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THE ETHNOECOLOGY OF MALAY COMMUNITY TO SUPPORT MANAGEMENT OF FUNCTIONAL FOOD SOURCE AREAS IN BELITUNG REGENCY, INDONESIA

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ABSTRACT
PRASAJA, D., CHIKMAWATI, T., SULISTIJORINI, S., PURWANTO, Y. & DJUITA, N. R. 2025. The ethnoecology of the Malay community to support the management of functional food source areas in Belitung Regency, Indonesia. *Reinwardtia* 24(2): 199–217. — The Malay community in Belitung Regency is rich in local knowledge about the management of the Belitung community landscape, which has been passed down from generation to generation. This local knowledge enables food production from its sources, but there is no information on the diversity and composition of plants in the Belitung community's landscapes. This study aimed to analyze the diversity, composition, and conservation strategies of food plants in the Belitung community landscape. The study was conducted using the vegetation analysis method, which created tiered square plots of various sizes. Plant conservation status is determined based on the ICS and the Important Value Index (IVI). The most common family found in all landscapes (*rimba*, *bebak*, *kerangas bebak*, *kelekak*, garden, homegarden) is Myrtaceae (21 species), except in rice fields, it is Poaceae, and in *ume* is Euphorbiaceae. Food plants are most found in homegarden landscapes (136 species included in 57 families). The cultivation and development of other potentials process must be carried out for plants with low/moderate IVI and high ICS, such as *Ananas comosus, Arenga pinnata,* and *Cocos nucifera.* Information from this research can support efforts to diversify and provide food availability to realize food security based on local wisdom and local knowledge regarding the species diversity and the potential of local food plants in the Belitung Malay community. Traditional landscapes have an important role in providing sustainable food sources, as well as being a strong local identity, and providing economic contributions to the Belitung Malay community.

Key words: Conservation, food plant, landscape, Malay community.

ABSTRAK
PRASAJA, D., CHIKMAWATI, T., SULISTIJORINI, S., PURWANTO, Y. & DJUITA, N. R. 2025. Etnoekologi masyarakat Melayu dalam rangka mendukung pengelolaan kawasan sumber pangan fungsional di Kabupaten Belitung, Indonesia. *Reinwardtia* 24(2): 199–217. — Masyarakat Melayu di Kabupaten Belitung kaya akan pengetahuan lokal tentang pengelolaan lanskap yang diwariskan secara turun-temurun. Pengetahuan lokal tersebut memungkinkan produksi pangan dari sumbernya, namun belum ada informasi mengenai keanekaragaman dan komposisi tumbuhan pada lans-kap masyarakat Belitung. Penelitian ini bertujuan untuk menganalisis keanekaragaman, komposisi, dan strategi konservasi tumbuhan pangan di lanskap masyarakat Belitung. Penelitian dilakukan dengan metode analisis vegetasi, yaitu membuat plot-plot persegi berjenjang dengan berbagai ukuran. Status konservasi tumbuhan ditetapkan

berdasarkan Indeks Kepentingan Budaya (ICS) dan Indeks Nilai Penting (INP). Suku yang paling banyak ditemukan di semua lanskap (*rimba*, *bebak*, *kerangas bebak*, *kelekak*, pekarangan, dan kebun) adalah Myrtaceae (21 jenis) kecuali di sawah yaitu Poaceae, dan *ume* yaitu Euphorbiaceae. Tumbuhan pangan paling banyak ditemukan di pekarangan (136 jenis yang termasuk dalam 57 suku). Proses budidaya harus dilakukan untuk tumbuhan dengan INP rendah/sedang dan ICS tinggi, seperti *Ananas comosus, Arenga pinnata,* dan *Cocos nucifera.* Informasi hasil penelitian ini dapat mendukung upaya diversifikasi dan penyediaan pangan guna mewujudkan ketahanan pangan berbasis kearifan lokal dan pengetahuan lokal mengenai keanekaragaman dan potensi tumbuhan pangan lokal pada masyarakat Melayu Belitung. Lanskap tradisional memiliki peran penting dalam menyediakan sumber bahan pangan secara berkelanjutan, selain itu, sebagai identitas lokal yang kuat, dan memberikan konstribusi ekonomi bagi masyarakat Melayu Belitung.

Kata kunci: Konservasi, lanskap, masyarakat Melayu, tumbuhan pangan.

INTRODUCTION

The community perspective regarding the environment is inseparable from the various teachings of the ancestors and the philosophy of life. Specifically, local knowledge of the Malay community in Belitung Regency, Indonesia, has contributed significantly to meeting their daily needs by utilizing plant resources obtained from various Belitung landscapes (Henri *et al*., 2022). These include various elements that reflect the reciprocal relationship between humans and nature, as well as the cultural values that are upheld. The Malay community considers the Belitung community landscape to be a combination of physical, social, and cultural aspects that interact, creating a unique identity and local knowledge maintained from one generation to another (Sheil *et al*., 2002; Hussain *et al*., 2020). The Belitung community landscapes are a way of managing the community, which is highly dependent on the environment in a long and gradual process. Previous research has shown that community led environmental management can slow deforestation and maintain plant diversity (Blackman *et al*., 2017; Lawrence *et al*., 2019).

The community in Belitung Regency recognizes eight types of Belitung community landscapes, namely *rimba* (primary forest), *bebak* (secondary forest), *kerangas bebak* (heath forest), *kelekak*, homegarden, garden, rice field, and *ume*. The *kelekak* and homegarden are located near the house, while rice fields, *ume*, and gardens are located far from the house. Meanwhile, the forest is considered a forbidden area, serving as a place for spirits or ancestral spirits. These landscapes have been managed since ancient times by applying the local knowledge of the community in the Belitung Regency (Henri *et al*., 2022). The Malay community lives on the coast and inland, using and managing the Belitung community landscapes in the Belitung district. Some members make a living as pepper farmers, rice farmers, fishermen, or gardeners of rubber or vegetables (BPS, 2024). One example of the knowledge related to the Belitung community landscapes includes creating *kelekak* (mixed fruit gardens) as a source of life in meeting food needs that have economic value. This is achieved by processing young rattan stems (*Calamus manan*) to be used as a mixture of fish soup called *Gangan*. In the *kelekak* landscape, plant species are still oriented toward consumption and commodities such as sugar palm, pepper, coconut, fruit, turmeric, ginger, and galangal (Novita & Adi, 2020).

In Belitung Regency, the Malay people utilize surrounding plants for various purposes, utilizing several parts including tubers, rhizomes, stems, bark, leaves, buds, flowers, fruits, and seeds. The most widely used part of the plant is the fruit, followed by the leaves (Chikmawati *et al*., 2023). The utilization of plants is closely related to the management of the surrounding environment. Local communities will develop various methods and technologies to obtain resources in their surroundings sustainably, which will then create ecological wisdom in certain ethnicities and locations. Ecological wisdom, informed of local community activities, can describe adaptation patterns that play crucial role in the success of agriculture (Rahayu *et al*., 2023; Prasetyo *et al*., 2018). Exploring ecological knowledge, particularly among the Malay community, is expected to have positive and strategic implications for maintaining the environment and natural resources.

All landscapes and other ecosystem landscapes that include ecological aspects are significant in ensuring the sustainability of life and culture of the Malay indigenous community (Oktavia *et al*., 2021). This understanding is fundamental considering the large-scale clearing of forests in the interior for regional plantation industry projects. The impact of forest clearing threatens their lives and devalues their traditional knowledge. However, traditional belief systems and conservation have proven to maintain forest sustainability and ensure the availability of natural resources as well as ecosystem services for humans (Henri *et al*., 2022; Wheeler & Root-Bernstein, 2020).

Due to the development of advanced science and technology, the Malay community in Belitung Regency continues to maintains local customs and wisdom that have been passed down for hundreds of years (Susiarti *et al*., 2023; Henri *et al*., 2022). Belitung community landscapes managed by the community provide essential ecosystem functions that describe the characteristics of rural areas as an

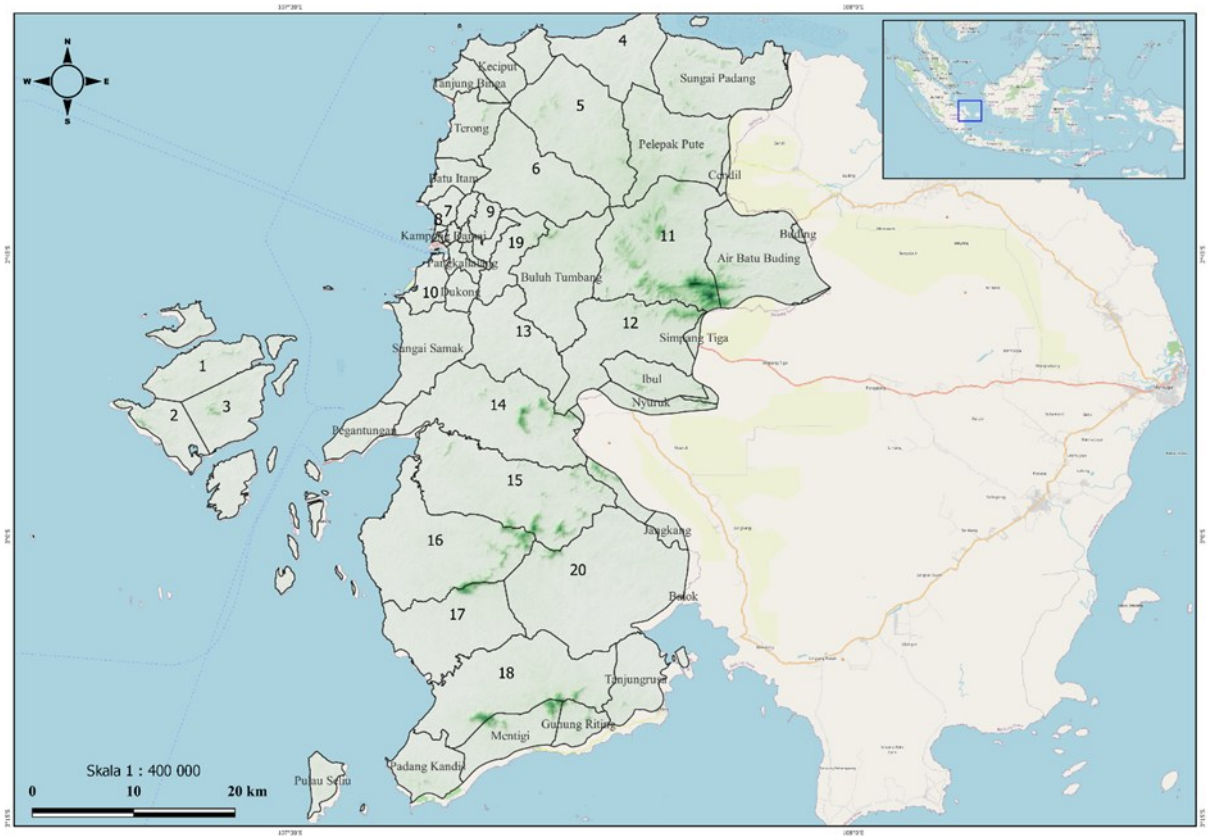

Fig. 1. Study location in Belitung District, Indonesia (1. Selat Nasik, 2. Suak Gual, 3. Petaling, 4. Sijuk, 5. Air Selumar, 6. Air Seruk, 7. Air Saga, 8. Tanjung Pendam, 9. Air Merbau, 10. Juru Seberang, 11. Kacang Butor, 12. Badau, 13. Cerucuk, 14. Bantan, 15. Simpang Rusa, 16. Lassar, 17. Perpat, 18. Membalong, 19. Perawas, 20. Kembiri villages).

effort to integrate biodiversity and cultural functions sustainably for human life (Renes *et al*., 2019; Agnoletti & Rotherham, 2015). Despite the significant contribution, the diversity of plants that comprise the community landscapes in the Belitung District has not been explored. Therefore, this study analyzed the ethnoecology of the diversity, composition, and conservation strategies of food plants in the Malay community in Belitung district to support the management of functional food source areas.

MATERIALS AND METHODS

Study Area

This study was conducted in five sub-districts of Belitung Regency, Bangka-Belitung Island Province, namely Tanjung Pandan, Badau, Sijuk, Membalong, and Selat Nasik (Fig. 1). The research location consists of 20 villages. The main criteria for selecting the location were (1) most of the population was Belitung Malay, (2) there were traditional elders in the area, as well as (3) *rimba* (primary forests), *bebak* (secondary forests), *kerangas bebak* (heath forests), *kelekaks*, homegardens, gardens, *ume*, and rice fields were still used by the community to meet their needs. In this study, 20 *kelekak*, one *rimba*, six *bebak*, and one *kerangas bebak*, 260 homegardens, 29 gardens, one *ume*, and ten rice fields were observed across all sub-districts, where vegetation analysis was conducted.

This study employed a combination of qualitative and quantitative methods, incorporating an ethnoecological method (Albuquerque *et al*., 2014). Data were collected using the vegetation analysis method to obtain the Important Value Index (IVI) for each plant species at individual landscapes. The distribution of Belitung community landscapes was mapped using QGIS, while the population of target species was determined using vegetation analysis in the form of nested plots. Based on the experimental design, the main plot was 20 m × 20 m for the tree phase. Within the main plot, there was a subplot measuring 10 m × 10 m for the pole phase or shrub species, 5 m × 5 m for the sapling, and 2 m × 2 m for the seedling or herbaceous. Meanwhile, for the homegarden, garden, *ume*, and rice field landscapes, an inventory of plants is conducted.

The placement of observation plots was conducted through purposive sampling based on information gathered from respondents. The distance between the main plots was adjusted to field conditions (Palinkas *et al*., 2015). The IVI values of each species were grouped into three categories: low, medium, and high for an average IVI of <10, between 10 and 20, and > 20, respectively. Plants with an average ICS value below 20 had were classified in the low ICS category, while those with values above 20 were classified in the high category (Yamini *et al*., 2023). Plants are recorded and documented for each species that grows in the Belitung community's landscapes for further identification using POWO (Plants of the World Online, https://powo.science.kew.org/). Several parameters recorded directly in the field during the vegetation analysis, including the number of individuals and the frequency of presence of each plant species to calculate the density. The calculation was performed to obtain the IVI of each plant species (Palinkas *et al*., 2015).

$$\text{Relative Frequency (FR) of Species (i)} = \frac{\text{absolute frequency of species i}}{\text{total frequency of all species}} \text{ x } 100\%$$

$$\text{Relative Density (KR) of Species (i)} = \frac{\text{absolute density of species i}}{\text{total density of all species}} \text{ x } 100\%$$

$$\text{Relative Dominance (DR) of Species (i)} = \frac{\text{number of species dominance i}}{\text{the total number of dominant species i}} \text{ x } 100\%$$

Species Importance Index = FR(i) + KR(i) + DR(i).

Ethnobotanical quantitative data were analyzed using the Index of Cultural Significance (ICS). This index is analyzed using the Turner's formula (1988) referred to:

$$\text{ICS} = \sum_{i=1}^{n} (q.i.e)\, ni$$

Where q is the quality, which is the use number of a plant species, i is the intensity value, which is the value of the intensity of utilization of beneficial plant species, and e is the exclusivity value, which is the value of the level of exclusivity preference.

RESULTS

Food Plant Diversity in Each Environmental Unit in Belitung Regency

The Malay community in Belitung Regency utilizes many plant species, 189 species and three varieties, from their environment for food. The plants commonly used come from eight environmental units: *rimba*, *bebak*, *kerangas bebak*, *kelekak*, garden, rice field, *ume*, and homegarden. The environmental unit with the largest number of species is the homegarden (Fig. 2). The food plants used can be grouped into six utilization categories, namely fruits, vegetables, seasoning producers, beverages, supplementary foods, and staple foods. The highest utilization category for each environmental unit is fruits, except in rice fields and *ume*, which are more dominated by vegetable categories such as *Breynia androgyna*, *Ipomoea aquatica*, *Phaseolus vulgaris*, *Momordica charantia*, *Solanum melongena*, *Archidendron pauciflorum*, and *Vigna cylindrica* (Fig. 3). The category of fruits that are commonly utilized are those that can be consumed directly, spread across several families, including Myrtaceae, Anacardiaceae, Fabaceae, and Rubiaceae (Fig. 4). The lowest utilization category is staple food because all Malay communities in the Belitung Regency utilize rice (*Oryza sativa*) as a staple food. Rice is generally grown in rice fields.

Based on the similarity index, more similar environmental units are between *bebak* and *kelekak*, followed by homegarden and garden. However, there is no similarity between the *kerangas bebak* and rice field, the *kerangas bebak* and *ume*, *ume* and garden, *ume* and *rimba* (Table 1).

The plant growth categories, number of species, and the species with the highest IVI vary among environmental unit types (Tables 2 and 3). There are four plant growth categories found in the *rimba, bebak,* and *kelekak*, which are tree, pole, sapling, and seedling, but only two plant growth categories are found in the *kerangas bebak*, sapling, and seedling (Table 2). For example, in *rimba* and *bebak*, a tree with the highest IVI is *Bouea oppositifolia*, while in *kelekak,* it is *Durio zibethinus*; a pole with the highest IVI is *Oncosperma tigillarium* in *rimba* and *bebak*, but it is *Garcinia mangostana* in *kelekak* (Tables 2 and 3).

The level of importance of food plant species across different environmental units reflects their ecological role and cultural significance in local

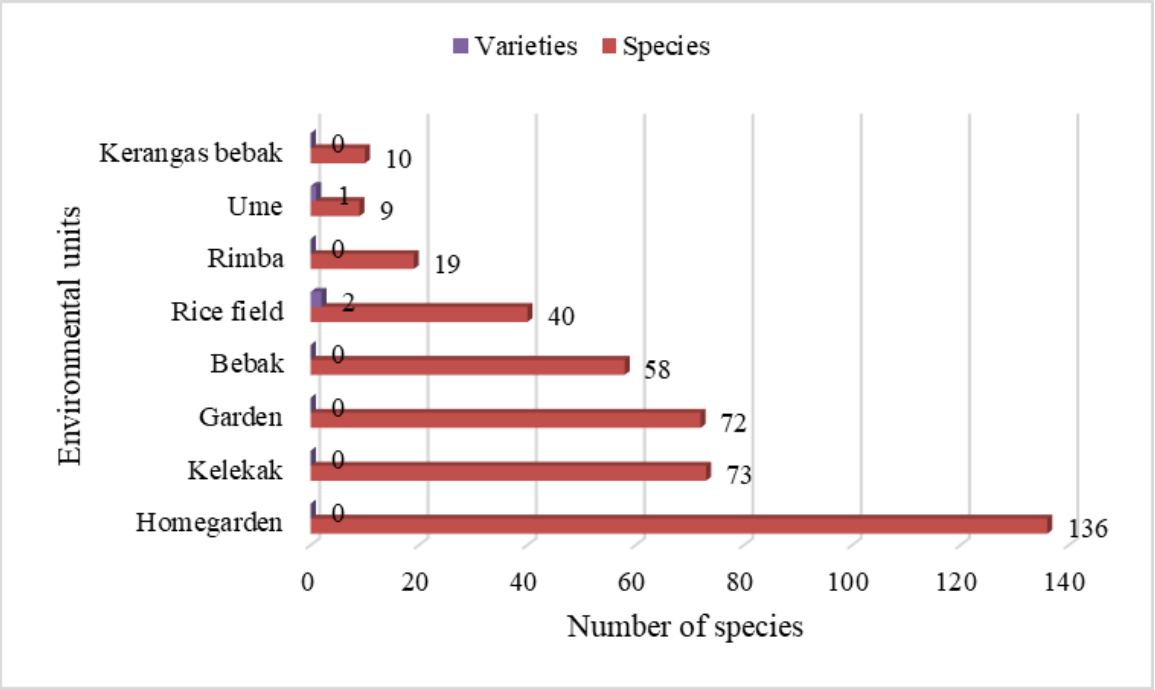

Fig. 2. Comparison of the number of food plant species in each landscape in the Belitung Regency.

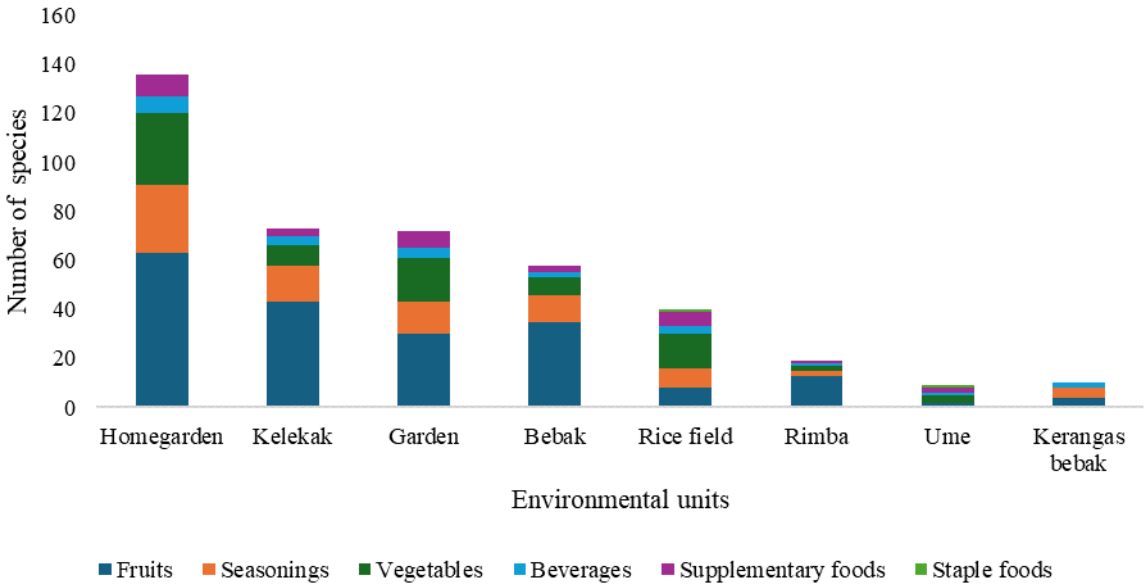

Fig. 3. Categories of food plant utilization in each landscape in the Belitung Regency.

utilization systems. The importance of value index (IVI) was used to identify the most dominant and frequently used species across various environmental setting, including the homegarden, garden, rice field, and *ume*. A higher IVI value indicates greater utilization intensity and wider distribution of a species within traditional agroecosystems. The species with the highest IVI values in each artificial environmental unit are presented in Table 3.

Conservation efforts of food plants in Belitung Regency are implemented through various strategies tailored to the ecological importance and the level of cultural knowledge associated with each species. These strategies include maintaining species availability, cultivating, studying, and developing the potential of local food plants. Based on the analysis of the Importance Value Index (IVI) and the Index of Cultural Significance (ICS), each species demonstrates different conservation priori-

Table 1. Similarity matrix of food plants among landscapes (%).

Landscape	*Rimba*	*Bebak*	*Kerangas bebak*	*Kelekak*	Homegarden	Garden	Rice field	*Ume*
Rimba	0	45	21	35	9	14	3	0
Bebak		0	17	**57**	23	28	8	2
Kerangas bebak			0	9	4	9	0	0
Kelekak				0	42	37	22	7
Homegarden					0	**52**	32	10
Garden						0	**50**	0
Rice field							0	30
Ume								0

Table 2. Highest importance index in the *rimba*, *bebak*, *kerangas bebak*, and *kelekak.*

Land-scape	Habits	Scientific name	Vernacular name	Family	IVI
Rimba	Tree	*Bouea oppositifolia* (Roxb.) Meisn.	Urisan	Anacardiaceae	28.30
	Pole	*Oncosperma tigillarium* (Jack) Ridl.	Nibong	Arecaceae	37.51
	Sapling	*Psychotria malayana* F.Villar ex Vidal	Meleman	Rubiaceae	24.03
	Seedling	*Syzygium bankense* (Hassk.) Merr. & L.M.Perry	Sekudong pelandok	Myrtaceae	12.54
Bebak	Tree	*Bouea oppositifolia* (Roxb.) Meisn.	Urisan	Anacardiaceae	16.76
	Pole	*Oncosperma tigillarium* (Jack) Ridl.	Nibong	Arecaceae	26.38
	Sapling	*Rhodamnia cinerea* Jack	Jemang	Myrtaceae	22.90
	Seedling	*Calophyllum pulcherrimum* Wall. ex Choisy	Betor padi	Calophyllaceae	13.02
Kerangas bebak	Sapling	*Rhodomyrtus tomentosa* (Aiton) Hassk.	Karamunting	Myrtaceae	92.91
	Seedling	*Syzygium bankense* (Hassk.) Merr. & L.M.Perry	Sekudong pelandok	Myrtaceae	71.74
Kelekak	Tree	*Durio zibethinus* L.	Durian	Malvaceae	73.48
	Pole	*Garcinia mangostan*a L.	Manggis	Clusiaceae	62.17
	Sapling	*Syzygium racemosum* (Blume) DC.	Kelebantuian	Myrtaceae	38.18
	Seedling	*Curculigo latifolia* Dryand.	Kelingauan	Hypoxidaceae	19.89

ties. The detailed conservation strategies of food plants in Belitung Regency are presented in Table 4.

DISCUSSION

A. Taxonomy Diversity of Food Plant

In the Belitung Regency, there are three types of environmental units based on their traditional wisdom and perception. Each type has several environmental units, namely natural environmental units (*rimba*, *bebak*, and *kerangas bebak*), artificial environmental units (gardens, rice fields, *ume*, and homegardens), and succession environmental units (*kelekak*) (Henri *et al*., 2022). Forests in Belitung have unique and distinctive characteristics influenced by the island's tropical climate and geography. The condition of forests in Belitung is currently experiencing several challenges due to various factors, including degradation due to tin mining and land conversion for plantations and settlements, which threatens to reduce the number of endemic species, which is also a serious problem. Homegardens, *ume*, and rice fields in Belitung are areas for cultivating certain plants on land or other growing media in a suitable ecosystem, process,

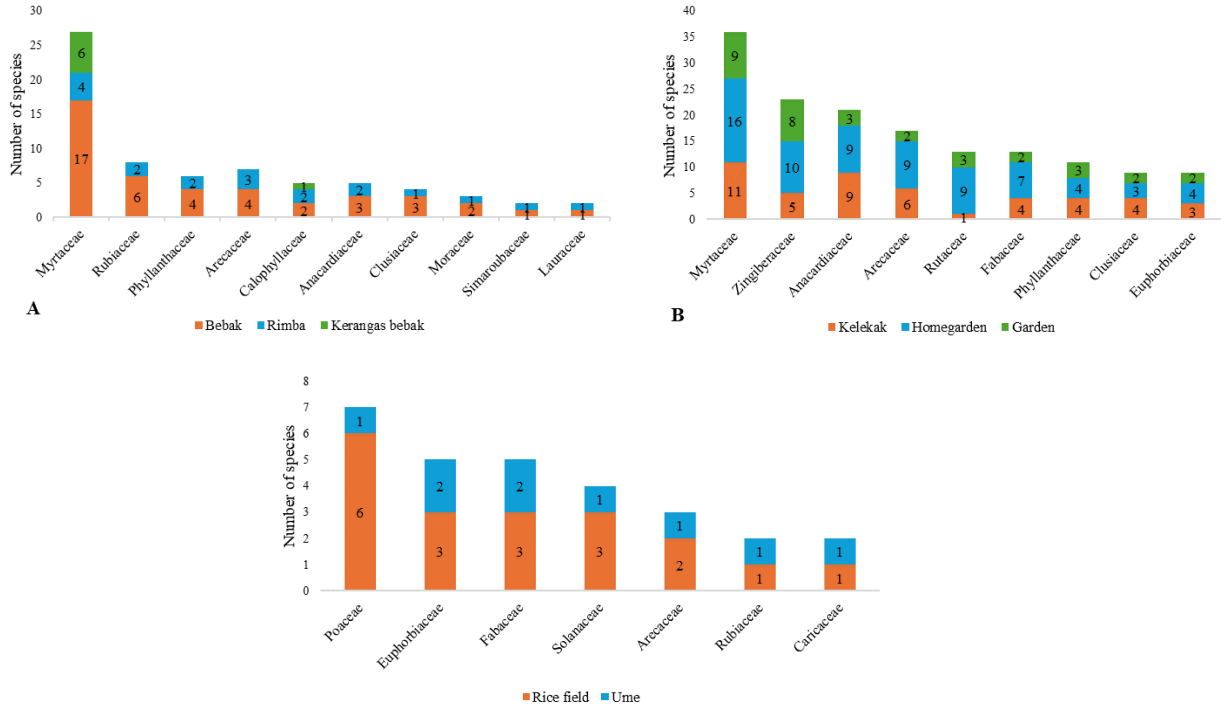

Fig. 4. Most plant families found in each landscape in Belitung Regency. A. *rimba*, *bebak*, and *kerangas bebak*; B. *Kelekak*, homegarden, and garden, C. Rice field and *ume.*

Table 3. Highest importance index in the homegarden, garden, rice field, and *ume.*

Type	Scientific name	Family	Vernacular name	IVI
Homegarden	*Manihot esculenta* Crantz	Euphorbiaceae	Menggale	12.12
	Alpinia galanga L.	Zingiberaceae	Lengkuas	10.5
	Breynia androgyna (L.) Chakrab. & N.P.Balakr.	Phyllanthaceae	Cekok manis	9.88
Garden	*Zea mays* L.	Poaceae	Jagung	30.48
	Piper nigrum L.	Piperaceae	Sahang	20.42
	Ananas comosus (L.) Merr.	Bromeliaceae	Nanas	13.35
Rice field	*Oryza sativa* L.	Poaceae	Padi	63.3
	Manihot esculenta Crantz	Euphorbiaceae	Menggale	7.15
	Alpinia galanga L.	Zingiberaceae	Lengkuas	5.00
Ume	*Oryza sativa* (L.) cv. Mirah	Poaceae	Padi mirah	93.78
	Manihot esculenta Crantz	Euphorbiaceae	Menggale	18.56
	Cnidoscolus aconitifolius (Mill.) I.M.Johnst.	Euphorbiaceae	Menggale jepang	16.02

market goods, and services from these plants, with the help of science and technology, capital, and management to realize welfare for plantation business actors and the community.

The Malay community in Belitung Regency has a good understanding of the diversity and utilization of food plant species in their area. This knowledge is evident from their ability to recognize, name, utilize, and cultivate various plant species in their environment. It can also be seen from how they take or harvest plant species in their environment. Based on the results of this study, all food plants identified across all community environmental units were 189 species and 3 varieties belonging to 57 families . The number and composition of plant species vary among environmental units. The largest number of species was found in the homegardens (136 species). In contrast, the

smallest number of species was found in the *kerangas bebak* (Fig. 2). This situation occurs because the *kerangas bebak* ecosystem is typically a poor-nutrient forest. Unfertile soil limits leaf production and positively selects long-lived leaves.

The Malay community in Belitung Regency utilizes rice as a staple food and source of carbohydrates. Local rice (*Oryza sativa* cv. Mirah) is grown in *ume* (rice grown on dry land), and the rice is usually used for daily life. After the *ume* is harvested, the owners abandon it for a few years and they will look for a new location they considered more suitable for a new *ume*. The *ume* abandoned by the owner will become *kelekak*. The *kelekak* environmental unit is formed if the owner plants fruit-bearing perennials after finishing the rice harvest, or if the fruit trees planted at the same time the rice grow well and produce fruit. In addition, they also utilize *Manihot esculenta*, *Xanthosoma sagittifolium*, *Ipomoea batatas*, and *Colocasia esculenta*. Tubers can be processed in various ways, including compote, boiled, or fried. The tubers of *I. batatas* are usually cooked into a compote and served during the rice harvest season as an expression of gratitude from the owner of the rice field to the workers who harvested the rice. *Colocasia esculenta* and *X. sagittifolium* tubers are processed by frying them into typical Belitung taro chips. *Colocasia esculenta* tubers have a high starch content of 70–80% (Temesgen & Ratta, 2015).

The most dominant family of food plants across all environmental units is Myrtaceae, except in rice fields, where it is Poaceae, and in *ume*, where it is Euphorbiaceae (Fig. 4). This pattern occurs because the species planted in the rice fields and *ume* are monocultures. Farmers are more concerned with the number of rice individuals than other species. Rice fields in Belitung are planted with three varieties of rice, namely *O. sativa* cv. Inpari 32, *O. sativa* cv. IR-36, and *O. sativa* cv. Mirah (local variety). Farmers plant crops other than paddy rice to utilize available space, thereby earning additional income by selling their products or consuming them personally. Myrtaceae is abundant in tropical rainforests and the Belitung region, and it also dominates the Atlantic Forest (Jo *et al*., 2022). Myrtaceae is the most diverse plant family, comprising more than 1,600 species and over a quarter of the world's 5,500 species (Wilson, 2011; Wagner & Fiaschi, 2020). It also has standard, dominant, and highly diverse woody plants (Thornhill *et al.*, 2015). The important value of Myrtaceae is that members of this family have several uses. The fruit can be consumed directly, and some parts are used as wood, spices, dyes, ornamental plants, medicines, antioxidants, and antidiarrheals (Kuspradini *et al*., 2019). The Myrtaceae is one of the leading families of commercial fruit tree worldwide. Among the 121 genera included in this family, *Syzygium* has a highly diverse fruit with great economic potential, in addition to having excellent nutritional value (Farias *et al*., 2020). In an ethnobotanical study in the Sesaot Protected Forest, West Nusa Tenggara, Indonesia, *Syzygium* also had the highest importance value index that was widely used by the community as a medicinal plant for various diseases, a food source in the form of fruits, drinks, or jellies, and building materials (Hidayat, 2017). This family also includes the genus *Myrceugenia*, which is plentiful and has the most tree species in the highlands of Southern Brazil for the highland flora region (Wagner & Fiaschi, 2020). The diversity of food plant species, such as *Calophyllum pulcherrimum* and *E. longifolia*, was dominant in the primary forest in Belitung.

Fruit consumption carries significant risks, such as the possibility of being poisonous, bitter, pungent, or hot, or causing itching. These risks can be reduced by first peeling the skin and then washing the fruit under running water before eating. Most fruits can be consumed fresh or processed into other foods. The species of fruits and the number of species utilized by the Malay community in Belitung Regency vary among environmental units. This result is consistent with previous research, which found that the consumption of edible wild fruits in Bhutan varied significantly across districts, age groups, and levels of indigenous knowledge (Yangdon *et al*., 2022). The highest similarity between *bebak* and *kelekak* stems from *kelekak* being an environmental unit that is less routinely maintained, allowing wild plants to thrive. Then, *kelekak* can undergo a succession stage towards the *bebak*. The high similarity between the homegardens and the gardens stems from the fact that both environmental units share as many as 60 species (52%), including *Curcuma longa*, *Br. androgyna*, and *Cymbopogon nardus*. In addition, the distance between houses and gardens is relatively close, and some gardens are even next to their houses. The closer the zones are combined, the higher the similarity. Conversely, the farther the zones are combined, the lower the level of similarity will be because the flow of plant seeds between environmental units is reduced (Wirabumi *et al*., 2017).

***Rimba* (primary forest)**. *Rimba*, a tropical rainforest, is defined as a natural forest that has never undergone selective logging or total clear-cutting (Slade *et al*., 2011; Audino *et al*., 2014). Tropical rainforest is characterized by two seasons with distinct differences: the rainy and dry season. They have high air temperatures and humidity, as well as rainfall, with rainy days evenly distributed throughout the year (Audino *et al*., 2014). The lowland forests in Sumatra have high biodiversity, including those in the Bangka Belitung Islands.

The tropical lowland forest of Gurok Beraye in Badau is characterized by a dense canopy of woody trees (Fig. 5). The food plant diversity of *rimba* comprises 19 species belonging to 11 families. The species with the highest IVI value were *Bouea oppositifolia* (tree), *Oncosperma tigillarium* (pole), *Psychotria malayana* (sapling), and *Syzygium bankense* (seedling) (Table 2) .

***Bebak* (secondary forest).** *Bebak* are forests that regrow after the *rimba* have been damaged or disturbed. The diversity of food plants found in the *bebak* consists of 58 species belonging to 27 families (Fig. 2). Myrtaceae, the most common food plant family found in this forest environmental unit, consists of 13 species, five of which are *Syzygium bankense, S. napiforme*, *S. pycnanthum*, *Rhodamnia cinerea* and *Rhodomyrtus tomentosa*. The food plant species in the forest can be grouped into five use categories, namely fruits, vegetables, seasonings, beverages, and additional food (supplementary foods and staple foods) (Fig. 3). The most common category is fruit (35 species), including *R. tomentosa*, *Rh. cinerea*, and *S. bankense*. At the same time, the lowest is additional food (three species), which are *Metroxylon sago*, *Xanthosoma sagittifolium*, and *Tacca palmata*. In the *bebak*, the species with the highest IVI value was *Bouea oppositifolia* (tree), followed by *On. tigillarium* (pole), *Rh. cinerea* (sapling), and *Ca. pulcherrimum* (seedling) (Table 2). Mountain forests in the Belitung Islands are in the low category, with an altitude of less than 1,500 m. Generally, low mountain forests host unique plant species due to their diverse vegetation with high humidity and air temperature (Priambudi *et al*., 2022).

***Kerangas bebak* (heath forest)**. *Kerangas bebak* on Sumatra Island is found only on the islands of Bangka-Belitung, and a small part of the Natuna Islands (Whitten *et al*., 1984). Belitung Island is dominated by podzol soils (white sand, quartz rock). It makes *kerangas bebak* and vegetation the most common and distinctive ecosystems on Belitung Island. During the rainy season, it often floods, and the water is usually black. This character is due to the presence of a black soil layer that is easily dissolved (Oktavia *et al*., 2021). The *kerangas bebak* ecosystem is typically a poor-nutrient forest that limits leaf production and positively selects long-lived leaves (Fig. 5). The food plants found in the *kerangas bebak* consist of 10 species belonging to one family: Myrtaceae and Calophyllaceae. The species with the highest IVI value in the sapling strata was *R. tomentosa,* and in the seedling strata was *S. bankense* (Table 2). In the *kerangas bebak* areas that have been opened, there is high dominance by one species, resulting in a decrease in the diversity of food plant species. In addition, environmental conditions are quite extreme and restrictive, such as nutrient-poor soil, low soil pH (acidic), limited water supply, and limited plant adaptation (Oktavia *et al*., 2021).

Kelekak. *Kelekak* is a growing farming culture that has become a tradition in Belitung, particularly in rural settlements. It can be interpreted as a forest containing fruit plants having owners (Prasaja *et al*., 2023). The term forest refers to the condition of the diversity of plant species in this environmental unit. *Kelekak* has usually been given to family members for generations. There were 73 species of food plants belonging to 30 families successfully determined in this unit. Based on the use, the plant species were grouped into five categories: fruit, spices, beverage ingredients, vegetables, and additional food. The highest number of plant species in *kelekak* was fruit (43 species). In comparison, the lowest was additional food (three species) (Fig. 3). In this environmental unit, the species with the highest IVI value were *Durio zibethinus* (tree), *Garcinia mangostana* (pole), *Syzygium racemosum* (sapling), and *Curculigo latifolia* (seedling) (Table 2). *Kelekak* has ancestral customary values from the species *durian*, *mangosteens*, and *langsat* plants, which were perennial fruit plants that produce fruits yearly (Fig. 5).

Kelekak holds profound cultural, social, and economic significance in the daily life of the Malay community in the Belitung Regency. The practice of managing *kelekak* has been passed down from one generation to another as part of the farming and gardening tradition rooted in local culture. Initially, *kelekak* was developed as a subsistence farming solution using land around the house or village to plant various food, fruit, vegetable, and medicinal plants. This practice has been developed as the primary source of daily needs in the form of adaptation to economic and environmental changes (Sheil *et al*., 2002; Suryadin, 2023; Lisboa *et al*., 2024). Therefore, *kelekak* is part of local wisdom in managing natural resources sustainably in the Malay community in Belitung Regency (Fakhrurrozi *et al*., 2001).

Based on plant composition, *kelekak* contains several typical fruit families as environmental unit markers, namely the Clusiaceae, Moraceae, Anacardiaceae, and Sapindaceae. On Bangka Island, it is generally planted with species of trees whose fruits can be eaten fresh, such as durian, mango, and *rambutan* (Henri *et al*., 2022). These fruits are planted and allowed to grow when the *kelekak* is first established, serving as an initial marker of settlement presence. In the early stages of *kelekak* in Belitung Regency, the environmental unit is predominantly composed of herbaceous weed species, such as *Physalis minima*, *Rh. cinerea*, and *R. tomentosa*. However, through the process of succession, the composition of plants is replaced by other species with tree habits from the Myrtaceae, including *Syzygium grande* and *Rh. cinerea* (Oktavia *et al*., 2021).

Homegarden. Homegarden is a plot of land located in the home area planted with various spe-

cies of plants, such as annual and perennial plants, including wild plants, semi-cultivated plants, and multifunctional cultivated plants that form a multi-layered vegetation community. Homegardens play an important role across various aspects, including ecology, economy, society, and culture (High & Shackleton, 2021). Ecologically, the homegarden serves as a place to grow food and ornamental plants, as well as to provide shade and prevent erosion (Larios *et al*., 2013; Ramli *et al*., 2021). In this study, the size of homegardens belonging to the Malay community was relatively large. Initially, the homegarden was used by local people for social and family activities, so the homegarden size was limited. The activities undertaken in the homegarden included parenting, socializing with neighbours, and drying agricultural products (Silalahi *et al.,* 2015). The analysis results of homegarden determined 136 species of food plants belonging to 57 families. Based on use, plants were grouped into five categories: fruit, spices, beverage ingredients, vegetables, and additional food. The highest number of plant species in homegarden was fruit (63 species). In comparison, the lowest was additional food and beverages (7 species) (Fig. 3).

In the homegarden, the species with the highest IVI value was *Manihot esculenta* (12.12%) (Table 3). The Malay community in Belitung Regency also consumes *M. esculenta* and *Br. androgyna* as vegetables. The highest IVI value of *M. esculenta* is inseparable from the ease of planting and low capital allocated for planting and maintenance costs. The production of *M. esculenta* tubers in Belitung Regency in 2023 was 1,337.05 tons (BPS, 2024). The sub-regency with the highest *M. esculenta* production is Tanjung Pandan, with 464 tons, and production has increased significantly compared to 2019. *Alpinia galanga* (Zingiberaceae) has primarily used as a spice, enabling a single plant species can serve multiple functions. *Breynia androgyna* is not only used as a vegetable, thus encouraging people to cultivate it, while *C. nucifera* is not only used as fruit but also as spice (Chikmawati *et al*., 2023).

The fruits of *C. nucifera* can also be sold, thereby increasing owner's income. In addition, *C. nucifera* is mostly found in coastal areas of the tropics and subtropics because coconut requires a hot, humid climate and alluvial soil. This species can grow up to an altitude of 1,000 m. asl, but altitude increases, growth slows (Wakhidah *et al*., 2020). The homegarden of the Malay community greatly contribute to meeting the community of the local community's food needs (Fig. 5). This situation is indicated by the number of plant species, most of which were mostly for food. The homegarden is closely related to closely related to the life of the owner (Galluzzi *et al*., 2010; Galhena *et al*., 2013).

The composition of homegarden plant diversity in this study differed from that in other tropical regions, such as in the southwestern region of Bangladesh and the Vaca Brava region, Brazil, where the Fabaceae had the highest number of species (Carvalho *et al*., 2013). These species from Zingiberaceae were frequently used as spices and medicines, and it is not easy to find alternative species with the same properties. The same plant species was used in the Malay community in Durian Sebatang Village, West Kalimantan. Thus, homegardens play an important role in conserving the source of genetic diversity of local plant species and protecting species that are not widely planted in various places as well (Wulandara *et al*., 2018).

Garden. In the Belitung Regency, a garden is a piece of land, mostly in open areas, that has been treated by the community, especially as a place to grow plants. The results of the analysis showed that 72 species of food plants belonged to 40 families. Based on use, plants were grouped into five categories: fruit, spices, beverage ingredients, vegetables, and additional food. The highest number of plant species in the garden was fruit (30 species). In comparison, the lowest was beverages (four species) (Fig. 3). The most dominant family is Myrtaceae, followed by Zingiberaceae, Solanaceae, Poaceae, and Phyllantaceae (Fig. 4). Species from Myrtaceae found in this environmental unit include *S. bankense, S. polyanthum*, *S. aqueum*, *P. guajava*, *S. malaccense*, *Rh. cinerea*, *R. tomentosa*, *S. racemosum*, and *T. marguensis*.

The species with the highest IVI value was *Zea mays* (corn), followed by *Piper nigrum*, *An. comosus*, *A. galanga*, and *Amaranthus hybridus* (Table 3). The high importance of corn in most gardens in Belitung is due to its harvest time, which runs until the end of the year, when there is a high demand for corn for the New Year's celebration. The corn planted by farmers is a type of sweet corn. The marketing opportunity for this corn is not only to meet local needs, but it can also be sent outside Belitung. In the future, it may be possible to build a small-scale feed factory that can meet local needs. However, this requires assessment and commitment from the government, farmers, and the private sector. Malay communities tend to plant and cultivate the Zingiberaceae family more often in the garden. Zingiberaceae is widely used as a food and medicinal plant worldwide. Members of this family are among the most popular herbs in many traditional medicinal systems, especially the ginger rhizome. This plant has a long history of ethnobotanical use due to its antimicrobial properties, derived from the essential oils of its rhizomes (Shahrajabian *et al*., 2019). For example, galangal, turmeric, and ginger have been used extensively for decades and are still used for traditional and medicinal purposes today, with easy access and

low cost, allowing more people to benefit from these plants.

The crops that farmers in the Belitung Regency widely cultivate in their gardens are *Z. mays*, *P. nigrum*, and *An. comosus*. The *P. nigrum* propagates on *Gliricidia sepium*. Besides being utilized as a pillar for plant propagation, *G. sepium* roots are also useful as a nitrogen enhancer for the plant's root system, preventing soil erosion and landslides, and can kill weeds, especially the reeds that grow underneath (Alamu *et al*., 2023). *Piper nigrum* is widely cultivated by farmers in Belitung Regency gardens because of its ease of cultivation and high economic value, which encourages people to plant it. Besides its economic value, *P. nigrum* is also used by the community as a spice. Gardens serve as farmland to meet the needs of vegetables, fruits, and herbs, as a main or secondary source of income for the farmer by selling plant products.

Rice field. Rice fields in Belitung Regency are wet environmental units that physically is on wetlands with a flat surface, bounded by bunds, planted with rice and other plants on the edges of rice fields, around huts, and bunds (Fig. 5). Farmers plant plants other than rice fields to utilize the available space so that they can earn additional income by selling their product or consuming it personally. The area of rice fields that were successfully inventoried ranged from 300 to 3,500 m^2. The wider the rice field, the more rice is planted. Although the rice field area is large, it does not affect the number of species other than rice found around the rice fields. This situation occurs because the species planted in the rice field are monocultural, and farmers are more concerned with the number of rice individuals than with other species. The analysis of the rice field determined 40 species of food plants belonging to 26 families. Based on use, plants were grouped into six categories: fruit, spices, beverage ingredients, vegetables, staple food, and additional food. The highest number of plant species in the rice field was vegetable (14 species), while the lowest was staple food (one species, two varieties) (Fig. 3).

The rice field inventory results show that the most dominant family is Poaceae, followed by Zingiberaceae, Solanaceae, Fabaceae, and Euphorbiaceae (Fig. 4). Species from Poaceae include *Z. mays*, *O. sativa* cv. Inpari 32, and *O. sativa* cv. IR36. This rice variety is also used in Rias Village, Toboali District, South Bangka Regency, which explains that rice farmers in the village mostly use Inpari 32 and Inpari 42 seeds. The farmers use these seeds because they are derivative from the easy-to-obtain sources (Sitorus *et al*., 2024).

In the rice field, the species with the highest IVI value were *O. sativa*, *M. esculenta*, and *A. galanga* (Table 3). The Belitung Malay community tends to prefer the type of rice that produces white rice rather than red rice. It is because the taste of white rice is considered better, although in terms of nutrition, red rice is superior. Efforts to intensify the increase in Inpari 32 rice production are more likely to be carried out by using superior rice varieties. Other research indicates that Inpari 32 has high production potential, makin it suitable for increasing rice production (Agustian *et al*., 2022).

On the other hand, lemongrass (*Cy. nardus*), also included in Poaceae, is useful for imparting a distinctive aroma to food. The Malay community in Belitung Regency usually uses lemongrass to make chili sauce. The community usually uses it to treat itching and often mixed it with massage oil (Chikmawati *et al*., 2023; Mukarram *et al*., 2021).

Ume. In Belitung Regency, *ume* is an artificial environmental unit; initially, it was a stretch of forest, then the community cut down trees in the wilderness to create *ume* for planting rice, horticultural plants (pineapple, pepper, lemongrass, ginger, turmeric, and galangal), and secondary crops (cassava, sweet potato, corn, peanuts, and green beans). When planting rice, the community also planted perennial plants that produce edible fruit, including *Durio zibethinus, Nephelium lappaceum,* and *Mangifera indica*. There are nine species of food plants belonging to seven families in the *ume*. Based on use, plants were grouped into five categories: fruit, spices, beverages, vegetables, staple food, and additional food. The highest number of plant species in the *ume* was vegetables (Fig. 4). In the *ume*, the species with the highest IVI value was *O. sativa* cv. Mirah, followed by *M. esculenta* and *Cnidoscolus aconitifolius* (Table 3).

After the *ume* is harvested, the owners leave it for several years, then look for a new location that is considered more fertile for *ume*. The community can also reuse the *kelekak* as *ume,* or turn it into a village and cemetery. Meanwhile, suppose the fruit plants once planted in the *ume* do not grow, and the community does not plant hardy fruit trees after the rice harvest. In that case, the abandoned *ume* will become an environmental unit overgrown with shrubs and wild plants, from stake level to pole level. Land that will be used for *ume* must first obtain approval from the village *shaman* (Henri *et al*., 2022).

In this study, only one *ume* was successfully inventoried, having been cultivated by its owner for 2 (two) months. This *ume* land is divided into two parts for planting the main plants, which are red rice (*O. sativa*) and cassava (*M. esculenta*). In the middle of the *ume,* there is a hut used by farmers as a place to rest and temporarily store the harvest before taking it home (Fig. 5).

Table 4. Conservation strategies of food plant in Belitung Regency.

Conservation strategies/species	IVI Category	ICS Category
Maintaining the availability of species (2%)		
Kemang (*Mangifera caesia*)	High	High
Sahang (*Piper nigrum*)	High	High
Padi (*Oryza sativa*)	High	High
Cultivating, studying, and developing another potential (49%)		
Nanas (*Ananas comosus*)	Moderate	High
Aren (*Arenga pinnata*)	Low	High
Kelapa (*Cocos nucifera*)	Low	High
Cultivating, studying, and developing other potentials (49%)		
Cempedak (*Artocarpus integer*)	Moderate	Low
Rambutan (*Nephelium lappaceum*)	Low	Low
Kuweni (*Mangifera odorata*)	Low	Low

B. Conservation of Environmental Unit of the Malay Community in Belitung Regency

Sustainable management of natural resources (SMNR) is needed to support community life in an area, particularly the management of food plants in the Belitung community environmental units, such as *kelekak* and the forest. Management of SMNR in a conventional regional community based on local knowledge can preserve several potential plants, such as medicinal plants, food plants, or others (Rahayu *et al*., 2022). Environmental unit development can be carried out by cultivating potential food plant species and by developing the *kelekak*, homegarden, *ume*, and garden environmental units as ecotourism attraction in Belitung Regency. *Kelekak*, *ume*, garden, and rice field, owned by one family and passed down through generations, support erosion prevention, water source management, and the provision of livelihoods for plants. Therefore, *kelekak*, *ume*, gardens, and rice fields can be a buffer for forest areas generally located on hills or above, providing settlements for the Malay community. Several species of food plants in the forest can only be used during the fruiting season or when abundant in nature (Suwardi *et al*., 2020).

The community in Belitung Regency has a rule prohibiting the trading of *kelekak*, a heritage that must be guarded from one generation to another. This rule can protect the heritage from being converted into tin mining and oil palm plantations. *Kelekak* and *ume* also act as a medium for transferring knowledge about the environment in the Malay community of Belitung Regency during the fruit season. While eating fruit, family members also tell stories regarding history, forest fruits, and other knowledge on managing nature and the surrounding environment. This transfer of knowledge continues to occur and applies not only to the family but also to the community outside the Belitung Regency. The environmental units provide the potential for diverse food and non-food plants, including medicine and rituals, to meet daily economic needs. The community has a variety of local food plants that are continuously used and maintained.

The Malay community in Belitung Regency has little knowledge of the ecological values of several food plants, including the critical value of fruits, spices, vegetables, additional foods, and staple foods. These results are in line with a previous study on the Minangkabau community in Lima Puluh Kota Regency, which used 154 plant species belonging to 51 families as sources of carbohydrates, proteins, fats and oils, fruits, vegetables, spices, and drinks (Agesti *et al*., 2023). The existence and availability of food plants are attributed to various environmental units, including homegardens, gardens, *kelekak*, rice fields, *rimba*, *bebak*, and *ume*. Each plant has cultural value for the community due to the diverse values of intensity, quality, and exclusivity of each plant species, depending on its use, processing method, and existence in nature (Chikmawati *et al*., 2023). The plant IVI can be used to determine the conservation strategy for food plants utilized by the Belitung community. The importance of preserving plants is an essential principle in sustainable conservation efforts that impact the regeneration of a species. The Belitung Malay community has essential values and high local wisdom in maintaining a plant species, including prohibiting the cutting

Fig. 5. Traditional landscapes in Belitung Regency. A. *Rimba*. B. *Bebak*. C. *Kerangas bebak*. D. *Kelekak*. E. Homegarden. F. Garden. G. Rice field. H. *Ume*. Photos by Dimas Prasaja.

down young trees near water sources or springs, which can damage the ecosystem and affect the quality of the water needed daily. Another study also described a similar regulation, in which the Madurese community was prohibited from cutting down trees near water sources (spring area) (Yamini *et al*., 2023).

The surrounding community's harvesting and retrieval processes influence the existence of food plants in nature. Species with high importance will als tend to have high harvest rates, suggesting that continuous harvesting without replacement can lead to extinction (Yamini *et al*., 2023). Therefore, plants with high cultural importance (ICS) and availability (IVI) must be maintained in their habitat to meet daily needs. For plants with high ICS and low levels of availability, cultivation efforts are needed to meet the species' needs. The Belitung community harvests food crops from gardens, including *P. nigrum* and other non-cultivated plants, to meet daily needs. During the abundant season, plants, such as *Archidendron pauciflorum* are often sold in the market, thereby increasing a family's income. Communities usually sell cultivated and non-cultivated plants that have economic value to the market, either as fresh or processed products into food (Moksia *et al*., 2019; Karabak, 2017).

Plant species that need conservation efforts to maintain species availability are *Mangifera caesia*, *P. nigrum*, and *O. sativa* (Table 4). These three plant species, with high ICS and IVI values, should be maintained in their habitat to ensure continuous availability. *Ananas comosus, A. pinnata,* and *C. nucifera* are plant species with a moderate to low level of availability in nature but high use value (Table 4). Conservation efforts through cultivation are essential for plant species with low or moderate availability with high cultural value, such as *An. comosus, C. nucifera,* and *A. pinnata* (Table 4). *Arenga pinnata* is used for palm sugar production, underscoring the need to explore and develop other potentials uses of these three species, which grow in *kelekak* and garden in Belitung. The low to moderate presence of plant species shows that the number of individuals in nature is also small. Specifically, *An. comosus* and *A. pinnata* used as spice mixture for cooking foods in the Belitung Regency. The Belitung Malay community harvests it in the homegarden, garden, or *kelekak,* for a cooking spice to process fish soup (*gangan*).

Several plant species, *A. integer*, *N. lappaceum*, and *M. odorata*, require conservation efforts in the form of cultivation, studies, and other potential development due to low or moderate availability in nature and use value (Table 4). *Artocarpus integer* has moderately available in nature, as the fruit is typical for fresh and rarely found in forests or homegarden. When harvesting and cultivation activities in nature are unbalanced, they threaten the availability of plants and the unmet needs of plants (Suwardi *et al*., 2020).

Most food plants used by the community are available every year. The Malay community in Belitung Regency obtains several species of food plants from *kelekak* and forest sources. Several species of alternative food plants can meet their needs during the lean season. Wild food plants are often used to meet subsistence food needs and survive during famine, serving as a basis for maintaining and preserving the sustainability of traditional ecological knowledge in managing food plants in *kelekak, rimba, bebak,* and *kerangas bebak*. The presence of wild species in the surrounding environment motivates the community to recognize the benefits of plant species, such as fruits, vegetables, and spices.

Various fruit species can be available throughout the year, such as *Musa paradisiaca*, *A. integer*, and *An. comosus*. Several species of other fruit-producing plants bear fruit in certain seasons, including *D. zibethinus*, *Mangifera indica*, *N. lappaceum*, *L. domesticum*, and *G. mangostana*. The community obtains several vegetable plants from homegardens, gardens, and rice fields, such as *Cucumis sativus* and *Amaranthus* sp. This study shows that the Malay community in Belitung Regency has food diversification and security for traditional communities that need to be maintained and sustainably available.

Ecological value. Malay communities in Belitung Regency who depend on natural resources in the form of food plants that can be obtained from the environmental unit show the ecological role of the environmental unit as a provider of ecosystem services, such as helping pollination, contributing to the formation of microclimates, reducing soil erosion, playing a role in the energy cycle, and controlling pests. For example, homegardens can provide habitat for birds, insects, and reptiles. High plant diversity also provides genetic sources for various plant species, especially for food crops. Regarding rice fields, although no research has examined the role of rice field environmental units in pest management, several researchers indirectly suggest that species diversity and interactions among organisms can reduce pests and plant disease populations (Mohri *et al*., 2013). This statement is reinforced by the discovery of species with potential as refugia and as organic pesticides. Based on the experience of rice field owners in the Membalong sub-district, planting *Allamanda cathartica* can protect secondary crops from pests by becoming a habitat for predators of these pests (Fig. 5).

Belitung's natural beauty and ecological richness offer great potential for ecotourism development. By sustainably managing the environment, local communities can develop an environmentally friendly tourism industry, which in turn can boost

their economy without damaging the ecosystem. Community-based management involving local stakeholders can ensure the sustainability of the ecosystem and provide direct benefits to them. Ecosystem damage that often occurs due to deforestation or land conversion can be restored through ecosystem restoration such as the restoration of mangrove forests and primary forests which can provide great benefits for the restoring lost or disturbed ecosystems, improving ecological balance, and improving ecological functions such as water absorption, pollution control, and increasing the food crops cultivation so that it remains sustainable in its habitat.

Economic value. The environmental unit of Belitung society plays a role in fulfilling nutritional needs by supplying food in the form of beverage ingredients, tubers, vegetables, and fruits. *Rimba*, *bebak*, *kerangas bebak*, *kelekak*, *ume*, homegardens, gardens, and rice fields are food sources that meet food needs and maintain food security for rural and urban communities. In addition to being a food source, the Malay community used food plants in the *rimba*, *bebak*, *kerangas bebak*, *kelekak*, *ume*, homegardens, gardens, and rice fields as additional sources of income. Excess harvests are sold to intermediaries or local markets, enabling the owners of a single environmental unit to earn additional household income. Sources of fulfillment of food needs socio-economically contribute to maintaining food availability for their own needs and for neighbours who feel the benefits. The use of plant species as food ingredients is an important link in increasing the availability of functional food for a community (Silalahi *et al*., 2015; Zhang *et al*., 2020). In addition, research indicates that several plants in each environmental unit contain secondary metabolites with medicinal properties that can be used to treat common diseases in the community (Galhena *et al*., 2013).

Food plants that serve as a source of food also have economic value, useful as a source of income for the Belitung Malay community. An observation of the economic value of the plant species was conducted to determine the direct contribution of the species to the survival of the Malay community. The food plant species that has economic value for the Malay community is pepper (*P. nigrum*). This species is used for its fruit to meet the needs of spices and herbs. Pepper is usually harvested once a year during the dry season. Pepper production in Belitung involves a lengthy process and requires specialized skills. Pepper is planted in fertile plantation lands, usually in the highlands with a tropical climate that supports its growth. Pepper farmers in Belitung have passed down pepper cultivation techniques from generation to generation, ensuring the quality and distinctive taste of the pepper they produce.

The pepper harvesting process is usually carried out after the pepper fruit is ripe, and the fruits are then dried using traditional methods to maintain its distinctive aroma and taste. Pepper is more often used to provide a warm taste to various dishes. Economically, pepper provides significant added value, especially with stable demand in the national and international markets. Pepper plantations are one of the agricultural sectors that continue to grow and make a major contribution to the welfare of the people in Belitung. One important aspect of the production of pepper commodities in Belitung is sustainability. Local farmers are increasingly aware of the importance of environmentally friendly agricultural practices to maintain the sustainability of pepper production. This practice includes the use of organic fertilizers, good water management, and crop rotation to maintain soil fertility. These sustainable practices not only protect the environment but also ensure that Belitung pepper production remains of high quality and can meet future market demand.

Socio-cultural value. Studies from a socio-cultural perspective illustrate that the Malay community plants various species of plants on the edge of the land or the front of the homegarden. At the same time, the middle part is used to dry various crops, such as vegetable seeds, coffee, and rice. It is a characteristic of the homegarden environmental unit of local people who work as farmers or gardeners. In addition, food crops planted in the homegarden can be useful to the owner or shared with neighbours who need them to be processed into daily food. The cultivation of plant species used as food ingredients in the homegarden helps conserve the species. Thus, the local community will ensure the sustainability of these plant species so that they remain available for daily cooking. Apart from the homegarden, the community can harvest it from the *rimba*, *bebak*, *kerangas bebak*, *kelekak*, gardens, *ume*, or rice fields. From this culture emerge patterns of behavior for maintaining, using, and managing natural resources so that they remain sustainable, ultimately leading to harmony between humans and nature. The plant species utilized by the Malay community of Belitung Regency has development potential. The use of these types is local knowledge and wisdom obtained by the community from their ancestors. The community wealth of local knowledge and wisdom needs to be preserved because it aligns with its customary, cultural, and socio-economic background.

CONCLUSION

Food plant diversity varies among the eight environmental unit types studied (*rimba*, *bebak*, *kerangas bebak*, *kelekak*, homegarden, garden, *ume*, and rice field). The highest food plant diver-

sity was found in the homegarden environmental unit (136 species belonging to 57 families), while the least was in the *ume* (nine species belonging to seven families). The food plants used can be grouped into six utilization categories, namely fruits, vegetables, seasoning producers, beverages, supplementary foods, and staple foods. The highest utilization category for each environmental unit is fruits. The most common food plants found in homegardens are *M. esculenta*, *Alpinia galanga*, *Br. androgyna*, *C. nucifera*, and *Cy. nardus*. The most common family across all environmental units is Myrtaceae, except in rice fields where it is Poaceae (six species), and in *ume,* where it is Euphorbiaceae (two species). Conservation strategy management related to the management and development of food plants must be implemented in accordance with the ecological status and cultural interests of each species. Moreover, the cultivation process should be carried out for plants with low to moderate IVI and high ICS, such as *An. comosus*, *Arenga pinnata*, and *C. nucifera*. There are five important commodities in Belitung Regency whose economic value is evident, namely *P. nigrum, A. pinnata, D. zibethinus, G. mangostana,* and *An. comosus*. *Piper nigrum* is used for its fruit to meet the needs of a spice and herb. Pepper (*P. nigrum*) from Belitung has unique characteristics that distinguish it from pepper from other regions of Indonesia. Belitung white pepper is known to have for its rounder and denser grains. Its aroma is stronger and sharper, making it highly sought after for culinary and industrial uses. Belitung has sandy and red-yellow podzolic soils and is rich in minerals, which give the pepper a unique taste and aroma. Environmental units have ecological value as providers of ecosystem services, such as pollination, microclimate formation, reduced soil erosion, and pest control. The economic value of environmental units is that they are a source of food that supplies food needs and maintains food security for rural and urban communities, as well as being a source of additional income. The socio-cultural value of environmental units is that food crops planted in the yard can be useful for their owners or can also be shared with neighbours who need them to be processed into daily food.

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