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Community gardens: contribution to food safety and social inclusion

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ABSTRACT
Sustainability in large-scale food production is one of humanity's greatest contemporary challenges. Today's society is totally dependent on agricultural fields. In face of the increasing environmental and food crisis in the world, it is necessary to improve ways of promote sustainable agriculture. Conventional agriculture has proved to be predatory to the environment and maleficent to human health due to the intensive use of agrochemicals, and also inefficient to supply with quality and safety the whole urban population. Therefore, urban agroecology has become a tendency. The study presented here investigated a community garden of the West Zone of São Paulo City, organically grown in the Previdência Municipal Park, which is an intensely urbanized area. Observations were carried out in loco, plus interviews with the responsible for the community garden, and compilation of relevant literature, focusing on the importance of horticulture, practical difficulties in the community involved in the project, benefits to society, and the role in urban sustainability. Horticulturists' social aspects, involvement of the regulars, and adopted cultivation techniques were also investigated. The challenges of urban agriculture projects reported in the literature were identified, so as to define the best cultivation strategies to be adopted in the community garden. The main results pointed to benefits to food and nutrition safety, interpersonal involvement, and environmental education; the main challenges consist of social leaderships, technical-scientific knowledge regarding productivity of organic cultivars, and planning aiming the continuity of the projects. Relevant benefits can be obtained from the implementation of urban garden projects, contemplating some of the Objectives of Sustainable Development that are related not only to sustainable agriculture, but also to the sustainability of cities and communities.
KEYWORDS: Urban Agriculture. Food Safety. Urban Parks. Sustainability.

1 INTRODUCTION

In view of the contemporary environmental and social problems imposed to urban environment, the application and improvement of sustainable agroecological practices is indispensable (THEODORO et al., 2009). As a matter of fact, the field-city relationship has caused losses, when examined under an environmental, economic and social perspective, contradicting the sustainability precepts (EHLERS, 2017) and consequently causing ecosystem imbalances.

Pesticides negatively impact not only nature, but also cause problems to the health of both productors and consumers. Brazil is one the major pesticide consumers of the world (GONÇALVES et al., 2019). It is worth mentioning that there is no evidence that the use of pesticides increase productivity in tropical regions. Organic agriculture can be as productive or even better than conventional agriculture, with the advantage of causing no risks to nature or human health (PASCHOAL, 2015).

Ribeiro et al. (2015) point out that organic horticulture in urban environments can bring benefits to individual and social health, besides promoting a positive connection between people and the environment. The Food and Agriculture Organization of the United Nations (UN-FAO, 2018) proposes family agriculture as a solution to eradicate hunger and to improve the production of safe food. Despite a promising solution, agroforests cannot shorten the distance between food and consumer: it is necessary that the time spent of food transportation be the least possible (MEDEIROS, 2014).

Urban gardens are options for the betterment of the quality of life in the cities and food safety (PESSOA et al., 2006; AGENDA, 2030) – besides being green spaces, they are well designed and well used. The implementation of such gardens plays an important role in urban sustainability, aggregating educational and nutritional values and improving the well-being of the population involved in such projects. However, challenges rise when planning these gardens so as to make them productive, functional and ever-lasting. The engagement of the population is crucial to attract public policies to put plans into practice, social leaderships to organize and manage the projects, and to adapt cultivation practices to agroecological concepts, with proper methods and equipment.

Among the challenges for the development of urban community gardens, there is the space for these practices and the interest of the local community to cultivate. There are 109 municipal parks in São Paulo City, one of the biggest cities of the world – a community garden was identified in one of these green spaces. The Previdência Park not only represents a successful plan, but also the population's initiative to find

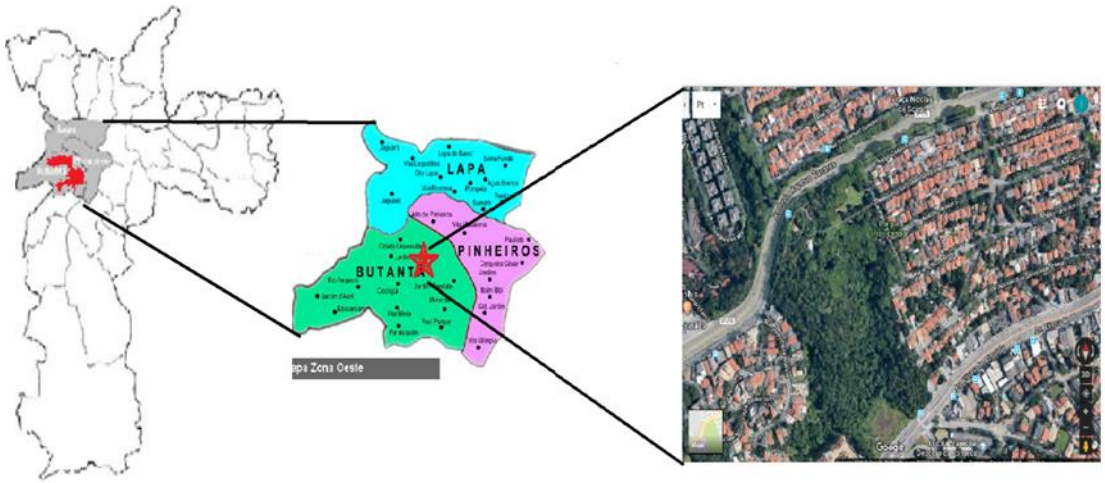
sustainable and agroecological solutions for the urban environment. The present study reports the cultivation practices in this urban public space, identifying both the importance and the challenges of a community garden. This study investigates the agricultural practices in the Previdência Park community garden, specifically the activities of the garden horticulturists. The questions prepared for the research aim at the understanding of the benefits and difficulties of the implementation of such community garden, initiative that certainly contributes to the sustainability in big.

2 MATERIALS AND METHODS

2.1 The study area

The Previdência Municipal Park is located in the West Zone of São Paulo City, in the Previdência Neighborhood, at Pedro Peccinini Street 88. It is 91,500 m² in area and was founded on September 21st, 1979 (SÃO PAULO, 2010; PREVIDÊNCIA PARK, 2012). Figure 1 and 2, shows the location of the Previdência Park in São Paulo City (State of São Paulo).

Figure 1 – Location of the Previdência Park in São Paulo City, State of São Paulo.



Source: Modified after Google Maps; Google Earth, 2018.

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Figure 2 – The entrance of the Previdência Park

Source: Author, 2018.

2.2 Methods used in the investigation

Weekly visits were made to the Previdência Park community garden along the month of August, 2018, in order to gather information on the seedling beds, disposition and identification of the plants. The characteristics of the plants cultivated in the beds and the presence of pests and diseases were reported, as well as the irrigation system adopted to water the plants. The data were recorded in notebooks and photos, following the methodology proposed by Prela-Pantano *et al*. (2009) and Medeiros (2014).

Besides the observations on the cultivars, the person responsible for the Previdência Park garden was interviewed on 22nd August, 2018. The interview was recorded and authorized by the volunteer. A guide based on Prela-Pantano *et al*. (2009) and Medeiros (2014) aided the organization of the questions. From the answers given by the responsible for the garden, other questions about the garden and the horticulturists were prepared during the interview.

The guide for the interview (Chart 1) contained questions concerning the profile of the project leader; activity, profile and engagement of the volunteers; practical aspects, as possible problems found in the cultivars and techniques used; whether the garden follows agroecological concepts; and the social context of the project.

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Chart 1 – Guide used in the interview and information provided by the investigation

QUESTIONS	INTEND TO INVESTIGATE
Name	**Profile of the leader of the project**
Age	
Education	
Sex	
QUESTIONS	**INTEND TO INVESTIGATE**
How long has the garden been operating?	**Volunteers' activities, profiles and engagement**
Have you had or worked in other gardens before?	
How many people work in the garden?	
How old are they?	
Which are the days and working hours of the garden?	
What plants are cultivated in the garden?	**Practical aspects of the garden: Possible problems found in the cultivars and technologies used in cultivation**
Where are the plants bought? Are they seedlings or seeds?	
Is irrigation used? If yes, what type?	
How many times is the garden watered? For how long?	
Where does the water for irrigation come from?	
Has the water been analyzed?	
Do you have assistance from an agricultural technician or agronomist?	
Is compost used in seedling beds?	
What is the type of compost used?	**Whether the garden qualifies in the agroecological concepts**
Which is the compost incorporation timing?	
Are fertilizers used in seedling beds?	
What is type of fertilizer used?	
Which is the fertilizer incorporation timing?	
Is the soil analyzed before compost incorporation?	
Do you use pesticides?	
Are there pests (insects) in the garden? If yes, which ones?	
What do you do to avoid insect infestation?	
Are there any diseases? If yes, which ones?	
How do you prevent plant diseases?	
How do you control weeds?	
Do you use shovel or chemicals?	
Is the garden registered in the municipality?	**Social context of the project**
Do you wear personal protective equipment?	
How much water does the garden use a month?	
What is the destination of the vegetables produced in the garden?	

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2.3 Analysis of the results

The data obtained in this study were analyzed via flowcharts and Microsoft Excel worksheets (SANTOS *et al.,* 2014; RÉGIS, 2016). The data include the results of cultivation practices adopted in the garden located inside the Previdência Park; contributions to society, and observations regarding the difficulties found in the horticulture and possible solutions. Regarding the interview with the responsible for the garden, the content analysis method was applied to the answers (MATTOS *et al*., 2011; RÉGIS, 2016).

3 RESULTS AND DISCUSSION

3.1 The Previdência Park community garden

The plants are cultivated in three parallel beds, one of 16 m^2 in area (16 x 1), and the other two of 22 m^2 in area each (11 x 2), totalizing 60 m^2 of soil. The beds are limited by wood chops disposed in rows, forming rectangles around each bed (Figure 3). The irrigation system consists of a plastic hose with small holes; water drops continuously through the holes. The hose extends along the beds. Water is provided by the public supply system; water consumption is not controlled and the water has not been analyzed.

Figure 3 – Infrastructure of the beds of the Previdência Park community garden, São Paulo City.

Source: Author, 2018.

No composter is available in the Previdência Park. The volunteers store the burlap in a deposit (Figure 4a), and wait until organic matter is naturally decomposed, without any control of variables, i.e. oxygen, temperature, pressure, or mixtures made with other products to improve the efficiency of the compost. Despite the neighborhood residents dispose domestic organic waste in bins (Figure 4b), this waste is not used as soil nutrient.

Figure 4 – A. Burlap deposit and B. bins for organic waste disposal in the Previdência Park (researcher's archive, August 22nd, 2018).

Source: Author, 2018.

It was necessary to identify the characteristics of the Previdência Park garden infrastructure because, according to Branco and Alcântara (2011), garden projects should provide space enough to include technical procedures such as green composting, thus reducing the dependence on external inputs and increasing the producers' autonomy. Besides, the spaces for horticulture should be agronomic planned and managed, so that to guarantee proper maintenance and environmental sustainability, by preventing degradation to occur in these spaces. On the other hand, Branco and Alcântara (2011) affirm that the success of such projects depends much more on the communal organization than on the technology available.

3.2 Horticulturists' profile and voluntary engagement

The first questions presented to the responsible of the Previdência Park garden helped elaborate the interviewee's profile. She has been one of the leaders of the project from the beginning and integrates the group of counselors of the Previdência Park. Living in the Previdência neighborhood and a long-time regular, she behaves in an engaged way and in agreement with the local citizens' functions. She is 41 years old, is a Biology graduate and post-graduated in Environmental Licensing.

She reported that the garden was created approximately the year before, when neighborhood residents met to decide about the structure of the garden. The profile of the volunteers was further investigated. The answers revealed that as the implementation of the garden started, a group of 20 people, including children, adults and elderly people helped organized a task force in the neighborhood. Among the volunteers, park scouts included children, adults and elderly people of all sexes. At present, however, only five people, from 35 to 45 years old, are active maintaining the task force. The interviewee complains about the difficulty in engaging younger people.

On the other hand, the other horticulturists have taken a positive attitude, empowering the public space, engaging the neighborhood residents and the Park regulars, so as to make the community garden viable. In this context, Melo (2010) states that the implementation of community gardens, where the residents themselves work in groups, promotes the ample health of the neighboring population, involving educational, environmental and social aspects, besides allowing solidarity bonds among the participants, promoting food safety, via the production of quality food, and economic benefits, as the products can be used for own consumption or be commercialized.

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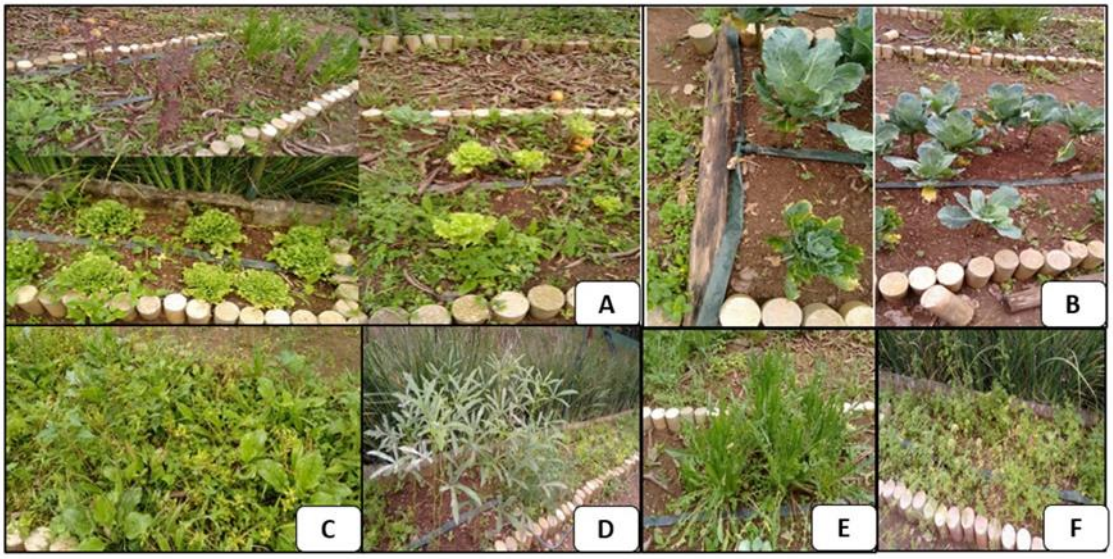
3.3 Cultivation practices

Once the horticulturists' profile and their organization as a community was investigated, the interview advanced into the horticulture practical aspects. A volunteer was asked about the species cultivated in the garden; she admitted she did not know the scientific names of the plants. Thus, the identification was carried out by the researcher, taking into account personal observations and the comparison of the popular names of the plants given by the interviewee with those listed in the EMBRAPA portal (*Empresa Brasileira de Pesquisa Agropecuária*), which is a public research institution linked to MAPA (*Ministério da Agricultura, Pecuária e Abastecimento do Brasil*).

Among the species listed by the horticulturist, the following are highlighted: purple, butterhead and crisphead lettuce (*Lactuca sativa* variations*)*; cabbage, cauliflower, and broccoli (*Brassica oleracea* variations); spinach *(Spinacia oleracea)*, and arugula *(Eruca vesicaria);* bean (*Phaseolus vulgaris);* chicory and radicchio *(Cichorium intybus* variations*)*; and spices – parsley *(Petroselinum crispum),* chives *(Allium schoenoprasum),* and cilantro (*Coriandrum sativum*) (EMBRAPA, 2018). All the cultivars are organized in three rows of rectangular beds, separated approximately 30 cm from one another. Figure 5 illustrates some species cultivated in the Previdência Park garden.

The species cultivated in the Previdência Park garden were bought as seedlings, purchased by one of the volunteers from a private nursery. According to the responsible for the garden, the volunteers plan to follow the cycle of life of the plants to endure cultivation by means of plant reproduction: "*we collected the lettuce and chives seeds to try to propagate and see if it would work*". Regarding the production of seedlings, Aquino and Assis (2007) observed that the use of alternative substrates is fundamental for establishing the organic systems in urban areas on the basis of agroecology – as a matter of fact, these systems are low-cost and practical.

Figure 5 – Species cultivated in the Previdência Park garden: a. lettuce; b. cabbage, cauliflower and broccoli; c. spinach and arugula; d. bean; e. chicory; f. parsley and cilantro.



Source: Author, 2018.

The data regarding the Previdência Park horticulture suggest that it in part respects agroecological concepts. The cultures are changed according to space and time of the year, even if rotation is not well planned, as adaptation of the species to soil, climate, and seasonality are not fully taken into account. The rotation of cultivars is necessary to maintain the soil minimally healthy.

In this context, Chart 2 illustrated the relationship between the Previdência Park garden practices with the agroecological concepts collated from the literature (AQUINO and ASSIS, 2007). In order for the Previdência Park horticulture to be considered organic, the answer to the first five topics in Chart 2 should be "no". The other topics deal with the productivity optimization respecting agroecological practices, and therefore the more the "yes" answers, the more efficient the cultivation.

Considering the data presented in Chart 2, the Previdência Park garden qualifies as organic, because industrial agrochemicals are not used and transgenics are not cultivated. However, should agroecological concepts shown in literature be followed, such as: the proper choice of cultivars in respect to climate, time of the year, and the interaction of these factors; nutrient recycling and green composting via composting so as to recycle organic waste, and biologic control to mitigate herbivory reported in the interview, the Previdência Park garden would be much more productive and efficient.

Chart 2 – Criteria that qualify the Previdência Park garden in the agroecological concepts

IS THE CULTIVARS QUALIFIED AS ORGANIC?	YES	NO
1. Is pesticide used?		X
2. Is fertilizer used?		X
3. Are growth regulators used?		X
4. Is any type of synthetic chemical used?		X
5. Are transgenics cultivated?		X
AGROECOLOGICAL TECHNIQUES		
6. Use of dead organic matter	X	
7. Use of animal compost and biofertilizers		X
8. Reuse of organic waste		X
9. Cultivars selected according to the time of the year		X
10. Control of microorganisms in the soil		X
11. Diversification and intercropping of cultivars	X	
12. Non-polluting alternative pesticides		X
13. Green compost		X
14. Rotation and integration of cultivars		X
15. Project functional to the urban ecosystem		X
16. Control of physical-chemical conditions of the soil		X
17. Biological control of pests and phytopathogens		X
18. Living mulch to improve soil		X

Source: Author, 2018.

Chart 3 lists the specific problems of the Previdência Park garden and presents solutions based on the literature. Among them, the insertion of playful activities to children, the analysis of environmental resources involved in cultivation, such as soil and water, are highlighted, besides the minimization of waste and better planning and management.

Chart 3 – List of problems found in the Previdência Park community garden and suggestions to solve them.

PROBLEMS	SUGGESTED SOLUTIONS
Difficulty in rising children's interest	Propose playful activities in the garden
Inefficient irrigation and irrational use of water	Efficient methods with no waste of water
Bad planning	Logistical support
Few volunteers	Publicize the project
Lack of social leaderships	Social mobilization
Poor technical-scientific knowledge	Experts' support
No composters	Provide basic infrastructure
No continuity	Proper planning and managing
No organic waste recycling	Provide logistics for composting
No control on food safety	Water and soil analysis
No periodical composting	Create a composting schedule
No criteria of cultivar selection	Plan which species and time of the year to cultivate them
Lack of techniques to fight pests and diseases	Select biological control and pesticides
Horticulturists' disorganization	Planning
Organic productivity optimization	Follow agroecological concepts

Source: Author, 2018.

3.4 Contributions and difficulties of urban agriculture in the sustainability of the cities

The study of the Previdência Park garden indicates that from the social point of view the garden offers benefits to the citizens regarding the contact with nature, interpersonal relationships, and the offer of fresh and healthy food; moreover, the project can evolve regarding environmental education, attraction of youngsters, and planning. From the environmental point of view, the garden is without any doubt beneficial regarding landscape effects and food production without degrading the environment. It would be better if organic waste produced by the neighboring population were recycled and the agroecological concepts be integrally respected.

Regarding long-term participatory urban planning and leaderships, Medeiros (2014) suggests ways to implement communal urban gardens, considering planning and design in steps, such as: create ideas; build social capital; define the space; search for partnerships; raise funds; plan, project and build the garden, and provide maintenance. The first steps work well in the Previdência Park garden, but the long-term maintenance has been inadequate.

Chart 4 lists the main challenges found in the implementation of urban communal organic gardens, naming strong and weak points, which represent the difficulties that put in risk the execution and continuity of such projects. These difficulties, on the other hand, can be viewed as opportunities for these enterprises to play a better role in the society, tracing guidelines that contribute to their success and sustainability of the cities.

If well planned, the projects shall stress the strong points regarding the role of urban gardens in society, so as to improve planning leading to the success of the urban gardens and examination of the weak points that put their implementation and success to risk.

Chart 4 – The role of urban agriculture in the sustainability of the cities: contributions and challenges.

	CONTRIBUTIONS	CHALLENGES
Role of the urban agriculture in the sustainability of the cities.	Involvement of the community	Social leaderships
	Environmental education	Lack of children's interest
	Disseminate organic agriculture	Apathy of the population
	Support sustainable projects	Lack of incentive
	Agroecological practices	Misinformation
	Food safety	No soil and water analysis
	Destiny of the organic waste	Inoperative logistics
	Urban ecological mobilization	Short-term thinking
	Participative urban projects	Lack of initiative
	Minimal impact to the environment	No interest
	Urbanistic factor	Bad planning
	Food for the population	Social disorganization
	Urban ecosystem integration	Alienation and stress
	Functional green area	Underutilized spaces
	Sustainable agroecology	Inverted priorities
	Biodiversity	Inadequate choice of cultivars
	Self-sufficient cities	Third-party interests
	Continuity of the projects	Recruiting of volunteers
	Environmental conscientization	Inform and mobilize
	Technical-scientific knowledge	Experts' support
	Change of habits	Teach and motivate
	Make cultivation productive	Efficient methods
	Participatory planning	Urbanistic perspective
	Make cultivation profitable	Optimize productivity
	Attract youngsters	Propose children recreation
	Technical support	Partnerships
	Voluntary engagement	Publicize and attract people
	Composting	Optimize nutrient recycling
	Disseminate organic agriculture	Agroecological support
	Proper soil handling	Agroecology
	Biological control	Academic support

Source: Author, 2018.

4 CONCLUSION

The Previdência Park community garden is a model of urban garden inside a municipal park in São Paulo City, which is managed by the community. It shows that agroecological practices bring benefits, such as communal initiatives and leaderships that can be divulged to other public sites in order to contribute to the city's sustainable development.

We conclude that the "key point" to the success of community gardens in urban areas is planning and long-term social motivation, as well as publicizing the project to involve the population. The example of the Previdência Park community garden indicates not only points of success that can be replicated, but also aspects to be improved and that can serve as parameters. The involvement of children and the elderly has been one of the challenges.

The results point to relevant benefits regarding the implementation of urban garden projects, which contemplate some of the Objectives of Sustainable Development, related to both sustainable agriculture and sustainable cities and communities. It is attested that the implementation of urban gardens plays a positive role in urban sustainability, improving the global population's well-being and encompassing economic, social and environmental factors.

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