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Review on Urban Horticulture and Food Security in Ethiopia

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Abstract

There are long traditions of farming intensively within and at the periphery of cities. Each tradition is deeply rooted in local concepts of city and community, and in local societal and cultural practices. Urban Horticulture varies with country, local culture, and traditions and it may involve cultivation of ornamental and medicinal species such as fruit, vegetables, tubers, herbs, aromatic plants, roots, mushrooms and so on mainly in the city where there is competition for land. It could involve the use of plants for recreation, the design of landscape, public facilities, or therapy of ill and disabled individuals. Today, in Ethiopia, urban farming is becoming increasingly significant as a source of household food, a trend that is closely linked to declining incomes of vulnerable urban households in the wake of economic restructuring, high rates of urbanization, and the need to serve an emerging niche market. Urban horticulture is major food and income source for many urban settlers and when merged with other technologies, it can assist urban territories in absorbing increasing populations while providing food security.

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Introduction

The world is being urbanized at a great speed. In a time of extremely high population growth, loss of arable land, dietary changes, increasing bio-energy use, and climate change, the food issue is becoming more and more important. According to the United Nations (2013), the current world population of 7.2 billion people will increase to 9.6 billion people by 2050. Approximately a billion people are chronically malnourished (Foley *et al.*, 2011) and in addition, the stability of the whole food systems may be at risk because of short-term variability in supply. Compared to rural agriculture the growing of food in cities has some major advantages such as close proximity to markets, providing fresh food as well as reducing transportation costs. Local food supply through urban horticulture can have multidimensional positive

impacts such as reducing negative impacts on the environment through humans, promoting the local economy, and strengthening social cohesion (Haberman *et al.*, 2014). Food security is not only an issue for countries of the world but also, for instance, for low-income households of the world, contributing also to economic and social well-being. In addition, food quality is a major concern in cities of the world and there is an increasing need to provide sustainable locally produced foods (Forster *et al.*, 2017; Poulsen, 2017).

According to Tenkouano, (2011) low income urban areas, the dietary deficiency of micronutrients, such as iron, zinc, iodine, and vitamin A is more common. Horticultural commodities, such as fruits and vegetables, are rich in minerals, fibers, and bioactive compounds (example phenolics and antioxidants), and have the

potential to reduce malnutrition. Moreover, when these products are fresh and hygienic, this local food supply can have multiple positive impacts on humans, such as strengthening social cohesion and the local economy. On other hands, higher poverty rates, malnutrition, stunted growth, and rising populations across the world have enhanced the importance of urban horticulture (Dubbeling *et al.*, 2010). To fulfill the food needs of people, vacant spaces in urban areas will be a prime priority in order to compensate for lack of food and urban ecological losses if land is left barren. Growing horticultural food crops in urban landscapes, and open spaces, will improve the sustainability of food and the environment. Urban horticulture is essentially, a way to mitigate societal social challenges.

Results and Discussion

Urban Horticulture and Food Security in Ethiopia

Urban horticulture is one of the most important socioeconomic sectors for future city designs combining economical, ecological and societal demands. The balance of these demands leads to sustainability. Production of plants used in cities, including food, is re-discovered in city planning currently. Being part of typical cities for centuries and forgotten over decades, more and more city designers have space in mind for horticultural plant production (Edmondson *et al.*, 2020).

“Urban Horticulture” is the cultivation of fruits, vegetables, mushrooms, herbs and aromatic and ornamental plants that can grow easily in a city and its surroundings. Many horticultural crops are considered ideal in urban agriculture production systems because they occupy a small space, produce more per unit area, have high nutritional value, and short production cycles (Figure 1). Urban horticulture would help also to reduce food deserts in minority and low-income communities and help provide food in the local communities at unaffordable prices (Eva, 2010). In developing nations, like Ethiopia, urban horticulture is employed to generate independent businesses and a source of direct income or funds thereby prompting social security (Van Leeuwen *et al.*, 2010). Urban farming additionally enhances access to garden-fresh nourishing foods, helps battle diabetes and weight problems in children, gives accessibility to foods that are scarce among migrant communities, and improves poor health due to malnourishment in many urban areas and social well-being through strengthening existing relationships between different races and reducing criminality (Lovell, 2010).

Significant features of urban horticulture in Ethiopia

Improving food availability, food access and nutrition security

Food availability is the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid. Food availability might be aggregated at the regional, national, district or community level. Food access concerns a household’s ability to acquire adequate amounts of food through own home production and stocks, purchases, barter, gifts, borrowing and food aid. Utilization of food is ability of household members to make use of the food to which they have access. This includes an individual’s ability to absorb and metabolize the nutrients. It includes the ways in which food is stored, processed and prepared, including the water and cooking fuel used, and hygiene conditions. Utilization can be impaired by illness or poor caring practices. Stability of food (availability, access, utilization) sometimes included as an additional factor to address the time dimension of food security. This can refer to short-term instability or medium term instability, often stemming from climatic, economic, social and/or political factors that may threaten an otherwise food secure situation.

According to Eshetu (2011), the five years strategic plan of *Bishoftu* town (2007-2011), urban agriculture was the second intervention area of the town next to eco-tourism to be taken as a strategy to enhance food security situation and employment opportunities for the dwellers. The potential of the town for urban horticulture motivates substantial number of inhabitants to involve in the sector; lack of formal employment is one of the main reasons especially for youngsters to involve in urban farming activities. Urban farming does not only increase the quantitative access to food; but also food security in terms of quality by promoting a more nutritious diet irrespective of income level (Table 1). The growing interest of residents in organic and local food is a major opportunity to promote the implementation of Urban Horticulture further (Aubry and Kebir, 2013).

Ensures food supply and sustainability

Consistent food supply is at high-risk due to natural disasters, climate change, conflicts between countries, the refugee crisis, and worsening inequality. According to the Food and Agriculture Organization (2008), 820 million people are suffering from hunger, out of which, 113 million are at risk (concerning their lives and

livelihood). According to Terefa (2010), the small-scale farmers in the Adama town produce important agricultural outputs such as maize, teff, wheat, barley and pulses in order of their significance. They also produce vegetables like tomato, onion, potato, and carrot and beetroot vegetable and animal outputs to the market to supplement their household financial requirements (Table 2). The family members of the households vend the outputs themselves or sale it out to the formal shop owners.

Food source is a proxy indicator to measure household food access. It also indicates whether the households are vulnerable to shocks or not based on the sources of food they depend on as a major source of food. For example, the rate of dependency on purchased food vs home produced indicates the extent to which households are vulnerable to high food prices. As they mentioned Major source of food is, 71 percent reported purchase, 25 percent own production, 2 percent food assistance, and 2 percent gift from relatives and friends as a main source of food, respectively (Figure 2).

Source of income generation and increase economic growth

In developing countries, poverty is more prevalent and job opportunities are extremely marginal, particularly outside the agriculture sector. Cities are increasing in population, and the demand for healthy and safe food is under intense pressure. Urban horticulture offers a source of local food production and employment generation opportunities for the future, particularly in developing countries especially in Ethiopia. Currently, many from the developing world are using urban horticulture as a direct source of income generation by running their own businesses (Van Leeuwen *et al.*, 2010). According to Zezza and Tasciotti (2010) in Africa, urban horticulture is becoming an important source of employment, where roughly 40% of urban citizens are involved in urban agricultural jobs. This was also supported by other researchers, who stated that the agriculture sector has increased urban and rural employment by increasing labor empowerment. In many countries, urban areas are filled with large buildings and the most fertile lands are converted into structures.

Used to control environmental pollution and climate change

Worldwide, urbanization has negatively impacted the climate. Moreover, deforestation, greenhouse gases, heat

and smoke emissions from vehicles, industries, and homes have raised pollution levels, and the temperature of the earth. Modern facilities and home appliances, such as air conditioning and refrigerators, are also prime reasons for the temperature increase. The effects of climate change, particularly rising temperatures and erratic rainfall patterns, are notable in reducing crop yields and environmental growing conditions (Artmann and Sartison, 2018).

Urban horticulture can help mitigate ever-increasing environmental pollution because of the ability of plants to absorb air and soil pollutants. Cities are becoming denser due to rapid urbanization, the increase in the numbers of structures, and the addition of industry. Edible urban horticulture plants can help alleviate environmental pollutants. When vegetable and fruit crops are grown near city boundaries, the city will become the site of agricultural production. In cities, green vegetation reduces air pollution, dust particles and nitrogen dioxide (Harris *et al.*, 2010).

Moreover, the strategy of planting aromatic plants can help in mitigating bad odors from polluted cities. Urban horticultural plants have played an important role in making cities more natural, greener and beautiful. The use of tall trees, green shrubs, grasses and mulches in urban settings has been shown to have a cooling effect. Due to this; many people have developed an interest in participation on urban farming to concerns about climate change and sustainable food supply in urban areas (Keesstra *et al.*, 2018)

Resource use efficiency and urban regeneration

In light of resource scarcity and the challenge to feed the increasing urban population, the current modes of conventional food production are requested to reduce the urban footprint. To use resources efficiently and to maintain a healthy ecosystem there is a need to adapt cyclical urban metabolism. The potential of urban horticulture to contribute to resource-efficient food production was investigated through different challenges (Balda *et al.*, 2017). The focus of this challenge is in particular on vacant spaces and rooftop gardens. Vacant spaces can be used to increase energy self-sufficiency by bio-energy production, without threatening food security. To establish synergies between energy efficiency and food production fully, integrated rooftop greenhouses can be used to exchange carbon dioxide, rainwater and heat between the building itself and its connected rooftop greenhouse. To get a full picture of the metabolism of

urban horticulture from production to consumption, life-cycle assessments of rooftop gardens showed that environmental and economic impacts differ between cultivation techniques such as nutrient film technique, floating and soil, rooftop garden, industrial greenhouse or open-air rooftop and rooftop greenhouses (Sanyé-Mengual *et al.*, 2017).

Urban horticulture promotes urban regeneration processes by improving the city's image supporting local food supply, promoting urban biodiversity and increasing economic benefits for low-income residents by saving food costs (Roth *et al.*, 2015).

Challenges of urban horticulture to increase food security

According to Etana *et al.*, (2019), urban horticulture limiting factors in Ethiopia are: absence or limited agricultural inputs, shortage of land or inability to get enough land because of high land grabbing in the area for other investment and house construction which they fear that they are at risk of losing the land they cultivate at any moment with short notice, less attention to horticultural crops and priority to cereal crops in the town areas, shortage of irrigation water supply, seasonal insect pest and disease problems, seasonal price fluctuation of the produce, availability and access to credit services, high health risks because of the majority of the rivers in the town are polluted by industrial wastes, lack or limited technical support from the government and non-government organizations.

Urbanization (lack of space for cultivation)

Urbanization as highlighted translates to two related spatial challenges, which are the shrinking of urban spaces due to population growth and the resultant lack of 'readily' available space for food production. For example (Crush *et al.*, 2011) highlight how less than 5% of poor households in engaged in urban farming. This low percentage reflects scarcity of land for food production. Secondly, insecure land tenure is one of the key challenges faced by urban farmers (De Bon *et al.*, 2010). Urban farming requires land. However, there is lack of space for growing crops in cities. As Bryld (2003) said it, "besides feeding the poor in the cities, there is an urgent need for providing shelter for the homeless". Knowing that growing food in cities requires land, it may not be prioritized in urban land uses since the demand for urban spaces to build houses is by far higher than using spaces for agricultural activities.

Argenti (2000) further emphasized that "agricultural productive lands are likely to be lost in this competition."

Health problems

Urban agriculture can be a health hazard. It uses resources of cities such as water and urban wastes for production. Use of wastewater/polluted rivers and untreated compost may contaminate crops and become health hazards to human beings. There are a number of cases when urban farming brought health problems. It is associated with urban pollution by the use of agrochemical. Emission of pollutants such as Sulphur dioxides and chlorofluorocarbon that are directly associated with urban farming. According to reports of Muluneh *et al.*, (2016); Hamere and Eyasu (2017). Sebeta town and its areas are contaminated with various pollutants. These include chemicals and heavy metals, found at a very concentrated amount and being toxic to plants, humans and animals.

Socio economic situations

This includes limited knowledge of the dwellers on farming practices, lack of detailed knowledge of sources of livelihoods and the relative importance of urban agriculture, inadequate study in the contribution of urban farming to family nutrition, pattern of food availability from urban farming, impact of urban agriculture to the urban environment, organizational capacity and initiative taken by local groups with respect to urban farming.

Lack of appropriate plant selection for urban horticulture

Urban horticulture will lead to a re-definition of quality characteristics of plants produced locally. The plant varieties cultivated in professional urban horticulture mainly are determined by demands of retailers. Currently, quality criteria are characteristics important for climate adaptation, growing and cropping conditions, long distance transport, assumed consumer demands like size, taste characteristics, absence of diseases symptoms. Direct marketing will change all these circumstances significantly. Plants with short shelf life can enter the market because product distribution is direct, without retail and rapid. The interrelationship between product quality and production quality demonstrated by producers directly to the consumer will rise the understanding for certain integrated pest management practices and will transparently discuss risks and chances of management options.

Table.1 Quantities of food items and calories consumed by food items

S.No.	Food Item	Quantity of food consumed		PAE quantity of food consumed		Per capita calorie consumed		PAE calorie consumed	
		kg	% share	kg	% share	Cal	% share	Cal	% Share
1	Root crops	74.6	18.7	90.5	18.7	270.0	10.9	328	10.0
2	Spices	4.2	1.1	5.1	1.1	38.4	1.6	47	1.6
3	Sugar/Sweeteners	5.9	1.5	7.2	1.5	50.6	2.0	61	2.0
4	Oils and fats	7.1	1.8	8.6	1.8	174.0	7.1	211	7.1
5	Vegetables	50.2	12.6	60.9	12.6	47.5	1.9	58	1.9
6	Fruits	2.9	0.7	3.5	0.7	3.9	0.2	5	0.2
7	Soft drink & Juice	2.7	0.7	3.3	0.7	6.1	0.2	7	0.2
8	Alcoholic beverage	24.6	6.2	29.9	6.2	114.2	4.6	139	4.6
9	Other foods	26	6.5	31.6	6.5	58.4	2.4	71	2.4

Source: Ethiopia, World food program and Headquarters, 2014

Table.2 Small-Holding Sample Urban Farmer’s Major Crops Output in Adama town

Crops	Output per year /household (In quintals)				Output per year per person (In quintals)			
	Kebele 03	Kebele 04	Kebele 14	Average	Kebele 03	Kebele 04	Kebele 14	Average
Onion	1.8	1.6	2.3	5.7	0.31	0.30	0.41	1.01
Carrot	0.5	0.0	2.7	1.1	0.09	0.00	0.48	0.20
Potato	3.0	2.4	5.6	3.7	0.52	0.44	1.00	0.66
Tomato	1.5	3.5	1.3	2.1	0.23	0.65	0.24	0.38
Average Vegetables	1.70	1.88	2.98	3.15	0.29	0.90	0.53	0.56

Source: Tefera, 2010

Fig.1 Types of urban horticulture (Nwosisi, 2018)

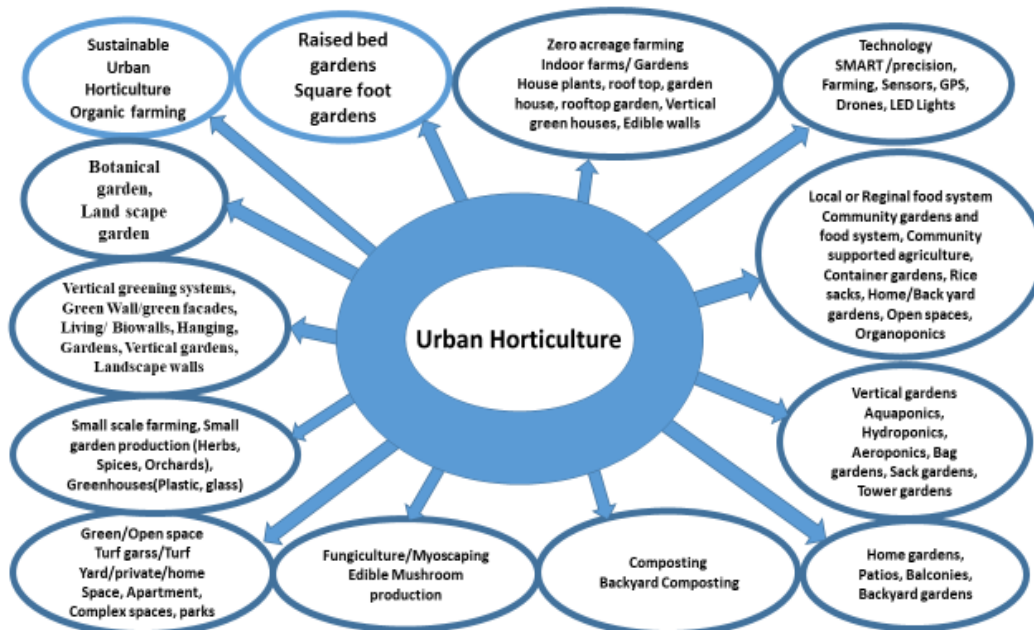
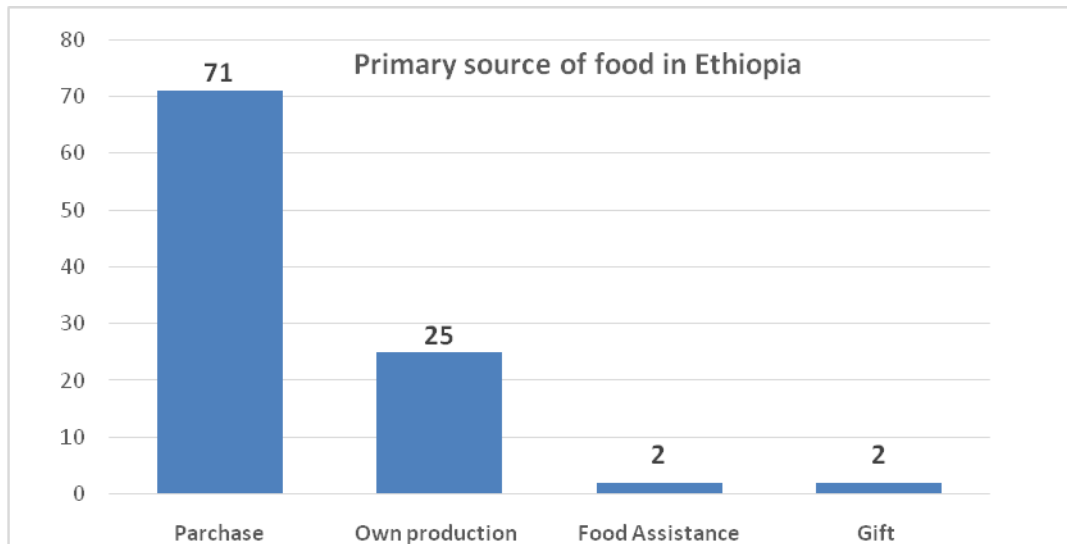


Fig.2 Percent of Distribution of Household's by Primary source of food in Ethiopia

Source: Ethiopia, World food program and Headquarters, 2014

This review attempts to shed lights on urban horticulture in Ethiopia in the contexts of the present and expected dynamics of the country. It particularly highlights how urban horticulture serves a unique opportunity to diversify employment, income and dietary options for urban households, and to recycle and reuse urban wastes thereby contributing to sustainable urban development. Despite its potential, however, the sector still receives inadequate institutional and policy support. A range of measures to raise urban households' awareness on waste management and their reuse in homestead gardens are highly needed.

Urban horticulture has positive effects on social, economic, food and ecological sustainability within cities. It increases community livelihood, saves energy, sustains the environment, and improves health through fresh food supplies in urban environments. It also offers recreational and aesthetic value to urban landscapes and individual homeowners. It offers a more consistent food supply, prevents markets disruptions, increases foods availability, and helps with stabilizing food prices. An important result of this paper is; that farmers perceive urban horticulture to make a vital contribution to their livelihoods. Motivated to produce food for their households' consumption, they choose to practice urban horticulture despite numerous barriers. In addition, a substantial proportion of their food appears to come from practicing urban horticulture.

Furthermore, there is, evidence that urban horticulture can have a positive effect on dietary diversity and

quality, and that it can be a key source of household income. Urban horticulture also appears to have potentially significant benefits for women. While more rigorous research is warranted to better understand the circumstances under which urban horticulture significantly impacts food security, I believe that multi-functional benefits associated with urban horticulture provide a sufficient basis to enact policies to support urban horticulture in settings where it is practiced to increase food security, food availability, food access, nutritionally sufficient food, environmentally acceptable and economically success full create farming.

References

- Argenti O., 2000. *Feeding the Cities: Food Supply and Distribution. Achieving Urban Food and Nutrition Security in the Developing World*. IFPRI, 2020 Focus 3. Brief 5 of 10. Washington.
- Artmann, M. and Sartison, K., 2018. The role of urban agriculture as a nature-based solution: A review for developing a systemic assessment framework. *Sustainability*, 10 (6), p.1937.
- Aubry, C. and Kebir, L., 2013. Shortening food supply chains: A means for maintaining agriculture close to urban areas. The case of the French metropolitan area of Paris. *Food policy*, 41, pp.85-93.
- Balda, M. C., Furubayashi, T. and Nakata, T., 2017. A novel approach for analyzing the food-energy nexus through on-farm energy generation. *Clean Technologies and Environmental Policy*, 19(4), pp.1003-1019.
- Bryld E. 2003. *Potentials, problems, and policy implications for urban agriculture in developing countries*.

- Agriculture and Human Values 20: 79-86, 2003. Kluwer Academic Publishers.
- Crush, J., Hovorka, A. and Tevera, D., 2011. Food security in Southern African cities: The place of urban agriculture. *Progress in development studies*, 11 (4), pp.285-305.
- De Bon, H., Parrot, L. and Moustier, P., 2010. Sustainable urban agriculture in developing countries. A review. *Agronomy for sustainable development*, 30 (1), pp.21-32.
- Dubbeling, M., Zeeuw, H. D. and Veenhuizen, R. V., 2010. *Cities, poverty and food: multi-stakeholder policy and planning in urban agriculture*. Practical Action Publishing.
- Edmondson, J. L., Cunningham, H., Tingley, D. O. D., Dobson, M. C., Grafius, D. R., Leake, J. R., McHugh, N., Nickles, J., Phoenix, G. K., Ryan, A. J. and Stovin, V., 2020. The hidden potential of urban horticulture. *Nature food*, 1(3), pp.155-159.
- Eshetu, Y., 2011. *The Role of Urban and Peri-Urban Agriculture for The Improvements of Urban Household Food Security The Case of Bishoftu town of the Oromia Region (Doctoral Dissertation, Addis Ababa University)*.
- Etana, M. B., Gonfa, M. T. and Duresa, C. O. 2019. Urban Horticulture. Ethiopia, W.F.P. and Headquarters, W.F.P., 2014. Comprehensive Food Security and Vulnerability Analysis (CFSVA).
- Eva De L, 2010. Urban agriculture as a strategy for poverty reduction in Uganda: the case of Lira Municipality. A master's thesis, Universities Gent, p 133.
- FAO 2008. Urban agriculture for sustainable poverty alleviation and food security
- Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E.S., Gerber, J.S., Johnston, M., Mueller, N.D., O'Connell, C., Ray, D.K., West, P.C. and Balzer, C., 2011. Solutions for a cultivated planet. *Nature*, 478 (7369), pp.337-342.
- Forster, T., Hussein, K. and Mattheisen, E., 2015. City region food systems: an inclusive and integrated approach to improving food systems and urban-rural linkages. *Urban Agriculture Magazine*, (29), pp.8-11.
- Haberman, D., Gillies, L., Canter, A., Rinner, V., Pancrazi, L. and Martellozzo, F., 2014. The potential of urban agriculture in Montréal: a quantitative assessment. *ISPRS International Journal of Geo-Information*, 3(3), pp.1101-1117.
- Harris, T. B., 2010. Nitrogen Dioxide in the Urban Forest: Exposure and Uptake.
- Keesstra, S., Nunes, J., Novara, A., Finger, D., Avelar, D., Kalantari, Z. and Cerdà, A., 2018. The superior effect of nature based solutions in land management for enhancing ecosystem services. *Science of the Total Environment*, 610, pp.997-1009.
- Lovell, S. T., 2010. Multifunctional urban agriculture for sustainable land use planning in the United States. *Sustainability*, 2(8), pp.2499-2522.
- Nwosisi, S. and Nandwani, D., 2018. Urban horticulture: overview of recent developments. *Urban Horticulture*, pp.3-29.
- Richards, P. J., Farrell, C., Tom, M., Williams, N. S. and Fletcher, T.D., 2015. Vegetable rain gardens can produce food and reduce storm water runoff. *Urban Forestry and Urban Greening*, 14 (3), pp.646-654.
- Roth, M., Frixen, M., Tobisch, C. and Scholle, T., 2015. Finding spaces for urban food production—matching spatial and stakeholder analysis with urban agriculture approaches in the urban renewal area of Dortmund-Hörde, Germany.
- Sanyé-Mengual, E., Oliver-Solà, J., Montero, J. I. and Rieradevall, J., 2017. The role of inter-disciplinarily in evaluating the sustainability of urban rooftop agriculture. *Future of Food: Journal on Food, Agriculture and Society*, 5(1), pp.46-58.
- Tefera, M. M., 2010. Food security attainment role of urban agriculture: a case study from Adama town, central Ethiopia. *Journal of Sustainable Development in Africa*, 12(3), pp.223-249.
- Tenkouano, A., 2011. The nutritional and economic potential of vegetables. In The World watch Institute (Ed.), State of the world 2011: Innovations that nourish the planet (pp. 27-37). New York, London: W.W. Norton and Company
- Van Leeuwen, E., Nijkamp, P. and de Noronha Vaz, T., 2010. The multifunctional use of urban greenspace. *International journal of agricultural sustainability*, 8 (1-2), pp.20-25.
- Yohannes, H. and Elias, E., 2017. Contamination of rivers and water reservoirs in and around Addis Ababa City and actions to combat it. *Environ Pollute Climate Change*, 1(116), p.8.
- Zeza, A., and Tasciotti, L., 2010. "Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries." *Food Policy*, 35(4), pp. 265-273.

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