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Is food a motivation for urban gardeners? Multifunctionality and the relative importance of the food function in urban collective gardens of Paris and Montreal

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Abstract In the cities of industrialized countries, the sudden keen interest in urban agriculture has resulted, *inter alia*, in the growth of the number and diversity of urban collective gardens. While the multifunctionality of collective gardens is well known, individual gardeners' motivations have still not been thoroughly investigated. The aim of this article is to explore the role, for the gardeners, of the food function as one of the functions of gardens, and to establish whether and how this function is a motivating factor for them. We draw on a set of data from semi-structured interviews with 39 gardeners in 12 collective gardens in Paris and Montreal, as well as from a survey on 98 gardeners and from field observations of the gardeners' practices. In the first part we present the nature and diversity of garden produce, and the gardeners' assessment thereof. In the second part we describe the seven other functions mentioned by the gardeners, which enables us to situate the food function in relation to them. We conclude that the food function is the most significant function of the gardens, and discuss the implications for practitioners and policy makers.

Keywords Collective gardening · Urban agriculture · Multifunctionality · Food function

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Introduction

In cities of industrialized countries, the increasing interest in urban agriculture has resulted, *inter alia*, in the growth of the number and diversity of urban collective gardens and in increasing numbers of urban dwellers becoming involved in some form of gardening (Evers and Hodgson 2011; McClintock 2010; Taylor and Lovell 2012).[1] In Paris, Montreal and New York for example, collective gardens are proliferating and waiting lists to join a garden grow longer by the day. This growing demand for allotments is relayed by the municipalities, more and more of which are adopting official programs to regulate and promote the integration of gardens into town planning (Demailly 2014; Gittleman et al. 2012; Ohmer et al. 2009; Saint-Hilaire-Gravel 2013). What explains this trend? Scientific literature has argued that urban collective gardens are by nature multifunctional (Duchemin et al. 2008) and their multifunctionality has been put forward as a strong driver of their development and consideration in local policies (Pouw and Wilbers 2005).

The concept of multifunctionality has been extensively used by sustainable agricultural research and policy-making, as an attempt to characterize the additional functions

[1] Collective gardens include cultivated spaces managed collectively by groups of gardeners, most often for food-production purposes and for gardener's own consumption, located at a distant place from gardener's home. They include both historical forms of gardens, whose origins go back in the late 19th century, for example French *jardins familiaux* (family gardens), allotment plots in the UK or the *jardins communautaires* (community gardens) in Quebec, and more recent forms of urban gardening such as the *jardins partagés* (shared gardens) in France. As we witness the fact that a same expression can refer, from one country to another and even within a same country, to a diversity of designs, settings and statuses, we will use the expression "collective gardens" to avoid ambiguity that may arise from using a word already used in a specific context.

of agriculture aside food and fiber production (Huang et al. 2015). Within this conceptual framework, functions refer to the provision of goods and services that satisfy societal needs or demands, for example food security, environment protection, rural vitality, and so forth. As a farm-centered approach, multifunctionality in sustainable agricultural research aims at documenting how these functions are jointly produced and how they result from or interact with agricultural production, mostly at the farm level (Huang et al. 2015).

Regarding urban collective gardens, the functions described in the academic literature range from social benefits such as community building and empowerment to food security, economic development, use and preservation of open spaces, health and wellbeing of participants (Draper and Freedman 2010). Among these multiple functions, the academic literature has examined the social and civil benefits of urban collective gardens, and occasionally their positive impacts on health and wellbeing (Evers and Hodgson 2011). Other functions, such as food production, have received little attention (Gittleman et al. 2012; Smith and Harrington 2014). While this is understandable in a context of non-professional production, whose products in Northern cities are generally not meant for economic profit, the knowledge gap on food production in urban collective gardens considerably weakens the evaluation of the contribution of collective gardens to household produce consumption.

Furthermore, the functions assigned to the gardens are generally described without explaining which point of view is adopted. Yet, it has been shown that depending on the speaker, the functions assigned to the garden and the weight of each function vary considerably. In a study undertaken in 2010 on the City of Montreal's *jardins communautaires* program, Duchemin et al. showed that some functions were granted more importance than others, depending on who was interviewed (gardeners, chairpersons of the garden association, horticultural facilitators, development agents, etc.). For instance, the food security and budget savings issues highlighted by the City of Montreal in its sustainable development strategic plan did not seem to be the gardeners' priorities. In contrast, the production of quality foods, contact with nature as opposed to city life, and educational functions were shown to be important motivations for community gardeners (Duchemin et al. 2010; Duchemin 2013). In a study on a community garden education program created in a low-income eastern North Carolina community, d'Abundo and Carden (2008) showed that the initial program goals of administrators focused on obesity reduction were different from participant goals that focused on wellness and community development.

Recent studies also indicate the lack of knowledge on gardeners' individual motivations (Draper and Freedman 2010; Gittleman et al. 2012). For instance, Draper and Freedman show that most publications on collective gardening in the USA concern changes of diet among young people who garden under gardening programs at school or in extra-mural school activities, hence as a "supervised" practice. The motivations of gardeners who practice gardening outside of a program are therefore largely unknown.

The goal of this paper is to deepen the understanding of urban gardens' multifunctionality as it is perceived by gardeners by (1) providing an insight on the motivations of gardeners, that is to say the expected benefits and functions assigned to urban collective gardens by gardeners and (2) describing the food function of these gardens and its importance with respect to other functions of the garden. The food function of the garden is the "quantitative and qualitative food supply gardens are likely to provide to gardeners," as defined in Pourias et al. (2015, p. 4).

Our results are presented and discussed in two phases: First, we present the "material" outputs of gardens, especially food produce, to further our understanding of how they constitute a motivation for gardeners. Second, we describe successively all the other functions fulfilled by gardens, from the gardeners' point of view, in order to situate the food function in relation to the others. We conclude that the food function is central among the multiple functions played by these gardens, and discuss the implications of our results for practitioners and policy makers.

Research method

Context

By choosing two cities of the global North, in countries with comparable standards of living, we posited that the food function does not, a priori, have a strictly subsistence function (insofar as other supply chains are theoretically readily accessible). This contrasts with countries of the global South, where food-producing urban agriculture has a very important role in the food supply (Aubry and Pourias 2013).

Collective gardening has developed substantially in Paris in recent years, in terms both of the number of gardens and of the number of people participating in them. In Paris *intra-muros*, the number of *jardins partagés* has risen from fewer than five in 2002, to over 80 today. Waiting lists to join a garden are sometimes very long. In the case of *jardins familiaux*, mostly situated in the *départements* around the capital, some applicants wait for over ten years before receiving an allotment. In Montreal, the past 15 years have witnessed a diversification of the garden offer. In 2014 the city had 97 *jardins communautaires* that had joined the municipality's *Jardins communautaires* program, and 87 *jardins collectifs* coordinated by many community bodies (Duchemin 2013). The City of Montreal

considers that some 12,000–15,000 individuals are involved, either directly or indirectly, in the *jardins communautaires* program (Duchemin et al. 2008).

The main types of collective gardens present in these two cities are summarized in Table 1.

In both Paris and Montreal, the cities adopted a municipal program to manage and promote urban gardening. Levels of involvement and the regulations that apply to gardens nevertheless differ between the two cities, as do the stated objectives.

Inspired by the experience of the New York community gardens, the City of Paris' *Programme Main Verte* was adopted by the *Conseil de Paris* in June 2003. This program was designed to promote the creation of *jardins partagés* and to process the applications of local non-profit associations that wished to set up *jardins partagés* or that had already done so informally. The main aim of the program was to foster social cohesion in disadvantaged neighborhoods. This was reflected, for example, in the gardeners' obligation to open their garden to the public for at least two half days per week, and to organize one public event (cultural, training in gardening, etc.) per year. In contrast, the food function was initially not emphasized and was even discouraged by the *Main Verte* program, for three reasons: first, the main goal of the City of Paris through the development of *jardins partagés* was to promote social interactions in the neighborhoods, which was perceived contradictory with individual food production; secondly, there was a clear intention to differentiate the *jardins partagés* from the traditional model of *jardins familiaux* and finally, this was also a way to prevent risks associated with the consumption of fruits and vegetable grown on polluted soils. Similar programs were likewise launched in the *départements* around the capital, based on that of the City of Paris.

In parallel, most of the *jardins familiaux*, historically present around Paris, are federated by the French National Federation of Family and Collective Gardens (FNJFC). This organization promotes the food-producing role of gardens, as well as access to a leisure space for families, contact with nature, and the fostering of social cohesion.

In Montreal the *Jardins communautaires* program has existed since 1975. Designed by the City of Montreal primarily as urban recreational areas (Bouvier-Daclon and Sénécal 2001), these gardens were also given the objective of food security in the Montreal community's 2007 sustainable development strategic plan. The gardens are expected "to increase the quantity, quality and freshness of perishable foods provided to the urban population" (*Plan stratégique de développement durable de la collectivité montréalaise 2007–2009*, cited in Wegmuller 2010). Since the reorganization of the urban community of Montreal in 2002, the *jardins communautaires* have been under the responsibility of the respective districts of the city, which manage the waiting lists for allotments and the horticultural activities in the gardens.

Sites of study

The study was conducted in 12 collective gardens: 8 were located in Paris and its close suburbs and 4 were in Montreal

Table 1 Four main types of CGs in Montreal and Paris

Name	Definition	Extent
Jardins communautaires	Neighborhood gardens in which individuals have their own plots where they grow and consume their own harvest, yet share the garden's overall management (Lawson 2005; Duchemin et al. 2008) In Montreal, the *jardins communautaires* are administered jointly by citizen organizations and city boroughs, and offer mainly plots of 15–20 m^2	North America mostly; 97 in Montreal in 2014
Jardins collectifs	Gardens that involve the pooling of many small garden plots, with all participants assuming joint responsibility [usually under the coordination of a garden supervisor] (Centraide 2013)	Quebec;* 87 in Montreal in 2012
Jardins familiaux	Gardens in which families tend their own plots, yet share the garden's overall management. In the Parisian region, they are the successors of nineteenth-century *jardins ouvriers* ("worker's gardens") and are predominantly located in the suburbs of Paris. Plot sizes are usually between 100 and 500 m^2	Europe; exact number unknown in Paris region; 2 in Paris *intra-muros* in 2013
Jardins partagés	Gardens that are shared by a group of citizens, usually people who live in the vicinity (Basset et al. 2008). Plots can be grown communally or individually, but are usually relatively small (between 2 and 20 m^2 for individual plots)	France (and Europe, under other names); exact number unknown in the Parisian region; 122 in inner Paris in 2013

* The same word exists in France but does not have the same meaning; in France, jardin collect if is the translation of the generic term collective garden, which includes community gardens, jardins partagés, jardins familiaux, etc

Table 2 Summary details of respondents

Characteristics	Number of gardeners
Type of garden	
Jardins partagés (Paris)	11
Jardins familiaux (Paris)	14
Jardins communautaires (Montreal)	14
Age	
20–30	6
30–40	8
40–50	9
50–60	10
60–70	5
70–80	1
Gender	
Male	19
Female	20
Occupation	
In activity	20
Unemployed	6
Retired	13
Country of birth	
Algeria	1
Cambodia	1
Canada	9
Congo	1
France	20
France (overseas)	1
Nigeria	1
Poland	1
Portugal	2
Sri-Lanka	1
USA	1
Experience in gardening	
>10 years	25
3–10 years	3
1–3 years of gardening in Quebec or France, previous experience in home country	3
1–3 years, first experience	8
Size of the plot (m^2)	
<10 m^2	4
10–50	23
50–100	3
>100	9
Part not devoted to food production (%)	
<10	9
10–50	23
>50	2
Unknown	5

(see Table 6 in Appendix). As the study focused on gardeners' practices, we excluded Montreal collective gardens, where a gardener coordinator provides technical support and guidelines for the choice of crops and cropping practices.

In Paris and Montreal, the study sites were selected to represent the greatest possible diversity, based on the following criteria: geographical location of the garden, the garden's age, size and number of plots, internal organization (collective plots vs individual plots), member or not of a municipal program and/or of a federation. In both cities, gardens exclusively dedicated to flower production—which is unusual but can exist—were excluded.

Data collection

Interviews

Within each garden, we selected a sample of gardeners as follow. In Montreal, we used the opportunity of garden general assemblies, which take place in every garden at the beginning of the growing season, to present the on-going study and ask gardeners to leave their contact details if they were willing to enroll in the study. When we had more than 4 gardeners on the contact list for one garden, we randomly selected 4 gardeners for the interview; when we had fewer than 4 gardeners, we contacted all the gardeners who had left their contact details. In Paris, as there were not always general assemblies, we first contacted gardeners on the recommendation of a reference person in the garden (for example the chairperson of the garden association) and then proceeded step-by-step to meet other gardeners, with the aim of interviewing, as far as possible, 4 gardeners per garden.

At the beginning of the growing seasons we interviewed 25 gardeners in Paris in 2012 and 14 in Montreal in 2013 (Table 2).

Interviews were semi-structured and private, except in some cases where the participants came in couples. In that case, in order to ensure that the discussion ran smoothly, they took turns to answer the questions. The interview consisted of 20 questions on: (1) the gardener's visits to the garden (time spent in the garden, frequency of visits, distance from his/her home, etc.); (2) his/her motivations to come to the garden and the functions he/she attributed to the garden; and (3) his/her point of view on the food function of his/her plot (type of products, use and destination of the products, etc.).

Questionnaire

At the end of the growing season, during the harvest festival or during the last garden meeting before winter, a

questionnaire was distributed to gardeners who attended the event in the 12 gardens that we investigated (including the small number of gardeners that were interviewed at the beginning of the growing season). With the help of research assistants, we assisted gardeners in filling in the questionnaire and answered their questions.

The aim of this questionnaire was to make a quick assessment of the importance of gardens' food function for the past growing season. The gardener was asked: (1) who had consumed the products from the garden during the past growing season (close family, friends and extended family, other gardeners, food banks, other) and the estimated percentage of the total harvest that went to each group of person; (2) how the produce was consumed (raw at the garden, raw at home, cooked at home or preserved) and the estimated percentage of the total harvest that was used in each way; and (3) the contribution of his/her plot to his/her food supply.

The latter question consisted in selecting one in a series of statements that best matched the gardener's appreciation of the food supply function of his/her garden. The series of statements was built on the basis of preliminary interviews conducted in 2011 in Paris, before the beginning of the study, with experts from local organizations and municipal authorities. It was tested on seven urban gardeners (not included in the sample above). This gradient defines five situations that cover the various ways the garden can contribute to the gardeners' diet by providing fresh fruit and vegetables, from anecdotal food production to complete self-sufficiency. We received 98 responses to this questionnaire, distributed as follows: 46 from Paris (30 in the 3 *jardins familiaux*, 16 in the 5 *jardins partagés*) and 52 from Montreal.

Observations in the field

During visits to the gardens, field observations provided us with the following: (1) a general plan of the garden's organization (number of plots, lay-out of the plots, collective spaces, main resources such as water, cabins, composters, etc.); (2) monthly monitoring of crops on the plots of the gardeners interviewed, throughout the growing season; (3) cropping practices (use of fertilizers and/or chemical pesticides, dates of sowing and harvesting, way of treating the soil, etc.). In this article we use these data on gardeners' practices to support the data collected during our interviews. The detailed results on the gardeners' cropping practices will be published elsewhere.

Data analysis

All interviews were audio-taped and transcribed verbatim. The motivations mentioned by the gardeners during the semi-structured interviews were grouped together by keyword, then sorted into broad themes or functions. The number of gardeners who mentioned each function and sub-function was quantified in order to situate the weight of each function or sub-function within the set of answers provided. The citations used to illustrate the functions and sub-functions described in the text were chosen amongst those that provided the best illustrations.[2] When needed, gardeners' citations were translated from French to English by the author. The first and last names of the individuals cited in the text have been changed to ensure anonymity.

Results and discussion

The food function

Of the 39 gardeners interviewed, 33 mentioned the possibility of producing food as one of the motivations for participating in the garden. All the gardeners of the *jardins familiaux* in Paris (14 individuals) mentioned this function, 11 out of 14 mentioned it in the *jardins communautaires* in Montreal, and 9 out of 11 gardeners mentioned it in the *jardins partagés* in Paris. Like Duchemin et al. (2010), we found that the quality of garden produce was the main advantage mentioned by the gardeners (22 of the 29 interviewees), followed by the quantitative and economic contribution that the gardens represented (14 out of 39 gardeners) and the diversity of possibilities afforded by the garden (6 gardeners).

Garden produce

The garden produce is highly varied (Table 3). By far the largest proportion consists of vegetables and small fruits, and in some cases flowers, which have a decorative function (or are used to make bouquets), a food function (edible flowers such as nasturtiums, borage, etc.), or protect vegetable patches (crop combinations such as French marigolds-tomatoes-basil). In Paris, in those gardens in which trees may be planted, pome and stone fruits (apples, pears, cherries, plums, etc.) can make up a substantial proportion of the harvest. Finally, the gardens occasionally supply other products such as wood, eggs and snails.[3]

[2] In order to do so, we did not use interview analysis software such as NVivo or Sonal, as the number of interviews was small enough to be treated manually and not to justify the use of such software.

[3] Breeding small animals is tolerated in certain *jardins partagés* in Paris, as the municipality's position on this subject is extremely vague. It is however prohibited in most *jardins familiaux* in the suburbs and in the *jardins communautaires* of Montreal. In Montreal the *Collectif de Recherche en Agriculture Urbaine et Aménagement Paysager Durable* (CRAPAUD) launched the initiave *Ma poule à Montreal* ("my chicken in Montreal") in 2010, to apply for authorization to have laying hens in the city. The practice has nevertheless remained illegal, except in one district.

Table 3 Garden produce

Products	Number of plots	Type of garden	City
Vegetables and small fruits	30	All	Montreal and Paris
Aromatic herbs	27	All	Montreal and Paris
Stone fruits, pome fruits and nuts	6	Suburban *jardins familiaux* and *jardins partagés*	Paris
Eggs	2	Jardin partagé	Paris
Wood	1	*Jardin familial*	Paris
Flowers	14	All	Montreal and Paris
Snails	2	All	Paris
Honey	1	*Jardin partagé*	Paris

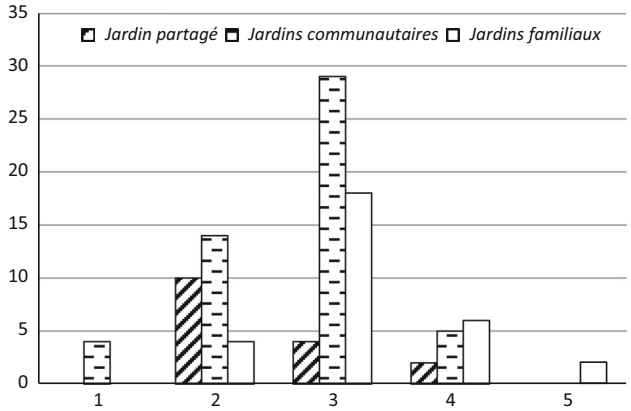

Fig. 1 Importance of garden production in the diet of urban allotment gardeners in Paris and Montreal (declarative assessment: self-reported positioning of 98 gardeners in 12 gardens on the food function gradient; 2013). Legend: 1 = "Food function is anecdotal," 2 = "Harvests allow occasional consumption," 3 = "Garden production covers 50 to 100 % of the needs for a few fresh products during the growing season," 4 = "Garden production covers the need in vegetables and/or fruits during the growing season, and occasionally allows canning or freezing for wintertime," and 5 = "Self-sufficiency, garden production is sufficient to cover the consumption of fruits and vegetables all year-round (harvests eaten fresh and preserved)"

Quantitative and economic supply

More than half the gardeners who answered the questionnaire (51 out of 98) identified with the third situation: "Garden production covers 50 to 100 % of the needs for a few fresh products during the growing season." Thirty percent of them identified with the second situation: "Harvest allows occasional consumption" and 10 % with the fourth situation: "Garden production covers the needs in fresh products during the growing season and occasionally allows canning or freezing for wintertime." In the *jardins partagés*, most of the gardeners questioned identified with the second situation, while in the family and the *jardins communautaires* most of them identified with the third situation (Fig. 1).

On a sub-sample of gardeners monitored, we showed that their own evaluation of their garden's contribution to their diet was highly consistent with the quantities of fruit and vegetables that they harvested (Pourias et al. 2015).

During interviews with the gardeners, debate surrounded their estimations of the economic benefits of the fruit and vegetables they produced. Those gardeners who considered that their garden was economically beneficial (14 gardeners out of the 30 interviewed), mentioned two strategies. First, they no longer bought fruit and vegetables and were satisfied with their own produce, even if it meant not having a variety of vegetables at certain times in the season:

> Oh no, I don't shop in supermarkets, we wait for it to grow and that's it. (Charlotte, gardener at the Bd de l'Hopital garden, Paris)

Second, the gardeners choose to produce the most expensive products themselves, and then buy the rest, that is, the cheaper products, in shops:

> I know that in winter vegetables are expensive… They're too expensive, so sometimes I sow only vegetables in the whole patch, spinach, chard… And that's like my stock for the winter. (Marie, gardener at the Basile-Patenaude garden)

However, over half of the gardeners interviewed considered that the garden was not economically advantageous. On the contrary, some gardeners considered that the vegetables produced at the garden ended up costing more than those bought in shops:

> We also garden to have fresh vegetables, but it turns out quite expensive. (Irene and Gilbert, gardener at garden St Cloud, Paris region)

It therefore seems the gardens' quantitative contribution is important for most of the gardeners, but that does not necessarily mean they think they are saving money. On this point, Weber showed gardeners' different opinions on the fact of saving or not by having a garden, and the difficulty of

Table 4 Mode of consumption and destination of the harvest (average part of the total harvest for each type of use, in %)

Position on gradient	Raw, at the garden	Raw, at home	Cooked at home	Preserved or stored	Number of respondants
1	15	76	9	3	4
2	7	45	39	9	28
3	10	29	44	19	51
4	7	24	35	38	13
5	2	35	35	28	2
Total	8	35	39	18	98

providing "objective" elements to settle this question (Weber 1998). Cérézuelle and Roustang (2010, p. 50) explain that the fact of having access to better quality products is in itself an economic advantage, but that gardeners mix it with "a qualitative dimension of pleasure [and therefore do not see] the economic aspect." Gojard and Weber (1995) reminds that gardeners do not calculate explicitly the cost and savings of gardening, while gardeners who produce high amounts of fruits and vegetables might not know the value of such products on the market. From a strictly monetary point of view, the statistics on expenditures related to gardening show that the amounts of money invested can be quite substantial. In France, gardening and pets ranked third in spending on culture and leisure in 2013, with €11,464 million spent (Insee 2013). These figures should however be treated with caution as they also concern private gardens, for which expenditures are probably far higher than for collective gardens. Despite these expenditures, a recent American study shows that the gains expected from a community garden are quite high, with a mean productivity of 15.19$/m^2 in 2010 (Smith and Harrington 2014).

Quality

Under the term "quality" we include several aspects of the garden produce, as described by the gardeners: taste, freshness, and sanitary characteristics. When the gardeners mention the taste of their produce, it is primarily by comparison with commercial produce, which is reputedly not as good, either because of the assumed modes of production of supermarket food, or because of the varieties chosen, or else simple because gardeners project the satisfaction of having produced their own home-grown fruit and vegetables. Three gardeners commented on the advantages of garden produce:

> It's much tastier when it comes from the garden. And then it's fresh as well, it wasn't picked a week ago and stuffed into boxes for the market… (Romain, gardener at garden George-Vanier, Montreal)

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> Everyone agrees that what they've grown themselves is tastier. Even if it's not better, in any case they'll think it's better (Maurice, gardener at garden Bd de l'Hôpital, Paris)

In terms of harvesting and preserving products, the gardeners' practices resemble those of market gardeners in short supply chains, which a study has already shown to yield tastier and more nutritious produce (Bressoud and Parès 2009). The practices involved in long supply chain commercialization, such as harvesting before maturity and the selection of fruit and vegetable varieties based on technical criteria (shelf life, size, firmness, resistance to transport conditions, etc.) rather than taste criteria tend to reduce the organoleptic quality of produce. By contrast, gardeners generally choose varieties for their organoleptic qualities and not for advantages in terms of conservation and firmness. They harvest produce at maturity and generally store it for short periods.

The percentage of the harvest preserved or stored for future use (generally in winter) increases with the contribution of the garden to gardeners' food supply (Table 4). On average, the major part of the harvest is eaten at home, raw or cooked immediately after harvest. Interestingly, the results of the questionnaire seem to show that when the plot supplies a low share of the gardeners' supply in fruits and vegetable, crops dedicated to be eaten raw (lettuce, tomatoes, herbs…) are favored; on the contrary, when the harvest represent a higher percentage of the food supply, the choice of crops orientates towards produce dedicated to be cooked or preserved (potatoes, squashes…). This also has to be considered in relation with the size of the plots: bigger plots provide higher amounts of vegetables, but also allow to plant crops that have a strong growth and occupy a larger area, such as potatoes and squashes.

From the same perspective, the sanitary quality of produce is often highlighted, as is the trust put in produce with a known origin, whose production processes are controlled.

> I trust what I grow more, because I know that I haven't added anything […]I tell myself, at least for a few months I eat slightly more organic! (Federica, gardener at garden George-Vanier, Montreal)

With a few rare exceptions, the observation of gardeners' practices showed that their cultivation techniques

approach organic farming requirements (no synthetic fertilizer, no chemical pesticides, etc.), which tends to legitimize their arguments about commercial vegetables.[4] The potential risks of contamination of the gardens' soil or air pollution were rarely mentioned, except by two Parisian gardeners whose plots were known to be polluted. In those two cases, the pollution generated contrasting attitudes: one of the gardeners had an essentially "experimental" approach on his plot, where he tested cultivation techniques and new varieties, with little concern for the yields. He nevertheless consumed what he produced. The second gardener whose plot was polluted had given up growing edible produce. Instead, he had left his land fallow or under grass, while waiting for more detailed results on the risks related to this contamination. In both cases we nevertheless see a modification of the functions attributed to the garden: one of the gardens became essentially experimental, while the other one was transformed into a green space used primarily for leisure activities. In Montreal, proven cases of soil pollution of *jardins communautaires* led to a vast operation of decontamination by the municipality a few years ago. Yet this event was seldom commented on by the gardeners, who tended not to talk about the issue of the potential impacts of the soil on their garden's produce.

Diversity

The wide range of plants that can be grown in gardens was mentioned with regard to both species and varieties:

> It's true that people sometimes plant lots of different things, not really to have a big quantity and all that, but to have diversity… (Monique, gardener at the Bd de l'Hôpital garden, Paris)

In the parcels that we studied, the number of species varied considerably from one gardener to the next. In the *jardins communautaires* in Montreal, the number of species ranged from 9 to 28, with an average of 21 per plot. In Paris, in the *jardins familiaux* and *the jardins partagés*, the number of species ranged from 9 to 36, and from 6 to 35 respectively, with averages respectively of 22 and 30 per plot.

Thus, while most gardeners seek to produce a diversified range of fruit and vegetables, some specialize in one type of crop or range of crops (e.g. "vegetables for ketchup and pesto": tomatoes, celery, basil, garlic; leafy vegetables and herbs; etc.). For six of the gardeners questioned, the gardens enabled them to grow vegetables that were difficult to find in shops:

> [The garden allows one to have] special varieties. We only have one food shop here in this neighborhood, there's a supermarket but it's the only one. [If you want special things], you have to go to the hypermarket which is far, and even then they don't have that much. (Ethan, gardener at the George-Vanier garden, Montreal)

In the gardens studied in Paris and Montreal, 12 gardeners were born in a different country. Eight of them mentioned that they regularly obtained seeds in their home country so that they could grow certain species, either because the seeds were not sold in their country of residence, or through attachment to their country of birth, of which the plant species concerned reminded them (Portuguese cabbage, Chow chow, Charentais melon, African spinach, etc.).

The diversity of garden produce, related to the gardeners' multi-cultural backgrounds, has already been highlighted by Duchemin et al. (2008), who examined the potential of *jardins communautaires* in Montreal to provide cultural communities with fruit and vegetables suited to their diet. A study in 1994 on gardens in New Orleans showed the extent to which exotic vegetables were produced in the Versailles neighborhood, the largest Vietnamese "enclave" in the USA. A wide diversity of vegetables and aromatic herbs was grown, enabling residents to maintain their traditional diets and thus reducing the effects of acculturation, especially for older people (Airriess and Clawson 1994).

For many gardeners, the diversity of crops also lies in the choice of varieties. For example, in the gardens of Montreal that we studied in 2013, we listed 25 different tomato varieties: Italian tomatoes (Roma, San Marzano), round tomatoes (Brandywine, Big Beef, Better Boy, Fantastique, etc.), colored tomatoes (Cosmonaut Volkov, Chocolate, Rose de Berne, White Wonder, etc.), cherry tomatoes (Sweet 100, Yellow Pear, Mathew White Cherry, etc.). The choice of varieties is based primarily on the tomatoes' expected destination: cooked as a sauce preserved for the winter, or consumed fresh in sandwiches. The same reasoning applied to other vegetables, especially in France in the case of potatoes, where the choice of varieties largely determined the possibilities of preserving the harvests, as Weber pointed out nearly two decades ago (Weber 1998).

This diversity of varieties cultivated is linked mainly to exchanges of plants and seeds between gardeners, which are organized more or less formally in most gardens. These exchanges enable gardeners to multiply the species and varieties grown. In the case of certain vegetables such as tomatoes, beans and lettuce, one frequently sees as many varieties as there are plants, especially on small plots where the gardeners

[4] Contrary to what has been found in other studies, such as that of J. Barrault, who showed that, in the context of private gardens, French gardeners are heavy consumers of chemical fertilizers and pesticides (Barrault 2009).

Table 5 Destination of garden produce (results of the questionnaire distributed to 127 gardeners in Paris and Montreal; 114 respondents)

Type of garden	Gardeners' close family	Friends and extended family	Other gardeners	Other	Food bank
Jardins communautaires	86.9 ± 23.7	9.4 ± 19	1 ± 3.6	4.5 ± 17.1	0
Jardins partagés	90.5 ± 8	6.1 ± 6.1	2.5 ± 3.8	1.7 ± 3.7	0
Jardins familiaux	79.9 ± 19.9	18.9 ± 14.7	9.7 ± 7.9	0	0

seek to have the widest diversity possible, despite the limited space. The fact of having several varieties of the same crop—by combining early varieties and later ones in the case of crops with long cycles, or summer and winter varieties in the case of crops with short cycles—enables gardeners to spread out their production over the season.

Sharing and giving

Even if most of the produce is intended for the gardener's close family, the possibility of being able to exchange and to give away products from the garden is often mentioned as a motivation:

> We produce too much we have to give away. My wife gives a lot to her hairdresser who makes her a rhubarb and chocolate cake! I give to my children and my grand-children, and of course to my garden neighbors, our acquaintances and those who ask! (Irène and Gilbert, gardener at garden St Cloud)

People who receive these gifts are primarily members of the extended family and, to a lesser extent, friends or colleagues, or the other gardeners of the same garden (Table 5).[5] In the latter case, the gifts may seem like exchanges, for frequently a gardener who gives a surplus lettuce to another gardener receives something from him or her later in the season, as Dubost (1997) pointed out. The gift of garden products to members of the family was frequently mentioned by people who didn't have children at home anymore: when children leave the family house, garden products allow maintaining a concrete link with them.

The questionnaire that we used provided for an answer "food bank", following discussions with officials from the municipality, who suggested that food banks may sometimes be the destination of gardeners' produce. However, none of the respondents ticked this box. Among the other destinations of garden produce, one of the Parisian gardeners, who worked in a restaurant, said he supplied the restaurant with Portuguese cabbage used to make *caldo verde*, the cabbage soup sometimes served there.

Even if gifts are often made when there is a surplus, a study undertaken in parallel (Pourias et al. 2015, p. 11 xx) shows that "the percentage of produce given away is not related to levels of production: gardeners who produce the largest quantities are not necessarily those who give the most, and vice versa." This tends to show that the ability to give a part of one's produce is in itself an expected function of the garden.

[5] The extended family is comprised of members of the family not living under the same roof as the gardener.

Other functions of gardens

Grouping together the verbatim by keywords enabled us to highlight eight of the gardens' main functions. Apart from the food function, we thus identified the following seven functions: social place, health, emancipation from urban life, contact with nature, leisure, learn and teach, and impact on city and landscape. These functions are close to those identified by Duchemin et al. (2008). We also find the four motivations proposed by Bouvier-Daclon and Sénécal (2001) in a survey distributed to Montreal community gardeners (leisure activity, food supply, possibility of meeting people, contact with nature). Yet some of the functions described in the literature were very seldom mentioned in our interviews with gardeners. For example, apart from some gardeners who mentioned educating the public that came to visit the garden, or the collective dimension of their project, the political aspects of urban gardening were hardly mentioned by gardeners—contrary to the findings of other studies (Legault 2010; Ohmer et al. 2009; Saldivar-Tanaka and Krasny 2003) where this aspect seemed to prevail. The potential economic benefits (financial benefits and youth employment) were not either mentioned by the gardeners questioned. In fact, the sale of fruit and vegetables is prohibited in all the gardens studied, and does not seem to be something that the gardeners want, even those who have large plots. These economic aspects seem to be far more important in certain North American projects described in the literature, which see *jardins communautaires* as collective enterprises serving as a driver of development and fostering community ties (Draper and Freedman 2010; Kaufman and Bailkey 2000).

The differences between the functions mentioned in the literature and those that we encountered are also explained by the scope of our study. We were solely interested in the gardeners' point of view, contrary to other studies that took municipal officials into consideration, which tended to bring to the fore the expected functions pertaining to urban development, for example (Wegmuller 2010).

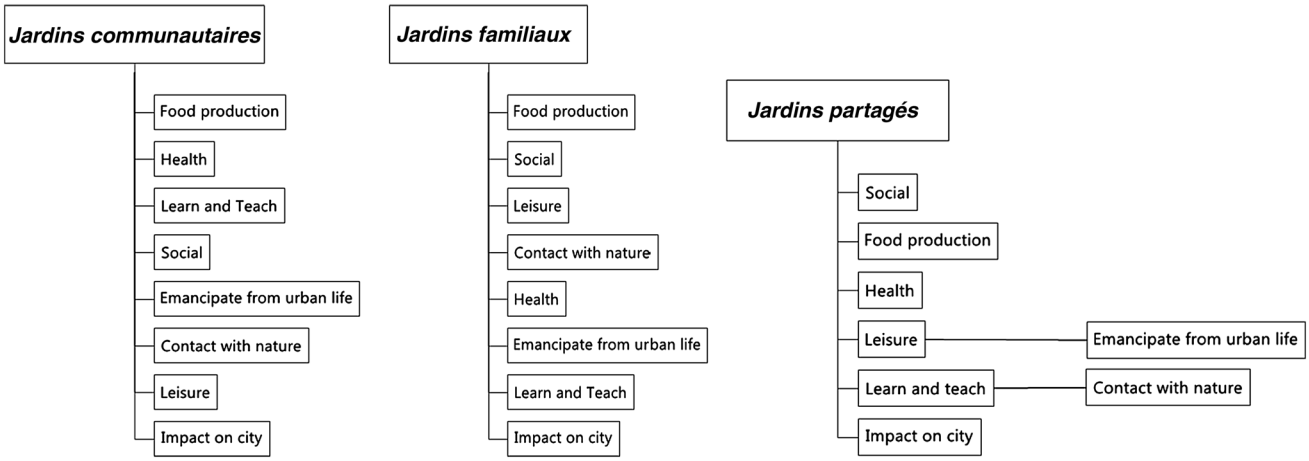

Fig. 2 The functions mentioned most by gardeners in each type of garden (number of gardeners who mention the function; decreasing order)

Irrespective of the functions mentioned, all the gardeners attribute several functions to the garden. 30 of the 39 gardeners interviewed mentioned three or more functions, while nine mentioned two functions. The weight attributed to each function may of course vary. Moreover, each function encompasses different practices and expectations, which we describe below. Depending on the type of garden, the weight of each function (all gardeners together) may vary. Even though the functions evoked vary greatly from one gardener to another, this hierarchy of functions is instructive, as it partly reflects the functions put forward by municipal programs or federations of associations, especially regarding the place of food function: in the *jardins partagés* of Paris, mostly affiliated to the Main Verte program, the social function is the first function evoked by gardeners, while in the *jardins communautaires* of Montreal and the *jardins familiaux* of the Parisian region, the food function comes first (Fig. 2).

Social space

Thirty-one of the 39 gardeners interviewed mentioned the garden's social function as a motivation to go to the garden, even if that was not their initial objective. This function seemed to be particularly important in Parisian gardens, where all the gardeners in *jardins partagés* and 13 gardeners out of 14 in *jardins familiaux* mentioned it. In the *jardins communautaires*, this function was mentioned by 7 out of 14 gardeners.

In their description of this function, the gardeners mentioned the garden as a place to meet and interact with people, which enabled some of them to nurture a feeling of belonging to a community.

> You need something or you realize that someone's not okay… Immediately the garden turns into a family. Like here, the woman's going to have her third child, but the other two are still small. So it's… I find it great actually, because if they've got trouble, you can help them weeding… (Louise, gardener at garden de Lorimier, Montreal)

When the garden is open to the public and situated in an area where there are many passers-by, as in a park or next to a road, interaction with passers-by is also common. We found this mainly in the case of Parisian *jardins partagés,* situated in parks. The garden is also open onto the private and family spheres: it is a reception place, an "open-air living room," to which friends and family are invited, especially in gardens with large plots partially shielded from view by hedges and fences. This is often the case in French *jardins familiaux*, where the gardeners arrange their own reception space. Here the link is obviously very strong with the "emancipation of the urban space" function, in so far as it contributes to investment in a new space and in making the garden an extension of the home.

Exchanging favors and advice with other gardeners provides some of them with recognition, which contributes to the sense of accomplishment described below:

> I even help the others, the lady there, it's me who mows her lawn, sometimes I do a bit of digging, and then in July/August I'm here to water when the others are on holiday. (René, gardener at garden Des Habitants, Paris)

The social function of the garden also extends beyond the garden, by way of the gifts of fruit and vegetables. These gifts are a function in their own right of the gardens, sometimes highlighted by the gardeners, as shown above. Thus, the garden produce is one of the vectors of social relations at the garden, as are collective leisure areas, when

they exist, and "compulsory" meeting points such as water supply points, the paths between plots, and shared tool sheds.

The various levels of the social function of urban collective gardens described above, are also mentioned in a recent study that provide recommendation to design gardens and urban farms and integrate them in the "social landscape of cities" (Poulsen and Spiker 2014).

Physical and mental health

The question of health, broadly speaking, was mentioned by 22 gardeners. This function ranked second in those mentioned by the Montreal gardeners, and third in those mentioned by gardeners at Parisian *jardins partagés.* In motivations concerning health, we can distinguish those concerning physical aspects (sports, nutrition) and those concerning psychological ones (feeling of accomplishment, place for remembering memories). Regarding physical health, gardening is often described as a sports activity, and physical work in the garden as a motivation:

> I work alone, I prune the trees, I climb to prune them, I dig, I've got a sore back, I'm exhausted when I go home, but the next day all I want to do is to carry on. In fact I haven't done any other sport since I've been gardening. (Dihia, gardener at garden St Cloud, Paris region)

The consumption of fruit and vegetables known to be healthier is also one of the "health" arguments mentioned by the gardeners. The gardeners also frequently mention a sense of accomplishment, which is more related to psychological health. They derive satisfaction from mastering a living cycle; there is the idea of getting even just a little closer to an ideal of self-sufficiency. This sense of accomplishment was mentioned by retired people and by people in activity, for different reasons: for retired people, the garden is a mean to continue a valued work, while for active people, especially those who work in offices, the manual work that the gardening activity requires provides a contrast with from their daily work. Cérézuelle and Roustang (2010, p. 54) see this feeling of accomplishment as contributing to the "symbolic construction of the self." From this point of view, the harvest is the final product and the reward for the work put into it, as one of the gardeners explained:

> So there's the pleasure of planting, of seeing it germinate, that it's growing, and then what a victory when, really, when one can harvest something. (Monique, gardener at garden Bd de l'Hôpital)

Apart from the harvest, which consecrates the gardener's work, the garden's appearance is an important reflection of the gardener's investment and "merit", as Weber (1996, p. 18) showed: "the garden […] has an ostentatious dimension: [the way in which it is] tended reflects the status of [its] owner, it makes it visible, it attests to it, including in his or her own eyes." The garden is also a place that enables gardeners to maintain memories through actual practices and certain specific products: memories of childhood, of people who have died or of a home country, related to specific practices and cultural choices.

Learn and teach

This function, which groups together both the learning and the teaching of new knowledge and know-how, was mentioned by 14 of the 39 gardeners interviewed. In the Montreal *jardins communautaires* in particular, this was the third most frequently mentioned function. In contrast, it was far less present in the motivations mentioned by the Parisian gardeners. Of the 39 gardeners interviewed, 8 were gardening for the first or second year, and had started without any prior experience in gardening. Three others had recently immigrated (less than 5 years previously) to France or Quebec. These gardeners had extensive experience in gardening but had acquired it in very different climatic contexts. Of these 11 "beginner" gardeners, five gardened in a *jardin communautaire* in Montreal, which can explain the greater importance attributed to this function in *jardins communautaires*. Most beginner gardeners mentioned the learning function, and the particular advantage of a collective garden to observe the other gardeners' practices and to talk to them.

Whether it is kindly or teasing, interaction with more experienced gardeners is a way of acquiring new knowledge; it helps to create what Cérézuelle and Roustang (2010, p. 54) call "an educational and social qualification." By acquiring new skills, consecrated by the harvest, gardeners find a place and legitimacy within the group of gardeners and beyond that, in the eyes of their family and friends.

> People have got lots of advice to give, and I've realized that it's me who's giving advice to the young ones now. It's a nice feeling! You give out information, and then you laugh because you see the beginners' mistakes. (Chantal, gardener at garde de Lorimier, Montreal)

For the individuals who learned to garden in other climates, chatting to other gardeners and watching them garden often helps them adjust their own practices, especially with regard to the calendar, that is, planting, harvesting and other dates. However, seeing these new arrivals' practices often intrigues the "old gardeners," who tease them or else admire them:

> We [often look at] the Portuguese's garden, diagonally across from ours. They already have plants… The cabbages are already planted, it really looks good. But you see, I find their garden magnificent, but I don't know how they manage to have so many… Because they don't turn over their soil, they don't hoe… They plant. (Louise, gardener at garden de Lorimier, Montreal)

The educational function, the passing on of knowledge, is mentioned mainly with regard to children. Children are a major incentive to participate in a collective garden, especially for people who have young children. In several cases, our interviewees mentioned the educational interest with regard to questions on their children's nutrition:

> We often shop at the supermarket, and my two-year-old son started to say "do tomatoes grow in trees?" or "I want the vegetable in the tin" – that's when we serve tomato sauce in a tin! So well, […] we decided to do something about it! And then also perhaps it will make him like vegetables a little more, so it won't be such a struggle with him! (Amina, gardener at garden George-Vanier, Montreal)

Finally, this educational function was also highlighted by gardeners who integrated a militant aspect into their gardening practice. In gardens open to the public or adjacent to a public space, these gardeners frequently devoted several hours a week to talking to passers-by, not only about their gardening practices but also about ecological issues in general.

Like Legault (2010), who analyzed gardens as a multidimensional educational project, we note here the various dimensions of their educational function: the acquisition of new know-how, the transmission of knowledge, social qualification, political and critical dimensions, etc.

Leisure

The garden in itself is of course a place of leisure, as well as a medium for other activities. Unlike other studies (Bouvier-Daclon and Sénécal 2001), we distinguish between the activity of gardening as such, and the garden as a medium for other leisure activities. Because of this distinction, and unlike Duchemin et al. (2008), we also discuss the "leisure" and "contact with nature" functions separately.

Sixteen of the 39 gardeners interviewed mentioned activities other than gardening as motivations: reading, picnicking and barbecues, fishing, playing bowls, etc. Regulations permitting, these activities can be carried out in collective spaces or on individual plots. In that case, the areas on individual plots reserved for such other uses are under grass or are artificialized, with specific equipment. In Quebec gardens there are no spaces devoted to leisure on garden plots, as the regulations prohibit this in the city's *jardins communautaires*. Collective leisure areas are nevertheless provided for in certain gardens. In Paris they are found mainly on large plots of over 100 m^2, better suited to equipment such as sheds, tables and chairs.

These garden characteristics enable us to partially explain why the gardeners of the Montreal *jardins communautaires* and, to a lesser extent, those of Paris *jardins partagés*, mentioned this function less often than did the gardeners of *jardins familiaux*. Note that when the gardeners were asked about the time that they spend weekly at the garden, most of their answers differentiated between the time spent actually gardening, that is, working the soil, planting, watering and harvesting, and the time spent in the garden without working, to talk to the other gardeners, read, or walk around.

Contact with nature

Sixteen of the 39 gardeners interviewed saw the garden as an opportunity to be in contact with nature. Nine of them lived in an apartment and the other seven lived in a house with a balcony or a small private garden. Interestingly, even for those who had a private garden, the collective garden offered something more. The tranquility of the place, its serenity, and the peace of mind associated with it were often mentioned as a strong motivation for going to the garden. It was even frequently likened to the countryside.

> I get here, there's nothing. There's no noise, there are no cars, nothing at all… Here we're in the countryside. The countryside in Paris! (Eduardo, gardener at garden pointe de l'Ile, region of Paris)

A recurrent theme concerns the fact of "breathing", both figuratively and literally. In Paris, the air at the garden is described as healthier, or different to the air in the city:

> The advantage of being here is that one gets a breath of fresh air (Francis, gardener at garden Bd de l'Hôpital, Paris)

Yet, far from a naïve vision of the garden that alone provides all the benefits of "the countryside in the city," the gardeners' descriptions highlight the ambiguity of this space "outside the city" yet completely included within it. Their discourse contains many elements that attest to a *mise en scène* of their garden as a natural space:

> There are some who say that there's the drawback of the highway but for me it's a river running. I say to

> them, just imagine that it's a river… Really, if you put your mind to it that's how you hear the river. (Dihia, gardener at garden St Cloud, Paris region)

In other respects, contact with "nature" at the garden is by no means a contemplative and idealized vision. It materializes mainly in the fact of touching the earth, which is often mentioned as a motivation in itself.

Note that in another study undertaken in 2001, contact with nature seemed to play an important role, since in a survey on 123 gardeners in five *jardins communautaires* in Montreal, 80 % of respondents considered that contact with nature was a very important reason for participating in the garden (Bouvier-Daclon and Sénécal 2001). This high score can partly be explained by the format of the questionnaire, in which the gardeners were asked to evaluate the relative importance of four motivations: contact with nature, recreation, food, and the possibility of meeting people. Other functions that we consider separately in the present study, such as emancipation from urban life, which play on the city/garden-nature contrast, may thus be found in this contact with nature function in the study by Bouvier-Daclon and Sénécal (2001).

Emancipation from urban life

In view of this description of the garden as a "space in nature," we decided to group together a set of keywords concerning daily life and the constraints of city life, under the heading "emancipation from urban life." For instance, a motivation mentioned by 17 gardeners was the fact of seeing the garden as a space where they could escape city life, either to be alone or to occupy a new space as an extension of their home, as a way of getting round a strong constraint of city life, especially in Paris: its density. Duchemin et al. (2010) have already emphasized the strong link between community gardening and the constraints related to city life. Barrault (2012) has likewise identified this function in his description of the "garden-sanctuary."

For certain gardeners and especially for people in activity, the garden constitutes a space in which one can withdraw from city life and its daily constraints. It is then described as a space of freedom, an antidote to the rat-race and even a place synonymous with holidays. By contrast, for others the garden is above all a new space to occupy, one that is complementary to life in the city. It replaces the holiday home or private garden that one does not have: "it's a consolation for not having a house with a garden" (*Margaux, gardener at garden Bd de l'Hôpital*). This view of the garden, coupled with the "reception" function described above, shows that for some gardeners the garden is "a fifth room in their apartment" (Roux 2009).

Impact on the city and on the landscape

The "impact on the city and on the landscape" function is a function in its own right that was not mentioned by the gardeners as one of their motives for joining a garden. Instead, it was one of the reasons for originally creating the garden. This function was mentioned only by the incumbent or chairperson(s) of the garden association or by members of the committee who had participated in the garden's creation. It is striking to note that the expected impact of gardens on the city was primarily mentioned in this study by people in contact with the authorities, who had the role of representing the gardeners in their dealings with these authorities, and therefore of ensuring that the garden survived. Yet most of the gardeners interviewed lived close to the garden: 30 of them lived less than a 20-min walk away, and 9 others lived 5–30 min away by car, bus or metro. The garden is thus truly a neighborhood space and the people who use it are mostly residents of the neighborhood. Yet it seems the function of urban development or embellishment is not a motivation in the daily practice of gardening, which does not mean that gardeners do not see it as a positive effect. It seems however to be considered more as a side-effect than as the driver of their participation in the garden.

Conclusion

Far from wanting to dissociate the different functions of the gardens from one another, in this study we set out to highlight their complementarity. When the gardeners were questioned on their motivations for participating in the garden, all gave several answers, clearly illustrating the multifunctionality of the gardens, even on an individual scale. This attests to the fact that they are far more than just a place of production. Even if their harvests have an expected benefit and are an important motivation for the gardeners, the gardens have many other functions, without which the gardeners would perhaps not participate.

We thus clearly see the "vital" value for the gardens of allowing multifunctionality to be expressed, in both municipal regulations and the planning of the gardens. The creation of collective spaces devoted to uses other than gardening, as is already the case in certain gardens, provides a leisure space as well as facilitating the social interaction that gardeners expect. Yet we also see the gardens' "domestic" function, as Gojard and Weber (1995) put it: gardens need privacy as a guarantee of the "contact with nature" that the gardeners expect, and for family uses of gardens. A balance between private sphere and collective sphere, individual plots and collective plots with openness onto the public space is difficult to find in a garden. In fact, the fear of

a "privatization of the public space" was initially an impediment to the *Main Verte* program in Paris. A possible solution to solve this debate, and one which is often implemented in the Parisian *jardins partagés*, is not only to combine individual spaces (plots) and collective spaces (plots, sheds, meeting places, lawns, etc.), but also to foster relations with the non-gardening public, which can be in the form of an opening onto the street, a path for walking through the gardens, or "open days" organized occasionally to introduce gardening to the uninitiated. Some projects go even further, by totally integrating the gardens into urban parks, and by combining gardening, professional vegetable farming, open orchards, breeding of small animals, and other facilities such as children's playgrounds or sports fields. A catalogue of this type of space is available via the Carrot City project, which explores possible relations between urban design and food systems, and the ways in which the new "food-related" developments can contribute to changing perceptions of the city (Gorgolewski et al. 2011). In any case, consultations with the group of inhabitants concerned by a garden project are an essential step before the creation of the garden. The functions mentioned in this article can serve as a guide for people interested in knowing the advantages of collective gardens in urban environments. However, depending on the context, some functions may be more important or sought-after than others, and only consultations with the local inhabitants can produce a relevant project likely to ensure the gardeners' adhesion.

Within this multifunctionality we would like to draw attention to the key role of the food function. In this study, from our initial goal of illustrating the weight of the food function among the other functions assigned to their garden by gardeners, we moved to consider food function as a central function that support other functions of the garden and is closely interacting with most of the motivations and expectations of gardeners. Food production is the motivation most often mentioned by the gardeners questioned, from both a qualitative and a quantitative point of view. It moreover participates in other functions of the garden: for instance, harvests contribute to the sense of accomplishment mentioned by certain gardeners; the "health" function is strengthened by the quality and diversity of the garden produce described by the gardeners; and the social function, which as we have seen is one of gardeners' main motivations, is based on the exchange of both knowledge and produce. Apart from its intrinsic qualities and the qualitative and quantitative contribution that it can represent, the garden produce is also a means of fostering the social link between gardeners of the garden and with other gardeners who may be friends or family.

This central role of food production, attested by gardeners' testimonies, shows the importance of understanding the complexity of gardens' food function, without limiting it to a quantitative contribution alone and by considering, on the contrary, the qualitative value of garden produce and the links that it maintains with multiple other functions of gardens.

From this point of view, Duchemin et al. (2010) noted that there can be a gap between municipal programs or the agencies promoting gardens, on the one hand, and gardeners' expectations, on the other. In this study, we observe that the functions assigned to a garden by local authorities or managing organizations can influence the functions assigned to their gardens by gardeners, through a number of constraints that range from the initial design of the garden to laws and regulations that govern life in the garden. These constraints would be an interesting research topic for future investigations. Similarly, we observe that the demands of gardeners can also influence the view of municipal authorities: in Paris, where the *Programme Main Verte* of the City of Paris initially discouraged fruit and vegetable production, a slight reorientation in the functions assigned to the *jardins partagés* by the City is described by Dubost in the preface of a book published recently on the "recipes of Parisian *jardins partagés*" and supported by the City of Paris, in these terms: "10 years ago, when the adventure began, the pioneers didn't think about it. For them, these pieces of gardens in the city were for the pleasure of finding land and water, being outdoor, meeting people. But barely set in their plot, the desire to plant tomatoes and lettuces, sages and raspberry bushes came to all of them" (Collective 2014, p. 8). To conclude and following this example, we argue that the central role of the food function, which makes gardens unique compared to other urban facilities, must be taken into account when a garden is created, and in planning a municipal gardening program.

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Appendix

See Table 6.

Table 6 Summary of sites studied

City	Type of garden	Garden name	Total size (m^2)	Number of plots	Type of plots	Mean size of plots (m^2)	Location	Municipal program	Federation of associations	Common resources	Management of collective areas
Paris and Parisian region	*Jardins familiaux*	Bd de l'hôpital	5600	26	Individual	28	Paris, 13th *arrondissement;* at the foot of social housing buildings	Yes (Main Verte)	Yes (FNJFC)	Garden shed, tools, water supply, leisure patch, compost	City employees
		Jardin de l'AJOAC	53 000	290	Individual	200	St-Cloud (92); in a public park	No	Yes (FNJFC)	Water supply, shop inside the garden for inputs (choice is gardener's to buy or not)	Each gardener tends the paths around his or her plot
		Jardin de la Pointe de l'Ile	3500	15	Individual	220	Les Moulineaux (92) on an artificial extension of an island	No	No	–	Each gardener tends the paths around his or her plot
	Jardins partagés	Jardin des Bordes	35 000	51	Individual	150	Chennevière-sur-Marne (94); in a nature reserve	No	No	Garden shed, tools, water supply, leisure patch (some plots), compost	Collective chores
		ECOBOX	200	25	Individual	4	Paris, 18th *arrondissement,* on a parking lot, entirely in containers	Yes (*Main Verte*)	No	Garden shed, tools, water supply, leisure patch, fruit trees	Informal, some gardeners take care of collective spaces
		Jardin aux habitants	500	13	Individual	22	Paris (16th *arrondissement),* on a street; created in 2001 by an artist, Robert Milin.	No	No	Garden shed, tools, water supply	Informal, some gardeners take care of collective spaces
		Le Sens de l'Humus	500	1	Collective	500	Montreuil (93), located on the heritage site of the "Murs à Pêches," a former site of fruit production	Yes (*On sème à Montreuil*)	No	Plot, garden shed, tools, water supply, inputs (fertilizers), leisure patch	Collective chores
		Perlimpinpin	170	20	Individual	5	Paris (17th *arrondissement),* in a public park	Yes (*Main Verte*)	No	Garden shed, tools, water supply	Collective chores
Montreal	*Jardins communautaires*	Basile-Patenaude	2000	76	Individual	18	District Rosemont Petite-Patrie	Yes	No	Garden shed, tools, water supply, inputs (fertilizers), leisure patch	Collective chores
		George-Vanier	1950	64	Individual	18	District Ville-Marie	Yes	No	Garden shed, tools, water supply, inputs (city compost), leisure patch	Collective chores
		Lorimier	5257	120	Individual	18	District Plateau-Mont Royal	Yes	No	Garden shed, tools, water supply, inputs (city compost), small fruits	Collective chores
		Pointe-Verte	1000	51	Individual	15	District Pointe St Charles	Yes	No	Garden shed, tools, water supply, inputs (city compost), leisure patch	Collective chores

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