Minireview Article

Urban Gardening in Latin America and Panama: A New Strategy for Conservation

ABSTRACT:

This article aims to reflect on the importance of urban gardening in Latin America, emphasizing community participation in the design and development of urban gardens. A documentary review was conducted on the available experiences and scientific studies reported in the region, revealing that urban gardening when approached through the lens of agrobiodiversity is expanding across Latin America and has become a key strategy for safe food production and environmental sustainability. However, it was found that several Latin American countries lack clear and established laws to regulate this activity. Various studies highlight that urban gardening provides multiple benefits: it strengthens family ties, improves nutrition, generates income by reducing the cost of the basic food basket, and offers therapeutic support for diseases such as cancer, HIV, and mental health disorders. Several researchers highlight the importance of conducting simultaneous parasitological and microbiological assessments during the development and implementation of urban gardens, as part of monitoring and controlling their health. We also report the first ongoing urban agriculture projects in Panama, revealing preliminary evidence of rotavirus detected in fresh vegetables from an urban garden. This review is supported by evidence indicating that urban gardens can become infection foci capable of causing diseases of public health and veterinary importance. We conclude that the impact of urban gardening in Latin America should be framed within a sustainable development perspective.

Keywords: Urban Agriculture, Urban Gardens, Latin America, Panama, Conservation

INTRODUCTION

Urban gardening (UG) has recently gained momentum as a growing global trend (FAO, 2024). While UG has been recognized as a viable strategy for food production and environmental sustainability, it continues to face numerous challenges in Latin American countries (FAO, 2024). Nevertheless, many

of these nations are making significant efforts through strategic policies aimed at promoting innovative designs and the implementation of UG initiatives, particularly in urban settings such as homes and apartment complexes (FAO, 2024).

In this review, the term "Urban Gardening (UG)" is primarily used to describe small-scale, community-based, and household food production systems in urban environments. The term "Urban Agriculture (UA)" is only used when referring to broader institutional or policy contexts (e.g., FAO reports).

UG offers multiple benefits to city dwellers, ranging from environmental conservation to food security (Urías Borbón & Ochoa De La Torre, 2020; Sant'Anna de Medeiros et al., 2020). In Latin America, interest in UG has increased, largely due to the high cost of food, as most crops grown in rural areas become significantly more expensive when harvested and sold in urban markets often containing high levels of fertilizers and pesticides (Eigenbrod & Gruda, 2015). Traditionally, in Central America, land-use systems have depended on factors such as land ownership, type of labor, capital availability, and the market structure for agricultural products (Urías Borbón & Ochoa De La Torre, 2020).

Today, UG is attracting increasing environmental interest in Latin America not only for its contributions to food security, but also as a public good that fosters community interaction (Urías Borbón & Ochoa De La Torre, 2020). It offers a space where families and neighborhoods can connect, supports mental health, and provides a recreational opportunity for children, who can engage with the entire growth cycle, culminating in harvesting and consuming what they helped grow (Urías Borbón & Ochoa De La Torre, 2020; Sant'Anna de Medeiros et al., 2020).

The recent global COVID-19 pandemic triggered an economic crisis that placed both food and nutritional security at risk (Aldaco et al., 2020). In particular, the isolation caused by the coronavirus hindered the population's ability to access goods and services in a timely manner especially food. As a result, many individuals became increasingly motivated to engage in urban gardening, adapting spaces within their homes and apartments to grow their own food (Aldaco et al., 2020).

Moreover, with the ongoing rise in urbanization, the reduction of arable land, and the impacts of climate change, agriculture is expected to face significant challenges in the coming years (Eigenbrod & Gruda, 2015; Aldaco et al., 2020). By 2030, it is projected that 70% of the global population will be living in cities (Eigenbrod & Gruda, 2015; Aldaco et al., 2020). In this context, UG emerges as a viable alternative to increase global food production and help ensure food security (Eigenbrod & Gruda, 2015).

Numerous studies around the world have shown that food production through UG is on the rise, with estimates suggesting that at least 100 million people are actively engaged in the practice (Eigenbrod

& Gruda, 2015; Vieira et al., 2018). In several Latin American countries, UG is considered a traditional agricultural system in both urban and peri-urban areas (Urías Borbón & Ochoa De La Torre, 2020; Sant'Anna de Medeiros et al., 2020; Eigenbrod & Gruda, 2015; Vieira et al., 2018). Research emphasizes that, in Latin America and the Caribbean, this activity has not yet reached its full potential and requires greater government support in order to develop it for purposes such as food production, timber, handicrafts, and medicinal uses often combined with small-scale animal husbandry (FAO, 2024; ONU, 2017; Urías Borbón & Ochoa De La Torre, 2020; Sant'Anna de Medeiros et al., 2020).

It is important to understand how Latin America has developed and evolved over the years in the areas of horticulture, agriculture, urbanization, community participation, and both economic and social development all converging toward urban gardening (UG) (FAO,2024). This understanding helps to highlight these initiatives and strategies as tools for building more just and balanced cities, considering that UG projects offer multiple benefits for both communities and the environment (Sant'Anna de Medeiros et al., 2020).

This article aims to reflect on this phenomenon in order to explain the relevance of implementing urban gardening in homes and apartment settings within cities across Latin America and Panama. The discussion is grounded in literature review of current scientific studies and reported experiences related to this practice.

IMPORTANCE OF AGROBIODIVERSITY IN URBAN GARDENING

Home gardens, also referred to as family gardens in some Latin American contexts, are traditional land-use systems that combine different types of plants such as trees, shrubs, and herbs located near households (González-Ball et al., 2022). These systems, mainly managed by families, provide multiple benefits including food production, medicinal plants, and, in many cases, a supplementary source of income (Sant'Anna de Medeiros et al., 2020; Eigenbrod & Gruda, 2015; González-Ball et al., 2022).

Public health research has shown that the consumption of organic foods is beneficial to human health compared to processed foods; therefore, the establishment of urban agriculture is widely promoted (Wang et al., 2014). The ability of individuals to make healthy food choices is determined by the availability and accessibility of such foods (Kamphuis et al., 2006; Wang et al., 2014).

UG can offer an opportunity for learning about food security, environmental sustainability, community resilience, social justice, and cultural identity (Walter, 2013). Recent studies have increasingly explored the influence of urban agriculture particularly when practiced in domestic

spaces such as homes and apartments on a wide range of positive outcomes, including improved quality of life and physical activity (Sommerfeld et al., 2010), better mental health (Shiue, 2016; Zhang et al., 2021), income generation (Ribeiro et al., 2015), and knowledge sharing (Harris et al., 2014), among other benefits.

It has also been demonstrated that urban agriculture contributes positively to addressing climate change by enriching agricultural biodiversity (Clucas et al., 2018), improving resource-use efficiency, reducing carbon emissions, and enhancing genetic exchange (Philpott et al., 2023; Kaiser et al., 2015; Prudic et al., 2022; Siviter et al., 2023).

In the context of food security, UG allows families to face socioeconomic crises while ensuring their subsistence (Sant'Anna de Medeiros et al., 2020). Moreover, urban agriculture impacts human, social, cultural, political, natural, and financial resources, fostering integral development and resilience (Sant'Anna de Medeiros et al., 2020).

In most Latin American countries with tropical climates, family gardens are examples of diverse agroecosystems characterized by high plant biodiversity (Barbhuiya et al., 2016; Clucas et al., 2018). Most urban gardens in the region seek to maintain this agrobiodiversity to obtain from the land those plants that meet the families' nutritional and sociocultural preferences (Arias Ramírez & Dumani Echandi, 2024).

Agrobiodiversity in urban agriculture plays a pivotal role in ensuring a country's food security and enhancing its adaptation to climate change (Castañeda-Navarrete, 2021). In these systems, plant diversity helps meet nutritional and health needs by providing a variety of fresh foods throughout the year (Das & Das, 2015). In Latin American countries, this diversity also contributes to the conservation of native species and local varieties, preserving traditional indigenous knowledge (Barbhuiya et al., 2016).

From an ecological perspective, agrobiodiversity enhances soil fertility, nutrient recycling, and carbon reduction while creating favorable microclimates (Arias Ramírez & Dumani Echandi, 2024). Its proper management can improve family livelihoods, generate additional income, and promote sustainable development in rural and peri-urban communities (Castañeda-Navarrete, 2021).

Agrobiodiversity also supports the increase of pollinators in urban gardens (Philpott et al., 2023). By cultivating a wide variety of plant species, urban gardens attract diverse insects such as bees,

bumblebees, butterflies, hummingbirds, and frugivorous bats, all of which contribute to ecosystem health and sustainability (Kaiser et al., 2015; Prudic et al., 2022; Siviter et al., 2023).

RESEARCH ON URBAN AGRICULTURE IN THE UNITED STATE AND LATIN AMERICA

The study of the design and implementation of urban gardens in Latin American countries is essential for understanding their impact on food security and urban sustainability (González-Ball et al., 2022). Similarly, the Food and Agriculture Organization of the United Nations (FAO) states that urban agriculture can make a significant contribution to food and nutritional security, improving livelihoods and promoting environmental sustainability (FAO, 2024). This perspective proved to be decisive during the pandemic, as it encouraged reflection on the need to produce local food and to ensure its availability for the entire population (FAO, 2024).

Numerous studies on UG in the United States suggest that, in the long term, this practice has the potential to reduce soil contaminants while enabling the production of safe food for human consumption (Lal, 2020). It is also considered an effective option to improve access to fresh produce in low-income urban communities (Lal, 2020). Although some studies have reported the presence of heavy metals in urban soils, most concentrations remain below acceptable limits (Small et al., 2019; Lupolt et al., 2021). Therefore, UG continues to be regarded as highly beneficial for urban soils, even though some researchers consider it a potentially risky practice (Bassetti et al., 2023). Other investigations have demonstrated that urban gardening promotes an increase in animal biodiversity (Philpott et al., 2023) and pollinators (Kaiser et al., 2015; Prudic et al., 2022; Siviter et al., 2023), and that it also enhances physical activity among older adults, according to studies conducted in the United States (Klann et al., 2019).

In the Dominican Republic, studies involving HIV patients have shown that food insecurity negatively affects HIV prevention and treatment. Several investigations indicate that Urban Gardening (UG) combined with peer nutritional counseling can improve diet quality, increase the consumption of healthy foods, and enhance participants' psychosocial well-being (Derose et al., 2021; Celeste-Villalvir et al., 2023; Celeste-Villalvir et al., 2024; Derose et al., 2024). In Puerto Rico, UG initiatives have been documented, particularly after the hurricanes that severely affected the island; however, studies on the presence of heavy metals in soils where UG is practiced remain limited (Misenheimer et al., 2018). Meanwhile, in Cuba, Urban Agriculture (UA) emerged as a solution to the national food crisis, and by 2012 the country had positioned itself as a global leader in sustainable

and ecological food production (Humboldt, 2012). Currently, Cuba follows a convergent approach in the use of agrobiodiversity within municipal projects where UA is practiced, aiming to consolidate a prosperous and sustainable agricultural model capable of meeting the growing food demands of its population (Endres & Endres, 2009; Peña, 2015; Núñez González et al., 2023). In Mexico, research has found a positive association between plant diversity, food consumption, and the frequency of vegetable intake (McDonnell & MacGregor-Fors, 2016; Castañeda-Navarrete, 2021). Another study in Mexico demonstrated that UG contributes to greater pollinator diversity, including hummingbirds (Sánchez Sánchez & Lara, 2024). Although numerous efforts are being made to expand UG initiatives, the country still lacks a specific legal framework regulating the establishment and maintenance of urban gardens (Alcántara Nieves et al., 2022). In Central America, UG remains understudied, with few scientific records available. One investigation in Costa Rica examined agrobiodiversity in family gardens and household food security in Monteverde (Arias Ramírez & Dumani Echandi, 2024), while another explored the diversity and traditional knowledge of medicinal plants in private gardens (González-Ball et al., 2022). In Colombia, ongoing projects on sustainable UG have proposed innovative methodologies to evaluate and select green infrastructure and to manage water resources in order to provide ecosystem services adapted to specific environmental conditions (Feola et al., 2020; Arteaga-Zambrano et al., 2025). Other studies focusing on the role of women in UG have revealed that many women demonstrate strong leadership within gardens, actively participating in cultivation, plant care, self-management, waste handling, and harvesting (Pantoja Bohórquez et al., 2024).

In Ecuador, programs promoting Urban Gardening (UG) projects for people with mental health conditions are being implemented, and it has been demonstrated that UG fosters active social participation, improves mental health, and strengthens family dynamics (Zamora-Moncayo et al., 2024). Other studies are being developed to assess the influence of earthworm bioturbation on the phytodisponibility of heavy metals in Ecuadorian UG systems (Lévêque et al., 2019). Similarly, in Peru, research has shown that facilitating access to UG contributes to better mental health in marginalized urban neighborhoods (Korn et al., 2018). Other studies in Peru have reported experiences with UG through tomato cultivation using hydroponic systems supported by mobile applications designed to assist family horticulture, taking into account the participants' cultural background (Ibarra-Cabrera et al., 2024). These studies demonstrate that the system can adapt to the cultivation context, the gardener's needs, and the project's budget, as the mobile application can be configured accordingly (Ibarra-Cabrera et al., 2024). In Argentina, research has identified the cultivation of medicinal plants in Urban Gardening (UG) initiatives, revealing that species

composition among gardens is generally similar, with approximately 30% variation in medicinal plant species (Furlan et al., 2016). Additional studies on fruit gardens within urban areas have been conducted in the peri-urban region of Iguazú, Argentina, demonstrating that these systems have significantly influenced landscape diversification over the years, which is closely linked to the country's cultural diversity (Furlan et al., 2017). In Chile, as well as in Paraguay and Uruguay, studies on UG remain scarce; however, several published works and academic theses have documented initiatives aimed at promoting UG practices in these countries (Jana et al., 2019; Delvalle Fernández, 2019; Álvarez Pedrosian, 2023). In Brazil, multiple investigations on UG have been conducted. Scientific studies assessing the influence of air pollution on vegetables cultivated in São Paulo demonstrated that atmospheric pollution caused by traffic directly affects the absorption of chemical elements in these vegetables, which often exceed the recommended safety limits for human consumption (Amato-Lourenco et al., 2016). Another study, carried out in the metropolitan region of São Paulo, specifically in Santo André an area characterized by intense industrial activity where UG is practiced evaluated the presence and concentration of elements such as As, Ba, Cd, Co, Cu, Cr, Ni, Mo, Pb, Sb, Se, V, and Zn, revealing moderate to severe contamination according to established regulatory standards and indicating the presence of pathogenic bacteria such as Shigella, Enterobacter, and Citrobacter (Lange et al., 2024). Studies conducted in southern Brazil have demonstrated the presence of Giardia duodenalis in community gardens where raw vegetables are consumed and organic or chemical fertilizers are used, evidencing through PCR the identification of genotypes with zoonotic potential (Rafael et al., 2017). Terrestrial mollusks that can become agricultural pests and transmit parasites have also been detected in Urban Gardening (UG) areas in Rio de Janeiro specifically in the neighborhoods of Manguinhos and Jacarepaguá where larvae of the family Metastrongyloidea were found, a group that includes nematodes of concern for public health and veterinary medicine (Oliveira et al., 2023). Based on this discovery, scientists have emphasized the need to provide information and develop educational initiatives and health interventions aimed at controlling parasitic diseases transmitted by mollusks in community gardens in Brazil (Oliveira et al., 2023).

Brazilian researchers have reported a lack of information about the amount of food produced by Brazilians in their Urban Gardening (UG) systems and how this production is managed (Sant'Anna de Medeiros et al., 2020; da Cunha et al., 2020). Furthermore, there is a knowledge gap related to the relationship between food produced in urban gardens and the prevalence of food and nutritional security, biodiversity, and urban environmental sustainability (Sant'Anna de Medeiros et al., 2020; da Cunha et al., 2020).

STUDIES ON URBAN AGRICULTURE CONDUCTED IN PANAMA

In Panama, UG has shown slow development throughout its history, with no specific policy for the promotion and regulation of this activity, and there are no reported scientific studies or official records related to this practice in the country (Soto-Fernández & Bourdett-Stanziola, 2025, unpublished data). In most areas of Panama City, UG activities have developed spontaneously and are currently operating in some urban sectors of the country (Soto-Fernández & Bourdett-Stanziola, 2025, unpublished data). Recently, on March 31, 2025, the "Agricultural Affairs Commission of Panama" approved a law to promote, regulate, and support UG nationwide, considering UG a relevant strategy for Panama's food security because it would increase the food supply and encourage the implementation of agroecological practices in a context marked by social inequalities.

In Panama, Urban Gardening (UG) projects are currently being developed, and some preliminary results are presented here: since 2019, the Faculty of Agricultural Sciences (FCA) at the University of Panama has implemented a UG construction project involving 500 students, who were encouraged to design and implement gardens in their homes and apartments located in the northern, eastern, and western areas of Panama City. Another group of 200 students has been developing UG activities since 2019 at the Porcelana Experimental Farm, a research center belonging to the FCA and located in Tortí, Chepo, approximately 150 km east of Panama City. In addition, a group of 57 women organized by the "Fundación de Líderes de Panamá" (FUNDALIPA, Leaders of Panama Foundation) in Capira, located 47 km west of the capital, has received training and education to establish UG systems in their homes; this project has been operating since January 2024 (Soto-Fernández, 2025, unpublished data).

All the aforementioned projects include the cultivation of diversified short-cycle vegetable gardens intended for consumption, such as fruit crops (Annona muricata, Carica papaya, Psidium guajava, Byrsonima crassifolia, Mangifera indica, among others); aromatic and medicinal plants (Coriandrum sativum, Mentha spicata, Chamaemelum nobile, Calendula officinalis, Zingiber officinale, among others); tubers (Manihot esculenta, Daucus carota, Curcuma longa, among others); as well as the cultivation of rice, beans, corn, and other crops, using natural fertilizers (Soto-Fernández, 2025, unpublished data).

The preliminary results of the above-mentioned projects have shown that 100% of the harvested products are being used for consumption, 60% of the garden's produce is also sold, and 30% of the vegetables produced are being donated to schools, high schools, orphanages, nursing homes, and

other institutions (Soto-Fernández, 2025, unpublished data). About 5% of graduates from the Faculty of Agricultural Sciences are currently engaged in the "Silvopastoral" system as a commercial activity (Soto-Fernández, 2025, unpublished data). At the same time, at the Porcelana Experimental Farm, UG has been shown to increase the biodiversity of pollinators such as bees, bumblebees, butterflies, and hummingbirds; in parallel, another ongoing project aims to identify pollinator species and quantify their presence in this garden (Soto-Fernández, 2025, unpublished data).

Another research project currently underway, which began in January 2025, is being conducted in San Miguelito, 11 kilometers north of Panama City, at the Hogar San José, a home that houses about 60 abandoned elderly individuals, some with mental health conditions, and approximately 30 children with disabilities. The project involves the elderly participating in the construction of Urban Gardens (UG) with the support of students and professors from the Faculty of Agricultural Sciences (FCA) at the University of Panama. These gardens also include the cultivation of diversified short-cycle vegetables such as those mentioned in the previous projects. Anthropometric data from the elderly and validated mental health surveys were collected at the beginning of the study, and so far, preliminary results have shown that UG can improve mental health among the elderly participants (Soto-Fernández, 2025, unpublished data).

Since 2022, an Urban Gardening (UG) project has been developed in five residential homes located in El Espino, La Chorrera, situated 40 kilometers west of Panama City, where a diversified vegetable garden for consumption has been implemented, and according to preliminary results, 200 samples of tomatoes and bell peppers were collected (100 tomatoes and 100 peppers) for E. coli analysis, the appropriate dilutions were made and plated on E. coli count (ECC) Petrifilm plates (3M) and incubated at 37 ± 2.0 °C, detecting the presence of E. coli in 32 samples (21 tomatoes and 11 peppers). All samples were analyzed using a commercial ELISA technique for the detection of the VP6 protein of rotavirus and the RT-PCR technique for the detection of VP7 (G) and VP4 (P) rotavirus proteins. A positive presence of rotavirus was detected by the ELISA technique in 73 samples, and rotavirus group genotype G9 P [10] was detected in 64 samples of tomatoes and bell peppers (55 tomatoes and 9 bell peppers) from three houses where UG is currently being implemented (Bourdett-Stanziola, 2025, unpublished data).

Currently, these projects have been approved by the Bioethics Committee of the Faculty of Agricultural Sciences (FCA) at the University of Panama (FCA-2019-2029).

DISCUSSION

In the 20th century, cities experienced exponential growth, and it is predicted that by 2050 more than 70% of the world's population will live in urban areas (World Bank, 2022). Considering this future scenario, urban areas acquire a central role due to the multiple challenges faced by cities (World Bank, 2022). As a proposed solution to these challenges, efforts are being made to intensify UG in cities with the aim of making better use of urban land and, in this way, contributing to food security.

In recent years, UG has gained increasing prominence worldwide due to the negative effects of urban growth, which is contributing to environmental degradation, and therefore UG is perceived as a tool to strengthen food sovereignty (Sant'Anna de Medeiros et al., 2020), and it would also contribute to climate change adaptation and mitigation (FAO, 2024). This is closely linked to the advance of urbanization, as Latin America and the Caribbean currently have 80% of their regions urbanized, and this trend continues to rise (Aulestia & Lana, 2024). At present, in many countries there are no formal or approved laws regulating policies to support UG, which slows down its progress (Sant'Anna de Medeiros et al., 2020).

The increase in urbanization leads to higher food demand, which in turn puts pressure on natural resources; research shows that urban residents must pay between 10% and 30% more for their food than those living in rural areas of the same country (Eigenbrod & Gruda, 2015), which demonstrates that it is also necessary to promote the implementation of UG in cities, as it helps among many other benefits to reduce the cost of the basic food basket; moreover, UG enables the population to become more independent and resilient, as experienced during the COVID-19 pandemic, when the expedite acquisition of food in urban areas across Latin American countries became difficult.

Some research carried out in the United States and in Latin American countries such as Peru, Ecuador, Argentina, and Brazil has shown that activities related to horticulture offer a wide range of benefits, from environmental to social aspects (Xue et al., 2025), which examined how horticulture can provide therapeutic advantages by contributing to improved quality of life and reduced biological stress levels, based on a study conducted with medication-dependent diabetic patients from the UK Biobank.

Other studies have shown that gardens and productive farms facilitate the strengthening of family and institutional ties, as they represent good options for food production, nutritional improvement, and income generation (Celeste-Villalvir et al., 2024; Derose et al., 2024; Castañeda-Navarrete, 2021).

On the other hand, humanity faces the growing problem of depressive and mental illnesses, which are increasing every day, and since 2019, the Director-General of the World Health Organization (WHO),

Dr. Tedros Adhanom Ghebreyesus, has warned about the need to establish an international policy to support a growing population affected by mental health disorders. With this in mind, studies carried out in Latin America on UG in Peru and Ecuador (Korn et al., 2018; Zamora-Moncayo et al., 2024) are moderately promising, as improvements have been observed in patients with mental health problems through their participation and commitment to the design, construction, and implementation of UG projects, and studies currently being conducted in Panama (Soto-Fernández, 2025, unpublished data) have also shown improvements in patients with mental health conditions who are involved in the design, construction, and implementation of UG projects. Another study demonstrated that UG provided mental health benefits to people who practiced it during and after the COVID-19 pandemic (Zhang et al., 2021). Moreover, other studies have also shown that UG contributes to improved life expectancy and better health among patients who suffer from or have survived cancer and HIV. This is believed to be due to the fact that patients begin to eat more fruits and vegetables and engage in more physical activity, thereby strengthening their immune systems and significantly reducing stress and anxiety (Demark-Wahnefried et al., 2024; Bail et al., 2022; Demark-Wahnefried et al., 2018; Derose et al., 2021; Celeste-Villavir et al., 2023; Celeste-Villalvir et al., 2024; Derose et al., 2024).

Ecosystems must be restored as they are being destroyed; however, such restoration is not progressing at the pace needed to counteract their degradation. Cities must green existing spaces, and in this process, they should also work to restore what has been lost. Research on agrobiodiversity (Philpott et al., 2023) in UG has demonstrated that it attracts pollinators (Kaiser et al., 2015; Prudic et al., 2022; Siviter et al., 2023); therefore, the incorporation of biodiversity into UG is considered an important and indispensable component for achieving sustainability and conservation, nevertheless, maintaining this practice has become increasingly difficult in recent years in many Latin American countries and around the world. Developing and implementing strict policies in Latin America particularly in Central American and Caribbean countries to promote agrobiodiversity in UG is urgent, as such measures would offer innovative solutions to the ecological challenges we are currently facing.

Following the reports of studies published by some Latin American scientists, we consider it important that the laws of each country should establish that it is necessary to carry out, in parallel with the construction, implementation, and development of UG, a documentary analysis through monitoring records of garden health by means of entomological, malacological, microbiological, and parasitological examinations. Biological control has shown to help maintain garden health (Lucatero et al., 2024), and this involves not only the pests that affect the growth and health of the gardens per se, but also those pests (parasites, bacteria, and viruses) that can use the garden as a potential

environment that poses a risk of accidental infection to humans through contact with soil and the consumption of inadequately washed vegetables and fruits (Bourdett-Stanziola, 2022; Bourdett-Stanziola et al., 2022; Bourdett-Stanziola, 2023; Bourdett-Stanziola, 2025, unpublished data; Lange et al., 2024; Rafael et al., 2017; Oliveira et al., 2023; Nath et al., 2024; Dahoui et al., 2023). Studies have shown that some bacteria, parasites, and viruses identified in UG can cause health problems of veterinary importance (Rafael et al., 2017). Research worldwide has also advanced in this line and has detected bacteria, parasites, and viruses some of zoonotic importance (Rafael et al., 2017; Oliveira et al., 2023) in urban gardens in several countries, where they have spread to humans (Nath et al., 2024; Dahoui et al., 2023) and animals (Rafael et al., 2017; Oliveira et al., 2023). There is a clear need in Latin American countries for joint initiatives that integrate political, educational, and scientific measures to ensure effective pest control and prevent diseases that may affect public and domestic animal health (Kolomiiets et al., 2022). The studies related to this topic, together with the scenarios observed in the reported investigations, highlight the "One Health" concept, which can be achieved through a multidisciplinary collaborative effort to attain optimal health for people, animals, and the environment. Any initiative of this kind should integrate different sectors to ensure the best public health policies. We also consider it important that, parallel to the expansion of UG, chemical studies be carried out to detect contaminants in vegetables and soils (Amato-Lourenco et al., 2016; Lange et al., 2024).

CONCLUSION

Urban gardening is growing in Latin American countries, establishing itself as a major strategy for food production and environmental sustainability; however, it currently faces many political challenges. The recent COVID-19 pandemic, which triggered an economic crisis, left us with important lessons, showing that UG greatly strengthens the demand for safe food that the world needs both now and in the future. Furthermore, numerous studies have demonstrated that UG can contribute by providing multiple benefits, including the strengthening of family and institutional bonds, improved nutrition, decrease in basic food basket costs, income generation, therapeutic support, and better health outcomes for patients with various physical and mental conditions.

It is important to implement this UG approach through the concept of "agrobiodiversity" to support ecosystems in promoting and increasing the biodiversity of animals and pollinators which is essential for maintaining the sustainability and conservation of our tropical forests that represent 23% of the world's total in Latin America.

Last, but not least, this practice of UG must be carried out under established laws that promote it and include parallel studies alongside the progress of UG focused on the detection and monitoring of pests (parasites, bacteria, and viruses) that may affect garden health, as well as microbiological (bacterial and viral) and parasitic pathogens that pose potential health threats to the population and are also of veterinary importance.

AI USE STATEMENT

We declare that no artificial intelligence technology was used in the writing of this manuscript.

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