The Characteristics and Utilization of *Pekarangan Pangan Lestari* to Achieve Urban Food Security in Depok City, West Java

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ABSTRACT

The main challenge for urban food security is a public policy perspective that considers food security only from a rural lens and agricultural activities in the cities are appraised to have no place. In dealing with that challenge, the local government of Depok City has developed a local urban food system program called *Pekarangan Pangan Lestari* (P2L) in Bojongsari Sub-district. The existence of P2L influenced the increase of Depok City's food security score by 1.68 within 5 years and placed Depok City as the 10th city with the highest food security index in Indonesia. This study aims to document the characteristics and utilization of P2L in the Bojongsari Sub-district. The research was conducted using in-depth interviews with 30 people and field observation in 33 P2L. The area of *Pekarangan Pangan Lestari* (P2L) in the Bojongsari Sub-district can be found in the villages of Duren Seribu, Duren Mekar, Pondok Petir, and Serua, is categorized as moderate and narrow, and managed by the Women Farmers group. P2L functions as living barns (*lumbung hidup*), living stalls (*warung hidup*), living pharmacies (*apotek hidup*), nurseries, livestock, and fisheries. A total of 92 species belonging to 86 genera and 47 families were identified in Bojongsari Sub-district. These plants have been used by the society in Bojongsari Sub-district as a source of medicine, vegetables, spices, herbs, vitamins, and carbohydrates as much as 55%, 17%, 10, 9, 8,17, respectively. Besides, there are several animals raised in P2L such as chickens, goats, and catfish.

Keywords: Bojongsari Sub-district, Urban food security, *Pekarangan Pangan Lestari*

INTRODUCTION

Urban food security has been an interesting issue for discussion in the academic sphere (Dinku et al. 2023) because 68% of the population in the world will live in urban areas by 2050, approximately 6 billion (Amorim et al. 2019; Mensah, 2023). With projected high population growth living in urban areas, urban food security will become a serious problem for cities (Amorim et al. 2019), because global food demand is expected to increase by 59% to 98% in 2050 (Karakaya Ayalp et al. 2022). While global food production continues to keep pace with population growth in general, the facts show that the world is not on track to end hunger, achieve food security, and promote sustainable agriculture (Zerbian and Romero, 2023). According to Yazew et al. (2023), around 150 million people in the world are predicted to experience extreme poverty and food insecurity. Therefore,

understanding urban food security will be a significant contribution to addressing future challenges in cities (Chandra and Diehl, 2019).

The main challenges for urban food security are a public policy perspective that considers food security only from a rural lens (Zerbian and Romero, 2023) and in the modern world, agricultural activities in the cities are appraised to have no place (Steenkamp et al. 2021). This perspective arises due to the lack of studies linking urban food security with food market chains in urban food system settings (Dinku et al. 2023). The urban food system is complex. It integrates humans, the environment, society, and economy in all activities start from food production to waste disposal (Zhong et al. 2021). In dealing with that challenge, a localized urban food system by volunteering or participating in farm or garden-based community events and as gardeners or farmers themselves could be a feasible approach (Diekmann et al. 2020).

In West Java Province, the local government of Depok City has developed a local urban food system program called *Pekarangan Pangan Lestari* (P2L). The P2L in Depok City can be found in Bojongsari Sub-district, especially in the villages of Duren Seribu, Duren Mekar, Pondok Petir, and Serua. This program was initiated by the Ministry of Agriculture and implemented through the utilization of yards, vacant land, and unproductive vacant land to provide a sustainable source of food (BKP, 2020). This activity was conducted through a sustainable agricultural approach, based on local wisdom, community engagement, and market orientation (Nuryana et al. 2022). Therefore, the types of plants that are grown in P2L such as vegetables, fruits, medicines, or ornamental plants, can be consumed or sold in the market (Dwiratna et al. 2016). The existence of P2L in Depok City is thought to have influenced the increase of Depok City's food security score by 1.68 within 5 years (2018-2022) and placed Depok City as the 10th city with the highest food security index in Indonesia (BKP, 2018; BKP, 2022). This study aims to document the characteristics and utilization of P2L in Bojongsari Sub-district which encourages the establishment of urban food security in Depok City.

METHODS

The research was conducted between November 2022 and February 2023 in Bojongsari Sub-district (four villages namely Duren Seribu, Duren Mekar, Pondok Petir, and Serua). Administratively, Bojongsari Sub-district is in Depok City, West Java, while its astronomical location is -6^{o}24’18” South latitude and 106^{o}49’02” East longitude (Figure 1). Bojongsari Sub-district has an area of 19.41 km^{2} with a population of 121,044 people. The topography is lowland with an altitude of 60 meters above sea level an average temperature of 23^{o}C-30^{o}C and humidity between 52% to 98% (BPS, 2023).

The research method is a mixture of qualitative and quantitative methods. This research uses primary and secondary data. Primary data is the result of interviews and field observations. The primary data such as informant profile, plant benefit, and how P2L is managed. The technique for selecting respondents was snowball sampling with a total of 30 people (Anggraeni et al. 2023). The field observation aims to obtain the area, distribution, and plant diversity of P2L. Data analysis uses the Miles and Huberman Model through the steps of collecting, reducing, presenting, verifying, and concluding data.

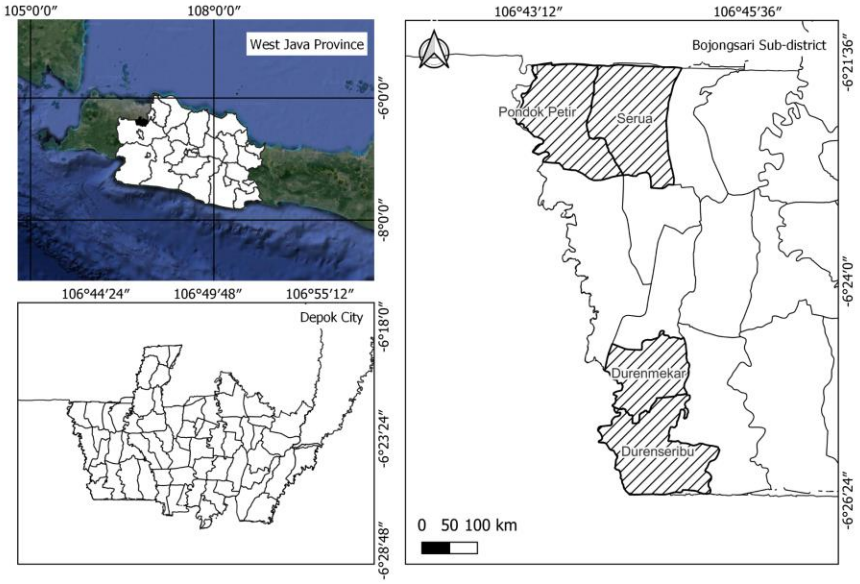

Figure 1. Research location: Villages of Duren Mekar, Duren Seribu, Pondok Petir, Serua, Bojongsari Sub-district, Depok City, West Java

RESULTS AND DISCUSSION

The Profile of Informants

A total of 76.67% of the informants who were involved in the in-depth interview were middle-aged and the rest 23.33% were elderly. All key informants were female and 86.67% worked as housewives. In terms of education, a total of 70% of informants have been educated up to senior high school, 13.33% were educated up to a bachelor's degree, 10% were educated up to junior high school, and 6.67% were educated up to diploma III program. Even though Depok City is part of West Java Province, not all the informants in this study came from the Sundanese ethnic group. This is because many migrants come from Java Island and the position of Depok City as a buffer for the capital city of Jakarta makes this area also inhabited by the Betawinese ethnic group. A total of 36.67% were Sundanese, 33.33% were Javanese and the rest 30% is Betawinese. There were 13.33% of informants who had been P2L managers for more than 10 years and the rest had less than 10 years. A breakdown of the informants is provided in Table 1.

Table 1. The Characteristics of Informants

Characteristics	Group	Informants	
		No. of informants	Percentages (%)
Age group (years old)	Young (18-36)	0	0
	Middle-aged (37-55)	23	76.67
	Elderly (≥ 56)	7	23.33
Gender	Male	0	0
	Female	30	100
Occupation	Housewife	26	86.67
	Entrepreneurs	4	13.33
Education	Junior high school	3	10
	Senior high school	21	70

	Diploma III program	2	6.67
	Bachelor degree	4	13.33
Ethnic	Sundanese	11	36.67
	Betawinese	9	30
	Javanese	10	33.33
Length of membership	<10 years	26	86.67
	>10 years	4	13.33

The Characteristics of *Pekarangan Pangan Lestari*

P2L in Bojongsari Sub-district is in public facilities such as an integrated health care centre and park in the middle of the residential area, vacant land, or a government office yard. Usually, the location chosen to build P2L is accessible by society so that many people can experience the results of P2L, not only farmer women's groups. P2L functions as living barns (*lumbung hidup*), living stalls (*warung hidup*), living pharmacies (*apotek hidup*), nurseries, livestock, and fisheries. The living barns, living stalls, and live pharmacies are differentiated based on the type of plants grown. The living barns are used to grow carbohydrate-containing crops such as tubers and maize. According to Edi (2021), a living barn will greatly assist the community in dealing with the famine season, the Covid-19 pandemic, climate change, and other unpredictable disturbances. Therefore, the types of plants that should be planted in a living barn are food crops (Solihah, 2020).

The living stalls are used to grow vegetables and fruits to meet daily needs. According to Solihah (2020), living stalls should be planted with plants or used to raise animals, which can be sold anytime. The results can be used to help the family or community finances. The living pharmacies are used to grow family medicinal plants that can be used as first aid. Living pharmacies not only provide herbal medicine but also increase society's economy by selling these plants as raw materials for making herbal medicines and reducing society's dependence on chemical drugs (Hidayatullah, 2018). Meanwhile, the nursery is used to plant seedlings before planting or distributing them to members of the Women Farmers group or the society. The existence of nurseries in P2L is important because seedlings planted in nurseries have a higher survival rate compared to seedlings directly planted in the field (Garba et al. 2019).

Based on the area, P2L is divided into four categories: narrow (<120 m^2), moderate (120 to 400 m^2), wide (400 to 1000 m^2), and very wide (<1000 m^2). According to Kadarsah and Susilowati (2018), the utilization of yards with an area of <120 m2 has been able to provide benefits for managers, namely reducing food expenses by 9%, increasing income by 11%, and increasing intake of vitamins, minerals, and carbohydrates as much as 2.4%, 23.6%, and 1.9%, respectively. In terms of species that can be grown or animals that can be raised in the P2L of Bojongsari Sub-district, there are no specific rules. Everything depends on the agreement of the Women Farmers Group which is responsible for managing P2L. P2L in Bojongsari Sub-district can be found in the villages of Duren Seribu, Duren Mekar, Pondok Petir, and Serua. The difference of P2L in each village is shown in Table 2 below.

Table 2. *Pekarangan Pangan Lestari* in Each Village of Bojongsari Sub-district

Village	The total sample of P2L	The area of P2L		Distribution	Location
		Average area (m^2)	Categorized		
Duren Seribu	12	155	Moderate	Spread evenly	Vacant land, healthcare center, government

					office yard
Duren Mekar	4	117.5	Narrow	Not spread evenly	Vacant land, park, healthcare center
Pondok Petir	12	124.4	Moderate	Not spread evenly	Vacant land, healthcare center
Serua	5	94.6	Narrow	Not spread evenly	Vacant land, parks, and a healthcare center

The total sample of P2L in Duren Seribu Village is 12 with an average area of 155 m^2 and categorized as moderate (Figure 2). The distribution of P2L in this village is spread evenly because P2L can be found in every neighborhood association. The P2L is found in vacant land, a healthcare center, and a building yard. Types of plants that are often found are *Colocasia esculenta* (*talas*), *Xanthosoma sagittifolium* (*kimpul*), and *Zea mays* (*jagung*). The types of animals raised at Duren Seribu Village are *Gallus gallus domesticus* and *Pangasius* sp., *Clarias gariepinus*, *Oreochronis mossambicus*, *Colossoma macropomum*, and *Oreochromis niloticus*.

Figure 2. P2L in the Duren Seribu Villages: (a) An area for educating people on how to plant (b) Nursery (c) Fishpond.

There are 4 P2L in the Duren Mekar Village with an average area of 117.5 m^2 and categorized as narrow (Figure 3). The distribution of P2L in this village is not spread evenly because this village is a densely populated area. The P2L is found in vacant land owned by the government, parks, and a healthcare center. Types of plants that are often found are *Ipomoea aquatica* (*kangkung*), *Solanum melongena* (*terong*), and *Colocasia esculenta* (*talas*). The types of animals raised at Duren Mekar Village are chickens and catfish.

Figure 3. P2L in the Duren Mekar Villages: (a) An area for educating people on how to plant (b) Fishpond (c) Chicken coop.

There are 12 P2L in the Pondok Petir Village with an average area of 124.4 m^2 and categorized as moderate (Figure 4). The distribution of P2L in this village is not spread

evenly because this village is a densely populated area. However, the Women Farmers Group succeeded in inviting residents to get involved in a P2L program by planting plants in their respective yards. The P2L is found in vacant land owned by the government or residents, parks, and a healthcare center. Types of plants that are often found are *Capsicum annuum* (*cabai*), *Ipomoea aquatica* (*kangkung*), *Brassica chinensis* (*sawi*). The types of animals raised at Pondok Petir Village are chickens, goats, and catfish.

Figure 4. P2L in the Pondok Petir Villages: (a) Living barns (*lumbung hidup*) (b) Living stalls (*warung hidup*) (c) Living pharmacies (*apotek hidup*).

The last village is Serua which has 5 P2L with an average area of 94.6 m^2 and is categorized as narrow (Figure 5). Same with the previous village, the P2L in the Serua Village is not spread evenly because this village is a densely populated area, and the area is narrower than others. The type of animal raised in Serua Village is fish. The P2L is found in vacant land owned by the government or residents, parks, a healthcare center, and a waste bank area. Types of plants that are often found are *Capsicum annuum* (*cabai*), *Pandanus amaryllifolius* (*pandan*), and *Carica papaya* (*gedang*). The types of animals raised at Serua Village are chickens and catfish.

Figure 5. P2L in the Serua Villages: (a) Nursery (b) Goat farm (c) Living pharmacies (*apotek hidup*).

The Utilization of Food Crops in *Pekarangan Pangan Lestari*

The traditional home garden is a plot of land that has boundaries and provides the necessities of life for the owner in the form of fruit trees, vegetables, and medicinal plants which can be a source of income (Susanto et al. 2022). As a part of traditional gardens, P2L plays an important role in socio-economic, cultural, ecological function, and biodiversity conservation (Iskandar et al. 2023). In addition, P2L has been providing a source of medicinal plants and various foodstuffs (Sari and Irawati, 2020). The use of plants as medicine or foodstuffs in urban areas is interesting to discuss considering that urban

communities' local wisdom is often neglected compared to traditional communities' local wisdom (Ladio and Albuquerque, 2016).

A total of 92 species belonging to 86 genera and 47 families were identified in Bojongsari Sub-district. Zingiberaceae was the most dominant family with 8 species and 4 genera, followed by Fabaceae with 6 species and 6 genera, Eurporbiaceae and Lamiaceae represented 5 species and 5 genera. A total of 25 families were represented by a single species and genus (Figure 6).

These plants have been used by the society in Bojongsari Sub-district as a source of medicine, vegetables, spices and herbs, vitamins, and carbohydrates as much as 55%, 17%, 10, 9, 8,17, respectively (Table 3). In terms of medicine, the rhizome of genus Zingiber found in Bojongsari Sub-district, namely *Z. zerumbet* (*lempuyang*), *Z. officinale* (*jahe*), and *Z. cassumunar* (*bengle*) have been used. According to Sharifi-Rad et al. (2017), the rhizome can be used to treat various types of diseases such as stomach-ache, sore throat, cough, headache, etc. In addition, they have biological activities such as antimicrobial, antioxidant, cytotoxic, and anti-inflammatory effects (Silalahi et al. 2021).

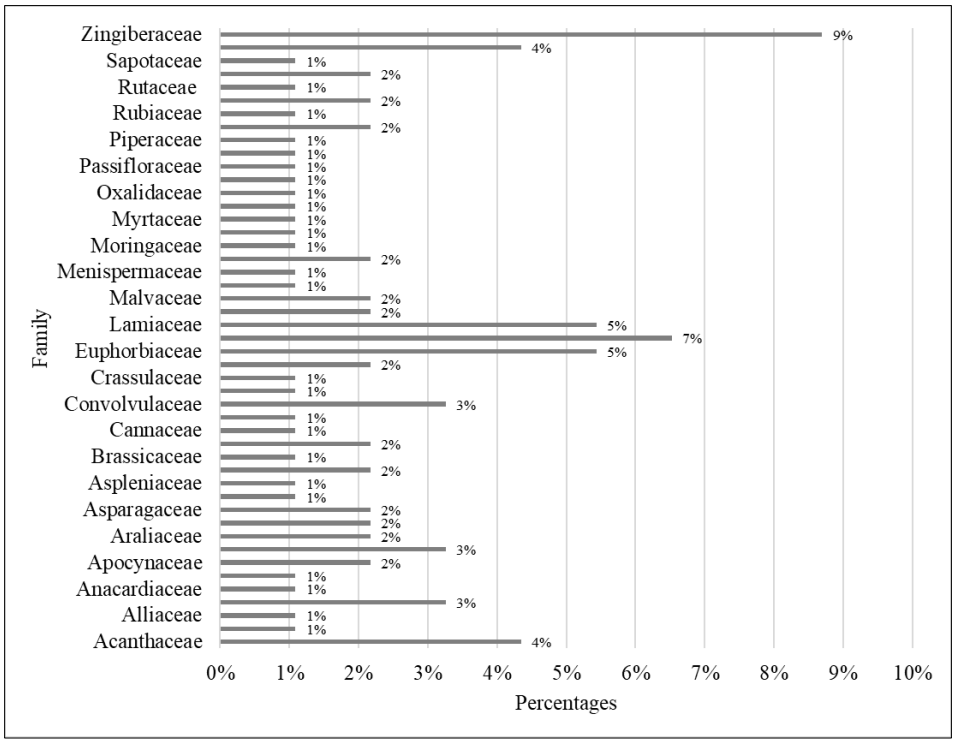

Figure 6. Families of plants with the highest number of plant species

A total of 17 species from 11 genera have been used as a source of vegetables by the society in Bojongsari Sub-district such as *Amaranthus spinosus*, *Brassica chinensis*, and *Moringa oleifera*. The leaves of *M. oleifera* contain the highest protein (19-29%) compared to other parts of its plants, are rich in nutrients and medicinal ingredients, and are easy to obtain and process. Besides, it is containing a high of vitamin A, vitamin E, vitamin C, vitamin B, calcium, and iron. Therefore, *M. oleifera* has many possibilities for inclusion in a healthy diet (Trigo et al. 2020).

A total of 10 species from 10 genera are used as a source of spices and herbs such as *Averrhoa bilimbi*, *Curcuma longa*, and *Kaempferia galanga*. According to Insan et al. (2019), the fruit of *A. bilimbi* is usually used as a spice and medicine to treat cholesterol, gout, diabetes, and canker sores. The leaves are useful as antioxidants and antidiabetics while the

flowers can be used as a typhoid fever medicine because they contain antimicrobial compounds.

A total of 9 species from 9 genera have been used as a source of vitamins such as *Dimocarpus longan*, *Durio zibethinus*, and *Mangifera indica*. Every 100 grams of *D. longan* fresh fruit contains 84 mg of vitamin C, higher than other ordinary fruits. In addition, D. longan is also rich in protein, fiber, and minerals such as Phosphorus, Potassium, and Sodium. Therefore, *D. longan* is considered a functional health fruit (Zhang et al. 2020).

A total of 8 species from 7 genera have been used as sources of carbohydrate such as *Colocasia esculenta*, *Canna discolor*, and *Manihot esculenta*. *Colocasia esculenta* is a tropical plant that produces tubers as a source of carbohydrates for people with diabetes and digestive disorders (Afifah et al. 2023). According to Aditika et al. (2022), *C. esculenta* is predicted as a potential food crop to combat malnutrition and hidden hunger because it is rich in nutrients and essays to grow even though it is still categorized as a neglected crop.

Table 3. The Data of the Food Crops Diversity in *Pekarangan Pangan Lestari*

Scientific Name	Local Name	Uses	Plant part use
Acanthaceae			
Pacytachys lutea	Bunga lilin	Medicine	Flower, leaves
Clinacanthus nutans	Dandang gendis	Medicine	Leaves
Graptophylum pictum	Daun ungu	Medicine	Leaves
Justicia gendarussa	Ganda rusa	Medicine	Leaves
Agavaceae			
Sanseviera trifasciata	Lidah mertua	Medicine	Leaves
Alliaceae			
Allium fistulosum	Daun bawang	Spices, herb	Leaves
Amaranthaceae			
Aerva sanguinolenta	Sambang colok	Medicine	Leaves
Celosia cristata	Jengger ayam	Medicine	Leaves
Amaranthus spinosus	Bayam	Vegetable	Leaves
Anacardiaceae			
Mangifera indica	Mangga	Source of vitamin	Fruit
Annonaceae			
Annona muricata	Sirsak	Medicine	Leaves
Apocynaceae			
Allamanda catharyica	Alamanda	Medicine	Flower, leaves
Tabernaemontana corymbosa	Melati rombusa putih	Medicine	Flower
Araceae			
Colocasia esculenta	Talas	Source of carbohydrate	Tubers
Dieffenbachia seguine	Sri rejeki	Medicine	Leaves
Xanthosoma sagittifolium	Kimpul	Source of carbohydrate	Tubers
Araliaceae			
Notopanax scutellarium	Mangkokan	Medicine	Leaves
Polyscias filicifolia	Cakra cikri	Medicine	Leaves
Arecaceae			
Cocos nucifera	Kelapa	Spices, herb	Fruit

Cyrtostachys renda	Palem merah	Medicine	Fruit
Asparagaceae			
Codyline fruticose	Andong	Medicine	Leaves
Dracaena angustifolia	Daun suji	Spices, herb	Leaves
Asphodelaceae			
Aloe vera	Lidah buaya	Medicine	Leaves
Aspleniaceae			
Neottopteris nidus	Paku sarang burung	Medicine	Leaves
Asteraceae			
Vernonia amygdalina	Daun afrika	Medicine	Leaves
Gynura divaricata	Daun dewa	Medicine	Leaves
Brassicaceae			
Brassica chinensis	Sawi	Vegetable	Leaves
Cactaceae			
Epiphyllum oxypetalum	Wijaya kusuma	Medicine	Flower
Hylocereus polyrhizus	Buah naga	Source of vitamin	Fruit
Cannaceae			
Canna discolor	Ganyong	Source of carbohydrate	Tubers
Caricaceae			
Carica papaya	Pepaya	Vegetable	Fruit, leaves
Convolvulaceae			
Ipomoea batatas	Umbi kuning	Medicine	Tubers
Manihot esculenta	Singkong	Source of carbohydrates, vegetable	Tubers, leaves
Ipomoea aquatica	Kangkung	Vegetable	Leaves
Costaceae			
Costus spiralis	Pacing	Medicine	Leaves
Crassulaceae			
Kalanchoe pinnata	Cocor bebek	Medicine	Leaves
Cucurbitaceae			
Cucumis sativus	Timun	Vegetable	Fruit
Momordica charantia	Pare	Vegetable	Fruit
Euphorbiaceae			
Codiaeum variegatum	Kaca piring	Medicine	Leaves
Euphorbia tirucalli	Tanaman patah tulang	Medicine	Stem
Excoecaria cochinchinensis	Sambang darah variegata	Medicine	Leaves
Pedianthus tithymaloides	Daun zigzag	Medicine	Leaves
Sauropus androgynus	Katuk	Vegetable	Leaves
Fabaceae			
Caesalpia sappan	Secang	Medicine	Stem
Clitoria ternatea	Bunga telang	Medicine	Flower, leaves
Laucaena leucocephala	Petai cina	Vegetable	Fruit
Samanea saman	Trembesi	Medicine	Leaves

Abrus precatorius	Daun saga	Medicine	Leaves
Vigna unguiculata	Kacang panjang	Vegetable	Fruit
Lamiaceae			
Coleus scutellaroides	Daun miana	Medicine	Leaves
Ocium sanctum	Kemangi	Vegetable	Leaves
Orthosiphon aristatus	Kumis kucing	Medicine	Leaves, stem
Plectranthus amboinicus	Daun jintan	Medicine	Leaves
Pogostemon cablin	Nilam	Medicine	Leaves
Persea americana	Alpukat	Source of vitamin	Fruit
Leguminosae			
Arachis hypogaea	Kacang tanah	Vegetable	Bean
Phaseolus vulgaris	Buncis	Vegetable	Fruit, beans, leaves
Malvaceae			
Sida rhombifolia	Sidaguri	Medicine	Leaves
Durio zibethinus	Duren	Source of vitamin	Fruit
Marantaceae			
Maranta arundinacea	Garut	Source of carbohydrate	Tubers
Menispermaceae			
Tinospora crispa	Brotowali	Medicine	Stem
Moraceae			
Artocarpus communis	Sukun	Source of carbohydrate	Fruit
Artocarpus heterophyllus	Nangka	Source of vitamin	Fruit
Moringaceae			
Moringa oleifera	Kelor	Vegetable	Leaves
Musaceae			
Musa sp.	Pisang	Source of vitamin	Fruit
Myrtaceae			
Psidium guajava	Jambu biji	Medicine	Fruit, leaves
Nyctaginaceae			
Bougainvillea glabra	Bougenvile	Medicine	Flower, leaves
Oxalidaceae			
Averrhoa bilimbi	Belimbing wuluh	Spices, herb	Fruit
Pandanaceae			
Pandanus amaryllifolius	Pandan	Spices, herb	Leaves
Passifloraceae			
Passiflora quadrangularis	Erbis	Source of vitamin	Fruit
Phyllanthaceae			
Phyllanthus acidus	Ciremai	Medicine	Fruit
Piperaceae			
Piper sarmenthosum	Sirih	Medicine	Leaves

Poaceae			
Cymbopogon citratus	Sereh	Medicine	Root
Zea mays	Jagung	Source of carbohydrate	Fruit
Rubiaceae			
Ixora coccinea	Asoka	Medicine	Root
Rutaceae			
Evodia sauveolens	Zodia	Medicine	Leaves
Murraya paniculata	Kemuning	Medicine	Leaves, stem, root
Citrus aurantifolia	Jeruk nipis	Spices, herb, source of vitamin	Fruit, leaves
Sapindaceae			
Dimocarpus longan	Kelengkeng	Source of vitamin	Fruit
Nephelium lappaceum	Rambutan	Source of vitamin	Fruit
Sapotaceae			
Manilkara zapota	Sawo	Medicine	Fruit
Solanaceae			
Capsicum annuum	Cabai	Vegetable	Fruit
Solanum lycopersicum	Tomat	Vegetable	Fruit
Solanum melongena	Terong	Vegetable	Fruit
Solanum tuberosum	Kentang	Source of carbohydrate	Tubers
Zingiberaceae			
Curcuma zedoaria	Temu putih	Medicine	Rhizome
Zingiber officinale	Jahe	Medicine, Spices, herb	Rhizome
Kaempferia galanga	Kencur	Medicine, Spices, herb	Rhizome
Alpinia galanga	Lengkuas	Medicine, Spices, herb	Rhizome
Curcuma longa	Kunyit	Medicine, Spices, herb	Rhizome
Zingiber cassumunar	Bengle	Medicine	Rhizome
Curcuma zanthorrhiza	Temu lawak	Medicine	Rhizome
Zingiber zerumbet	Lempuyang	Medicine	Rhizome

CONCLUSION

Pekarangan Pangan Lestari (P2L) in the Bojongsari Sub-district found in the villages of Duren Seribu, Duren Mekar, Pondok Petir, and Serua; is categorized as moderate and narrow; and managed by the Women Farmers group. P2L functions as living barns (*lumbung hidup*), living stalls (*warung hidup*), living pharmacies (*apotek hidup*), nurseries, livestock, and fisheries. A total of 92 species belonging to 86 genera and 47 families were identified in Bojongsari Sub-district. These plants have been used by the society in Bojongsari Sub-district as a source of medicine, vegetables, spices and herbs, vitamins, and carbohydrates as much as

55%, 17%, 10, 9, 8,17, respectively. Besides, there are several animals raised in P2L such as chickens, goats, and catfish.

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