SOCA: Jurnal Sosial Ekonomi Pertanian
Vol. 17, No. 2, May 2023, Page 116 - 128
ISSN: 2615-6628 (E), ISSN: 1411-7177 (P)
Accredited SINTA 2

https://ojs.unud.ac.id/index.php/soca

Diversity of Home Garden Plants in Traditional Tourism Villages

Anak Agung Keswari Krisnandika[1]✉, Naniek Kohdrata[1], I Made Agus Dharmadiatmika[1], Gede Mekse Korri Arisena[1] and Beata Joanna Gawryszewska[2]
[1]Udayana University, Denpasar, Bali
[2]Warsaw University of Life Sciences, Poland
✉Correspondence email: agung_keswari@unud.ac.id

Submitted: 16th March 2023 ; Accepted: 27th May 2023

Keywords: inventory; yard; local species; landscape plants

Abstract

Socio-cultural shifts and environmental changes can cause changes in the composition of plants in the home garden. These changes may lead to the loss of uniquely valuable plants in the home garden. Therefore, this study aims to identify species and functions; diversity and similarity as well as the composition of home garden plants in three traditional Balinese tourism villages. The method used was a survey with observation data collection techniques, questionnaires, and interviews. There were a total of 90 samples of home gardens from three traditional tourism villages in Bali with different landscape characteristics, namely Tenganan Pegringsingan, Pengotan, and Julah villages. They were selected as survey locations to record plant diversity. The results of this study show that the plants in the home gardens of the three villages have the main function as ornaments plants. Plants in both Tenganan Pegringsingan and Julah Villages have a high diversity of species, while those in Penggotan Village are considered as the medium category. The differences in plant species in each location indicate that the owners' culture also has an influence in addition to environmental factors.

How To Cite (APA 6th Style):

Krisnandika, A. A. K., Kohdrata, N., Dharmadiatmika, I. M. A., Arisena, G. M. K., & Gawryszewska, B. J. (2023). Diversity of Home Garden Plants in Traditional Tourism Villages. *SOCA: Jurnal Sosial Ekonomi Pertanian*, *17*(2), 116 - 128. https://doi.org/https://doi.org/10.24843/SOCA.2023.v17.i02.p05.

INTRODUCTION

A home garden considered as a small cultivation area in the house is useful for preserving the environment as a place for the domestication and conservation of on-site plants. Therefore, it contributes to the ecosystem services in the region (Avilez-López et al., 2020; Berkowitz & Medley, 2017; Regassa, 2016). Home gardens can also be utilized to maintain family food sustainability (Brown et al., 2015; Khuswati & Pudjiastuti, 2022; Sabaora et al., 2021). Changes in climate and environment, local social culture and the needs of owners will certainly affect the diversity and sustainability of plants in the home garden (Behbahani et al., 2012; Sudarma & As-Syakur, 2018; Kazakis et al., 2021; Soni & Ansari, 2017). Bali as a tourist destination is definitely experiencing rapid environmental changes so it is necessary to identify plants and their impact on home gardens, especially in traditional village which was also opened for tourist destinations. Research related to home gardens has been carried out and reported in various countries such as in Iran (Behbahani et al., 2012), Madagaskar (Brown et al., 2015), Ethiopia (Regassa, 2016), Dutch Caribbean (Berkowitz & Medley, 2017), Mexico (Avilez-López et al., 2020). Research related to home gardens In Indonesia, was reported by Iskandar et al. (2018), Nurlaelih et al. (2019) dan Wakhidah et al. (2020).

Traditional home garden systems in Indonesia generally have a high diversity of plants in which the types of plants are selected based on the knowledge of the ecology, culture, and the owners' daily needs (Prihatini et al., 2018). Plants in home gardens can be used for food, health, and agro-tourism (Sari et al., 2015; Hakim, 2014). The traditional settlements layout in Balinese home gardens is based on the concept of *Tri Angga* and *Sanga Mandala* where the home garden/*natah* is in the middle (*madya*) while the *teba* and *lebuh* are in *nista* area or outside the home (Adhika, 2004; Wijaya, 2019). Home garden plants in Bali usually consist of flowering plants intended for prayer, as well as medicinal plants (Wiranatha et al., 2021) while cultivated plants are planted in farm/*teba*. Traditional villages in Bali have local rules (*awig-awig*) which regulate spatial patterns and overall use of the house down to the criteria for plants in the home garden and *teba*. Rules regarding these plants may vary from village to village depending on the local culture.

Research related to the diversity of plant species in the home gardens of several traditional villages in Bali was reported by Sujarwo & Caneva (2015) in which the aim of this research was to study the structure, diversity, and utilization patterns of traditional Balinese ethnobotanical plants among these villages. The novelty of this research is the detailed discussion of plant composition in the home garden. The aims of this study were to identify 1) the types and functions of home garden plants, 2) the diversity and similarities of home garden plants in three traditional Balinese tourist villages, and 3) the composition of home garden plants in traditional Balinese tourist villages.

RESEARCH METHOD

The research was conducted in three locations of traditional Balinese tourism villages, namely Tenganan Pegringsingan Village (Karangasem Regency), Pengotan Village (Bangli Regency), and Julah Village (Buleleng Regency). These three tourist villages were chosen because they have different environments and also have preserved the existing customs, especially regarding house arrangements. This

research was conducted in 2022. The population of this research was all the residents in Tenganan Pegringsingan Village, Pengotan Village, and Julah Village. There were a total of 90 samples which consist of 30 houses with home gardens for each village.

The survey method was used to collect primary data. It used observation techniques including plant species (family, botanical name, local name, frequency, number) and plant arrangement (placement location and plant strata). Furthermore, the questionnaire was administered to the homeowner to gain information related to the function of the plants (aesthetics, consumption, medicine, ceremony) in the home garden. Interviews were conducted with homeowners to find out the background, gender, perceptions, and motivations of the respondents regarding the selection of plants.

The first objective was that the types and functions of home garden plants were obtained through descriptive analysis in the form of tabulation tables and image percentages. The second objective was to obtain the diversity and similarity of home garden plants in three traditional Balinese tourist villages using the formula:

Shannon-Wiener index (H) (Magurran, 2004) to analyze diversity of plant species in the home garden:

$H= -\Sigma(ni/n) \ln(ni/n)$
where ni is the number of species i and n the total number of all species

Persentase Sørensen's index of similarity (Ss) (Mohan et al., 2007) used to compare the similarity of species between tourism villages:

SS= ((2 x the same number of species)/Sa+Sb)) x 100
where Sa is the number of species in village A and Sb is the number of species in village B

The third one was that identification of the composition of home garden plants in traditional Balinese tourist villages was analyzed descriptively in the form of images.

RESULTS AND DISCUSSION

Plant species and their functions

Plants found in the residents' home gardens of Tenganan Pegringsingan, Pegringsingan, and Julah villages are generally ornamental plants used for decorating/filling the yard. These results are quite contrary to the research presented by (Surat & Yaman, 2017) which stated that home gardens in newly developed housing in urban areas have more exotic species but their function is more to ornamental plants. In contrast to home gardens in local housing and villas, they have tendencies to use fruit trees and other functional plants. It is due to the fact that production plants and trees with economic, social, and ecological value in the villages of Tenganan Pegringsingan, Pengotan, and Julah are generally planted outside residential areas in the form of fields located in the forest.

Plants in home gardens in Tenganan Pegringsingan, Pengotan, and Julah villages are mostly maintained by husbands (56.4%) compared to wives (43.6%),

however, the main reason for selecting plants by both husbands and wives has the same tendency, namely for aesthetics, then ceremony (upakara) and consumption (Figure 1). The owners' gender of home garden plants in the three villages did not give any effect on the choice of plant species, in contrast to the study by Gbedomon et al. Gbedomon et al. (2015) who reported that the function of the home garden was influenced by gender. If women manage the home garden, the choices were more likely to be food production plants such as food crops while men tend to maintain herbal plants

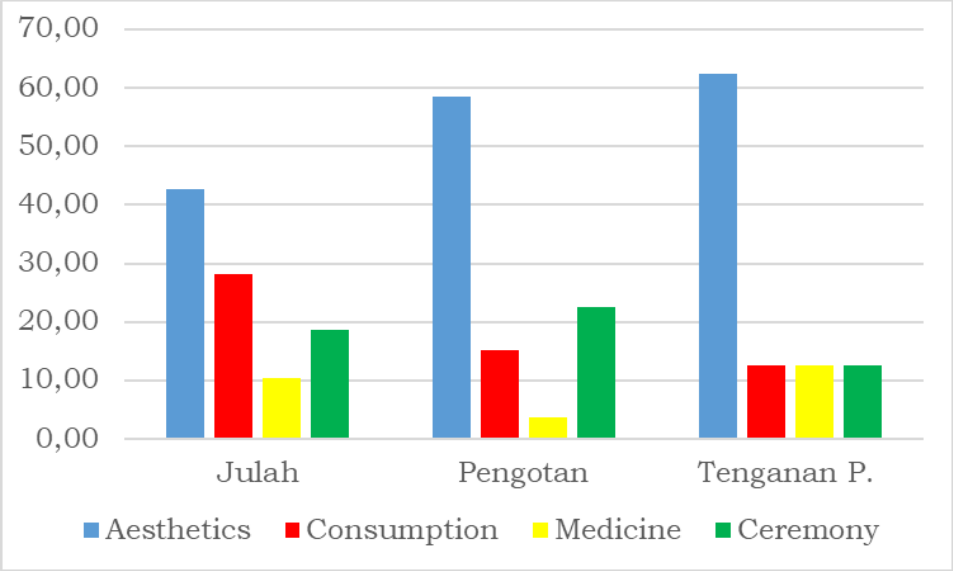

Figure 1. The function of plants in the home garden of Tenganan Pegringsingan Village, Pengotan and Julah (Source: Primary data processing, 2022).

The plants identified in the home garden of Julah Village consisted of 56 plant families with 96 species (Table 1). The highest frequency plants fell for the *Azadirachta indica* plant compared to the others since the community uses this plant as a ritual material, such as for everyday saplings. It is in line with the research results reported by (Nurjani, 2016). The plants' identification in the Pengotan Village home garden found 39 families of 53 species where *Cordyline fruticosa* was found in all home gardens surveyed. The plant was found in sacred areas (*merajan*) either used as a support tree (*sanggah*) or planted normally. There were 61 families and 112 species of plants found in the home garden in Tenganan Pegringsingan Village. The Nyctanthes arbortristis plant has sacred value in Tenganan Pegringsingan Village, although the frequency of its existence is low.

Table 1. Recapitulation of plant data in the villages of Tenganan Pegringsingan, Pengotan and Julah

Villages	Σ Species	Highest F	Unique
Tenganan P.	112	*Plumeria sp.*	*Nyctanthes arbortristis*
Julah	96	*Azadirachta indica*	*Azadirachta indica*
Pengotan	53	*Cordyline fruticosa*	*Cordyline fruticosa*

Source: Primary data processing, 2022

Diversity and similarity of plant species

Based on the Shanon Wiener test, the diversity of the home garden plant species in Tenganan Pegringsingan and Julah Villages was high, while it was in the medium category (Table 2) for Pengotan Village. The plant species between Tenganan and Julah had sufficient similarities (0.58) (Table 3). It is due to the fact that most of the residents in Pengotan Village do not frequently stay in the house so the plants did not grow well as in Tenganan Pegringsingan Village and in Julah Village. Fuentes (2021) stated that the preferences of home garden owners influence more on the type of home garden than the characteristics of the community. Furthermore, Avilez-López et al. (2020) concluded that the diversity of species in the home garden is influenced by the owner's knowledge regarding the ecological and economic functions of the home garden. On the other hand, the individual socio-cultural knowledge does not correlate with it.

Table 2. Shanon-Wiener test results in Tenganan Pegringsingan, Pengotan and Julah villages

Villages	H'	Description
Tenganan P.	4,13	tinggi
Pengotan	2,95	sedang
Julah	4,04	tinggi

Source: Primary data processing, 2022

Description:
H<= 1: low diversity
1<h<3: moderate diversity
H>= 3: High diversity

Table 3. Index of plant species similarity in the villages of Tenganan, Pengotan and Julah

Villages	Tenganan P.	Julah	Pengotan
Tenganan P.	100	0,58	0,38
Julah	-	100	0,35
Pengotan	-	-	100

Source: Primary data processing, 2022

Plant Composition

The home gardens in the villages of Tenganan Pegringsingan, Pengotan, and Julah have a similar pattern for growing small ornamental plants (Figure 2, 3, 4). Meanwhile, plants for consumption such as food crops and trees are planted far from their residential areas. It is due to the limited yard space, village rules, and the existing belief. The size of the yard impacts the sustainability of the tree utilization in the home garden (Jegora et al., 2019). Tenganan Pegringsingan Village also has a regulation that cultivated crops with economic value must be planted on moorland outside the residential areas (forest). Rules for cutting down trees and utilizing cultivated crops are also regulated through *awig-awig.*

Figure 2. Plant Arrangement in Tenganan Pegringsingan Village (Source: Personal Documentation, 2022)

Figure 3. Plant Arrangement in Julah Village (Source: Personal Documentation, 2022)

Figure 4. Plant Arrangement in Pengotan Village (Source: Personal Documentation, 2022)

The placement of plants in Tenganan Pegringsingan and Julah Villages also has a similar pattern of spreading them throughout the home garden (Figures 5 and 6). Meanwhile, in Pengotan Village (Figure 7), plants are generally found in the sacred part of the house. They have the same pattern for placing the plants on merajan section with the dominance of *Cordyline fruticosa, Dracaena angustifolia, Piper betle*, and *Erythrina subumbrans*. The home gardens in Pengotan Village are not really utilized because the houses are generally not the main house/residential house, the owners go there whenever they have some necessities or other mandatory activities.

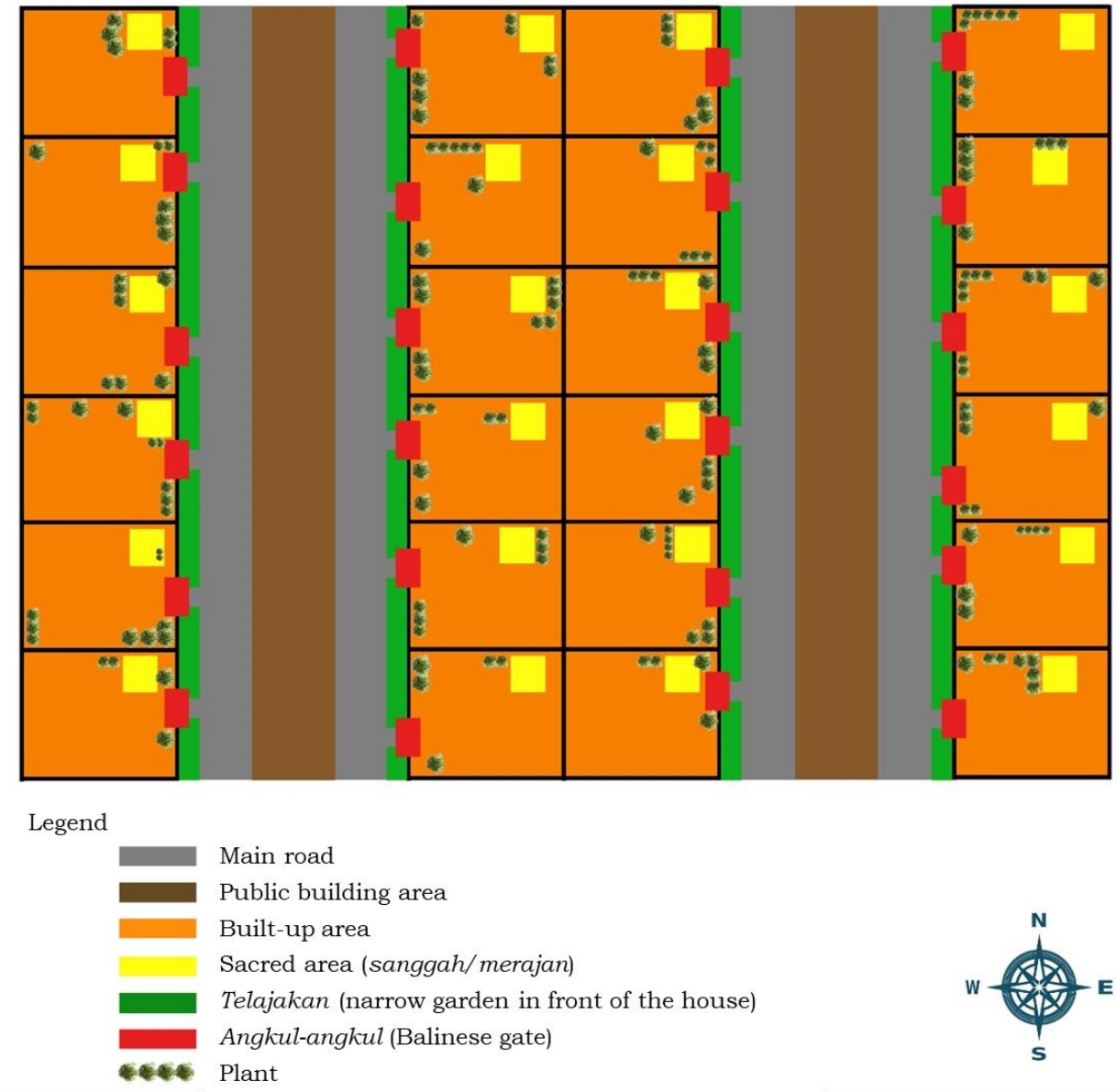

Figure 5. Illustration of the composition of the placement of plants in Tenganan Pegringsingan Village
(Source: Data processing, 2022)

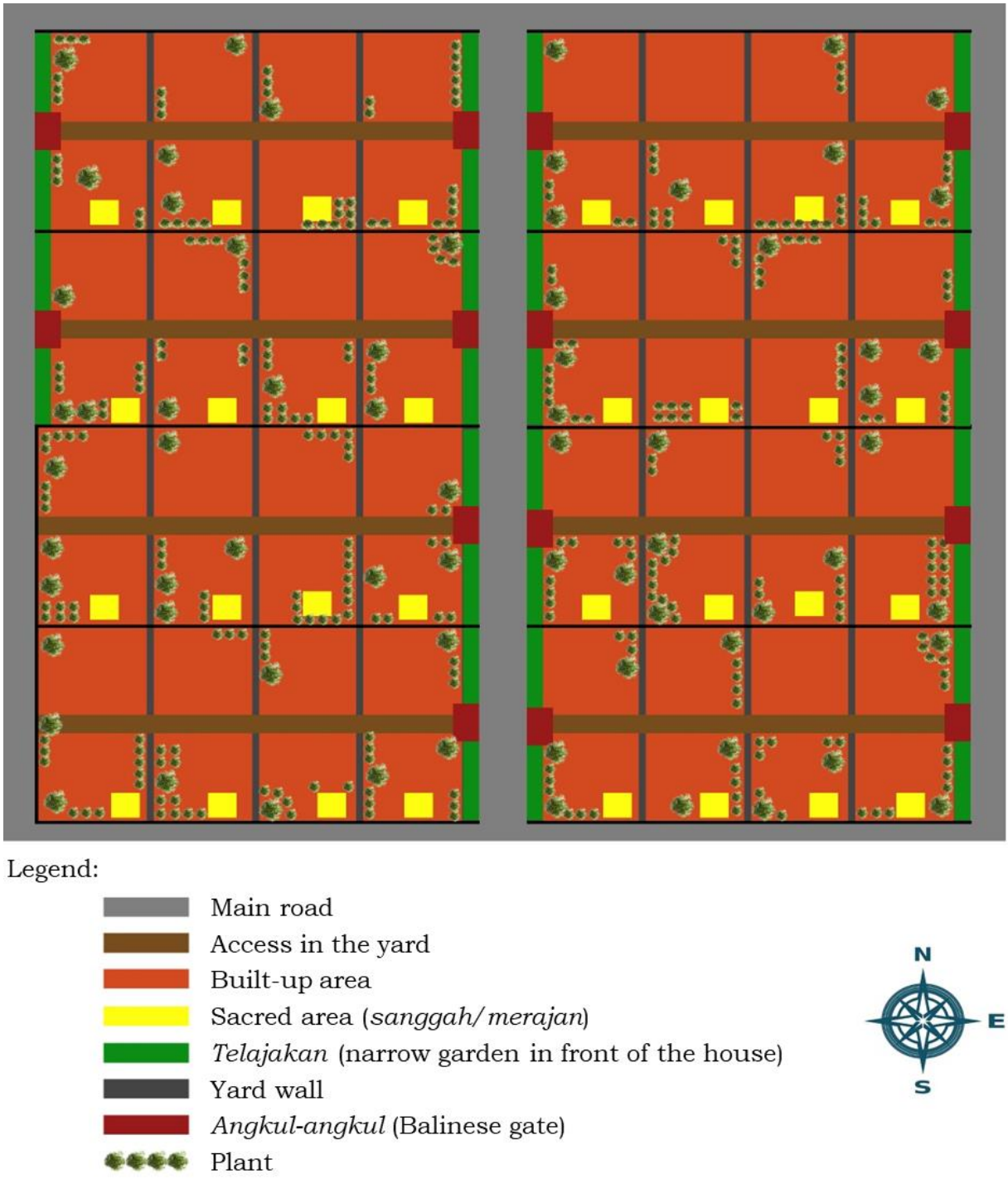

Figure 6. Illustration of the composition of the placement of plants in Julah Village
(Source: Data processing, 2022)

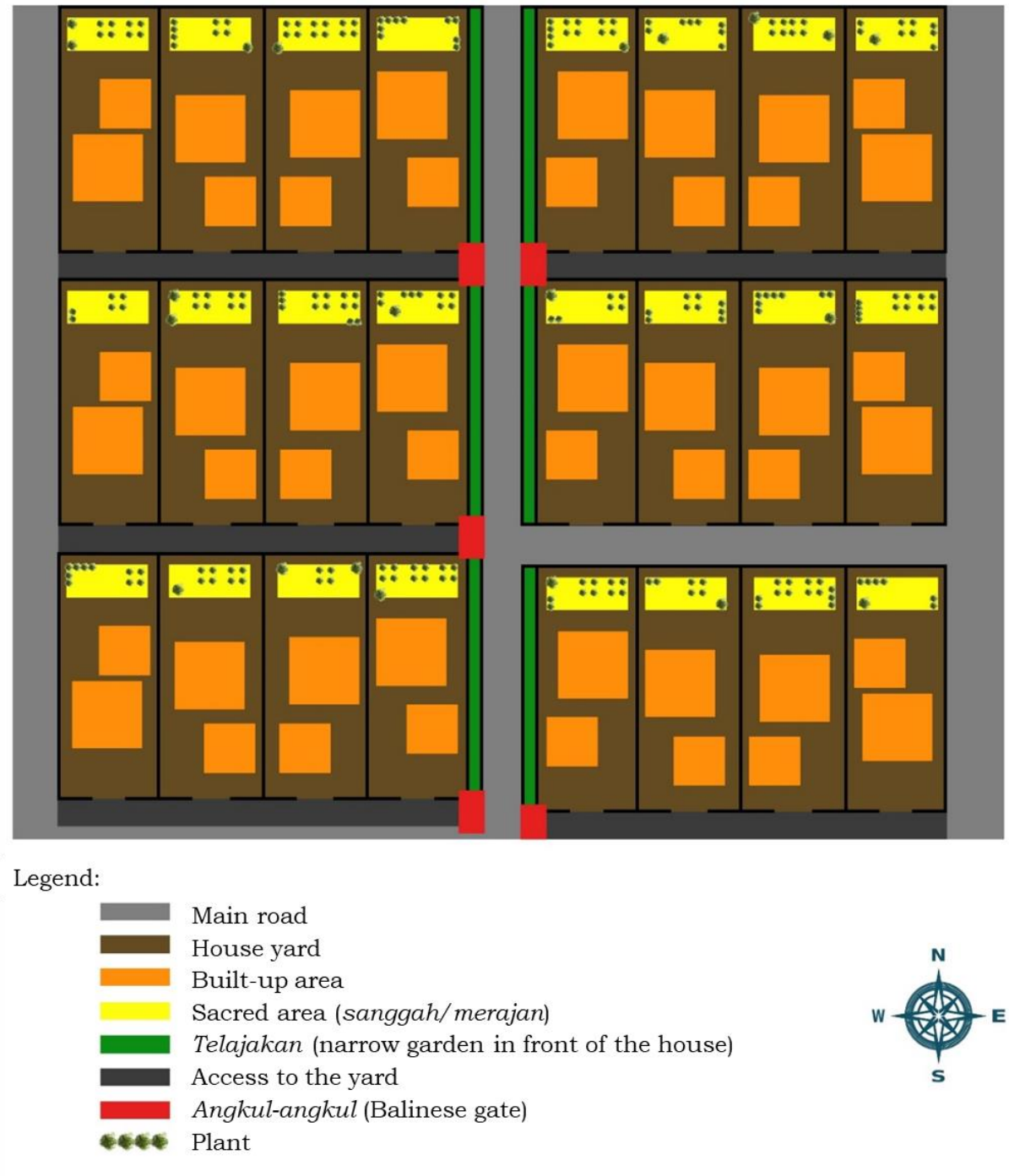

Figure 7. Illustration of the composition of the placement of plants in Pengotan Village
(Source: Data processing, 2022)

CONCLUSION

The function of home garden plants in the villages of Tenganan Pengirisingan, Pengotan, and Julah in general is for aesthetics. The type of plant that has spiritual value in Tenganan Pegringsingan Village is *Nyctanthes arbortristis*. In the interim, the *Azadirachta indica* plant has the highest frequency in Julah Village, and the *Cordyline fruticosa* plants always grow in *merajan* Pengotan Village. The

plant species are similar in Tenganan and Julah Villages, but some differences are found in Pengotan Village. The composition of the plants is spread out both in Tenganan and in Julah villages, while in Pengotan village it is focused on the sacred area (*merajan*).

RECOMMENDATION

Based on the results of the research, each village has different unique plant species which motivates researchers to study more deeply about the function and the meaning of these plants in the local village culture. This study is necessarily undergone in relation to the preservation of culture and the plants themselves. In this regard, it is necessary to conduct in-depth interviews with villagers who understand local customs and culture.

ANKWOLEDGEMENT

This article is the output of a study of Plant Diversity Studies Based on Landscape Character in the Home Garden of Three Traditional Tourism Villages, Bali which was fully funded by LPPM Udayana University through DIPA PNBP Udayana University FY-2022 in accordance with the Letter of Agreement on Research Implementation Assignment Number: B/78.129/UN14 .4.A/PT.01.03/2022, April 26, 2022.

AUTHOR CONTRIBUTIONS

1	**Anak Agung Keswari Krisnandika, S.P., M.Si**	
	Institution	Faculty of Agriculture, Udayana University, Jl. P.B. Sudirman, Dangin Puri Klod, Kecamatan Denpasar Barat, Kota Denpasar, Bali, Indonesia.
	Contributions	Coordinated all stages and work steps starting from the preparation of data collection, data analysis, until published texts.
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/5982459
2	**Naniek Kohdrata, S.P., M.LA**	
	Institution	Faculty of Agriculture, Udayana University, Jl. P.B. Sudirman, Dangin Puri Klod, Kecamatan Denpasar Barat, Kota Denpasar, Bali, Indonesia.
	Contributions	Collected, analyzed and interpreted data
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/5981299
3	**Ir. I Made Agus Dharmadiatmika, S.P., M.T**	
	Institution	Faculty of Agriculture, Udayana University, Jl. P.B. Sudirman, Dangin Puri Klod, Kecamatan Denpasar Barat, Kota Denpasar, Bali, Indonesia.
	Contributions	Collected, analyzed and interpreted data
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/6734011
4	**Dr. Gede Mekse Korri Arisena, S.P.,M.Agb**	
	Institution	Faculty of Agriculture, Udayana University, Jl. P.B. Sudirman, Dangin Puri Klod, Kecamatan Denpasar Barat, Kota Denpasar, Bali, Indonesia.
	Contributions	Collected, analyzed and interpreted data
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/6188678

5	**Beata Joanna Gawryszewska PhD, DSc**	
	Institution	Warsaw University of Life Sciences, Poland
	Contributions	Collected, analyzed and interpreted data
	Homepage	https://www.sggw.edu.pl/?pracownicy=beata-gawryszewska

REFERENCES

Adhika, I. M. (2004). Pola Penataan Ruang Unit Pekarangan. *Jurnal Permukiman Natah*, *2*(1), 1–9.

Avilez-López, T., Van Der Wal, H., Aldasoro-Maya, E. M., & Rodríguez-Robles, U. (2020). Home gardens' agrobiodiversity and owners' knowledge of their ecological, economic and socio-cultural multifunctionality: A case study in the lowlands of Tabasco, México. *Journal of Ethnobiology and Ethnomedicine*, *16*(1), 1–13. https://doi.org/10.1186/s13002-020-00392-2

Behbahani, A. G., Khoshbakht, K., Davari, A., Tabrizi, L., Veisi, H., & Alipour, A. (2012). Assessing the effect of socio-economic factors on agrobiodiversity in homegardens of Jajrood and jamabrood in Tehran province(Iran). *Advances in Environmental Biology*, *6*(5), 1708–1715.

Berkowitz, B. N., & Medley, K. E. (2017). Home gardenscapes as sustainable landscape management on St. Eustatius, Dutch Caribbean. *Sustainability (Switzerland)*, *9*(8). https://doi.org/10.3390/su9081310

Brown, K. A., Parks, K. E., Bethell, C. A., Johnson, S. E., & Mulligan, M. (2015). Predicting plant diversity patterns in madagascar: Understanding the effects of climate and land cover change in a biodiversity hotspot. *PLoS ONE*, *10*(4), 1–19. https://doi.org/10.1371/journal.pone.0122721

Elih Nurlaelih, E., Hakim, L., Rachmansyah, A., & Antariksa, A. (2019). Landscape Services Of Home Garden For Rural Household: A Case Study Of Jenggolo Village Malang Regency. *Agricultural Social Economic Journal*, *19*(3), 135–143. https://doi.org/10.21776/ub.agrise.2019.019.3.2

Fuentes, T. L. (2021). Homeowner preferences drive lawn care practices and species diversity patterns in new lawn floras. *Journal of Urban Ecology*, *7*(1), 1–13. https://doi.org/10.1093/jue/juab015

Gbedomon, R. C., Fandohan, A. B., Salako, V. K., Idohou, A. F. R., Kakaï, R. G., & Assogbadjo, A. E. (2015). Factors affecting home gardens ownership, diversity and structure: A case study from Benin. *Journal of Ethnobiology and Ethnomedicine*, *11*(1). https://doi.org/10.1186/s13002-015-0041-3

Hakim., L. (2014). *Etnobotani dan Manajemen Kebun-Pekarangan Rumah: Etnobotani dan Manajemen Kebun-Pekarangan Rumah: Ketahanan Pangan, Kesehatan dan Agrowisata*. Retrieved from https://biologi.ub.ac.id/wp-content/uploads/2015/11/ETNOBOTANI-dan-MANAJEMEN-KEBUN-PEKARANGAN-RUMAH.pdf

Iskandar, J., Iskandar, B. S., & Partasasmita, R. (2018). Review: The impact of social and economic change on domesticated plant diversity with special reference to wet rice field and home-garden farming of West Java, Indonesia. *Biodiversitas*, *19*(2), 565–577. https://doi.org/10.13057/biodiv/d190227

Jegora, T., Asfaw, Z., & Anjulo, A. (2019). Woody Species Diversity and Management in Homegarden Agroforestry: The Case of Shashemene District,

Ethiopia. *International Journal of Forestry Research*, *2019*. https://doi.org/10.1155/2019/3697047

Kazakis, G., Ghosn, D., Remoundou, I., Nyktas, P., Talias, M. A., & Vogiatzakis, I. N. (2021). Altitudinal vascular plant richness and climate change in the alpine zone of the lefka ori, crete. *Diversity*, *13*(1), 1–16. https://doi.org/10.3390/d13010022

Khuswati, R., & Pudjiastuti, A. Q. (2022). *Sustainability of the Kawasan Rumah Pangan Lestari (A Sustainable Food House Area Program) in Pasuruan Regency*. *16*(1), 28–41.

Magurran, A. E. (2004). Measuring Biological Diversity. In *Angewandte Chemie International Edition, 6(11), 951–952.*

Mohan, S., Ramachandran Nair, P. K., & Long, A. J. (2007). An assessment of ecological diversity in homegardens a case study from Kerala state, India. *Journal of Sustainable Agriculture*, *29*(4), 135–153. https://doi.org/10.1300/J064v29n04_10

Nurjani, N. P. S. (2016). Struktur Rumah Tinggal Masyarakat Julah. *Jurnal Arsitektur, Bangunan, & Lingkungan*, *5*(2), 91–104.

Prihatini, J., Iskandar, J., & Partasasmita, R. (2018). Struktur Pekarangan Komersil: Studi Kasus Di Desa Sukapura Kecamatan Kertasari Kabupaten Bandung, Das Citarum Hulu, Jawa Barat, Indonesia. *BIOTIKA Jurnal Ilmiah Biologi*, *16*(2), 5. https://doi.org/10.24198/bjib.v16i2.19904

Regassa. (2016). Useful plant species diversity in homegardens and its contribution to household food security in Hawassa city, Ethiopia. *African Journal of Plant Science*, *10*(10), 211–233. https://doi.org/10.5897/ajps2016.1439

Sari, I. D., Yuniar, Y., Siahaan, S., Riswati, & Syaripuddin, M. (2015). Community Tradition in Planting and Using Medicinal Plant in Surround Home Yard. *Indonesian Pharmaceutical Journal*, *5*(2), 123–132. Retrieved from http://download.portalgaruda.org/article.php?article=378944&val=4889&title=Tradisi Masyarakat dalam Penanaman dan Pemanfaatan Tumbuhan Obat Lekat di Pekarangan

Sudarma, I M. & As-syakur, A. R. (2018). Dampak perubahan iklim terhadap sektor pertanian di provinsi bali. *SOCA*, *12*(1). https://doi.org/https://doi.org/10.24843/SOCA.2018.v12.i01.p07

Soni, D. K., & Ansari, F. (2017). Climate change and biodiversity; impacts, vulnerability and mitigation in Indian perspective : A review. *Journal of Applied and Natural Science*, *9*(1), 632–638. https://doi.org/10.31018/jans.v9i1.1243

Sujarwo, W., & Caneva, G. (2015). Ethnobotanical study of cultivated plants in home gardens of traditional villages in Bali (Indonesia). *Human Ecology*, *43*(5), 769–778. https://doi.org/10.1007/s10745-015-9775-8

Surat, H., & Yaman, Y. K. (2017). Konut bahçelerindeki bitki türlerinin değerlendirilmesi: Batum (Acara) kent merkezi örneği. *Turkish Journal of Forestry | Türkiye Ormancılık Dergisi*, *18*(1), 11–11. https://doi.org/10.18182/tjf.308755

Umbu, Y., Sabaora, O., Priyanto, S. H., & Prihtanti, T. M. (2021). *The Food Security Of The Household Recipient Of Food Independent Village Program In Central Sumba Regency*. *15*(2), 334–344.

Wakhidah, A. Z., Chikmawati, T., & Purwanto, Y. (2020). Homegarden ethnobotany

of two saibatin villages in lampung, indonesia: Species diversity, uses, and values. *Forest and Society*, *4*(2), 338–357. https://doi.org/10.24259/fs.v4i2.9720

Wijaya, I. K. M. (2019). Konsepsi Natah Dan Lebuh Sebagai "Ruang Keseimbangan" Dalam Arsitektur Tradisional Bali. *Jurnal Arsitektur ZONASI*, *2*(2), 98. https://doi.org/10.17509/jaz.v2i2.14677

Wiranatha, I. K., Dharmadiatmika, I. M. A., & Krisnandika, A.A. K. (2021). Model Desain Taman Toga Desa Bukian, Kecamatan Payangan, Kabupaten Gianyar. *Jurnal Lanskap Indonesia*, *13*(2), 45–53. https://doi.org/10.29244/jli.v13i2.34321