= 6.15 meals		
Revenue (by Harvest-o-meter)						
Revenue (€/kg)		= 9.79				
Revenue (€/m²)		= 4.82				
Revenue per average garden plot (€/133 m²)						
= 641						
Costs (by Harvest-o-meter are 40% of Revenue)						
Costs (€/m² year)		= 1.93				
Costs per average garden plot (€/133 m² year)						
= 256						
Gross Margin						
Gross Margin (€/m²)		= 2.9				
Gross Margin per average garden (€/133 m² year)						
= 385						
*Gross Margin = Revenue total – Costs total						
Calculation for the City of Ljubljana gardening area						
Area of calculation →	1 m²	100 m²	1 hectare	861 ha of aerial images identified		
	€/m²	€/ 100 m²	€/ha	€/861.23 ha		
Revenue (€/year)	4.82	482	48.200	41,511,286		
Costs (€/year)	1.93	193	19.300	16,621,739		
Gross Margin (€/year)	2.89	289	28.900	24,889,547		

5.2.3 Milano agro-economic calculation

Table 12: Milano agro-economic calculation for 42 growing spaces (garden plots)

Milano Calculation for 42 growing spaces (garden plots)										
Area (average by interviews)										
By type of vegetable gardens	Garden plot away from home on public land		Garden plot away from home on private land		Community gardens	Other: Didactic gardens		Average		
Area (m²)	26		70		100	100		30.4		
Crops/vegetable (average for interviewed gardeners in 2014)										
Average most common varieties in gardens	Salad and lettuce	Spinach	Tomatoes	Peas and green beans	Zucchini	Cabbages	Onions	Peppers	Eggplants	Carrots
Share (%)	8.94	6.86	17.74	14.36	13.96	11.72	4.66	6.62	5.99	9.14
Yield average annual harvested (kg/m²)	2.5	1.8	2.7	1.7	2.6	1.4	3.4	1.6	1.9	2.2
Yield (kg per area of average garden)*	6.80	3.75	14.56	7.42	11.04	4.99	4.82	3.22	3.46	6.11
*Yield = Average Area × (Share/100) × Yield (kg/m²)										
Retail price (statistical average in 2014) (Statistical office data)										
Price by vegetable (€/kg)	1.50	1.50	2.00	1.40	1.55	1.40	0.80	1.40	1	1.80
Calculation for average garden (30 m²)										
Revenue										
Varieties	Salad and lettuce	Spinach	Tomatoes	Peas and green beans	Zucchini	Cabbages	Onions	Peppers	Eggplants	Carrots
Revenue by veg. var. (€/year)*	10.20	5.63	29.13	10.39	17.11	6.99	3.85	4.51	3.46	11.00
Revenue total (€/year)										= 102.27
*Revenue = Yield × Price										
Costs (€/m² year) (interviews)										= 2.99
Costs include: seedling plants: seeds: fertiliser: plant protection products										
Costs by varieties (€/year)*	8.16	6.26	16.18	13.10	12.73	10.69	4.25	6.04	5.47	8.33
Costs total (€/year)										= 91.21
*Costs= Area × (Share/100) × Costs (€/m²)										
Gross Margin (€) per 30.4 m²										= 11.05
*Gross Margin = Revenue total – Costs total										
Calculation for the City of Milan gardening area										
Area of calculation →	1 m²	100 m²	1 ha	37 ha of city designated areas	190 ha of aerial identified gardens					
	€/m²	€/ 100 m²	€/ha	€/37.52	€/190.16 ha					
Revenue (€/year)	3.36	336	33,640	1,262,173	6,397,045					
Costs (€/year)	3.00	300	30,005	1,125,788	5,705,694					
Gross Margin (€/year)	0.36	36	3,636	136,423	691,351					

5.2.4 Nairobi agro-economic calculation

Table 13: Nairobi agro-economic calculation for 10 growing spaces (garden plots)

Nairobi calculation for 10 growing spaces (garden plots)							
Area (average by interviews)							
By type of vegetable gardens	Home garden	Garden plot away from home on public land	Garden plot away from home on the land of the other owners	Average			
Area (m ²)	1,624	146	806	935			
Crops/vegetable (average for interviewed gardeners in 2014) (TOP 7 vegetables)							
Average most common varieties in gardens	Tomato	Tubers (potato, arrow roots, cassava)	Salad	Kale	Traditional vegetables	Spinach	Onions
Share (%)	12.26	5.68	18.06	16.77	23.23	20.65	3.35
Yield average annual harvested (kg/m ²)	2.74	0.70	1.33	7.87	1.63	6.56	2.01
Yield (kg per average garden)*	314.09	37.18	224.59	1234.01	354.04	1266.59	62.96
<i>*Yield = Average Area × (Share/100) × Yield (kg/ m²)</i>							
Retail price (statistical average in 2014) (Statistical office data)							
Price by vegetable (€/kg)	0.27	0.29	0.17	0.24	0.27	0.24	0.45
Calculation for average garden (935 m ²)							
Revenue							
Varieties	Tomato	tubers	Salad	Kale	Traditional vegetables	Spinach	Onions
Revenue by veg. var. (€/year)*	84.80	10.78	38.18	296.16	95.59	303.98	28.33
Revenue total (€/year)							= 857.83
<i>*Revenue = Yield × Price</i>							
Costs (interviews)							
Costs include: seedling plants and seeds: fertiliser: plant protection products							
Costs total (€/m ² year)							= 133.8
<i>*Costs= Area × (Share/100) × Costs (€/m²)</i>							
Gross Margin (€) per average garden							= 724.03
<i>*Gross Margin = Revenue total – Costs total</i>							
Calculation for the City of Nairobi gardening area							
Area of calculation →	1 m ²	100 m ²	0.94 hectares	1 hectare			
	€/m ²	€/ 100 m ²	€/0.94 ha	€/ha			
Revenue (€/year)	0.92	92	858	9,175			
Costs (€/year)	0.14	14	134	1,431			
Gross Margin (€/year)	0.77	77	724	7,744			

6. Conclusions

6.1 Empirical sociological findings on urban gardening

Nowadays urban gardening is receiving a considerable attention of various scientific disciplines, but as shown in the literature review, much more of social sciences than of life sciences. Existing research on gardening in the so-called developed societies have shown that this phenomenon is more related to the pursuits of the population to affordable healthy food, recreation and relaxation than to poverty and food shortages. In this report, the phenomenon of gardening is observed in sociological and environmental perspective. In the focus of analysis based on data obtained through survey questionnaire (see subchapter 3.2 and Annex 1) are motivations and environmental practices of different groups of urban gardens holders (home food gardens and allotment gardens in public and private plots) in the cities of Ljubljana (SI), London (GB), Milano (IT) and Nairobi (KE). For this purpose, the data from a survey carried out in 2014 within the framework of the international project FOODMETRES on a sample of 127 gardeners from Ljubljana, 42 from London, 42 from Milano and 10 from Nairobi are applied (Sub-chapter 5.1).

Analysis of the results of EU case study cities on motivations, practices and impacts of growing own food among various socio-economic groups confirms the thesis of predominantly hobby nature of the gardening in Europe. Non-profit motivations are also mirrored through the analysis of environmental practices, especially in the case of allotment gardeners growing their own food on private beds that cope with organic production in relatively unfavourable growing conditions, which is consistent with the thesis of "quiet sustainability" of food self-provisioning. However results from Nairobi case study show that main motivation originates from saving the money and selling vegetable for rising household income.

6.2 Economic calculation in urban gardening

Urban gardening is not a new phenomenon but it has received considerably more practical and academic interest in recent years, both in the Global North and the Global South. There are many studies available on the social and ecological aspects of urban gardening, but rather fewer on the economic aspects. Studies on economic aspects such as crop yields, inputs and outputs of production, productivity, economic margins and the contribution to home-economics in the EU are rare. While home production and subsistence have an important role to play in the Global South, its role and full potential in prosperous cities within the EU for food productivity and home economics is currently under-researched. This research compares crop production data from urban gardening (home gardening, allotments, community gardening) in three EU cities (London, Ljubljana, Milan) with commercial production in the EU and provides a model to assess the economic potential of urban gardening within a city's local agri-food system (LAS). For the analysis we use data from various sources: a 2014 survey conducted within the framework of the EU 'Foodmetres' project, and data from the London Harvest-ometer survey as well as other published data on home gardening and commercial food production.

For the purpose of this research gardeners were asked to estimate their yearly production costs (seeds, seedling plants, fertilisers, plant protection etc.). With multiplying yield of the most common harvested crops/vegetables and average retail price of vegetable we estimated the revenue. With deducting the production cost from revenue we estimated average gross margin for the gardening production per m² in the Ljubljana, London, Milano and Nairobi Metropolitan regions (Sub-chapter 5.2). If we multiply Gross Margin with area of urban gardening in the case study metropolitan city we can estimate influence of urban gardening on food supply chain. Total average annual Gross Margin for Ljubljana (158 ha), London (861 ha) and Milano (201 ha) is 3,823,600 EUR/year, 24,882,900 EUR/year and 723,312 EUR/year, respectively. With other words this is the amount of the money that gardeners save as a result of their own food (vegetable, fruits) production.

Results from the economic analysis show that home gardening can play an important role for the provisioning of vegetables and fruit in urban areas, especially for those products with a shorter shelf-life, such as soft berry fruits, but also many vegetables and herbs. Although profit is not the main motivation for most urban gardeners, the models show that productivity can be high in urban systems and that

gardeners can earn above the minimum wage especially when using organic inputs and outputs i.e. organic food prices in the calculation. We conclude that in the Global North, urban gardening can be made into a serious part-time profession, which can be combined with other part-time jobs and/or used as step towards obtaining a full-time gardening career. In addition to the production economics, food eating and buying patterns, which are considered in this paper, there are also further documented socio-economic benefits from urban gardening, such as improvements in health and wellbeing, community life, skills and environmental sustainability, these may be assessed by e.g. the social return on investment method, however they are part of this research and report.

6.3 General conclusion

Urban gardening presents import social as well as economic activity of the population in all Metropolitan case study areas. Typology of the urban gardens showed that when there is a desire for growing own vegetable multiple ways exists to fulfil that. From home gardens to hired gardens from public or private landowners. Not so rare is also guerrilla gardening without any contract possessed land with quiet approved of the landowner (usually public). Majority of the cities has areas of land which are dedicated for urban gardening. They also have a city acts on regulating urban gardening.

Ten selected stories from each Metropolitan area show that urban gardening is very alive and forms vigorous and vibrant communities which are not only self-sufficient and closed but they interact with others especially in sharing knowledge in growing plants, new gardening technics, exchanging seed and seedling plants and final products (vegetables, fruits, jams, compotes, etc).

7. Literature

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Annex 1: Urban gardening socio-economic survey – semi-structured interviews (Subchapter 3.2)

A. About your growing space

Q1. Please tell us where you grow your food

- 1 Home garden
- 2 Garden plot away from home on private land
- 3 Garden plot away from home on public land
- 4 Garden plot away from home on the land of the other owners (e.g. nearby railways, roadsides,...)
- 5 Other, please specify: _____

Q2. Please provide the street name or postcode of the site where you grow your food

Q3. How do you get to your growing space(s)?

- 1 On foot
- 2 By public transport
- 3 By bike
- 4 By car
- 5 Other: please specify: _____
- 7 Not applicable (my plot is at my home) _____

Q4. Do you have a contract with someone to use your garden/allotment?

- 1 Yes, please indicate with whom: _____
- 2 No

Q5. Do you pay rent or any other fees in order to use your growing space? If yes please specify the amount. If no please go to Q6

Yes, I pay a rent of (in Euro).....per year

Yes, I pay another type of fee of (in Euro).....per year

Q6. What is the approximate size of the area you grow your food in?

Please specify in m²: _____

Q7. Please indicate what you produced on your plot(s) during the last year and estimate the amount of that produce. In doing so, please think about each patch that you have cultivated and all seasons - from spring to winter. *Quantity of the produce should be indicated at least in two of the referred quantities:*

TYPE OF VEGETABLES	The amount of harvested vegetables (in kg)	Harvested area of production (m ²)	Number of seedlings, volume of tubers (in kg)
a) Mangold, b) Asparagus c) Broad bean d) Broccoli e) Brussels sprouts f) Pumpkins g) Zucchini h) Cauliflower i) Onions j) Onion bulbs k) Garlic l) Cherry tomatoes m) Chick-peas			

n) Black radish o) Pepperoni p) Green beans r) Beans (high) s) Beans (low) t) Peas u) Eggplant v) Kohlrabi z) Carrot aa) Maize ab) Potatoes ac) Cucumbers ad) Cucumbers (for pickling) ae) Corn salad af) Dwarf French bean ag) Kale ah) Paprika ai) Tomatoes aj) Parsley ak) Leek al) Chicory am) Beetroot an) Turnip ao) Rucola ap) Sweetcorn ar) Lettuce as) Sunflowers at) Shallots au) Spinach av) Pole bean az) Celery ba) Cabbage bb) Other, please specify : _____			
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TYPES OF BERRIES	The amount of harvested vegetables (in kg)	Number of boxes or. Crates	Harvested area of production (m ²)	Number of seedlings, volume of tubers (in kg)	Number of seed bags
ca) Strawberries cb) Raspberries cc) Blackcurrant cd) Blackberries ce) Gooseberries cf) Other, please specify: _____					

TYPES OF HERBS	The amount of harvested vegetables (in kg)	Number of boxes or. Crates	Harvested area of production (m ²)	Number of seedlings, volume of tubers (in kg)	Number of seed bags
da) Basil db) Chives					

dc) Horseradish dd) Chamomile de) Marjoram df) Melisa dg) Marigold dh) Oregano di) Tarragon dj) Wormwood dk) Peppermint dl) Rosemary dm) Lavender dn) Savory to) Thyme dp) Tobacco Dr) Wine rue ds) Sage dt) Other, please specify: _____					
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B. Your Growing Methods

Q8. Which term best describes the way in which you principally cultivate your plot(s)?

- 1 Conventional (I want to achieve the greatest possible yield at lower cost)
- 2 Integrated (I try to avoid using chemicals such as artificial fertilizers and pesticides)
- 3 Organic (I use natural methods of pest control, do not use mineral fertilizers and genetically modified organisms)
- 4 Biodynamic (I take note of ecological principles, the seasons and the lunar calendar)
- 5 Permacultural (I take note of organic and biodynamic principles and the natural symbiosis between the plant and animal species)
- 6 Other, please specify: _____

Q9. Roughly how many hours per week during the growing season do you spend growing food?

1. 0-2 hours
2. 2-4 hours
3. 4-6 hours
4. 10 hours or more

Q10. Do you grow food by yourself or does anyone help you with this?

- 1 I work by myself
- 2 Other members of the household help me
- 3 Other relatives help me
- 4 My friends help me
- 5 Other, please specify: _____

Q11. What kind of fertilizer do you use?

	Yes	No
a. Homemade compost	1	2
b. Bought compost	1	2
c. Manure	1	2
d. Mineral fertilizers	1	2
e. Other, please specify: _____	1	2

Q12. Where do you get your seeds and seedlings?

	Yes	No
a. I save my own seeds	1	2
b. I exchange the seeds with others	1	2
c. I buy seeds	1	2
If, yes, specify where: _____		
d. I grow seedlings by myself	1	2
e. I exchange seedlings with others	1	2
f. I buy seedlings	1	2
If, yes, specify where: _____		

Q13. Do you use any old or 'heritage' crop varieties?

- 1 Yes, please specify types of sorts of vegetables: _____
- 2 No

Q14. Do you water/irrigate your growing space(s)?

- 1 Yes, regularly
 - 2 Only if I think it is necessary
 - 3 No
- please go to Q18

Q15. How do you decide when to water your crops?

	Yes	No
I take into account how well the plants are growing	1	2
I take into account the air temperature	1	2
I take into account the amount of rain we have had	1	2
I look at how dry the soil is	1	2
Other reason, specify: _____	1	2

Q16. Where do you get water for your crops?

	Yes	No
a) Collecting rainwater	1	2
b) Use the tap water from my home	1	2
c) Other, specify: _____	1	2

Q17. Would you find the advice for watering/irrigation from a smartphone application useful to you?

- 1. Yes, it would be helpful to me
- 2. Yes, if I would have a smart phone
- 3. No, in any case
- 4. Do not know what a smartphone application is

Q18. Are you faced with any of the following difficulties in growing your food? If so, how do you solve or manage them?

	Yes	No
With weeds	1	2
If yes, specify solution: _____		
With pests	1	2
If yes, specify solution: _____		
With vegetable diseases	1	2
If yes, specify solution: _____		
With crop stealing	1	2
If yes, specify solution: _____		
With lack of water for irrigation	1	2
If yes, specify solution: _____		
Any other problems, please specify: _____	1	2
If yes, specify solution: _____		

C. Skills and knowledge

Q19. How have you learned to grow your own food?

	Yes	No
Personal observation	1	2
School, university	1	2
Learning from family members and relatives	1	2
Learning from friends, neighbours	1	2
Learning from other gardeners	1	2
Attending a training course	1	2
Learning from books and magazines	1	2
Learning from Radio and TV programs	1	2
Other, specify: _____	1	2

Q20. Would you find a smartphone advice application on gardening helpful to you?

1. Yes, it would be helpful to me
2. Yes, if I would have a smart phone
3. No, in any case
4. Do not know what a smartphone application is

D. Motivations for gardening

Q21. How long have you been growing your own food?

Specify (in years): _____

Q22. What inspired you to start growing your own food?

- 1 Own motives, a pleasure to work in nature
- 2 It's a family tradition
- 3 My friends and acquaintances grow their own food
- 4 A public notice or information about the possibility to have a growing space
- 5 Other, please specify: _____

Q23. What are the main reasons you grow your own food? Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 (Completely unimportant) to 5 (very important).

	1 Completely unimportant	2 Not very important	3 Neither important nor unimportant	4 Important	5 Very important
a) I grow food to save money					
b) I think my own grown food is safer than food I buy from shops					
c) I think my own grown food is healthier than food I buy from the shops					
d) Growing my own food is good exercise					
e) Growing my own food helps me relax					
f) Growing food helps improve my local environment					
g) Growing my own food is a good way of socializing with other people					
h) I grow food to sell it					
i) I grow food to reduce my environmental impact					
j) I grow food to learn new skills					
k) Other reasons, please specify: _____					

Q24. Do you have enough space to meet your food growing needs?

- 1 Yes, I have just the right amount
- 2 No, my space is too small
- 3 No, my space is too large

E. A contribution of gardening to food supply and household budget

Q25. Please estimate what proportion of your household needs for vegetables is covered by the food you grow:

- | | | | | |
|--------|--------|--------|--------|----------|
| 1. 10% | 2. 20% | 3. 30% | 4. 40% | 5. 50% |
| 6. 60% | 7. 70% | 8. 80% | 9. 90% | 10. 100% |

Q26. Do you think the amount of food you grow justifies the cost of buying seeds, seedlings, fertilizers, pesticides and tools?

1. Yes, entirely
2. Yes, partly
3. No, not at all

Q27. If possible, please estimate your personal expenditure on seeds, seedlings, fertilizers, pesticides and tools per year

Specify the amount (in Euro): _____

Q28. Do you produce only for your own needs and the needs of your household or do you also supply other people and/or sell surpluses from your plot(s)?

	Yes	No
a. Only for own needs	1	2
b. Exchange surpluses	1	2
c. Donate surpluses	1	2
d. Sell surpluses	1	2

F. The impacts of home growing

Q29. Please indicate to what extent you agree with the following statements. Please assign the importance of each statement by selecting a value on the scale of 1 (very strongly disagree) to 7 (very strongly agree)

a) Through mutual exchange of seedlings or crop surpluses home food growers create better interpersonal relationships.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

b) People who grow their own food lack the right skills to produce vegetables, therefore they contribute significantly to environmental pollution.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

c) People who grow their own food do not have to transport their food very far; therefore they contribute to the improvement of air quality.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

d) With their garden beds allotment holders are spread too much into the public areas; consequently they reduce the development of other activities in the area. OPTIONAL

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

e) When watering, people who grow their own food conserve water, therefore they contribute to the conservation of water resources.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

f) Organic or biodynamic agriculture is the only proper way of healthy food production.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

g) Vegetables grown by allotment holders are healthier than vegetables sold in the store. OPTIONAL

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

h) With their crop-beds and accompanying facilities (e.g. huts) allotment holders disfigure the appearance of the environment. OPTIONAL

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

i) While working in the garden by talking and socializing allotment holders strengthen the integration of people in the community.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

j) People growing their own food tend not to use pesticides and herbicides, therefore they contribute to environmental preservation.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

k) Home grown vegetables are tastier than vegetables sold in the store.

Very strongly disagree 1 2 3 Neither agree nor disagree 4 5 6 Very strongly agree 7

G. About you and your household

Q30. How many members of your household are supplied by the food you grow?

a) Enter the number of adults: _____ b) children: _____

Q31. Please estimate the share of your household budget earmarked to food supply?

1. 199 € or less
2. 200 – 399 €
3. 400 – 599 €
4. 600 – 799 €
5. 800 – 999 €
6. 1000 € or more

Q32. Please indicate your average yearly household income:

1. 499 € or less
2. 500 to 999 €
3. 1,000 to 1,499 €
4. 1,500 to 1,999 €
5. 2,000 to 2,499 €
6. 2,500 to 2,999 €
7. 3,000 to 4,999 €
8. 5,000 € or more

Q33. In addition to the food you grow by yourself, where else do you get your food from?

	Yes	No
1. From friends or relatives who produce food	1	2
2. From local growers, farm	1	2
3. At a marketplace	1	2
4. In shops and supermarkets	1	2
5. Other, please specify: _____	1	2

Q34.

A) Do you buy mostly organic produce?

1 Yes 2 No

B) Do you buy mostly conventional produce?

1 Yes 2 No

Q35. Are you a member of an association? **OPTIONAL**

1 No

2 Yes, specify which ones: _____

Q36. What do you do in your spare time and how often (minutes / week)? **OPTIONAL**

1. Listening to the radio, watching TV

Minutes / week: _____

2. Browsing, playing on the computer

Minutes / week: _____

3. Reading books, newspapers, magazines

Minutes / week: _____

4. Resting (relaxation, meditation, sunbathing, ...)

Minutes / week: _____

5. Excursions – visits? It refers to visiting domestic and foreign cities and countries

Minutes / week: _____

6. Sports, dance activities

Minutes / week: _____

7. Handiworks – crafts? It refers to sewing, knitting, crochet, ...

Minutes / week: _____

8. Games – aren't all of the categories interest and hobbies?

Minutes / week: _____

9. Volunteering

Minutes / week: _____

10. Visiting theatre and cultural events

Minutes / week: _____

11. Socialising with people outside the home

Minutes / week: _____

12. Other, please specify: _____

Minutes / week: _____

Q37. Gender:

1 Male

2 Female

Q38. How old are you?

In years: _____

Q39. What is your ethnic group? **OPTIONAL**

Q40. What is your highest level of education?

1. Primary School

2. Secondary School

3. Tertiary School e.g. college

4. Bachelor degree (BSc)

5. College or University, 4-5 year program (BSc) Master degree (MSc)

6. PhD

Q41. What is your working status?

1. Employed / self employed full time

2. Employed / self-employed part time

3. Unemployed → please go to Q40

4. Retired → please go to Q40

5. In education/training → please go to Q40

6. Stay at home parent? → please go to Q40

7. Long term sick or disabled

8. Doing unpaid or voluntary work

9. Carer

10. Other

Q42. Please indicate to what extent you agree with the following statements. Please assign the importance of each statement by selecting a value on the scale of 1 (strongly disagree) to 5 (strongly agree)

1.	My job is physically exhausting	1	2	3	4	5
2.	My job is mentally challenging	1	2	3	4	5
3.	My job is stressful	1	2	3	4	5
4.	My job is precarious	1	2	3	4	5

Q43. Please describe your housing type:

1. Detached house
2. Semi-detached house
3. Multi residential apartments or flats
4. Other, please specify: _____

Q44. Would you like to add something else?
