REVISTA GESTÃO & SUSTENTABILIDADE AMBIENTAL ISNN 2238-8753 unisul ecossistema ânima

JARDINS URBANOS: SAÚDE HUMANA, TERAPIA E SUSTENTABILIDADE

HUERTOS URBANOS: SALUD HUMANA, TERAPIA Y SOSTENIBILIDAD

URBAN GARDENS: HUMAN HEALTH, THERAPY AND SUSTAINABILITY

Marc François Richter[1]; Andreia de Bem Machado[2]; Angela Guimarães[3].

1. Professor do Programa de Pós-Graduação em Ambiente e Sustentabilidade (PPGAS) – Universidade Estadual do Rio Grande do Sul (Uergs), São Francisco de Paula/RS
2. Pós-doutoranda em Engenharia e Gestão do Conhecimento (PPGEGC) – Universidade Federal de Santa Catarina (UFSC), Florianopolis/SC
3. Responsável pelo Departamento de Sustentabilidade, Fortgreen S/A, Paiçandu/PR

PALAVRAS-CHAVE
Hortas comunitárias; Terapia; Sustentabilidade; Saúde humana; Bem-estar.

PALABRAS CLAVE
Jardines comunitarios; Terapia; Sostenibilidad; Salud humana; Bienestar.

KEY WORDS
Community gardens; Therapy; Sustainability; Human health; Well-being.

RESUMO
Jardins urbanos transformam o meio ambiente, são capazes de restabelecer a biodiversidade, proporcionam mais qualidade de vida para os cidadãos. Hortas urbanas são elementos importantes que levam à sustentabilidade urbana, sendo benéficas para a saúde humana. Assim, o objetivo deste artigo é analisar os benefícios das hortas urbanas através de terapias de saúde humana na promoção da sustentabilidade. Para este fim, foi realizada uma análise bibliométrica a partir de uma pesquisa sistemática no banco de dados Scopus. Foi identificado que a pesquisa surge nos seguintes campos de conhecimento: Ciências Agrárias e Biológicas, Ciências Ambientais, Artes e Humanidades, Engenharia, Medicina, Ciências Sociais e Veterinária. Os resultados do presente trabalho indicam que esta área ainda carece de estudos mais detalhados, mas, ao mesmo tempo, existem muitos benefícios terapêuticos dos jardins urbanos em relação à qualidade de vida das pessoas de todas as idades, sejam elas idosas, deficientes ou com distúrbios psicológicos.

RESUMEN
Los huertos urbanos transforman el entorno, son capaces de restaurar la biodiversidad y proporcionan más calidad de vida a los ciudadanos. Los huertos urbanos son elementos importantes que conducen a la sostenibilidad urbana, siendo beneficiosos para la salud humana. Por ello, el objetivo de este trabajo es analizar los beneficios de los huertos urbanos a través de las terapias de salud humana en la promoción de la sostenibilidad. Para ello, se realizó un análisis bibliométrico a

partir de una búsqueda sistemática en la base de datos Scopus. Se identificó que la investigación surge en los siguientes campos del conocimiento: Ciencias Agrícolas y Biológicas, Ciencias Ambientales, Artes y Humanidades, Ingeniería, Medicina, Ciencias Sociales y Ciencias Veterinarias. Los resultados del presente trabajo indican que este ámbito aún carece de estudios más detallados, pero, al mismo tiempo, son muchos los beneficios terapéuticos de los huertos urbanos en relación con la calidad de vida de personas de todas las edades, ya sean mayores, discapacitadas o con trastornos psicológicos.

ABSTRACT

English version of abstract in font italics Urban gardens transform the environment, are able to restore biodiversity, provide more quality of life for citizens. Urban gardens are important elements that lead to urban sustainability, being beneficial to human health. Thus, the aim of this paper is to analyse the benefits of urban gardens through human health therapies in promoting sustainability. For this purpose, a bibliometric analysis was conducted from a systematic search in the Scopus database. It was identified that research arises in the following fields of knowledge: Agricultural and Biological Sciences, Environmental Sciences, Arts and Humanities, Engineering, Medicine, Social Sciences and Veterinary Sciences. The results of the present work indicate that this area still lacks more detailed studies, but, at the same time, there are many therapeutic benefits of urban gardens in relation to the quality of life of people of all ages, whether elderly, disabled or with psychological disorders.

1 INTRODUCTION

Moments in natural outdoor spaces have physiological and psychological benefits, such as reducing stress responses and improving mood. Mental health experts have begun to exploit nature's therapeutic effect by defying tradition and bringing conversations outside. This type of therapy generates freedom of expression, mind-body holism, interconnection with the natural environment, as well as well-being for the practitioner (COOLEY *et al*., 2020).

Moments like these, experienced outdoors, can have basic therapeutic effects in gardening and agricultural practice that can be enhanced by engaging people in therapeutic gardening. Producing vegetables is one of the ways to nourish the body and care for people's minds. This kind of garden has several functions, including its therapeutic importance, as they promote well-being and balance between body and mind. Studies carried out under the supervision of occupational therapists and psychologists indicate that activities linked to the environment, such as gardening, are extremely beneficial for physical and mental health (SÖDERBACK, 2004).

In addition to their therapeutic effects, urban gardens also have an educational character, as they offer a pedagogical tool that addresses the production, transformation and consumption of food and its environmental impact, with a high potential for public awareness and ecological propagation with different planting and gardening practices, thus carrying out environmental and also nutritional education (RODRIGUES ROCHA *et al*., 2019). Pedagogically, they provide team-based practices that explore the multiplicity of ways of learning. In schools, contact with plants and small animals helps children to comprehend the value of nature, and to create relationships between the environment and its life forms. On the emotional side, the experience enriches the sense of "belonging" of the students, their educators and the school staff. They can be located in educational institutions that provide garden-based learning integrated into their community, such as schools, kindergartens, but also in specialized schools for children with disabilities, such as the “Associações de Pais e Amigos dos Excepcionais” (APAE), where the gardens, besides being educational, also have an important therapeutic character (SILVA and HAYASHI, 2018).

From this contextualization, the objective of the present article, is to analyze the benefits of urban gardens through therapies for human health and promotion of sustainability, using a bibliometric strategy. As a consequence, the article is structured in five sections: in addition to this introductory section, the second section explains the relationship between urban gardens and sustainability. In the third section the methodological path of the research, presenting in a detailed way the bibliometric result from the scenario of scientific publications resulting from this area, using the largest database, Scopus, of abstracts and citations of the scientific peer reviewed literature. The fourth section answers the research objective by discussing urban gardens for human health, therapy and the promotion of sustainability. And, finally, the final considerations, preceding the references that were used throughout the article.

2 URBAN GARDENS AND SUSTAINABILITY

Urban gardens can be therapeutic, educational and greatly improve people's quality of life. In Brazil, there are records of horticulture and hortotherapy spaces aimed at students with special needs or disabilities. It is an interactive management method used for the control and continuous improvement of garden and food production, used for both treatment and psychosocial inclusion (CAMARGO *et al*., 2015). An example of a garden project at the APAE “Centro de Educação Especial Pequeno Príncipe”, located in the municipality of Glória de Dourados/MS (Brazil) generated

equally positive results and greater inclusion of the students, based on greater student participation in the activities taking place in the garden. The project implemented at another APAE, in the municipality of Araguatins/TO (Brazil), aimed to use vertical vegetable gardens as hortotherapy and to promote social inclusion by improving the life quality of people with special needs. Hortotherapy is described as a practice consisting of the use of plant cultivation techniques (vegetables, ornamentals and medicinal plants) as occupational therapy, aiming at the physical and mental development of practitioners (SCARTAZZA *et al*., 2020; SPRING, 2016).

A valuable suggestion is the creation of gardens adapted for children with special needs, or sensory gardens, by involving students, parents, friends and teachers of schools for disabled children, thus generating a considerable improvement in quality of life of all participants, as well as a better social inclusion, resulting in improvements in the learning process of students in their daily lives, in addition to carrying out environmental, education in favor of healthier food and sustainability (BENNEDETTI *et al*., 2022). To obtain good results with a sensory garden, it must have the following characteristics: 1) appropriate facilities for people with locomotor and/or visual needs, 2) include plants that arouse stimuli such as touch, taste, sight and smell, and 3) offer social and educational activities within the space (GUIMARÃES *et al*., 2020).

These examples of gardens located in APAEs also show the importance of school gardens for the social inclusion. The theory of social inclusion is focused on recognizing and accepting diversity in society and seeks to ensure that all individuals have access to all opportunities, while safeguarding the particularities of each one. According to the WHO, social inclusion is understood as active participation in various social groups, and disability, as any loss or abnormality of a body structure or function. In addition, WHO states that 1 billion people live with some form of disability – this means one in seven/eight people worldwide (WHO, 2015). According to different studies carried out, garden therapy can be one of the tools to improve the quality of life of many of these people. Among the multiple benefits of this type of gardens are: 1) improve mood and reduces stress; 2) provide well-being; 3) rehabilitate patients mentally, emotionally and physically; 4) help to establish emotional bonds with the environment and the people around them (RICHTER *et al.*, 2022).

Following horticultural therapy, children's mood and psycho-physical well-being improved significantly, according to Mugion and Menicucci (2020). Interactive horticultural therapy had a beneficial effect on hospitalized pediatric patients and their parents, according to the authors. Parents stated that the therapy had a positive impact on their mood and that their children greatly benefited

from this kind of therapy. Therapeutic gardens can serve from childhood, showing great results as a complement for the treatment of mental disorders, depression, anxiety, autism, Down syndrome, or adults with cerebral palsy, and helping in the development of patients with degenerative diseases such as Alzheimer's and Parkinson's (UWAJEH *et al*., 2019).

Much may be learned from existing successful models, such as the Therapeutic Vegetable Garden initiated by the social care service of the municipality of Kifissia (Greece) (SIMON-ROJO *et al*., 2015). In Venice (Italy), the therapeutic vegetable garden at San Camilo Hospital is the first space in the country designed specifically for the rehabilitation of patients in wheelchairs or with physical disabilities (VEJRE *et al*., 2016). Patients can actively participate in planting, caring for and harvesting the plants, which is not only seen as a physical activity, as the greatest benefit derives from the contact with a variety of plants and flowers carefully chosen to stimulate smell, sight and touch, awakening the senses and thus memories and emotions. Therapeutic gardens have expanded in the Netherlands, with a strong national organization, having today more than a thousand of these spaces (SIMON-ROJE-Rojo *et al*., 2015). Part of the Botanical Gardens in Oslo (Norway), in collaboration with Oslo's Resource Centre for Dementia and Psychiatric Care of the Elderly, has been planned as a sensory garden for people with dementia. The sensory garden activates all of the senses, evokes fun feelings, resurrects long-forgotten memories, and promotes communication. As a result, sensory gardens are regarded as an essential intervention in the treatment of dementia that improves quality of life (BORGEN and GULDAHL, 2011).

Therapeutic sessions, through the creation of gardens, arise in a process that aims to re-establish the citizenship of the person with mental disorders through the deconstruction of the asylum model of mental health care (CIPRIANI *et al*., 2017). In this way, therapies involving therapeutical gardens come to play a primordial role, both as a therapeutic element and as promoters of social reinsertion, through actions involving work, the creation of a product, the generation of income and the autonomy of the subject. Smidl *et al*. (2017) analyzed the results of a therapeutic gardening project in a community mental health facility. The authors coordinated a study with twenty adults suffering from serious mental illness to design, build, and cultivate raised-bed gardens. Recovery goals are related to personal responsibility, emotional and physical well-being, personal responsibility, mental, and physical well-being. In addition, socialization was set in advance, thus indicating that the results of the study supported patients' recovery.

Occupational therapy for older people, carried out in retirement homes, indicates improvement in the relationship of a patient with other patients and with the therapist. Work is done to develop manual dexterity, motor awareness, physical flexibility, visual memorization, perception, which in some cases awakens some creative abilities, such as music and painting**.** Urban gardens promote positive aging, regardless of doing active gardening, or simply being present in the garden, indicating that the key point for attaining a positive therapeutic benefit was the contact with nature. This is convincing evidence in favor of providing gardens in aged-care facilities, where a growing number of older adults will reside in the coming decades, and whose transition to institutional living will be caused by health problems or the loss of a caregiving spouse, and who, as a result, will get the most from the rejuvenation that being in a garden provides (SCOTT *et al*., 2020).

There is more and more evidence highlighting the potential advantages of horticulture in older age, and as a favored form of leisure for older adults in a number of countries. Gardening may be a particularly beneficial form of physical activity to promote healthy ageing (COLLINS and O'CALLAGHAN, 2008). This type of therapeutic activity, through the formation of vegetable gardens, is important in a process that aims to re-establish the citizenship of people with mental disorders by deconstructing the asylums model of mental health care. In this way, this type of therapy starts to play an important role, both as a therapeutic element aa well as a promoter of social reinsertion, through actions that involve work, the creation of a product, the generation of income and the autonomy of the subject.

Van den Berg *et al*. (2010) showed that people aged 62 years and older who worked in urban gardens, scored higher on health and well-being indicators than those who did not. According to Wang and MacMillan (2013), gardening is beneficial for older people because: 1) it is an enjoyable way to perform physical exercise; 2) it increases mobility and flexibility; 3) it encourages the use of all motor skills, as well as improving endurance; 4) it helps prevent diseases, such as by decreasing osteoporosis rates; 5) it reduces stress levels, promoting greater relaxation; 6) it provides stimulation and interest in nature and the outdoors; 7) it improves well-being as a result of social interaction; 8) is able to provide nutritious and healthy products. The presence of gardens in urban or peri-urban centers should be incorporated into public health policies, as it acts in the prevention of diseases by providing healthy activities and food, aside from being able to exert a palliative effect for disorders already installed in sick individuals, providing special benefit to older people (SCOTT *et al*., 2015).

Gardens are also found in some brazilian prison institutions and around the world, and definitely have a therapeutic value. Generally, teachings on organic food cultivation are passed on, where the inmates learn to produce clean, beneficial food that comes from a production system that analyses the norms of nature and the entire agricultural apparatus is based on respect for the environment and the preservation of natural resources (TRIVETT *et al*., 2017). Several brazilian prisons have already adopted this learning method.

The simple contact with nature can bring several health benefits, such as a better quality of life, well-being, stress reduction and provide a better inner balance for the inmates as occupational therapy. It improves the life quality of the prisoners, as they are able to obtain healthy food for their diet, reducing the risk of diseases and the cost to the State in the purchase of medicines. As a result, the following advantages might be highlighted: 1) less expenses to the State, since it would need to bid less for the purchase of food for the detainees; 2) act with social bias of donations of healthy food to charities; and 3) decrease in the rate of criminal recidivism of the people who worked in the prison gardens (MORAN, 2019). An example is the Bataguassu Correctional Facility in Campo Grande/MS (Brazil), where prisoners were pleased to work in the production of organic vegetables in the prison garden, said that working in the garden is a way to acquire knowledge and fill the void of being away from the family. Inmates are always willing to work in the garden, because it brings moments for self-reflection. In this garden 27 beds are cultivated, organic fertilizers are used, generated in the garden itself, without any use of pesticides (ALVES, 2014).

Another study, conducted by Souza and Pinheiro (2018), reports on the contributions of the implementation of a vegetable garden in an Association for Protection and Assistance to Convicts (Associação de Proteção e Assistência aos Condenados – APAC) in the municipality of Sete Lagoas/MG (Brazil). This activity as a method of recovery stands out as a successful way to reintegrate convicted individuals into society. The inmates have greater opportunities in the labour market, the basis of the theoretical and practical knowledge obtained on horticulture, reinforcing the validity of the APAC methodology. Several convicts expressed a desire to create their own "vegetable" garden or get involved in community garden projects in their home towns.

Positive reports of prison garden programs by Rice and Lremy (1998) who investigated in their study the effect of the San Francisco Sheriff's Department's horticultural counseling program on inmate psychosocial functioning as part of their research. Timler et al. (2019) reported how a prison garden fosters rehabilitation and healing for incarcerated men in Canada. The initiative in question

involves incarcerated persons not only in planting and cultivating but also involves donation of products to food insecure and economically disadvantaged communities. Donation of food to local communities is correlated with the planting, cultivating, and harvesting of food, as well as a "giving back" to society has far-reaching positive implications for incarcerated people beyond the benefits of gardening. These attributes include boosting self-esteem and self-worth, which are essential for imagining a future formed by the experience of giving back through meaningful work.

In addition to the therapeutic benefits of urban gardens, they can favor healthy eating as, according to data from the environmental research institute Worldwatch Institute, something between 15% and 20% of the food consumed in the world is produced in this environment. These kinds of gardens are thought to make cities a little less grey and encourage also the consumption of organic food (IKERD, 2017). It is important to emphasize and understand that traditional agriculture in the countryside and urban agriculture through urban gardens can and should co-exist.

In some Chinese megacities, for example, most of the agricultural production comes from urban areas (ZHONG et al., 2020). It can be seen that urban agriculture can be truly useful in the strategy of achieving the goals of the United Nations Sustainable Development Goals (SDGs), especially SDG 1 (Poverty Eradication - end poverty in all its forms everywhere), and SDG 2 (Zero Hunger and Sustainable Agriculture - end hunger, achieve food security and improved nutrition and promote sustainable agriculture) (UN, 2015). The emergence of sustainable entrepreneurs in urban agriculture has culminated in growing global interest in this subject (VAN TUIJL *et al*., 2018).

In addition to the many natural resources that are used on large plantations/farms and far from urban centers, food must be transported from where it is grown to distribution centers in cities, which requires the burning of fossil fuels producing greenhouse gases (GHGs). With strong support from the Food and Agriculture Organization of the United Nations (UN/FAO), this type of cultivation has advantages over traditional forms of agriculture, such as proximity to markets or points of sale, low cost for transportation, reduction of the food system's carbon footprint and reduction of crop losses, and therefore an important economic gain. Furthermore, cities and urban centers need to change color, towards greener and more sustainable environments, with a better life quality and food security for all its citizens, on the basis of more urban gardens and urban agriculture practices (FAO, 2014). Globally, it is estimated that food demand will grow by 70% until 2050 in order to meet the basic needs of the world's population of approximately 9-10 billion people in the middle of the current

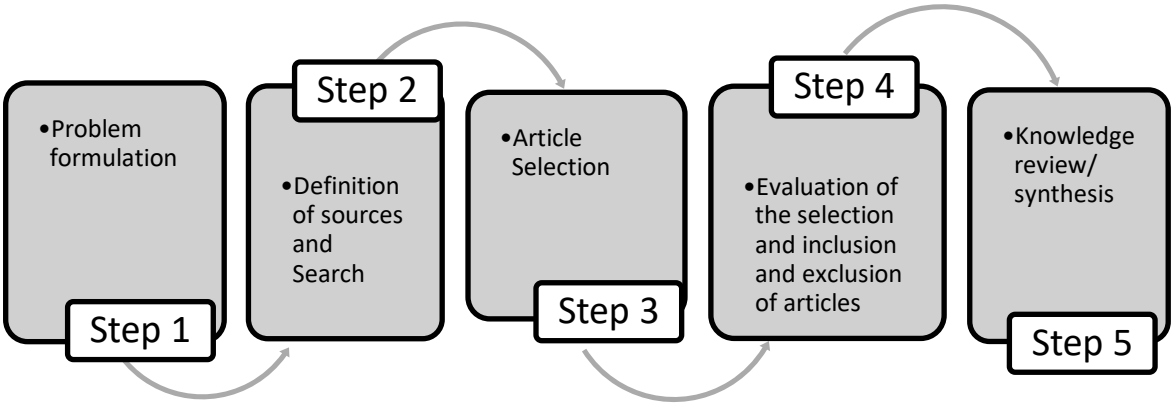
century (KORTH *et al*., 2014). There is an immense challenge to feed the growing population, which can and should be met by urban agriculture, being a major solution to the problem.

3 METHODS

The approach of a systematic integrative qualitative research was adopted in this study. According to Machado and Richter (2020), the qualitative approach as a research technique does not see itself as a strictly planned proposal, but rather inspires researchers' imagination and creativity, leading them to offer studies that investigate new ways. The systematic research is a synthesis of primary studies that explain the aims, materials, and procedures and is based on studies that provide evidence. The integrative systematic review, on the other hand, is a state-of-the-art bibliographic review method, i.e., it allows the researcher to select articles, assess them and synthesize the relevant information on a specific topic.

The term "integrative" originates from the integration of opinions, concepts or ideas from the search, and in this sense, it has been used in the area of health, education and in organizational studies to enable the synthesis and analysis of the scientific knowledge (MACHADO and RICHTER, 2020). To perform an integrative literature review study, a systematic search in an online database was used, followed by an integrative analysis of the results. Thus, we sought to work using the five steps of Torraco (2016), developed in the integrative literature review phase described in the figure below.

Figure 1 – Stages of integrative literature review.



In the first step, the problem guiding this study was formulated. This will answer the question: "What are the therapeutic benefits of urban gardens for human health in promoting sustainability?" To answer this question, a database search was conducted starting in March 2021 and ending in April of that same year. In the second step, called definition of research sources, the electronic database Scopus (www.scopus.com) was chosen, considered relevant due to the number of abstracts and peer-revied, indexed references, as well as its impact on the academic field in the interdisciplinary scope. Considering the problem issue, the third step was the selection of inclusion and exclusion of articles. Based on the research problem, search terms were defined, still in the planning phase. In the first moment the search with the term "urban gardens" AND "sustainability" resulted in 54 publications, and in order to delimit the search the term "Urban gardens" AND “sustainability” AND “therapy” OR “health” was used, resulting in 10 publications. In order to refine the search even more, by aligning the search term to the research problem, the expression: "urban garden" OR "green care" OR "garden" AND "sustainability" AND "therapy" was used, totaling 8 publications. It is considered that the variations of the terms used for the search are presented, in a larger context, within the same proposal, because a concept depends on the context to which it is related. Finally, when planning the search, it was decided to use the terms defined in the "title", "abstract" and "keyword" fields, without making temporal, language or any other restriction that might limit the result.

In the fourth step, which represents the evaluation of the selection, the search planning was carried out and the data collection retrieved a total of 8 indexed papers. The first publication was registered in the year 2000. As a result of the survey, 8 papers were identified, written by 26 authors, linked to 12 institutions from 8 different countries. 121 keywords were used to identify and index these publications, which were distributed among 14 areas of knowledge and 4 types of publications. Table 1 presents the results of this data collection in a general bibliometric analysis, when mapping the theme "urban gardens", "sustainability" and "therapy" in the Scopus database.

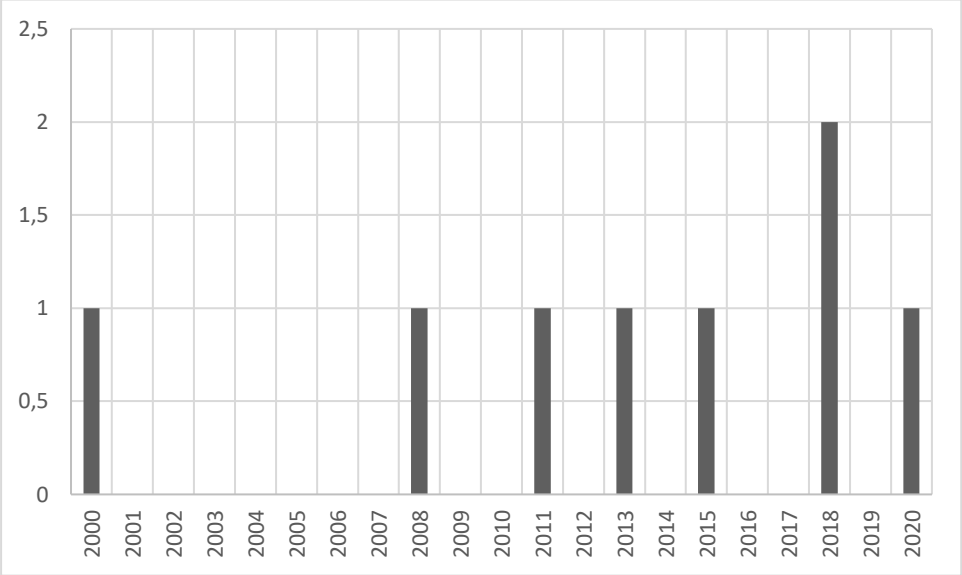
Table 1 – General bibliometric data

Item	Information
Data	Scopus
Search Terms	"urban gardens" OR "green care" OR "garden" AND "sustainability" AND "therapy"
Search fields	“title”; “abstract”; “keywords”
Total number of papers	8
Authors	26
Institutions	12
Countries	8
Keywords	121
Areas of knowledge	7
Type of publications	3

The analyzed papers are composed of 8 studies from the Scopus database. To appreciate the results in greater depth for the bibliometric analysis, these data provided the organization of relevant information in a bibliometric analysis, such as: temporal distribution; main authors, institutions and countries; type of publication in the area; main key words; and the most referenced papers.

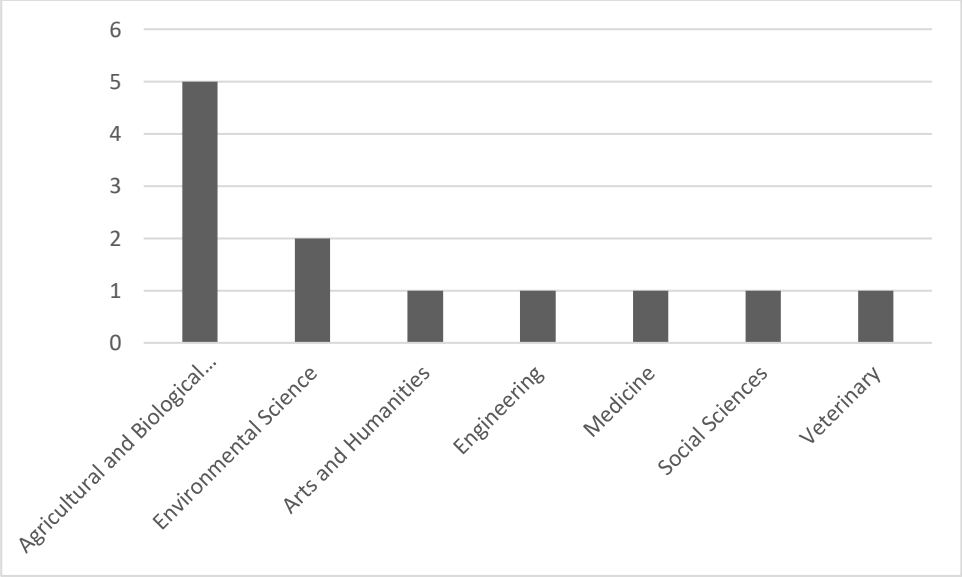
The first two records are from 2000 and 2008. Subsequently three papers were published in the year 2011, 2013 and 2015 with one publication each was. Finally, in the year 2018 two published articles were found and a final publication in the year 2020, as shown in Figure 2:

Figure 2 - Distribution of scientific publications over time



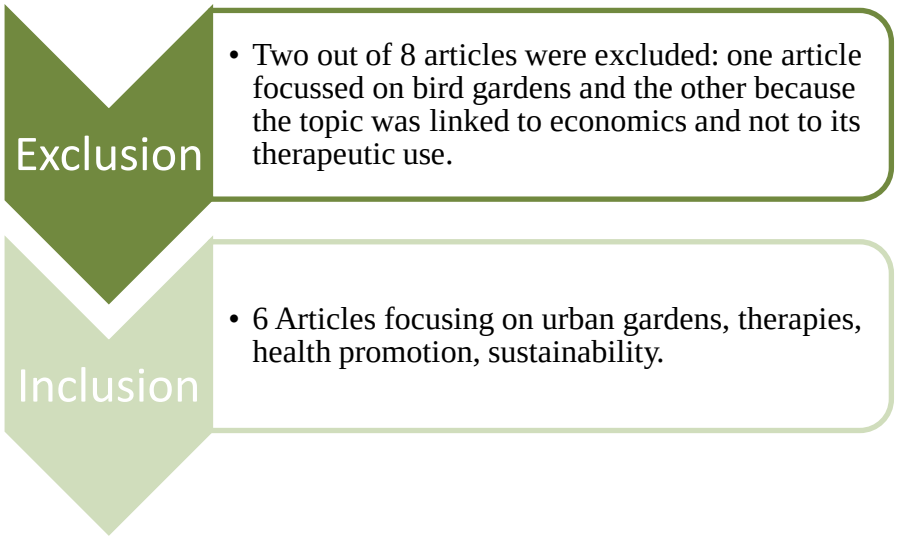
From the bibliometric analysis, based on the set of papers retrieved from the Scopus database, it was possible to identify the areas of knowledge of these publications. Agricultural and Biological Sciences stands out with an average of 42% of the publications, followed by Environmental Science with 17%, as shown in Figure 3 below:

Figure 3 - Areas of scientific publications



When analyzing in the origin of the authors by country, 8 countries were found, indicating a general interest of the topic in different countries, which each having one published paper, such as Canada, China, Italy, Japan, Norway, United Kingdom, United States. Of the 8 (eight) articles, only 6 (six) articles were selected, that do answer the main question of the present research (Figure 4):

Figure 4 - Articles that answer the research question



The fifth step involves the formulation of the problem that guided this study, answering the question: "What are the therapeutic benefits of urban gardens for human health in promoting sustainability?" Six papers were selected for full reading according to the online search and open access papers, with the aim of analyzing the benefits of urban gardens through therapies for human health in the promotion of sustainability, resulting in the schematic summary (Table 1).

Table 1 - Schematic summary

Year	Authors	Title	Therapeutic benefits of urban gardens for human health in the promotion of sustainability
2000	Dunnett e Qasim	Perceived benefits to human well-being of urban gardens	The publication explains that handling gardens, especially vegetable gardens, contributes both to the environment, providing more green areas in cities, and to people, causing well-being and peace.
2008	Smilski	Cultivations....and potting on a strategic plan for a social and horticultural therapy program	The article explains that gardens bring benefits to mental health, promoting recovery from fatigue, stress, recovery from illness and injury, increase concentration and improve productivity
2011	Borgen e Guldahl	Great-granny's Garden: A living archive and a sensory garden	The paper explains that gardens stimulate many senses, evoke pleasant emotions, bring up memories long forgotten and stimulate communication. Sensory gardens are therefore considered an important tool in dementia therapy
2013	Zhang	Research on therapy garden design for immigrant women	Social sustainability through garden establishment is one of the central pillars of sustainability. Empowerment means increasing the capacity of people to take control of their own lives and participate in society. Urban gardens are therapeutic for people wounded by war and violence and can be a way to use nature in a harmonious and beneficial way.
2018	Koura, Okawa, Oshikawa, Ueda, Nishikawa, Ikeda, e Kamijyo	Dementia protective efficacy by the combination of active and passive horticultural therapy for all persons concerned.	The benefits of gardening activities have been shown to have overall positive effects on the emotional health of older people. Multi-sensory stimulation in the handling of vegetable gardens can be beneficial for a wide variety of conditions typical of geriatric patients. Some therapies for the elderly start from the philosophy that the activities to be performed are also stimulating the senses. On the other hand, the dynamics of the senses play an important role beyond mere reason and sensitivity in people's lives. The benefits of horticultural activities have been shown to have overall positive effects on the emotional health of older people and care stuff.

2020	Scartazza, Mancini, Proietti, Moscatello, Mattioni, Costantini, Di Baccio, Villani,e Massacci.	Caring local biodiversity in a healing garden: therapeutic benefits in young subjects with autism.	Contact with nature and caring for gardens play important therapeutic roles. This paper explores the potential of caring for local biodiversity in a healing process. Urban gardens have two objectives: i) the improvement of health, subjective well-being and interpersonal relationships in highly vulnerable people of the local community, and ii) the conservation and enhancement of local biodiversity by caring for traditional crop varieties, the acquisition of relevant historical and functional data for local farmers, breeders and researchers and by transferring this heritage to future generations.

Therapeutic benefits of urban gardens for human health in promoting sustainability are achieved through: 1) access to fresh, traditional and nutritionally richer products; 2) promoting rich and healthy diets within the household, including eating more fruit and vegetables (DUNNET and QASIM, 2000); 3) promoting the consumption of organic products, reducing exposure to chemical fertilizers and pesticides; 4) increased consumption of fresh products, without preservatives; 5) mental health benefits, promoting recovery from fatigue and stress (KOURA *et al*., 2018), recovery from illness and injury, increased mental concentration, improved productivity and enhanced outlook and satisfaction with life (SMILSKI, 2008); 6) gardens can be spaces for leisure and exercise, as gardening and/or horticulture is considered a moderate physical activity, which produces beneficial changes in terms of cholesterol and blood pressure (BORGEN and GULGAHL, 2011); and 7) horticulture makes people more active (ZHANG, 2013).

The benefit obtained by urban gardens, in reducing the carbon footprint occurs because local food production significantly reduces GHG emissions related to food transportation, but also in the elimination of transportation time. In addition, urban gardens also significantly reduce household waste (SCARTAZZA et al., 2020)

4 URBAN GARDENS FOR HUMAN HEALTH IN THE PROMOTION OF SUSTAINABILITY.

Urban agriculture, and especially urban gardens and therapeutic gardens, are a strategic way of providing food and greater food security. The more developed a city is, the greater the need for healthy food for a more sustainable life, with better health for its residents, and thus more quality of life (GARCIA *et al*., 2017). Food production is a fundamental part of the sustainable development of

urban centers, especially when natural fertilization and plague control techniques are used, as this allows for the production of diversified, environmentally friendly, healthy, low-cost foodstuffs, generating greater autonomy also for the low-income population (BOUKHARAEVA *et al*., 2005).

Gardens allow the establishment of contact with the soil and nature, helping the psychological balance of the human being. They promote social inclusion and cohesion, physical health, and also generate well-being in most of their users by promoting "environmental justice" (BOUKHARAEVA *et al*., 2020). Urban gardens have been implemented in socially deprived areas, where poverty, drugs and crime are more frequent, in order to generate an alternative to this type of problem, including providing employment and social inclusion. Overall, urban agriculture is likely to reduce violence in cities and thus lead to a more peaceful and healthy life (FERRIS *et al*., 2001; MILBOURNE, 2012).

Urban gardens have various therapeutic effects. In Russia, gardens are seen as a means to recover physical, psychological and emotional health. A significant percentage of the population in various countries considers urban gardens as an environment that is seen as a source of energy recharging and rebalancing. In France some doctors recommend “working with soil” to their patients. Many people say that they have stopped taking antidepressants through gardening practice. The well-being and therapy functions of gardens lead us to think, that contact with nature is something fundamental for a healthier life (BOUKHARAEVA *et al*., 2005).

Also called ecotherapy, the effect of therapeutic gardens can be achieved in different ways: 1) in a natural way through the simple presence in a garden and contact with the open air; 2) through gardening itself; or 3) with a walk in a therapeutic garden, thus involving a physical activity. Research from the University of Essex shows that outdoor exercise and contact with nature have substantial benefits for health and wellbeing. Of the total population covered in this study, 54% practice gardening, and study participants stated that contact with nature and physical exercise, contributed to greater self-esteem, combating depression and stress, and also to better physical fitness (GARCIA *et al*., 2017). Additionally, to these benefits, urban agriculture provides a new way of managing organic waste by transforming it into high quality fertiliser and creating a more sustainable environment (BOUKHARAEVA *et al*., 2005). Based on these examples, several therapeutic horticulture projects minimize the impact on people's health, generating wellbeing and a more sustainable life in urban centers. In addition, they provide fresh, tasty, authentic food that respects its natural cycle, minimizing the impact of agriculture on the environment and on human beings (FARDET and ROCK, 2020). Food grown in urban gardens is more nutritious, tastes better than conventional pesticide-based

agriculture products, and contains 50% more minerals and vitamins (GUITARD, 2014). In other words, the presence of urban gardens and especially therapeutic gardens generates greater sustainable development.

5 FINAL CONSIDERATIONS

Horticultural gardens can be a vital source for the treatment of people with disabilities, or for people who are in a state of stress, anxiety and other syndromes caused by contemporary society. It was found that this benefit comes from the therapeutic functions provided by the contact of people with nature and the care with plants, medicinal herbs, vegetables, and fruits.

In this study, we found that the first records on this topic were published in the year 2000. The year 2018 stood out, with 2 papers published, in relation to the remaining years evaluated. The areas of emphasis in the publications obtained were: “Agricultural and Biological Sciences”, with an average of 42% of all publications, followed by “Environmental Sciences” with 17%. The authors that pubished in the subject are from the following countries: Canada, China, Italy, Japan, Norway, United Kingdom, United States.

The present work pointed out that therapeutic benefits of urban gardens for human health in the promotion of sustainability are numerous, such as improvement in life quality and wellbeing of the community, promotion of a diet rich in nutrients, increased consumption of fresh produce, mental health benefits, promoting recovery from fatigue, stress and being spaces for leisure and exercise. For future research, a literature review should be carried out on the federal laws that legitimize and support the practice of therapeutic gardens in different countries.

REFERÊNCIAS

ALVES, M. C. Prisoners of Resocialization, citizenship and income Generation: environmentally sustainable professionalization. **Scientiam Juris**, v. 2, n. 1, p. 33-40, 2014. DOI: https://doi.org/10.6008/SPC2318-3039.2014.001.0002.

BENNEDETTI, L. V. *et al*. Horta escolar implementada em Associação de atendimento a pessoas com deficiências: inclusão social, educação alimentar, educação ambiental. **Revista Verde de Agroecologia e Desenvolvimento Regional**, v. 17, n. 2, 2022.

BORGEN, L.; GULDAHL, A. Great-granny's Garden: a living archive and a sensory garden. **Biodiversity and Conservation**, v. 20, p. 441–449, 2011. DOI: https://doi.org/10.1007/s10531-010-9931-9.

BOUKHARAEVA, M. L'agriculture urbaine comme composantedu développement humain durable: Brésil, France, Russie. **Cahiers Agricultures**, v. 14, p. 154-158, 2005.

CAMARGO, R. de. Uso da hortoterapia no tratamento de pacientes portadores de sofrimento mental grave. **Enciclopédia Biosfera – Centro Científico Conhecer**, v. 11, n. 12, p. 3634-3643, 2015. DOI: http://dx.doi.org/10.18677/Enciclopedia_Biosfera_2015_250.

CIPRIANI, J. A Systematic Review of the Effects of Horticultural Therapy on Persons with Mental Health Conditions. **Occupational Therapy in Mental Health**, v. 33, n. 1, p. 47-69, 2017. DOI: https://doi.org/10.1080/0164212X.2016.1231602.

COLLINA, C.; O'CALLAGHAN, A. The Impact of Horticultural Responsibility on Health Indicators and Quality of Life in Assisted Living. **HortTechnology**, v. 18, n. 4, p. 611-618, 2008. DOI: https://doi.org/10.21273/HORTTECH.18.4.611.

COOLEY, S. J. 'Into the Wild': A meta-synthesis of talking therapy in natural outdoor spaces. **Clinical Psychology Review**, v. 77, p. 101841, 2020. DOI: https://doi.org/10.1016/j.cpr.2020.101841.

DUNNETT, N.; QASIM, M. Perceived benefits to human well-being of urban gardens. **HortTechnology**, v. 10, n. 1, p. 40-45, 2000. DOI: https://doi.org/10.21273/HORTTECH.10.1.40.

FAO – Food and Agriculture Organization of the United Nations. ***Growing greener cities:* FAO programme for urban and peri-urban horticulture**, 2014. Retrieved from: http://www.archdaily.com.br/br/623385/as-10-cidades-latino-americanas-lideres-em-agricultura-urbana-segundo-a-fao. Access in 29 May 2022.

FARDET, A.; ROCK, E. Ultra-Processed Foods and Food System Sustainability: What Are the Links? ***Sustainability***, v. 12, n. 15, p. 6280, 2020. DOI: https://doi.org/10.3390/su12156280.

Ferris, J. People, Land and Sustainability: Community Gardens and the Social Dimension of Sustainable Development**. Social Policy and Administration**, v. 35, p. 559-568, 2001.

GARCIA, M. T. *et al*. The impact of urban gardens on adequate and healthy food: A systematic review. **Public Health Nutrition**, v. 21, n. 2, p. 416-425, 2018. DOI: https://doi.org/10.1017/S1368980017002944.

GUIMARÃES, *N. de F.* Horta orgânica como eixo gerador de práticas pedagógicas: um relato ocorrido na associação de pais e amigos dos excepcionais (APAE). **Brazilian Journal of Development**, v. 6, n. 1, p. 1290-1304, 2020. DOI: https://doi.org/10.34117/bjdv6n1-090.

GUITARD, D. Color me healthy: Food diversity in school community gardens in two rapidly urbanising Australian cities. **Health & Place**, v. 26, p. 110-117, 2014. DOI: https://doi.org/10.1016/j.healthplace.2013.12.014.

IKERD, J. The economic Pamphleteer: the urban agriculture revival. **Journal of Agriculture, Food Systems, and Community Development**, v. 7, n. 3, p. 13-16, 2017. DOI: https://doi.org/10.5304/jafscd.2017.073.007.

KORTH, M. What are the impacts of urban agriculture programs on food security in low and middle-income countries? **Environmental Evidence**, v. 2, n. 1, p. 1-13, 2013. DOI: https://doi.org/10.1186/2047-2382-3-21.

KOURA, S. Dementia protective efficacy by the combination of active and passive horticultural therapy for all persons concerned. **Acta Horticulturae, v.** 1215, p. 223-232, 2018. DOI: https://doi.org/10.17660/actahortic.2018.1215.41.

MACHADO, A. B.; RICHTER, M. F. Sustainability in times of pandemic (Covid-19). **RECIMA21 – Revista Científica Multidisciplinar**, v. 1, n. 2, p. 264–279, 2020. DOI: https://doi.org/10.47820/recima21.v1i2.25.

MILBOURNE, P. Everyday (in)justices and ordinary environmentalisms: community gardening in disadvantaged urban neighborhoods. **Local Environment**, v. 17, n. 9, p. 943-957, 2012. DOI: https://doi.org/10.1080/13549839.2011.607158.

MORAN, D. Back to nature? Attention restoration theory and the restorative effects of nature contact in prison. **Health & Place**, v. 57, p. 35-43, 2019. DOI https://doi.org/10.1016/j.healthplace.2019.03.005.

MUGION, R. G.; MENICUCCI, E. Understanding the benefits of horticultural therapy on paediatric patient's well-being during hospitalisation. **The TQM Journal**, v. 33. n. 4. p. 856-881, 2020. DOI: https://doi.org/10.1108/TQM-04-2020-0078.

RICE, J. S.; LREMY, L. Impact of Horticultural Therapy on Psychosocial Functioning Among Urban Jail Inmates. **Journal of Offender Rehabilitation**, v. 26, n. 3-4, p. 169-191, 1998. DOI: https://doi.org/10.1300/J076v26n03_10.

RICHTER, M. F. *et al*. Hortas urbanas – História, Classificação, Benefícios e Perspectivas. **Confins**, v. 55, 2022.

*ROSRIGUES ROCHA, R. I. et al. H*ortas comunitárias: espaço público que contribui para o desenvolvimento sustentável da cidade de São Paulo, SP. **Periódico Técnico e Científico Cidades Verdes**, v. 7, n. 16, p. 87-97, 2019. DOI: https://doi.org/10.17271/2317860471620192214.

SCARTAZZA, A. *et al*. Caring local biodiversity in a healing garden: therapeutic benefits in young subjects with autism. **Urban Forestry & Urban Greening, v.** 47, p. 126511, 2020. DOI: https://doi.org/10.1016/j.ufug.2019.126511.

SCOTT, T. *et al*. Exploring the health and wellbeing benefits of gardening for older adults. **Ageing & Society**, v. 35, n. 10, p. 276–2200, 2015. DOI: https://doi.org/10.1017/S0144686X14000865.

SCOTT, T. *et al*. Positive aging benefits of home and community gardening activities: Older adults report enhanced self-esteem, productive endeavours, social engagement and exercise. **SAGE Open Medicine**, v. 8, p. 1-13, 2020. DOI: https://doi.org/10.1177/2050312120901732.

SILVA, J. H. da; HAYASHI, *M. C. P. I.* Estudo bibliométrico da produção científica sobre a associação de pais e amigos dos excepcionais. **Revista Educação Especial**, v. 31, n. 60, p. 65-80, 2018. DOI: https://doi.org/10.5902/1984686X18170.

SIMON-ROJO, M. *et al*. **From Urban Food Gardening to Urban Farming**. *In*: Lohrberg, F., Licka *et al.* (Eds.). Urban Agriculture Europe, 2015.

SMIDL, S. *et al.* Outcomes of a Therapeutic Gardening Program in a Mental Health Recovery Center. **Occupational Therapy in Mental Health**, v. 3, n. 4, p. 374-385, 2017. DOI: https://doi.org/10.1080/0164212X.2017.1314207.

SMILSKI, A. Cultivations...and potting on a strategic plan for a social and horticultural therapy program. **Perspectives**, v. 32, n. 2, p. 5-14, 2008.

SÖDERBACK, I. *et al*. Horticultural therapy: the 'healing garden'and gardening in rehabilitation measures at Danderyd hospital rehabilitation clinic, Sweden. **Pediatric Rehabilitation**, v. 7, n. 4, p. 245-260, 2004. DOI: https://doi.org/10.1080/13638490410001711416.

SOUZA, A. O.; PINHEIRO, D. C. Hortas comunitárias e reintegração social: uma análise das suas vantagens no sistema APAC de Sete Lagoas, Minas Gerais. **Em Extensão**, v. 16, n. 2, p. 53-74, 2018. DOI: https://doi.org/10.14393/REE_v16n22017_art03

SPRING, J. A. Design of evidence-based gardens and garden therapy for neurodisability in Scandinavia: data from 14 sites. **Neurodegenerative Disease Management**, v. 6, n. 2, p. 87-98, 2016. DOI: https://doi.org/10.2217/nmt.16.2.

STURIALE, L. *et al*. **Social and inclusive "Value" Generation in Metropolitan Area with the "Urban Gardens" Planning**. In: Mondini, G. *et al*. (eds) Values and Functions for Future Cities. Green Energy and Technology. Springer, Cham., 2020, pp. 285-302. DOI: https://doi.org/10.1007/978-3-030-23786-8_16.

TIMLER, K. *et al*. Growing connection beyond prison walls: How a prison garden fosters rehabilitation and healing for incarcerated men. **Journal of Offender Rehabilitation**, v. 58, n. 5, p. 444-463, 2019. DOI: https://doi.org/10.1080/10509674.2019.1615598

TORRACO, R. Writing Integrative Literature Reviews: Using the Past and Present to Explore the Future. **Human Resource Development Review**, v. 15, n. 4, p. 404-428, 2016. DOI: https://doi.org/10.1177/1534484316671606.

TRIVETT, J. R. *et al*. **Sustainability Education in Prisons: Transforming Lives, Transforming the World**. In: EarthEd. State of the World. Island Press, Washington, DC, 2017. DOI: https://doi.org/10.5822/978-1-61091-843-5_19.

UWAJEH, P. C. *et al*. Therapeutic gardens as a design approach for optimising the healing environment of patients with Alzheimer's disease and other dementias: A narrative review. **Explore**, v. 15, n. 5, p. 352-362, 2019. DOI: https://doi.org/10.1016/j.explore.2019.05.002.

VAN DEN BERG, A. *et al*. Allotment gardening and health: A comparative study among allotment gardeners and their neighbors without an allotment. **Environmental Health**, v. 9, n. 74, 2010. DOI: https://doi.org/10.1186/1476-069X-9-74.

VAN TUIJL, E. *et al*. Opportunities and Challenges of Urban Agriculture for Sustainable City Development. **European Spatial Research and Policy**, v. 25, n. 2, p. 5-22, 2018. DOI: https://doi.org/10.18778/1231-1952.25.2.01.

VEJRE, H. *et al*. **Can Agriculture Be Urban?** *In*: Lohrberg, F., LIČKA, L., SCAZZOSI, L., TIMPE, A. (Eds.), Urban Agriculture Europe. Berlin, JOVIS Verlag GmbH, 2016, pp.18-25. DOI: https://doi.org/10.1080/01924788.2013.784942.

WANG, D.; MACMILLA, T. The benefits of gardening for older adults: a systematic review of the literature. **Activities Adaptation and Aging**, v. 37, p. 153–181, 2013.

WHO – World Health Organization. **WHO global disability action plan 2014-2021. Better health for all people with disability**. Geneva, Switzerland, 2015. Retrieved from: https://apps.who.int/iris/bitstream/handle/10665/199544/9789241509619_eng.pdf. Access in 22 May 2022

ZHANG, J. Research on Therapy Garden Design for Immigrant Women. **Applied Mechanics and Materials,** v. 409-410, p. 8-11, 2013. https://doi.org/10.4028/www.scientific.net/amm.409-410.8.

ZHONG, C. *et al*. The impact of urbanization on urban agriculture: Evidence from China. **Journal of Cleaner Production**, v. 276, p. 122686, 2020. https://doi.org/10.1016/j.jclepro.2020.122686.