

Practical Reflection and Benefits of Making a Food Garden at Home During Covid-19 Pandemic

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Abstract

The partial lockdown during the Covid-19 pandemic in Indonesia pushed people to work from and spend more time at home. During this unprecedented time, many people pursued new hobbies in gardening, which proved to enhance physical and mental health. With anxieties regarding food insecurity, food gardens became a new urban trend. With a relatively tiny space available, it is possible to make an urban food garden in the front yard of a house using various cultivation techniques to maximize space. However, the implementation of food gardens in urban houses is quite challenging due to limited space. Then, we reflect on the practical process and personal benefits gained from developing a tiny food garden at home. The tiny food garden could produce a variety of vegetables and herbs, such as the spinach family, lettuce, Asian greens, the tomato family, eggplants, the basil family, mint, rosemary, moringas, and butterfly-pea flowers. It may support a household with few amounts of fresh emergency food in the worst scenario during the Covid-19 pandemic. Besides, developing a tiny food garden at home may also provide co-benefits such as enhanced subjective well-being, increased appreciation of food and the environment, motivating others to start gardening at home, and great personal satisfactions of consuming home-grown food. With all these socio-ecological co-benefits, home food garden must be integrated as a strategy to achieve urban sustainability and increase household food resilience.

Keywords: Covid-19; Food garden; Kitchen garden; Urban farming; Urban gardening

1 Introduction

The partial lockdown during Covid-19 pandemic in Indonesia pushed people to work from and spend more time at home. The stay-at-home orders during Covid-19 have affected mental health concerns related to anxieties, negative thoughts, and insomnia (Jacobson et al., 2020). During this unprecedented time, many people pursued a new hobby in gardening. Regular gardening activities proved to enhance physical and mental health (Soga et al., 2017). Moreover, engaging with nature through gardening could

improve psychological and physical well-being through biophilic features and high-intensity activities (Scott et al., 2020). Gardening may also improve human cognitive functions, such as better memory performance (Park et al., 2019).

The pandemic is predicted to disturb the urban food systems (Reardon et al., 2020) and threaten the food supply in urban areas (Carey et al., 2020). Furthermore, concerns arise regarding the possibility of Covid-19 transmission through the food supply chain (Rizou et al., 2020). Anxieties of food insecurity and disrupted food supply in the market during pandemic Covid-19 raise a

concern and demand that families be more resilient in the food supply. Therefore, we took the initiative to convert the tiny urban house yard into a tiny food garden to grow a small amount of fresh emergency food and improve household food resilience. Literature has suggested that home gardening and urban farming are important strategies to a more resilient household food supply and further benefit the environment, economy, and ecosystem services (Galhena et al., 2013; Jacobs et al., 2016; Lal, 2020; Spilková & Vágner, 2018).

Some authors have discussed the importance and benefits of urban gardens (Altieri & Nicholls, 2020; Pulighe & Lupia, 2020) and home gardens (Lal, 2020; Montefrio, 2020) for enhancing food security in urban areas during pandemics. But there is a limited number of articles discussing the experiences of developing urban food gardens during the Covid-19 pandemic. As far as observed, only one article discusses the experiences of making a food garden during the Covid-19 pandemic in a Mediterranean country (Sofa & Sofa, 2020). Inspired by their work, this article aims to contribute new findings to the literature about the experiences of making an urban food garden and its benefits during a pandemic situation.

2 Method and Process

2.1 Identification of Available Space and Sunlight

The initial preparation for setting up a food garden is by observing the site. The site is situated in a tropical city setting called Yogyakarta, Indonesia. Yogyakarta is located at latitude -7.797068, and longitude 110.370529. The characteristic of the climate is hot and humid. The city has rainy seasons from October to April and dry seasons from April to October. The preparation of the food garden started at the end of May, and the planting intensively began in June. Living in a small urban house with a tiny front yard has its challenges, even more so when it comes to building a food garden. Various studies explain that limited space is one of the biggest challenges of urban gardening (Glatron & Gran-

champ, 2018; Lu & Grundy, 2017; Ranasinghe, 2009). The observation found that the house only provides 7 square meters of available space for gardening. The area is located in the front yard of the building. The front area of the house is facing North, thus a good amount of sunlight during the day is available (Figure 1). Sunlight is an essential aspect of food plant cultivation as it contributes to photosynthesis (Hemenway, 2001). Then, the available site is planned into several cultivation strategies and types of plants, based on sun exposure throughout the day and space availability.

2.2 Maximising Space and Cultivation Techniques

With limited space available, strategies to maximize space are needed (see Figure 2). Most techniques require containers in various shapes and sizes. Basic containers and vertical cultivation are an efficient technique for limited building space (Lu & Grundy, 2017). As containers are made of plastic, we reuse them as long as possible. Besides containers, other cultivation techniques are still feasible (Al-Mayahi et al., 2019) such as raised beds and in-ground beds (see Figure 3). The practical reflection in practicing various cultivation techniques for maximizing space is elaborated in Table 1.

An initial financial outlay is needed to build a kitchen garden. The cost estimation and materials are divided based on cultivation techniques (see Table 2). Some of the listed materials are free resource. It should be noted that the estimated prices here may differ from prices in other cities or countries. In addition, during unstable pandemic conditions, it is preferable to buy materials from online marketplaces or find the nurseries closest to the location of the garden and always wear a mask.

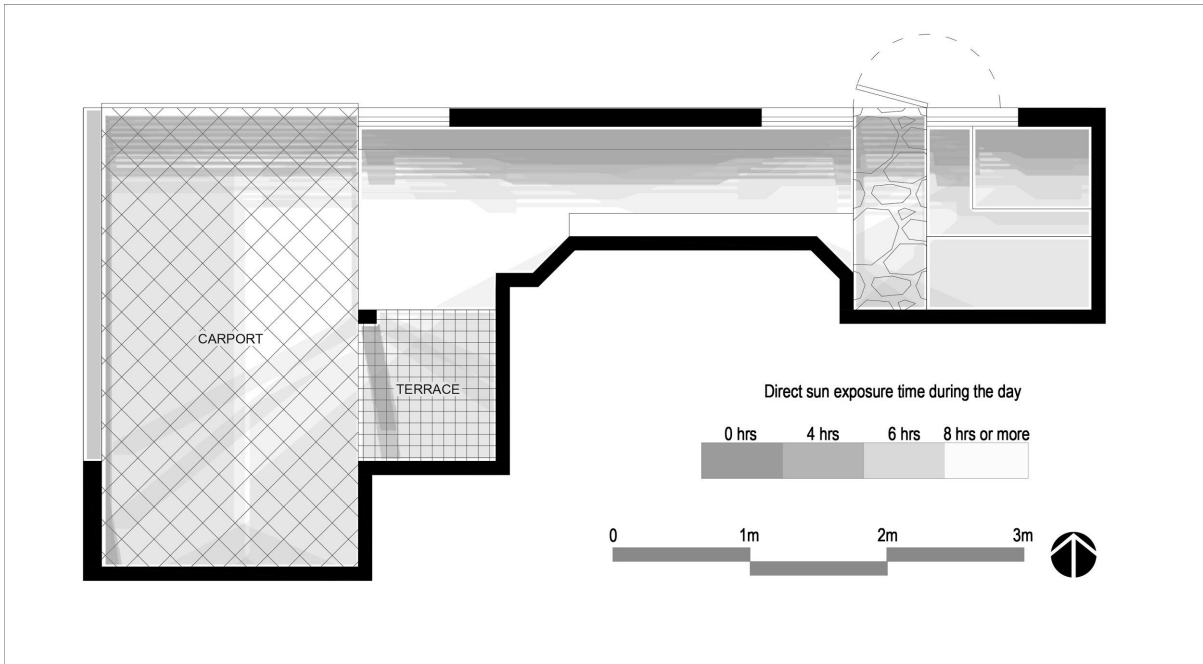


Figure 1: The area exposed to direct sunlight during June - August.

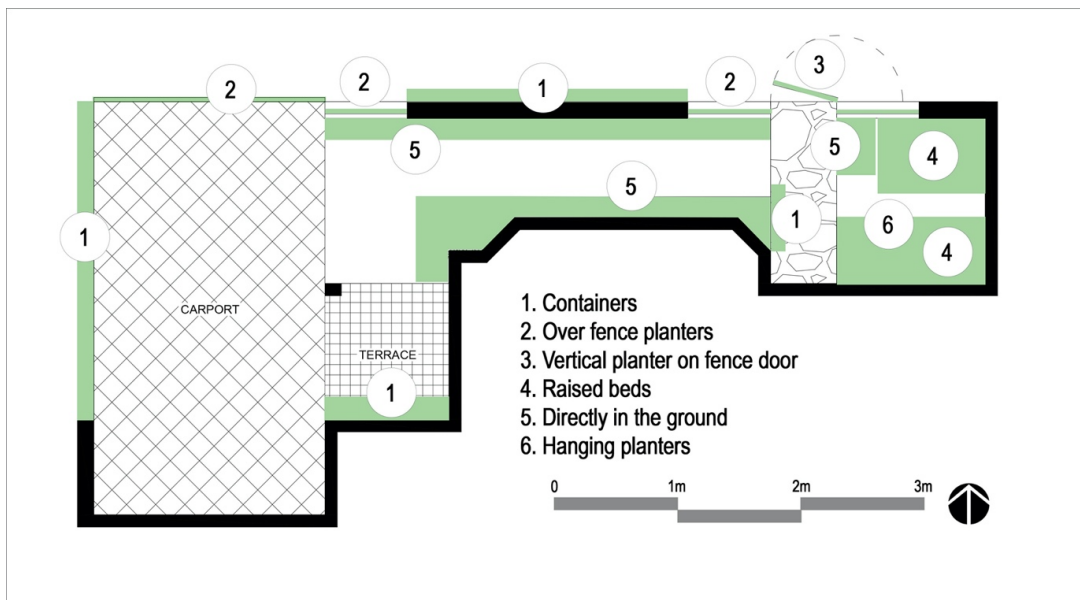


Figure 2: An Illustration of cultivation techniques for a small space.



Figure 3: Cultivation techniques adopted for the kitchen garden; 1) containers, 2) over fence planters, 3) vertical planters on fence door, 4) raised bed, 5) directly in the ground, 6) hanging planters.

Table 1: Cultivation techniques for maximizing space for a food garden

No.	Cultivation Techniques	Practical reflection	Examples	Plants
1	Basic Containers	Containers are the most common and practical method to maximize the limited yard. They are available in various shapes, sizes, and colours to fit the colour tones and design space.	Pots; polybags; planter bags	Tomatoes, chili peppers, spinach, basil, rosemary, cilantro, kale
2	Over fence planters	Over fence planters can maximize the unused vertical fence space for vines and herbs.	Hooked pots	Basil, butterfly-pea flowers, betel leaf plants
3	Vertical planters	Vertical planters can maximize wall and fence space. Plants like herbs and small Asian greens are the most suitable for this method.	Pocket planters	Spinach, mint, Asian greens
4	Raised beds	Raised beds need certain ground space to build on. They also require a large number of materials for filling; however, we anticipate using the hügelkultur method (layered organic materials) to fill half of the raised beds. Raised beds are useful to anticipate pests like slugs and allow us to control the quality of growing medium or soil by adding fertile materials before we start planting. Another benefit of a raised bed is that it can be built over concrete or pavement.	Raised beds	Lettuce, tomatoes, parsley, spinach, basil, Asian greens, eggplants, dill, marigolds, cosmoses
5	In-ground beds	It is a traditional method of gardening. Planting in the ground requires space in the yard. We converted some tiny areas of grasses and shrubs for vegetables, edible companion flowers, and rhizomes.	Planting directly in the ground	Rhizomes, carrots, spinach, chili peppers, cosmoses, marigolds, moringas
6	Hanging planters	Hanging planters are 'space-less as long as we have scaffolding or structure to hang planters on.	Hanging pots	Mint, edible flowers

2.3 Growing Method

After site identification and selecting techniques to maximize space, the plants' selection is started. The selection of plant types is based on the family's food needs, including vegetables and herbs. Living in a tropical city is an advantage as we can propagate all year long. Various propagation methods have been practiced including sowing seeds, growing bought-seedlings, propagating from cuttings and side shots, even re-growing from kitchen scraps. Every propagation method has different advantages and challenges (Table 3).

2.4 Mulching and Watering

In a hot and humid climate like in Yogyakarta, evaporation happens more rapidly. More evaporation means more watering for plants. To avoid it, we apply organic mulching on the surface of soils for every plant. Mulching is beneficial to reduce evaporation which leads to efficient use of water (Krebs & Bach, 2018; Lal, 2020) since water is one of the limited yet precious resources for urban agriculture (Knorr et al., 2018; Lu & Grundy, 2017). There are a variety of organic mulches to use such as rice straw, hay, dry leaves, or wood chips. By applying mulch to minimize evaporation, gardeners can use water as efficiently as possible.

2.5 Composting and Fertilising

To fertilize the soil at a home food garden, it is important to create homemade natural liquid fertilizers and compost from kitchen scraps. In the urban farming context, domestic composting can be applied to improve soil nutrition while simultaneously upcycling domestic organic waste (Cleveland et al., 2017). Liquid fertilizer could be made once a week regularly. Ingredients include leftover rice, banana peels, rice wash, brown sugar, and additional bought bacteria starter. All ingredients are placed in one container and kept for two weeks for fermentation. The fermentation process is anaerobic which needs no oxygen, so the lid has to be closed tightly during the process. Liquid fertilizer can be used by di-

luting it with water using a 1:10 ratio. For compost, daily organic scraps such as fruits' peels and vegetable scraps are suitable. To minimize space, a composter bag can be used for domestic composting (see Figure 4).



Figure 4: Composter bags for domestic composting.

Table 2: Materials and Cost Estimation

Cultivation Techniques	Materials	Amount	Cost
Basic containers	Various size polybags	30 bags	\$ 5
	Various size pots	10 pots	\$ 10
Over fence planters	Various size hooked pots	8 pieces	\$ 8
	Potting mix	2 bags	\$ 4
Vertical planters	15 pocket vertical planter	1 planter	\$ 5
	Potting mix	2 bags	\$ 4
Log raised Beds	Logs	3 m	No Cost
	Compost	1 bag	\$ 2
	Potting soil	1 bag	\$ 2
Brick raised Beds	Bricks	50 pieces	\$ 5
	Branch and browns	Cover 10 cm layer thick	No cost
	Leaves (greens)	Cover 10 cm layer thick	No cost
	Compost	1 bag	\$ 2
	Potting Soil	1 bag	\$ 2
In-ground beds	Compost	1 bag	\$ 2
Hanging planters	Hanging pots	3 pieces	\$ 3
	Potting mix	1 bag	\$ 2
Additional	1 liter watering can	1	\$ 3
	8 liter watering can	1	\$ 10
	Compost	2 bags	\$ 4
	Potting mix	2 bags	\$ 4
	Seeds & seedlings	-	\$20
TOTAL COST			\$93

Table 3: Growing Method

Growing Method	Practical reflection
Seeds (bought)	Growing new plants from seeds need a longer time. We need to learn about seeds' characteristics as they are unique. It is suggested not to grow seeds too much, and to match the space and number of seeds carefully. After the seedlings have around 4 to 6 true leaves, they can be transplanted to new larger containers or in the ground. Additionally, some plants can be sowed directly and do not need to be transplanted, which is very convenient for novice gardeners.
Seedlings (bought)	Going to the local and closest nurseries and buying small plants are one of the most convenient methods of adding new plants to the garden. Usually, seedlings are planted in smaller containers by nurseries, which means that they need to be transplanted.
Cuttings	Some plants could grow from cuttings. Growing new plants from cuttings is the cheapest (and even at no cost) method of growing new plants.
Side shoots	This is also the cheapest method of growing new plants. Propagating new plants from side shoots or commonly known as sucker branches work well on tomatoes. Soil or water propagation techniques can be used.
Regrowing from kitchen scraps	Kitchen scraps can provide us free (no cost) seeds, cuttings, bulbs, rhizomes, even tubers to be regrown in the garden. Some plants that grow from this technique include chili peppers, lemon basil, spring onions, cilantro, and rhizomes.

2.6 Harvesting

'Cut and come again' harvesting method is applied, especially for leafy greens such as lettuce and spinach. The method allows home gardeners to harvest in small quantities for direct consumption. Also, it makes plants live longer and provide more yields (Johnson et al., 2016), so no sowing or transplanting is needed for a longer period. It is found that the 'cut and come' harvesting method is very convenient for amateur (non-full-time) home gardeners.

2.7 Access to Information

For novice gardeners with extremely limited gardening knowledge, access to information is essential. Interestingly, popular sources of information about urban gardening are available online at relatively diverse platforms such as blogs, microblogs, and video blogs. Novice gardeners

who would like to start gardening can select their sources of information according to their preferences and learn from them. Practical reflections on various sources of gardening information are elaborated in Table 4.

3 Results and Discussion

Within around 7 months of gardening, co-benefits of home food gardening are discussed as follow:

3.1 Fresh foods 'storage'

Initially, the first motivation of us developing the food garden is as an alternative to fresh emergency food sources if the worst thing happened during the Covid-19 pandemic. The food system is a sector that is predicted to be disrupted by partial (or full) quarantine activities caused by

Table 4: Information Sources of Gardening Tips

Source of Information	Practical Reflection
Microblogs (Instagram and Pinterest)	Microblogs are beneficial to find quick information about gardening. Many Instagram and Pinterest accounts provide simple and short gardening information. Additionally, Pinterest may also provide links to the original authors (blogs and websites) to learn more detailed information.
Gardening blogs/websites	Gardening blogs and websites provide more detailed information than microblogs. Interestingly, some blogs and websites even cite peer-reviewed references to support information. With so many available gardening-related blogs and websites, accessing blogs and websites that have similar garden specifications is recommended.
YouTube Channels	There is an enormous number of YouTube channels providing gardening information for different countries and climate regions. Watching gardening videos from the same climate region or country is the easiest way to learn.

the Covid-19 pandemic (Reardon et al., 2020). It is also recognized that the yield of urban domestic food gardens is not significant (Hallsworth & Wong, 2015), however, the food garden then may function as fresh vegetables and herbs ‘storage’ that can be harvested 2 - 4 times a week. Scholars have discussed the roles of domestic food gardens as alternative sources of food and nutrition (Galhena et al., 2013; Jacobs et al., 2016; Lal, 2020; Spilková & Vágner, 2018).

During the pandemic, many people pay more attention to the quality of their foods and practice healthy eating in order to maintain and boost the immune system (Sharma, 2020). A previous study has also suggested that health concern is one of the most motivating factors for people to eat a healthy diet (Gustavsen, 2020). The tiny food garden gives stocks of fresh greens and herbs which provide micronutrients (vitamins, minerals) and fibers. Micronutrients are a significant source for boosting the immune system (McAuliffe et al., 2020; Sharma, 2020) and for possibly reducing mortality among Covid-19 patients (Akhtar et al., 2021). Moreover, freshly harvested yields, salads, and other types of vegetables-based food were prepared for a balanced diet (see Figure 5). They are healthy, natural (no synthetics/chemicals), and have fewer environmental footprints.

3.2 Subjective well-being

Tiny food gardens can also function as a family stress reliever and mood fixer, as suggested by studies (Scott et al., 2020; Soga et al., 2017). Playing and interacting with natural elements in the garden while reducing the time spent indoor may result in increased cognitive functions, increased academic performance, lowered short-sightedness, as well as reduced childhood obesity and negative health effects for children (Gleeson, 2019). Based on the experience, it is highly recommended to allocate time and a small space at home to grow vegetables.

3.3 Appreciation of Food and the Environment

From a tiny food garden, so many things can be learned about vegetables and herbs, from soil and space preparation, production (growing), waste management, and harvesting. This experiential learning process builds appreciation and respect for food, its growing process, ecosystem, and all food growers (farmers). Previous studies also found that sustainable and ethical values predominantly underlie urban gardening activities (Al-Mayahi et al., 2019; Hirsch et al., 2016).



Figure 5: Homemade food with homegrown vegetables. Most vegetables, herbs, and garnishes come from our tiny food garden.

3.4 Motivating others

Sometimes we share our activities on social media (Instagram) in order to motivate others to grow vegetables at home. We also answered all questions from colleagues and responded to them based on our personal experiences growing food in our small garden. So far, we successfully influenced friends and family to grow vegetables and fruits at their urban houses with various techniques, as well as motivated our neighbourhood's community to convert a small area of grass in a little green open space into a community food garden.

3.5 Small economic benefits, great personal satisfaction

Our personal experience found that the direct economic benefits of the tiny food garden are relatively small. On contrary, many urban garden-

ers place economic benefits as one of their motivations and gain profit from the yields (Kirkpatrick & Davison, 2018). Our experience shows that we could frequently harvest vegetables and herbs (2 - 4 times a week) for 2 servings or about 100 - 350 grams. It may be worth only 2 to 5 dollars a week. However, despite the small economic benefit, we found that it is very rewarding to harvest home-grown vegetables and serving the food directly from the garden to the table.

3.6 Urban Planning Policy Implication

A previous study argues that urban gardens may not provide a sufficient amount of food for urban citizens (Hallsworth & Wong, 2015). Although the contribution of urban gardens to urban food sufficiency is questioned, many studies agree that home food gardens can still bring co-benefits in urban socio-ecological aspects. For

instance, Cleveland et al. (2017) analysed the potential of domestic food gardens in reducing greenhouse gas (GHG) emissions. They found that people who participate in urban gardening activities tend to use household resources in more sustainable manners, such as using recycled or harvested water more, reducing the carbon footprint of transported food, and reducing organic solid waste by composting and applying it to food plants. All of these activities potentially reduce GHG emissions and contribute to a sustainable lifestyle at the household level. To link these co-benefits with the Covid-19 pandemic, it is observed that people's awareness of the environment increases due to the pandemic (Rousseau & Deschacht, 2020). Therefore, starting urban food gardening at home during the pandemic is a good beginning for a more ecologically friendly family lifestyle. Additionally, from the nutritional security point of view, previous studies claim that urban gardens may improve the nutritional diversity and healthy diet of households (Jacobs et al., 2016; Lal, 2020; Rybak et al., 2018). It means that urban food gardens may provide people with alternative food and nutrition during the pandemic which may help to maintain health. With all these co-benefits, decision-makers, environmental activists, and people who are concerned about the environment could leverage the moment to promote and integrate home food gardening and its circularity as an urban sustainable initiative.

4 Conclusions

The Covid-19 pandemic reminds us that the urban food system is vulnerable (Carey et al., 2020; Paganini et al., 2020; Reardon et al., 2020), as many experience anxieties of food insecurity. Thus, with relatively limited knowledge of urban gardening, we decided to convert our small urban house yard into a tiny food garden to enhance the family's food resilience. With a relatively small space, new gardeners in the urban residential area may harness various cultivation strategies, including containers and in-ground beds, depending on the available space. The tiny food garden could produce a variety of vegetables and herbs, such as the spinach family, lettuce, Asian

greens, the tomato family, eggplants, the basil family, mint, rosemary, moringas, and butterfly pea flowers. Such a garden may support a household with few amounts of fresh emergency food in case of the worst scenario during the Covid-19 pandemic. Besides, developing a tiny food garden at home may also provide co-benefits, such as enhanced subjective well-being, increased appreciation of food and the environment, others being motivated to start gardening at home, and great personal satisfaction of consuming home-grown food. Ultimately, with all these socio-ecological co-benefits, home food gardens must be integrated as a strategy to achieve urban sustainability and increase household food resilience.

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