Attitudes towards growing food in cities: the case of Lausanne, Switzerland

Therese Haller[1,3], Anna Crole-Rees[2], Michel Dumondel[1]
[1] ETH Zurich, Switzerland; [2] Agroscope Research Programme ProfiCrops Switzerland; [3] Bern University of Applied Sciences, Switzerland

Abstract
Urban agriculture is expected to improve the quality of life in urban areas and to contribute to a more sustainable urban development. In urban planning, directly perceived benefits to the local population should be considered. Urban residents may produce food; they may purchase locally produced vegetables or simply enjoy the presence of production sites near their home.
A survey (n=889) is used to explore current practices in urban agriculture and the potential for the population's participation in Lausanne, Switzerland. The results show that the aesthetic value explains a larger part of the positive attitude towards urban agriculture than the prospect of buying local food. When citizens have the prospect of growing vegetables on them, they appreciate the presence of production sites even more. Urban agriculture projects are expected to have broader popular support and a stronger impact on urban quality when the population actively participates in urban food production.

Keywords: *Urban agriculture, urban gardening, urban quality, population's attitudes*

JEL classification: *Q18, Q26, R14*

1. Introduction

Urban agriculture appears to be a novel concept in the context of European and North American cities. This impression is, however, misleading. During most periods throughout history, urban populations have been involved in food production for their own needs. In the 18th century, urban planners began to emphasize the ornamental values of urban green (van Leeuwen et al. 2010) and in the 19th century, gardening became a leisure activity for the urban middle class. Some philanthropic industrialists constructed housing with adjacent garden plots to improve the health and morals of their employees (Constantine 1981). Ebenezer Howard wrote the Garden City concept which influenced the urban planning of the early 20th century (Swyngedouw and Kaïka 2000). At about the same time, the public authorities of several European towns allocated allotment or community gardens to the population (van Leeuwen et al. 2010). From a practitioner's perspective, urban gardening may be the most important element of urban agriculture at all (Drescher et al. 2006).

Urban agriculture includes a much broader set of activities than gardening. As Mougeot (2000) suggests, it «is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products» (p. 10). It is of primary importance in the developing world, where it helps nourish urban populations, contributes to their livelihood and is a promising instrument to achieve sustainable urban development (Mougeot 2005). In developed countries, there are hopes of achieving sustainable urbanization with the help of urban agriculture that focus primarily on ecology and life quality (Wegmuller and Duchemin 2010). Sustainability puts urban agriculture in a new context and makes it appear novel.

This paper addresses the relationship between urban population and urban agriculture in the context of a developed country. More specifically, it aims to analyze the attitude of the urban population towards food grown in cities, as well as its underlying reasons and motivations. The city of Lausanne, Switzerland, is used as a case study.

2. Urban views on urban food production

The relationship between agriculture, urbanization and the concept of agricultural multifunctionality are first discussed. Motivations for urban population supporting urban agriculture are then briefly examined.

2.1 Agriculture and urbanization

In a European context, urban and rural are often perceived as opposites (Dewaelheyns and Gulinck 2008). Idealized representations of the countryside and negative conceptualizations of the city persist (Salomon Cavin 2005). This preference for the countryside is one of the driving forces behind urban sprawl – if you can afford it, you go and live in the countryside. Bouraoui (2005) found that people want «to be able to pursue a typically urban lifestyle [...] in a rural setting» (p. 215) in France and Tunisia. This might be true elsewhere. A few years ago, the architects Diener et al. (2005) argued that the whole country of Switzerland should be considered urban, except for some Alpine fallow land. Thompson and Prokopy (2008) define urban sprawl as «inefficient land use patterns associated with urban growth and development in rural areas» (p. 194). In Switzerland, there is a clear distinction between settlement zones and non-settlement zones, the aim of which is to protect farmland. Consequently, urban growth is more controlled than elsewhere, albeit still growing. Spatial planning does not impede the constant reduction of farmland. Bringing some appreciated rural elements back into urban areas could improve urban quality of life. Distinctions and connections between urbanism and agriculture should be reconsidered (Knight and Riggs 2010) and agriculture integrated into urban design (Vilijoen et al. 2005). In many cases this would simply mean reframing and reinforcing that which already exists.

2.2 Multifunctional urban agriculture

With respect to agriculture in general, the concept of multifunctionality has received much research and policy attention during the last two decades. It expresses the fact that agriculture not only produces food and fiber, but has many other functions (Renting et al. 2009). The importance of those functions differs between regions with respect to urbanization and production characteristics (Huber et al. 2007). Multifunctionality may hence have a different shape

in an urban context. Functions beyond food production are particularly important for peri-urban agriculture (Zasada, 2011) and for intra-urban agriculture. Van Leeuwen et al. (2010) point out the various functions and values provided by urban green spaces. Gómez-Baggethun and Barton (2012) discuss these functions while providing a classification of the ecosystem services in urban areas.

Many of the functions are important for urban policy and planning, no matter whether provided by professional or non-professional activity. Urban agriculture initiatives can have positive impacts on the social development of neighborhoods with economically disadvantaged populations (Duchemin et al. 2008). They also promise positive effects on the environment, such as microclimate improvement, soil conservation, the recycling of waste and nutrients (Deelstra and Girardet 2000), and increased water permeability.

2.3 Determinants of urban residents' attitudes to and interests in urban agriculture

In the context of multifunctional agriculture, Renting et al. (2009) point out the importance of the role of consumers and citizens in urban-rural partnerships. With respect to the multiple values of urban ecosystems, Gómez-Baggethun and Barton (2012) note a relative scarcity of studies addressing non-economic values compared to biophysical or economic studies. They explain that the various values people hold can affect their attitudes and behavior towards ecosystems. Attitude is a scientific concept that represents an individual's degree of like or dislike for something (Eagly and Chaiken 1993). It can be positive or negative. It can be interpreted as an overall evaluation that is shaped by beliefs and goals or values people hold with respect to the object of their attitude (Kruglanski and Stroebe 2005). Attitudes towards urban agriculture can be expected to be influenced by the benefits people expect from it.

Just as it is true for agriculture in general, food production is a main purpose of urban agriculture. Urban inhabitants may be producers themselves and/or they may chose to purchase food that is produced nearby. Additionally, multifunctional urban agriculture may be appreciated for various other reasons beyond food provision. The next three sections review the aspects of urban food production and consumption and urban agriculture's multifunctional effects on urban quality.

2.3.1 Urban residents as food producers

In Lausanne, as in general in European cities, virtually no resident practices professional farming, but many may be involved in hobby gardening. Urban gardening is a major component of urban agriculture and it includes homegardens, allotment gardens and community gardens (Drescher et al. 2006). Bouvier-Daclon and Sénécal (2001) found that the primary motivation of community gardeners in Montréal, Canada, was to establish direct contact with nature. The prospect of harvesting their own products was also very important to them, and they often shared their produce with friends and family. In England, Perez-Vazquez et al. (2005) found that gardeners sought relaxation from their daily stress, were concerned about food safety and the environment, liked to produce their own food, and, especially in the case of elderly persons, appreciated gardening as a form of light exercise that kept them healthy. Saving money and socializing were less important. In Western Europe, poverty generally does not seem to be a driving force for urban gardening. Informal food production has been found to be a recreational activity with nearly equal participation of all income classes except the richest quartile (Alber and Kohler 2008), at least before the financial crisis. Community gardens help build up social capital in various ways (Firth et al. 2011). Being a member in a community garden fosters social interactions and exchange. This is particularly important for members of the population who are at risk of being isolated due to old age or because they are part of a minority group (Duchemin et al. 2008).

2.3.2 Urban residents as consumers of food produced in intra- or peri-urban agriculture

The produce from allotment and community gardens is usually consumed by the producers themselves or given to their friends and family. Non-producing urban inhabitants are sometimes interested in buying food from nearby professional farmers. Professional small-scale farms in Tokyo typically sell their produce directly to consumers living in neighboring areas and thus do not involve conventional distribution channels (Yokohari and Amati 2005). Some consumers in the western world are interested in food that is produced locally and/or outside the conventional supply networks (Broadway and Broadway 2011). This interest has led to the establishment of so-called alternative food networks (AFN) that are motivated by shortening food supply chains and re-establishing

a relationship between consumers and producers at local or global levels (Renting et al. 2003).

The development of AFN is often attributed to consumers' dissatisfaction with the safety and quality of food from conventional sources, their wish to be informed about the origin of their food, and a desire to have a connection to the social, cultural and ecological context of food production (Murdoch and Miele 2004). Their motivation goes beyond having a source of healthy, organic food (Sumner et al. 2010). Jarosz (2008) found that the generation of AFNs is driven by urbanization and rural restructuring and thus must be seen as emerging from political, cultural and historical processes, such as described above. She points out that the increased urban demand for local products does not always enable peri-urban farmers to make their living from the sale of their produce due to the small structures of the farms and labor intensive production.

Concerns about sustainability play a major role in AFNs. The delivery of locally produced fresh products is thought to be ecologically responsible as the energy for transport ('food miles') sometimes exceeds the amount needed for production (Jones 2002). However, as Morgan (2010) shows, depending on the criteria, local products are not always more sustainable, and it is important to reconcile local and global food networks.

The transition from being a producer to being a buyer of local food is smooth. To some consumers, buying directly from a producer might be an alternative to producing themselves. Evers and Hodgson (2011) found that community garden members' preference, second after producing their own food, would be to buy at a growers' market (although most do not). Commercial production can be combined with consumers' contribution to cultivation as in the «self-harvest» concept described by Vogl et al. (2004), a hybrid model that associates elements of commercial production with leisure activity whereby individuals rent small plots of land from a farmer for the summer.

2.3.3 Multifunctional value of growing food in cities: Effects on urban quality

Multifunctional urban agriculture encompasses many aspects that are not all directly linked to food. Pearson et al. (2010) provide a comprehensive review of the goods and services urban agriculture provides. Many of these services may not be perceived by the urban population. Salient links between urban

agriculture and its non-food benefits can be expected with respect to urban quality of life. Surfaces used for urban agriculture have the potential, like other green spaces, to influence the attractiveness of the city, to reinforce its identity and to enhance the population's quality of life of (van Leeuwen et al. 2010). Natural green spaces have been found to possess various positive effects on human well-being (Aldous 2007, Tzoulas et al. 2007). However, the tools to evaluate the quality of different urban green spaces are still being developed (e.g., Home et al. 2009; Jorgensen and Gobster 2010). For example the aesthetic function of urban agriculture is an issue that has received little attention in previous research (Pearson et al. 2010).

3. Materials and methods

3.1. Description of the case study location

Lausanne is a city in the French-speaking region of Switzerland, in the so called Arc Lémanique. This region embraces one of the fastest growing metropolitan areas in Switzerland. Due to its high attractiveness as a place of residence for private persons or businesses, the region is continually challenged to maintain quality of life and traffic functionality. The city of Lausanne itself has 135'000 inhabitants. Lausanne's total population, with its urban agglomeration in adjacent municipalities, amounts to 334'000 inhabitants (2010 census; SCRIS 2011). The Southern areas, close to the Lake Geneva, are more urbanized than the Northern ones, at higher altitudes. This study focuses on the lakeside zones of Lausanne, administratively known as Lausanne-Ville.

In relation to the topic, it should be noted that Lausanne's authorities have provided cultivation plots of 6 to 48 m^2 in densely-built areas for approximately 260 inhabitants since 1996. These plots are called plantages and correspond to a surface of 1 ha in total. Their number is growing. There are also quite a few AFN initiatives in the case study region, with a growing number of contracts linking urban consumers to producers (Porcher 2011). In Lausanne, as in other Swiss cities, some professional farming still may be found.

3.2. Sample, questionnaire and data collection

A sample of 2'500 adults was selected randomly from the population registry of Lausanne-Ville (statistical quarters 1 to 17; adult population in 2010: 109'000 inhabitants; SCRIS 2011). Data collection started in March 2011. The questionnaire was sent to the sampled population with a letter inviting them to fill the questionnaire, on paper or online. Two reminders were sent out to non-respondents after 19 and 47 days from the initial mailing, with another set of the questionnaire included in the second reminder. The total return rate was 35.6% (n=889).

The demographic characteristics of the respondents differed significantly from Lausanne's population. First, more women participated than men. Second, the respondents' education was above average in the city. Finally, the proportion of respondents who were Swiss nationals was higher than in the actual population.

Income classes refer to the household's income per number of household members. It is important to note that persons living in households with children or adolescents (younger than 18) are significantly more often found in lower income classes than in higher ones. For the sampled persons living in households with adults only, there is no significant difference, whether they are retired or not.

The questionnaire consisted of 16 pages, 14 of which had questions. Most of these question items were standardized and measured with Likert-type scales of three to five points. About 10 questions were open, allowing the respondents to write down their own ideas. The questionnaire was tested prior to sending with persons living in Lausanne and subsequently adapted. The main changes were the elimination of some redundant questions, allowing the form to be shortened. Overall, the time to respond to all questions was quite long: around 30 minutes.

3.3. Definition of variables and methods

To assess attitudes, concrete objects or situations must be described. Pearson et al. (2010) propose a classification of urban agriculture with respect to its scale: micro (e.g. green roofs, courtyards, street verges), meso (collective and allotment gardens) and macro (commercial farms, greenhouses, etc.). In our case, the macro-scale refers to the opinion on whether professional farms in urban areas should be preserved or not. It does not refer to professional far-

ming in general (i.e. outside urban areas). Three attitude variables were constructed, one for each scale level of urban agriculture.

Attitude towards micro-scale urban agriculture (attitude_micro) was assessed by calculating the average evaluation of six possible planting sites: plots in parks, wayside, near schools or nurseries, near hospitals, near sports complexes, or on rooftops. Respondents had to rate each of these sites positively («good place»), neutrally («acceptable but not ideal place») or negatively («bad place»), with respect to the cultivation of food plants. To test the internal consistency of these evaluations, Cronbach's alpha was calculated. Its value of 0.797 indicates good reliability (Kline 2000).

For the attitude towards meso-scale urban agriculture (attitude_meso), the average evaluation of family gardens and *plantages* was used, namely «would you like family gardens in your neighborhood» and «what do you think about doubling or tripling the number of *plantages*». Both items were measured with a five-point scale and result in a Cronbach's alpha of 0.648, which is acceptable given the small number of items.

The attitude at macro-scale (attitude_macro) included the opinions about «farms are better outside the city» and «agricultural production in the city should be preserved». These two questionnaire items were also measure with a five-point scale (ranging from «not at all» to «fully agree») and yield a Cronbach's alpha of 0.776.

The questionnaire included items regarding the perceived benefit of urban agriculture (see section 2.3) when growing food, when buying local products, or when appreciating urban agriculture because of its aesthetic value. To assess the perceived benefit, a set of nine questionnaire items was designed, two to four items for each of the three topics (growing food, buying local products, aesthetic value). These items were used to generate uncorrelated principal components (Table 1). The data appeared to be adequate for a principal component analysis (determinant of the correlation matrix: 0.217; Kaiser-Meyer-Olkin Measure of Sample Adequacy 0.757; Bartlett's Test of Sphericity significant with $p<.001$). For reasons of interpretation, three factors were extracted, the third of which had an eigenvalue of 0.939. They accounted for 55% of the variance. To obtain uncorrelated principal components, an orthogonal rotation (varimax) was used, and scores were calculated based on the Anderson-Rubin method. The main loadings on the three components are in accordance with

the concept of each item (Table 1). Therefore, labeling components according to three fields – food producer, food buyer, and aesthetic value – is valid.

Table 1: Principal component analysis, variables and factor loadings

Questionnaire item	Loading on component		
	1 (food producer)	2 (food buyer)	3 (aesthetic value)
Item 1: Intention to intensify cultivation (probability)	.699		
Item 2: Intention to intensify cultivation (additional time)	.581		
Item 3: Likelihood of future cultivation (family garden)	.808		
Item 4: Likelihood of future cultivation (*plantage* plot)	.788		
Item 5: Preference for local products		.670	
Item 6: Willingness to pay for local products		.839	
Item 7: *Plantages* embellish the city			.670
Item 8: *Plantages* tend to be messy			-.839
Item 9: Flowers preferred to vegetables			-.523

Note: n=625; Principal Component Analysis; Rotation: Varimax with Kaiser Normalization; Loadings below 0.4 are suppressed

The socio-economic characteristics of urban individuals might influence both their attitude and their perception of benefits within the three fields. Criteria such as income level, level of education, age and nationality were tested for correlations with the above attitude variables and components. For the descriptive results, additional questions from the survey are used.

4. Results

4.1 Attitudes towards growing food in cities and the factors which influence them

Attitudes towards urban agriculture were generally positive in the study. Attitudes at the meso-scale of urban agriculture (e.g. family gardens) were more positive and larger than attitudes referring to planting sites (micro-scale). Whereas attitude_micro was favorable for 50.6% of the respondents, attitude_meso was favorable for 72.6%. For attitude_macro (27.0% of positive attitudes) it is important to keep in mind that it refers to the preservation of intra-urban professional farms, and not to professional farming as a whole.

Respondents who were more positive towards urban agriculture at one scale level also tended to be more positive at the other one (Pearson's r=0.424, 0.338 and 0.326, all p<.001), showing consistent attitudes for urban agriculture in general. Between the attitudes at the micro and meso level there is a higher correlation than between each of them and attitude_macro. All attitude variables correlate negatively with the respondents' age (seven age groups; Kendall's Tau b=-0.205, -0.181, and -0.173 for micro-, meso- and macro-scale; all p<.001) and positively with their level of education (three levels; Kendall's Tau b=0.288, 0.150 and 0.129; all p<.001), showing that younger and better educated persons were more positive towards urban agriculture than others. These correlations are stronger for micro-scale urban agriculture than for meso- and the macro-scale.

Table 2: Attitudes and field-specific evaluations for urban agriculture, differences by household type

	Household type			
Attitudes toward urban agriculture	With children	Adults only, not retired	Adults only, retired	All households
Percentage of positive attitudes				
Attitude at micro-scale	68%	53%	31%	51%
Attitude at meso-scale	85%	74%	63%	73%
Attitude at macro-scale	49%	38%	24%	37%
Correlations with income class (per household member; Kendall's Tau b)				
Attitude at micro-scale	.200**	n.s.	n.s.	n.s.
Attitude at meso-scale	n.s.	n.s.	-.132*	-.134**
Attitude at macro-scale	n.s.	n.s.	n.s.	-.062*
Field evaluation: perceived benefit from urban agriculture	With children	Adults only, not retired	Adults only, retired	All households
Average evaluation (household group average tested against all households (t-test)				
Produce own food	0.25**	0.07 n.s.	-0.17***	0.00
Buy food from urban agriculture	-0.01 n.s.	0.08 n.s.	-0.18*	0.00
Aesthetic value of urban agriculture	0.42***	-0.06 n.s.	-0.34***	0.00
Correlations with income class (per household member; Kendall's Tau b)				
Produce own food	n.s.	-.121**	n.s.	-.145**
Buy food from urban agriculture	.240**	n.s.	n.s.	.079*
Aesthetic value of urban agriculture	n.s.	n.s.	n.s.	n.s.

*Note: Levels of significance: *** p<.001, ** p<.01 level; * p<.05 level; n.s. not significant*

An analysis of different household types and income levels (Table 2) reveals that the highest percentage of positive attitudes was found among persons living in households with children or adolescents. For this group, there is a significant and positive correlation between income and attitude towards micro-scale urban agriculture (Kendall's Tau b=0.200, p=.001). Retired persons living in households with adults only (including single households) had the highest percentage of negative attitudes, and they show a negative correlation between income and attitude, however at the meso-scale (Kendall's Tau b=-0.132, p=0.046). This means that among families, socio-economically disadvantaged persons are less in favor of the presence of planting sites than better off persons, whereas among retired persons, the poorer ones are more favorable towards allotment or collective gardens than the richer ones.

4.2. Motivation and interests

The following sections contain the descriptive results of the questionnaire items used in the principal component analysis (PCA; Table 1) and some additional questions related to each of the three fields.

4.2.1. Urban population in the role of food producers

The perceived benefit of growing one's own vegetables or fruit is expressed as a person's willingness to engage in this activity. Four questionnaire items related to this activity were used in the PCA. 66% of the respondents would like to intensify cultivation and dedicate more time to that activity (item 1, Table 1). To the question about how many hours per week individuals currently dedicate to crop cultivation and how many hours they would like to invest in the future, 55% of the respondents indicated more hours than today and 43% would keep the same level of activity (this difference in hours is item 2). 25% of the respondents thought that they were likely to cultivate a family garden (item 3) and 27% were likely to cultivate a *plantage* plot (item 4).

On average, the interest in producing their own food is higher for persons living in households with children or adolescents and lower for retired persons (Table 2). Overall, persons with lower income express a higher interest in growing food, although this trend is not significant within the groups of retired persons or of persons living with children.

The respondents were asked to describe their current plant growing activities. 38% of the respondents were dedicating at least one hour per week (during the growing season); they were mostly cultivating flowers and/or aromatic herbs. Approximately half of this respondent subset (19% of all respondents) were cultivating vegetables or fruit, and investing approximately 5 hours per week in these activities.

The main constraint to starting food production activities is lack of space. Balconies or windowsills were most frequently used (by 44% of all respondents); another 14% of the respondents did not rely on pots, but had some surface to cultivate. 63% of those with surface had a private garden; family gardens or *plantage* plots were less common. Persons with access to land were dedicating considerably more time to cropping than those having to use their balconies or windowsills, with an average of 6.4 hours and only 2.4 hours per week respectively.

4.2.2. Buying products from local urban agriculture

Perceived benefits from buying local products were assessed with two items included in the PCA: a stated preference and a stated willingness to pay (WTP). 56% of the respondents would prefer fruit or vegetables from Lausanne and its surrounding areas than from elsewhere (item 5, Table 1). The rest of them were indifferent (42%) or preferred fruit/vegetables from elsewhere (2%).

The WTP for products from local urban agriculture (item 6 of the PCA) was assessed with a specific example, namely, tomatoes. The respondents were asked the maximum price that they would pay for tomatoes from their city, given that seasonal domestic tomatoes would cost 4 CHF per kg (the exchange rate in March 2011 was 1 CHF:0.78 EUR: 1.08 USD). This question seemed to be more difficult to answer than others, and 14% of the respondents did not give valid answers. 54% of the remaining respondents (n=763) stated a higher WTP, whereas 16% stated a lower WTP. For 30% of the valid answers, the WTP exceeded the reference price by at least 1 CHF per kg, whereas 12% would not pay more than a price 1 CHF below the reference.

The interest in buying products from local urban agriculture is lower among retired persons (Table 2). Overall, there is a weak correlation with income, meaning that persons with higher income show more interest in buying products from local urban agriculture. However, this correlation is very strong within the group of persons living in households with children or adolescents, and it does not appear within the other two groups.

Individuals stating a preference for products grown in Lausanne (as compared to products from alternative areas) are likely to expect a higher quality with respect to several criteria regarding the product and the method of production. This conclusion can be drawn from their answers regarding several criteria. The average WTP was tested between the respondent group expecting advantages in quality and the group that did not expect such advantages or was unaware of them. The difference in average WTP was highest for expected environmental benefits (33 cents), food safety benefits (32 cents) and freshness (29 cents). It was lower for expected better taste (15 cents) and not significant for expected difference in vitamin content.

4.2.3. Aesthetic value

To assess the aesthetic value of urban agriculture, three items were included in the PCA. When asked whether surfaces of *plantages* improve the beauty of the city (item 7, Table 1), 61% of the respondents agreed. Only 14% noted that these surfaces are often messy (item 8, Table 1). This indicates that overall, plantation plots are perceived to be a positive element within the urban landscape, although the above-mentioned evaluations regarding the *plantages* could refer more to the green space that these surfaces create, and less to the selection of plants growing on them. To assess the preference between productive and ornamental plants, another item was used (item 9). It revealed that 40% of the respondents preferred to see flowers in public parks and did not like the idea of vegetables being planted in such a site. This preference for ornamental plants appears to be stronger for people spending less time in public parks. Respondents who visit parks tended to object less to the idea of seeing vegetables planted there (Kendall's Tau b=-.104, p<.001). Twenty-three percent of the respondents spend time in parks every day, and another 50% visit a park at least once a week.

The appreciation of the aesthetic value of urban agriculture is highest in the group of persons living in households with children or adolescents and lowest among retired persons (Table 2). This finding is similar to that concerning the persons' interest in producing their own food. However, there is no difference with respect to income classes.

4.3. Explaining attitudes by field evaluations

For the following analysis, only cases that are complete in all relevant variables were used (n=623). The three principal components of field-specific perceived benefit are positively related to the attitudes towards urban agriculture. The components are uncorrelated to each other, due to the fact that the scores were calculated according to the Anderson-Rubin method. These scores were then used in a linear regression model to explain the attitude at the three scale levels (Table 3). This model is better able to predict attitudes at the meso-scale than those at the micro- or at the macro-scale (model for attitude_meso: R^2=.403; model for attitude_micro: R^2=.242; model for attitude_macro: R^2=.225). In the three model versions, the coefficients for all three components are highly significant.

Table 3: Linear regression models for the attitudes towards urban agriculture

	Attitude at micro-scale (e.g. plot at wayside)			Attitude at meso-scale (e.g. family gardens)			Attitude at macro-scale (e.g. urban farm)		
Field of evaluation	B	SE B	β	B	SE B	β	B	SE B	β
(Constant)	.090	.018		.416	.013		.053	.044	
food producer	.088	.018	.175***	.189	.013	.436***	.309	.044	.250***
food buyer	.145	.018	.289***	.089	.013	.207***	.305	.044	.248***
aesthetic value	.181	.018	.359***	.180	.013	.415***	.394	.044	.319***
R^2	.242			.403			.225		
Durbin-Watson	1.880			1.942			1.973		

*Note: n=623 for all models; Significances *** p<.001*

At the micro-scale level, the predictor with the highest standardized regression weight is the aesthetic value of urban agriculture (β=.359), followed by the evaluation of the possibility to buy local products (β=.289). In the macro-scale model, the aesthetic value shows the strongest regression weight as well (β=.319). Both other predictors have regression weights of about β=.25. The evaluation of the possibility to produce, which shows the weakest contribution for the model at micro-scale (β=.175), is the strongest predictor in the model at meso-scale (β=.436). This result indicates that an interest in engaging in growing vegetables or fruits is the primary determinant of the scale-specific difference in attitudes towards urban agriculture. In the model at meso-scale, the regression weight for the possibility to buy is weaker than in the other two models, whereas the opposite is true for the regression weight for the aesthetic value. As the Durbin-Watson statistic in Table 3 indicates, all models meet the assumption of independent error. The residuals were controlled graphically, and this gave no reason for concern.

5. Discussion

The interest in urban agriculture in developed countries is increasing. This case study found positive attitudes towards growing food in cities. The attitudes varied with the scale of food production, hence confirming the distinction proposed by Pearson et al. (2010). Micro urban agriculture was evaluated less positively than meso-scale production. For macro-scale urban agriculture, the smallest percentage of positive attitudes was found: A large percentage of the respondents expressed the opinion that professional farms are better outside the city. The concept of multifunctionality may help to explain this. Different scales of food production may impact the perception of the population about the multifunctional services that food production provides. At micro-scale, no information was given about who might cultivate the surface, whereas the meso-scale questions referred to family gardens and *plantages*, implicitly inviting the population to participate. Thus, other functions are salient. The evaluation of professional farms (macro-scale production) refers to an urban context only. As Huber et al. (2007) describe, expectations towards agriculture differ substantially between various regional contexts. To examine the importance of the various functions, the population's benefit from urban agriculture in three fields was taken into account – from growing one's own food, buying local products or appreciating the aesthetic value of urban agriculture. The multifunctional perception of urban agriculture by the population is confirmed by a positive relationship for all three fields. Thus, multifunctionality of urban green space is not only a useful theoretical concept (Van Leeuwen et al. 2010; Gómez-Baggethun and Barton 2012), it also influences what people think and feel about urban agriculture. The importance of the different functions and services depends on the scale level of urban agriculture. When evaluating it at micro-scale (referring to planting sites), non-food related functions such as the aesthetic value are of a primary importance. However, when evaluated at meso-scale, the prospect of participating in food production appears to be a major determinant for the attitudes towards urban agriculture. For professional farming in an urban context, the functions appear to be similar to the ones of micro-scale urban agriculture. It is mainly appreciated for the scenery it provides, less for what it produces. Overall, the regression models show that a large part of the variations remains unexplained, especially concerning attitudes towards micro-

and macro-scale urban agriculture. As the non-food related functions of urban agriculture were limited to aesthetics, more antecedents of attitudes might be found among the many other services (and disservices) of urban green space classified by Gómez-Baggethun and Barton (2012). The evaluation of professional farming refers to intra-urban agriculture and therefore might be influenced by perceptions that see urban and rural as opposites (Dewaelheyns and Gulinck 2008). Expectations towards farms in a peri-urban or rural setting regarding their functions are likely to differ – and in a Swiss context, they are not far away from urban areas either. To integrate agriculture into urban design (Vilijoen et al. 2005) might not primarily refer to professional farming, but to some of its functions that can also be provided by micro- or meso-scale urban agriculture. Persons with lower income have more positive attitudes and a higher motivation to crop themselves than those with higher income. The findings of Alber and Kohler (2008) suggested no impact of income on informal food production, and an increase due to the economic crisis could not be expected, as Swiss unemployment rates and household incomes have been little affected by it. A differentiated analysis with respect to household types might give a clue and indicate the deeper motivations for why some persons like urban agriculture better than others. As a group, members of households with children or adolescents have an income (per household member) that is below average and are much more positive about urban agriculture than other persons. At the same time, they express a much higher appreciation of the aesthetic value, as well as a higher motivation to grow food. If they think they can afford it, they are also more willing to buy local products: Even though this group includes a higher proportion of low-income persons, their interest in buying local does not differ from the other household types. However, the group of households with children/adolescents shows a clear relationship between their interest in buying and income. A lower interest in buying local might be the consequence of a restricted household budget. This might also explain the positive relationship between income and the attitude towards micro-level urban agriculture, found in this group. On a whole, the more positive attitude towards urban agriculture found in this group might be motivated by concerns about sustainability, (as Murdoch and Miele 2004 found for consumers interested in alternative food networks) and a wish to provide themselves and their children with direct contact with nature (as Bouvier-Daclon and Sénécal [2001] found among com-

munity gardeners). Watching a future generation growing up might increase sensitivity to these issues.

Across all groups, the case study confirms a considerable interest in purchasing locally produced food, as described by Porcher (2011), and mirroring trends found throughout other parts of the world (Broadway and Broadway 2011). These consumers expect local products to be of a higher quality than products supplied from elsewhere with respect to environmental issues, taste and food safety. Trust and authenticity are key factors in the context of short supply chains, which allow personal interaction between producers and consumers (Renting, et al. 2003). If the producers and produce of urban agriculture fulfill such consumer expectations, a higher WTP can be expected, as promised by the case study results. However, it remains to be seen whether this WTP would be enough to cover the high production costs incurred by the small scale nature of urban agriculture. There might be a dilemma as described by Jarosz (2008) for peri-urban farmers that is even more pronounced for intra-urban farmers. Models combining commercial production with consumers' contribution to cultivation (Vogl et al. 2004) can partially solve the problem of small structures and high labor costs.

With respect to urban quality, urban agriculture has a strong potential of a positive impact, as positive attitudes promise popular support. The survey results show that a large part of the population would like to grow more food, but they lack space. If more surfaces are provided, food growing activities can be expected to increase considerably. Whether this might be the beginning of a new relationship between urbanism and agriculture (Knight and Riggs 2010) and slow down the urban sprawl on rural land remains to be seen.

6. Conclusions

This study contributes to an increased understanding of the role of urban consumers and citizens and to exploring the non-economic value of urban ecosystems. As agriculture in general, urban agriculture is multifunctional and preferred by persons who appreciate its multiple functions. Younger persons, especially when having children, are more supportive than others. There is potential to build upon the tradition of allotment gardens as a large part of the population

is motivated to engage in growing food. Increased opportunities would therefore increase cultivation activities. Appreciation of urban agriculture is also expressed by a higher WTP for its produce and a positive evaluation of its aesthetic value. The population's support is needed to make the cities in the developed world more sustainable. Urban agriculture promises to be a well-accepted element within a strategy on this way. More research is needed with respect to the social values of urban agriculture and its impact on the quality of urban life.

References

Alber, J., and Kohler, U., 2008. Informal food production in the enlarged European Union. Social Indicators Research, 89(1), 113–127.

Aldous, D. E., 2007. Social, environmental, economic, and health benefits of green spaces. Acta Horticulturae, 762–185.

Bouraoui, M., 2005. Agri-urban development from a land-use planning perspective: The Sacly Plateau (France) and the Sijoumi Plain (Tunisia). In L. J. A. Mougeot (Ed.), Agropolis. The social, political and environmental dimensions of urban agriculture (pp. 203–238). Ottawa & London: International Development Research Center IDRC & Earthscan.

Bouvier-Daclon, N., and Sénécal, G., 2001. Les jardins communautaires de Montréal: un espace social ambigu (The Montreal community gardens: a socially ambiguous territory). Loisir et Société / Society and Leisure, 24(2), 507–531.

Broadway, M. J., and Broadway, J. M., 2011. Green dreams: promoting urban agriculture and the availability of locally produces food in the Vancouver metropolitan area. Focus on Geography, 54(1), 33–41.

Constantine, S., 1981. Amateur gardening and popular recreation in the 19th and 20th centuries. Journal of Social History, 14(3), 387–406.

Deelstra, T., and Girardet, H., 2000. Urban agriculture and sustainable cities. In N. Bakker, M. Dubbeling, S. Guendel, U. Sabel Koschella, H. de Zeeuw (Eds.), Growing cities, growing food, urban agriculture on the policy agenda, (pp. 43–65). Feldafing: Deutsche Stiftung für Entwicklung.

Dewaelheyns, V. and Gulinck H., 2008. Rurality near the city. Editorial paper. Proceedings of the conference held in Leuven, Belgium, on February 7–8th, 2008. 5–20

Diener, R., Herzog, J., Meili, M., de Meuron, P. and Schmid, C., 2005. Switzerland – An urban portrait. Berlin: Birkhäuser.

Drescher, A. W., Holmer, R. J., and Iaquinta, D. L., 2006. Urban homegardens and allotment gardens for sustainable livelihoods: Management strategies and institutional environments. In B. M. Kumar and P. K. R. Nair (Eds.), Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry (pp. 317–338). Dordrecht: Springer.

Duchemin, É., Wegmuller, F., and Legault, A.-L., 2008. Urban agriculture: multidimensional tools for social development in poor neighbourghoods. Field Actions Science Reports, (1 [Online]). Retrieved from http://factsreports.revues.org/113

Eagly, A.H. and Chaiken S., 1993. The psychology of attitudes. Belmont CA: Wadsworth Group / Thomson Learning.

Evers, A. and Hodgson, N.L., 2011. Food choices and local food access among Perth's community gardeners. Local Environment, 16(6), 585–602

Firth, C., Maye, D. and Pearson D., 2011. Developing «community» in community gardens. Local Environment, 16(6), 555–568

Federal Statistical Office, 2012. Statistical atlas of Switzerland. Retrieved October 14, 2012 from – http://www.atlas.bfs.admin.ch

Gómez-Baggethun, E. and Barton, D.N., 2012. Classifying and valuing ecosystem services for urban planning. Ecological Economics, http://dx.doi.org/10.1016/j.ecolecon.2012.08.019

Home, R., Bauer, N., and Hunziker, M., 2009. Cultural and biological determinants in the evaluation of urban green spaces. Environment and Behavior, 42(4), 494–523.

Huber, R., Haller, T., Weber, M. and Lehmann, B., 2007. Land(wirt)schaft 2020: Was erwartet die Gesellschaft? Agrarforschung 14(9), 406–411.

Jarosz, L., 2008. The city in the country: Growing alternative food networks in Metropolitan areas. Journal of Rural Studies, 24, 231–244

Jones, A., 2002. An environmental assessment of food supply chains: A case study on dessert apples. Environmental Management, 30(4), 560–576.

Jorgensen, A., and Gobster, P. H., 2010. Shades of green: Measuring the ecology of urban green space in the context of human health and well-being. Nature and Culture, 5(3), 338–363.

Kline, P., 2000. The handbook of psychological testing (2nd ed.). London: Routledge.

Knight, L. and Riggs, W., 2010. Nourishing urbanism: A case for a new urban paradigm. International Journal of Agricultural Sustainability, 8 (1&2), 116–126

Kruglanski, A.W. and Stroebe, W., 2005. The influences of beliefs and goals on attitudes: Issues of structure, function and dynamics. In D. Albarracín, B.T. Johnson and M.P. Zanna (Eds.), The handbook of attitudes. Mahwah, NJ: Lawrence Erlbaum Associates.

Morgan, K., 2010. Local and green, global and fair: The ethical foodscape and the politics of care. Environment and Planning A, 42, 1852–1867.

Mougeot, L.J.A., 2005. Introduction. In L. J. A. Mougeot (Ed.), Agropolis. The social, political and environmental dimensions of Urban Agriculture (pp. 1–24). Ottawa & London: International Development Research Center IDRC & Earthscan.

Mougeot, L.J.A., 2000. Urban agriculture: Definition, presence, potential and risks. In N. Bakker, M. Dubbeling, S. Guendel, U. Sabel Koschella, H. de Zeeuw (Eds.), Growing cities, growing food, urban agriculture on the policy agenda, (pp. 1–42), Feldafing: Deutsche Stiftung für Internationale Entwicklung.

Murdoch, J., and Miele, M., 2004. A new aesthetic of food? Relational reflexivity in the «alternative» food movement. In M. Harvey, A. McMeekin and A. Warde (Eds.), Qualities of food (pp. 156–175). Manchester: Manchester University Press.

Pearson, L.J., Pearson, L. and Pearson, C.J., 2010. Sustainable urban agriculture: Stocktake and opportunities. International Journal of Agricultural Sustainability, 8(1–2), 7–19

Perez-Vazquez, A., Anderson, S., and Rogers, A. W., 2005. Assessing Benefits from Allotments as a Component of Urban Agriculture in England. In L. J. A. Mougeot (Ed.), Agropolis. The social, political and environmental dimensions of urban agriculture (pp. 239–266). Ottawa & London: International Development Research Center IDRC & Earthscan.

Porcher, N., 2011. L'agriculture contractuelle de proximité en Suisse romande. Master Thesis, Institut Agronomique Méditerranéen de Montpellier.

Renting, H., Rossing, W.A.H., Groot, J.C.J., Van der Ploeg, J.D., Laurent, C., Perraud, D., Stobbelaar, D.J., Van Ittersum, M.K., 2009. Exploring multifunctional agriculture. A review of conceptual approaches and prospects for an integrative transitional framework. Journal of Environmental Management, 90, S112–S123

Renting, H., Marsden, T. K., and Banks, J., 2003. Understanding alternative food networks: exploring the role of short food supply chains in rural development. Environment and Planning A, 35, 393–411.

Salomon Cavin, J., 2005. La ville, mal-aimée. Représentations anti-urbaines et aménagement due territoire en Suisse: Analyse, comparaisons, évolution. Lausanne: Presses polytechniques et universitaires romandes.

SCRIS, 2011. Statistique Lausanne. Service cantonal de recherche et d'information statistiques Retrieved July 12, 2011 from http://www.scris-lausanne.vd.ch/

Swyngedouw, E. and Kaïka, M., 2000. The environment of the city … or the urbanization of nature. In Bridge G. and Watson, S. (Eds.). A companion to the city (pp. 567–580). Malden MA: Blackwell Publishers Ltd.

Sumner, J., Mair, H. and Nelson, E., 2010. Putting the culture back into agriculture: Civic engagement, community and the celebration of local food. International Journal of Agricultural Sustainability, 8 (1&2), 54–61.

Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kazmierczak, A., Niemela, J., 2007. Promoting ecosystem and human health in urban areas using green infrastructure: A literature review. Landscape and Urban Planning, 81, 167–178.

van Leeuwen, E., Nijkamp, P., and de Noronha Vaz, T., 2010. The multifunctional use of urban greenspace. International Journal of Agricultural Sustainability, 8(1&2), 20–25.

Vilijoen, A., Bohn, K., and Howe, J., 2005. Continuous productive urban landscapes (CPULs): Designing Urban Agriculture for Sustainable Cities. Oxford: Architectural Press.

Vogl, C. R., Axmann, P., and Vogl-Lukasser, B., 2004. Urban organic farming in Austria with the concept of Selbsternte (‚self-harvest'): An agronomic and socio-economic analysis. Renewable Agriculture and Food Systems, 19(2), 67–79.

Wegmuller, F., and Duchemin, É., 2010. Multifonctionnalité de l'agriculture urbaine à Montréal: étude des discours au sein du programme des jardins communautaires. VertigO – la revue électronique en sciences de l'environnement, 10(2), [on line]. Retrieved July 6, 2011 from http://vertigo.revues.org/10445

Yokohari, M., and Amati, M., 2005. Nature in the city, city in the nature: case studies of the restoration of urban nature in Tokyo, Japan and Toronto, Canada. Landscape and Ecological Engineering, 1(1), 53–59.

Zasada, I., 2011. Multifunctional peri-urban agriculture – A review of societal demands and the provision of goods and services by farming. Land Use Policy, 28(4), 639–648

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Therese Haller
Berner Fachhochschule
Hochschule für Agrar-, Forst- und Lebensmittelwissenschaft HAFL
CH-3052 Zollikofen
E-Mail: therese.haller@bfh.ch