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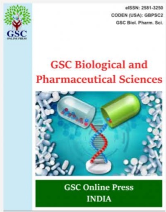

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ETHNOGASTRONOMY OF TRADITIONAL FOOD IN GUNUNGKIDUL'S TRADITIONAL MARKETS AND PROSPECTS FOR ITS CONSERVATION

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ABSTRACT

The community in Gunungkidul possesses local wisdom regarding the processing of various traditional food plants a subject studied within the field of ethno-gastronomy. This study aimed to describe the diversity of traditional foods sold in Gunungkidul traditional markets and the variety of plants used to produce them. The research employed an ethnobotanical approach involving surveys, interviews, and participant observation. Respondents consisted of vendors in Gunungkidul's traditional markets who sell various traditional foods; inquiries focused on the plant species utilized, production processes, and the foods' roles in food security. Data were analyzed qualitatively to obtain comprehensive information addressing the study's objectives. Twenty-nine types of traditional foods sold in Gunungkidul's traditional markets were identified, categorized into staple foods (carbohydrate sources), side dishes (protein sources), vegetables, and snacks. Twenty-seven species belonging 24 genera and 14 families were found to serve as raw materials for these traditional foods. The family with the highest number of species was Fabaceae (7 species), followed by Solanaceae and Poaceae (3 species each), and Amaryllidaceae, Euphorbiaceae, and Arecaceae (2 species each), while the remaining families were represented by one species each. The *gatot, tiwul*, and *sayur lombok hijau* (green chili vegetable dish) are indigenous foods developed from Gunungkidul's local wisdom. The *gatot* and *tiwul* are fermented foods serving as primary or alternative carbohydrate sources, whereas sayur lombok hijau serves as a side dish and protein source. The processing of cassava tubers into *tiwul* and *gatot* represents a form of local wisdom among the Javanese people of Gunungkidul and could serve as a biocultural conservation project within an ethnobotany course.

Keywords: Ethno-gastronomy, Gunungkidul, Conservation, Traditional Food

1 INTRODUCTION

Biodiversity, including plant life, has been utilized to meet various human needs, such as food and medicine [1]. Studies focusing on the use of biodiversity both plant and animal as food sources are more prominent than those addressing other uses [2,3]. Research into plants as food initially focused on exploring new species but subsequently expanded to encompass the gastronomy of various local or ethnic communities, a field known as ethnogastronomy [4].

Ethnogastronomy is derived from the terms "ethno" (referring to ethnic groups) and "gastronomy" (the study of the relationship between food/beverage and culture); thus, it is the study of the relationship between food or beverages and the cultures of ethnic groups. Scarpato [5] states that the study of gastronomy enables the identification of shortcomings, efficiencies, and potential improvements within the gastronomic life of a community. Panetta et al. [4] note that gastronomic research can reveal not only nutritional value but also illustrate symbolic aspects, tastes, habits, rules, taboos, and rituals.

Food processing is influenced by various factors, such as cultural acculturation and environmental diversity. For instance, the creation of *Asinan Bogor* reflects the acculturation between the Chinese community and the residents of Bogor. Panetta et al. [4] state that food is a key theme for exploring culture and traditions. Conversely, local knowledge regarding the use of plants as food sources [6] and traditional food processing methods [7] continues to decline. Sujarwo and Caneva [8] note that the prevalence of modern foods specifically convenient, ready-to-eat options with contemporary flavors has contributed to the younger generation moving away from traditional foods. Despite the impact of globalization and modernization, traditional eating habits and culinary practices continue to play a vital role in people's daily lives [9] and hold potential for development as a source of income.

Food and gastronomy are potential elements in sustainable development [12] and can be developed into a form of tourism [11, 13]. Culturally-based traditional culinary experiences (gastronomy) have become an appealing topic for tourists, as they offer a novel alternative for tourism destinations [14]. Furthermore, Rinaldi [12] states that food and gastronomy can contribute to economic, social, and environmental sustainability. Local gastronomy as a relevant component of the concept of traditional knowledge is increasingly attracting the attention of researchers, particularly when linked to the conservation and sustainable use of biological resources [9].

On the other hand, the erosion of local knowledge continues due to modernization a trend raising concerns that the local wisdom practiced by communities for centuries, or even millennia, could be lost. A *kenduri* is a communal prayer gathering where offerings of rice and side dishes are brought to be shared among all villagers. In the field of ethno-gastronomy, key areas for exploration include the documentation and assessment of traditional eating habits, as well as their social relevance regarding both food sovereignty and environmental conservation [4].

Wonosari Village in Gunungkidul, Yogyakarta, is rich in local wisdom, particularly regarding food processing. Silalahi and Wahyuningtyas [17] reported that the local community in Gunungkidul continues to observe various ceremonies such as *Rasulan* and *Babad Dalan* to preserve this local wisdom. Empirically, it is evident that traditional foods such as *tiwul, getuk*, *gudeg*, and fried grasshoppers are still being preserved in the region. The availability of food ingredients and traditional dishes plays a crucial role in upholding traditions and maintaining food security. This study aims to describe the diversity of traditional foods sold in Gunungkidul markets and the variety of plant species used in these foods.

2 METHODS

Research location: This study was conducted in Paliyan District, Gunungkidul Regency, Special Region of Yogyakarta. Survey sites included markets, kiosks, and households where various traditional foods are processed. Administratively, Paliyan District is part of Gunungkidul Regency. It is bordered by Playen District to the north; Wonosari and Tanjungsari Districts to the east; Saptosari District to the south; and Panggang and Playen Districts to the west, as shown in Figure 1. The area is inhabited by various ethnic groups, though the Javanese ethnic group predominates. The district features hilly terrain characterized by karst rock formations and experiences two seasons: the dry season and the rainy season. The research is being conducted from August 2024 to August 2025. Plant identification is carried out at the Botany Laboratory of the Biology Education Study Program, Faculty of Teacher Training and Education, Universitas Kristen Indonesia.

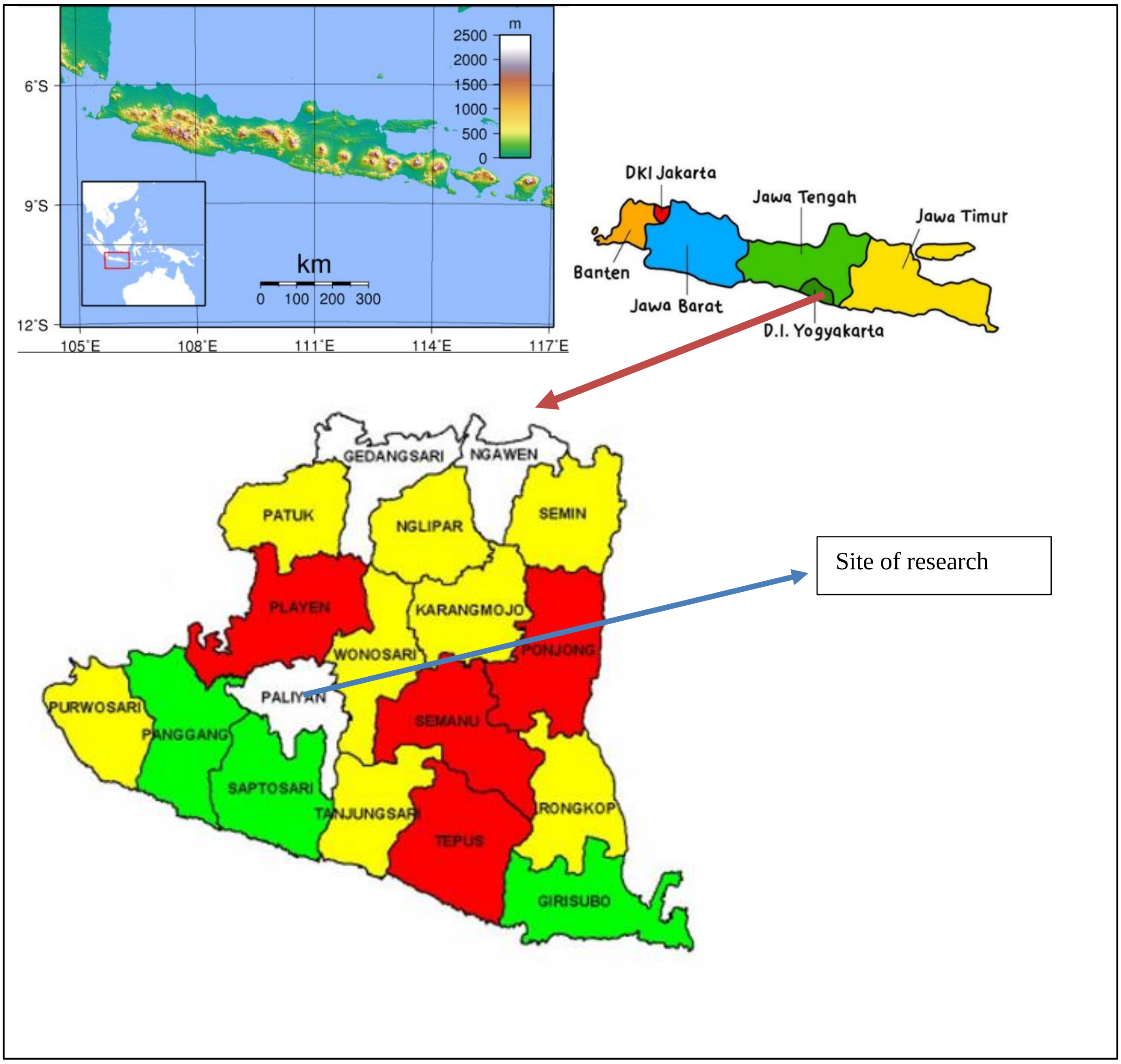

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Figure 1: Map of Paliyan District, Gunungkidul Regency, Special Region of Yogyakarta.

2.1 Data Collection

This study employed an ethnobotanical approach involving surveys and participatory observation. The respondents were local residents in Gunungkidul capable of preparing traditional foods, selected through purposive sampling. Information was gathered regarding the plants used in preparation, the production process, health benefits, economic significance, and the acquisition of gastronomic knowledge. To supplement the data, information on social characteristics such as gender, occupation, age, and education was also collected.

To prepare voucher specimens of plants used in traditional salads, field explorations were conducted in the surrounding area and at local markets. The voucher specimens were dried, identified using the Flora of Java (Volumes I–IV), and stored at the Universitas Kristen Indonesia laboratory. Additional information recorded included local names, plant habit, uses, and sources of acquisition. The data collection instrument was adapted from the methods of Silalahi & Wahyuningtyas [3] and Franco et al. [42], with data recorded in logbooks or on observation sheets. Voucher specimens were prepared from the traded food plants and air-dried to prevent spoilage. Identification was carried out using Flora of Java (Volumes I–IV), *Tumbuhan Bermanfaat Indonesi*a (Volumes 1–3), and Plants of Southeast Asia (Volumes 13 and 19)

2.2 Data Analysis

The data obtained from this study were analyzed qualitatively using descriptive statistics. The qualitative data covered (1) the distribution of plants according to their taxa (family, genus, and species); (2) types of food; (3) food preparation processes; and (4) the conservation potential of the plants and their gastronomic value.

3 RESULTS AND DISCUSSIONS

3.1 Diversity of traditional foods sold at the market in Gunungkidul

The traditional foods referred to in this study are those produced or prepared by the local community and sold in markets that are consumed in daily life as well as during various community activities. There are 29 types of market-based traditional foods in Gunungkidul. Generally, these traditional foods are categorized into staple foods (carbohydrate sources), side dishes (protein sources), vegetables, and snacks.

3.2 Carbohydrate Sources

There are 29 types of traditional carbohydrate-rich foods based on cassava, glutinous rice, taro, and sago. Cassava-based products are the most prominent among these, processed into items such as *lapis singkong* (cassava layer cake), tiwul, *gatot, getuk*, tape (fermented cassava), and *cemplo*n (Figure 2). Local communities have developed various processing methods, including fermentation (*gatot* and *tape*), frying (*tiwul* and *cemplon*), and steaming (*getuk* and *tiwul*). To enhance flavor, people also incorporate various toppings or combine ingredients; for instance, (1) *lapis singkong* is sweetened with sugar and enriched with coconut, adding a savory quality and a distinctive aroma, and (2) red beans are added to *bintul* to provide an additional source of protein. Bintul is a dish made from steamed glutinous rice characterized by its sticky texture combined with black-eyed peas (*Vigna unguiculata*). To enhance the flavor, it is often topped with steamed grated coconut or *serundeng* (fried grated coconut).

Figure 1: Foods as sources of carbohydrates. A. *Lapis Singkong* (cassava layer cake); B. *Bintul*; C. *Fried Tiwul*.

3.3 Vegetable

The *pecel* is a staple vegetable dish sold in markets, prepared from various boiled greens topped with a peanut sauce. Local communities distinguish between types of *pecel* based on added ingredients, resulting in names such as *pecel turi* (featuring *turi* flowers) and *pecel puli* (featuring *puli* chewy, pounded rice cakes) (Figure 3). Plant species commonly used as the main ingredients include cassava leaves (*Manihot esculenta*), papaya leaves (*Carica papaya*), water spinach (*Ipomoea reptans*), spinach (*Amaranthus* sp.), yard long beans (*Vigna unguiculata*), and mung bean sprouts (*Vigna radiata*). Additional ingredients that vary among vendors include carrots (*Daucus carota*) and *turi* (*Sesbania grandiflora*).

Figure 3: Various types of processed vegetables sold at Gunungkidul traditional market. A. *Pecel turi*; B. *Pecel puli*; C. *Bangko*

Besides *pecel, bongko* is also found, which is prepared by steaming various vegetables from legumes mixed with grated coconut and spices, then wrapped and steamed. Upon further study, this is rich in protein (*tolo* beans) and also a source of vegetable fat (coconut/Cocos nucifera), so it is often used by people as a substitute for side dishes. Coconut or endosperm tissue is a plant that is abundant in Gunungkidul, so it is often one of the most frequently used "spices" to enhance flavor, especially savory flavors. The savory taste of coconut endosperm is thought to be related to the lipid content, which is estimated to reach 41.16% while the protein content reaches 11.58% [43].

The coconut kernel is an abundant source of vitamins, phytochemicals, proteins, carbohydrates, and fats, and is particularly rich in saturated fats and medium-chain triglycerides. Various studies indicate that the endosperm tissue of *C. nucifera* is rich in phytochemicals, including phenols, flavonoids, alkaloids, tannins (0.18%), and saponins. In addition to phytochemical compounds, the coconut contains vitamins such as ascorbic acid, riboflavin, niacin, β-carotenoids, and thiamine. Mineral constituents include calcium, magnesium, potassium, sodium, phosphorus, iron, copper, and zinc [43]. Lauric acid (C12:0) and myristic acid (C14:0) are the primary free fatty acids found in coconut endosperm. The concentration of short-chain fatty acids (C10–C12) increases slightly, while the concentration of long-chain fatty acids (C14-C18) decreases as the fruit matures from the single-layer flesh stage to the double-layer flesh stage [44].

The presence of a wide variety of phytochemicals particularly lauric acid and α-tocopherol make the coconut a promising candidate for treating various conditions, including inflammation, cholera, dental caries, diabetes, skin infections, hypertension, cancer, cardiovascular disease, and obesity [45]. Extracts from *C. nucifera* endosperm tissue exhibit free-radical scavenging and antimicrobial activities. These extracts also demonstrate potent antimicrobial activity against *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans, Aspergillus niger*, and *Penicillium notatum* [43].

Food processing is influenced by various factors, such as cultural acculturation and environmental diversity. For instance, the creation of *Asinan Bogor* reflects the acculturation between the Chinese community and the residents of Bogor. Panetta et al. [4] state that food is a key theme for exploring culture and traditions. Conversely, local knowledge regarding the use of plants as food sources [7] and traditional food preparation methods [6] continues to decline. Sujarwo and Caneva [8] note that the prevalence of modern foods specifically convenient, ready-to-eat options with contemporary flavors has led the younger generation to move away from traditional foods. Despite the influence of globalization and modernization, traditional eating habits and culinary practices continue to play a vital role in people's daily lives [9] and hold potential for development as a source of income.

3.4 Fermentation Food

On the other hand, the predominantly karst landscape of the Gunungkidul region has inspired the local community to optimize available food sources particularly cassava to ensure food security. Cassava (*Manihot esculenta*) is adaptable to arid environments, making it suitable for cultivation in water-scarce areas like Gunungkidul. Fermentation is a traditional method employed by the local community to preserve food. This study identified three fermented food products: *gatot, tape,* and *tempe* (Figure 4). A closer examination reveals that the fermentation processes for these three foods differ significantly.

Figure 4: Various fermented foods. A. *Gatot* (cassava); B. *Tape Gronjol*; C. *Tempe koro*.

Cassava tubers have a high moisture content, making them prone to spoilage if stored for extended periods. Sun drying is one of the simplest preservation methods, utilizing solar energy as the heat source. The processing involves several stages: peeling, washing, and sun drying. The drying process takes approximately one to two months, depending on sunlight conditions and the size of the tubers. Local communities have also aligned their harvesting schedules with the dry season, a practice that indirectly dictates the planting season as well.

The *tape gronjol* is a fermented food product made from *gaplek* (dried cassava). The production process is similar to that of standard *tape*, but the raw material consists of dried cassava tubers. It is named "*gronjol*" because of its lumpy, uneven appearance forming small, irregular clumps rather than the smooth, uniform pieces found in fresh cassava *tape*. Due to its *gaplek* base, it has a chewier or slightly firmer texture and a longer shelf life compared to other varieties of *tape*.

The *tape singkong* (fermented cassava) is a traditional Indonesian food produced by fermenting a carbohydrate source using yeast as a starter culture [46]. *Saccharomyces cerevisiae* is the yeast most commonly used in the fermentation process on substrates with high starch or carbohydrate content such as cassava pulp, a byproduct of the tapioca industry [46]. The fermentation process is driven by microbial activity particularly that of bacteria which modifies the constituents within the local microorganism (MOL) solution. Changes occurring during fermentation include alterations in color and odor. Chemical analysis indicates that the optimal quality parameters for the MOL solution are: Total N 0.99%, P 0.33 mg kg^{-1}, K 0.71, organic C 7.56, and C/N ratio 12; whereas for compost, the values are: Total N 0.38%, P 0.20 mg kg^{-1}, K 0.208, organic C 7.50, and C/N ratio 35 (Muhith 2019). Differences in growth rates between pure *S. cerevisiae* cultures and *tape* yeast result in variations in the rates of starch degradation, dietary fiber degradation, cyanide degradation, and protein formation [47].

To produce *gaplek* (dried cassava), the drying process is carried out until the product is thoroughly dry and brittle. According to respondents, the dried tubers can be stored for up to a year or processed immediately into flour. The *gaplek* flour has long been traded in various traditional markets across Gunungkidul, such as the Playen, Paliyan, and Wonosari markets. One indicator used by the community to assess the durability of *gaplek* is the presence of flour beetles, which can compromise its quality. Milling also serves to facilitate storage and increase the selling price; *gaplek* flour commands a relatively higher price (Rp 15,000/kg) compared to wheat flour (Rp 12,000/kg). This indicates that, from an economic perspective, *gaplek* holds significant potential to support the local economy.

The initial stage of processing *gaplek* and *gatot* is relatively similar, involving the drying of cassava root pieces. The production of *gatot* proceeds with a fermentation phase stimulated by the growth of bacteria or yeast achieved through repeated cycles of soaking and drying. Once the cassava turns blackish in color, the roots are dried again and stored. Further soaking and washing are performed prior to cooking (steaming) for consumption.

3.5 *Getuk* (a processed food made from boiled, mashed tuber)

The *getuk* is a traditional Javanese snack primarily made from boiled or steamed tubers that are mashed or ground and mixed with sugar (either palm sugar or granulated sugar) and grated coconut. This study identified three varieties of *getuk: getuk ceplon, getuk kimpul, and getuk ketela* (Figure 5). The mashing process alters the texture, making it pliable and easy to shape as desired. While getuk was originally made solely from cassava, the availability of *kimpul* (*Xanthosoma sagittifolium*) tubers inspired people to diversify their production. In terms of texture, *getuk kimpul* is smoother than *getuk ketela*; this difference is thought to stem from variations in the composition of their ground tissue (parenchyma). Additionally, cassava *getuk* is also processed into *cemplong* (fried *getuk*).

Figure 5: Various *getuk* preparations in Gunungkidul traditional market. A. *Gethuk cemplon*; B. *Kimpul getuk*; C. Cassava *getuk*.

3.6 "Snack"

The *kudapan* refers to food items categorized as "light bites" or snacks. People typically consume them as treats often alongside tea or coffee before lunch or dinner. Commercially available snacks of this type are characterized by qualities such as sweetness (due to added sugar), crispiness (from frying), and savory flavors (as seen in *apem*) (Figure 6). Ten varieties of these snacks are sold in traditional markets, including *lemet, apem, cemplom,* and *emplek*.

In general, the processing methods involve steaming (e.g., *lemet, emplek*) and frying (e.g., *apem, cemplok*). The *lemet* is a snack made from grated cassava mixed with palm sugar, wrapped in banana leaves, and cooked by steaming. The *cemplon* is a traditional Indonesian snack made from grated cassava filled with palm sugar and deep-fried until cooked. The *emplek* refers to various traditional snacks or homemade treats that vary in ingredients and shape; in this study, they are made from cassava flour or wheat flour and are often served with either a savory or sweet flavor profile. The production of *apem* involves fermentation using yeast, which serves to make the cake softer, create an airy or "honeycombed" internal structure, increase its volume (causing it to rise), and impart a distinctive aroma.

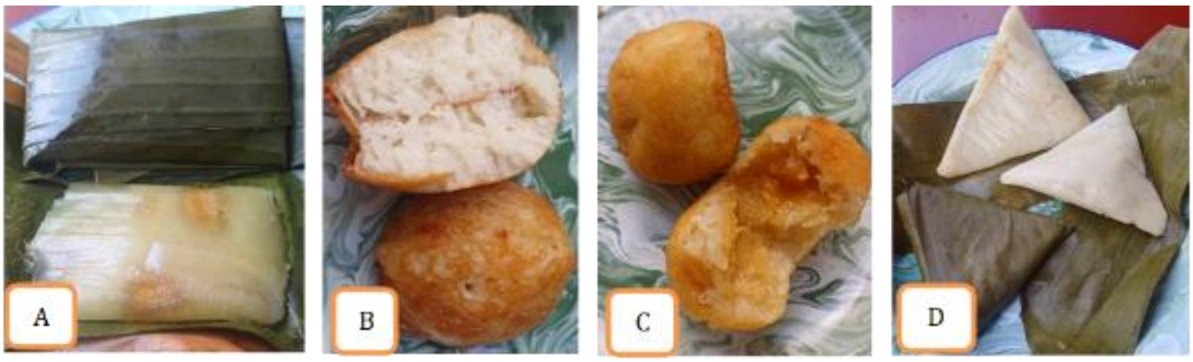

Figure 6: Various types of snacks. A. *Lemet*; B. *Apem*; C. *Cemplon*; D. *Emplek*

3.7 Protein Sources

The protein sources in this study consisted of wasp-based preparations, cattle trotter (*kikil*), and legume-based products (specifically *tempe*). We identified two types of *tempe* that differ significantly from those found in other regions: *tempe manding* (made from *Leucaena leucocephala* seeds) and *tempe koro* (made from jack beans/sword beans) (Figure 8). The *bothok* is a traditional dish made from grated coconut mixed with various other ingredients; in this study, wasps were used as the key ingredient. The *palas tawon* more commonly known as *botok tawon or pelasan tawon* is a specialty dish from Banyuwangi, East Java; while classified as extreme cuisine, it is highly sought after. The dish is prepared using honeybee larvae or brood still contained within the honeycomb.

Figure 7: Types of food as sources of protein. A. *Tawon Palas*; B. *Bothok wasp*; C. *Manding tempe*; D. *Koro tempe*

The protein and fatty acid content of *Leucaena leucocephala* (*petai cina*) seeds makes them highly promising for development as an alternative food source. These seeds contain over 31% crude protein and 5.5% fat [48,49]. Similar findings were reported by Hernández-Santos et al. [50], who noted high levels of fat (31.78 g/100g), protein (26.56 g/100g), and fiber (15.49 g/100g), although these values are influenced by the growing location. The fatty acid composition of the seeds is also affected by the maturity of the pods; generally, younger seeds have a lower fatty acid content than older ones. Oil yields from *L. leucocephala* seeds range from 2.70% to 4.70% for immature seeds, whereas yields for oil extracted from mature seeds range between 5.22% and 6.90% [51].

3.8 Diversity of plants used as traditional food in Gunungkidul traditional market

Plants are the primary raw material used to make traditional food/culinary products in Gunungkidul markets. Twenty-seven species, spread across 24 genera and 14 plant families, were found to be used as raw materials for traditional foods. The family with the largest number of species is Fabaceae (7 species), followed by Solanaceae and Poaceae (3 species each), Amaryllidaceae, Euphorbiaceae, and Arecaceae (2 species each), while the other families are each represented by one species (Table 1 and Figure 8).

Table 1: Diversity of plants used as ingredients in market-based traditional food products.

Family	Scientific name	Local Name	Part of used
Amaranthaceae	*Amaranthus hybridus* L.	*Bayam*	Leaves
Amaryllidaceae	*Allium cepa* L.	*Bawang merah*	Bulbs
	Allium sativum L.	*Bawang putih*	Bulbs
Apiaceae	*Daucus carota* L.	*Wortel*	Tubers
Araceae	*Xanthosoma sagittifolium* (L.) Schott	*Kimpul*	Tubers
Arecaceae	*Cocos nucifera* L.	*Kelapa*	Seeds
	Metroxylon sagu Rottb	*Sagu*	Stems
Caricacee	*Carica papaya* L.	*Pepaya*	Leaves
Convolvulaceae	*Ipomoea reptans* Poir.	*Kangkung*	Leaves, Stems
Euphorbiaceae	*Aleurites moluccanus* (L.) Willd	*Kemiri*	Seeds
	Manihot esculenta Crantz	*Singkong*	Leaves, Tubers
Fabaceae	*Arachis hypogaea* L	*Kacang tanah*	Seeds
	Canavalia ensiformis L	*Kacang koro*	Seeds
	Glycine max (L.) Merr	*Kacang kedelai*	Seeds
	Leucaena leucocephala (Lam.) de Wit	*Petai cina*	Seeds
	Phaseolus vulgaris L	*Kacang merah*	Seeds
	Sesbania grandiflora (L.) Poir.	*Turi*	Flowers
	Vigna unguiculata (L.) Walp.	*Kacang panjang*	Fruits
Musaceae	*Musa × paradisiaca*	*Pisang*	Leaves

Myrtaceae	*Syzygium polyanthum* (Wight.) Walp	*Daun salam*	Leaves
Poaceae	*Oryza sativa* L.	*Padi*	Seeds
	Oryza sativa L. var. glutinosa.	*Padi ketan*	Seeds
	Zea mays L.	*Jagung*	Seeds
Solanaceae	*Capsicum annuum* L.	*Cabe keriting*	Fruits
	Capsicum frutescens L.	*Cabe rawit*	Fruits
	Solanum lycopersicum L.	*Tomat*	Fruits
Zingiberaceae	*Alpinia galanga* (L.) Willd	*Lengkuas*	Rhizomes
	Kaempferia galanga L.	*Kencur*	Rhizomes

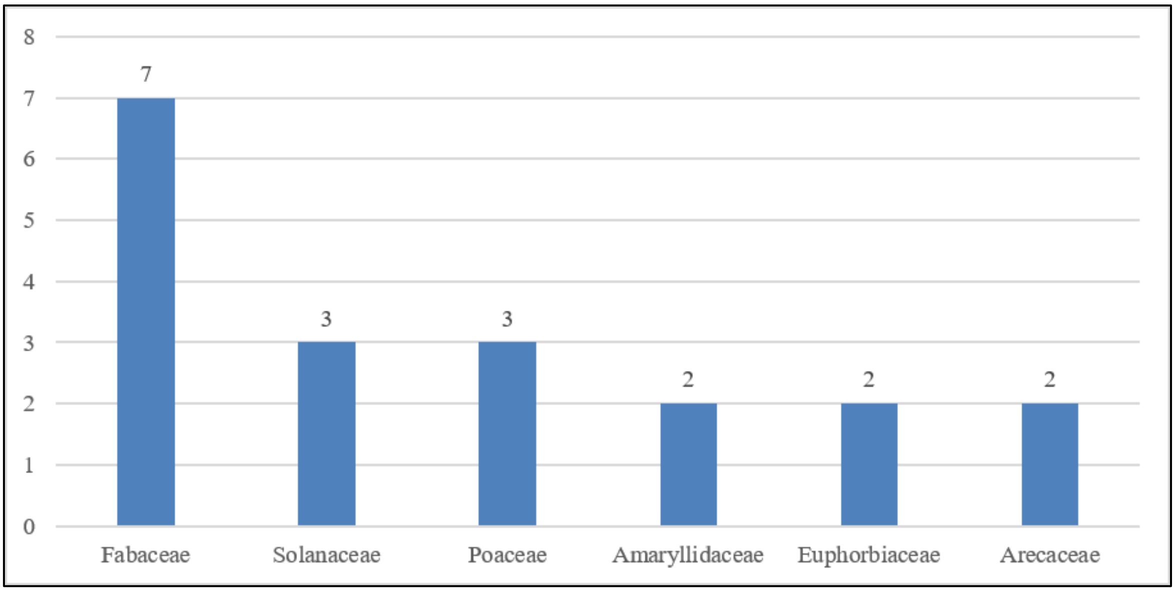

Figure 8: Families with the highest number of species used as traditional food sources in Gunungkidul traditional markets.

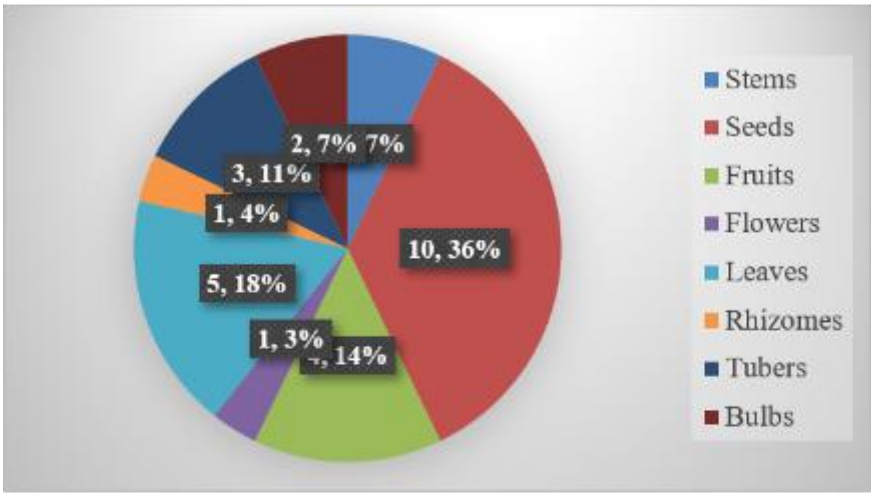

Figure 9: Number of species based on the parts used as traditional food ingredients in Gunungkidul traditional markets.

Figure 9 illustrates the number of species or the percentage of plants based on the parts utilized. Seeds are utilized from 10 species (36%), primarily from the Fabaceae family such as peanuts, kidney beans, soybeans, and sword beans. Leguminous plants have long served as a source of plant-based protein, with some being processed into tempeh.

Flowers and rhizomes are the least utilized parts, accounting for only one species (approximately 4%). Compared to other plant organs, the flowering stage is the shortest phase in a plant's life cycle; consequently, the availability of flowers is heavily influenced by the season.

The use of *turi* flowers as an ingredient in *pecel* in this study also offers potential for food diversification. This plant is widely distributed across Asian countries, including Indonesia; while it is cultivated in home gardens, it often thrives on neglected, vacant land. The *S. grandiflora* is prized for its beautiful flowers, leading to its frequent use as an ornamental plant. Silalahi et al. [52] reported that *S. grandiflora* flowers particularly the white variety have long been sold in markets as a vegetable. Traditional Indonesian dishes such as *pecel* incorporate *S. grandiflora* flowers as an ingredient; to avoid bitterness, the flower petals are removed prior to use or boiling. One hundred grams of fresh flowers contain 2.4 g of protein, 21 mg of flavonoids, 38 mg of total phenols (as gallic acid equivalents, including 0.04 mg of phenolic acids), 0.22 mg of total anthocyanins, 0.36 mg of total β-carotenoids (including 0.01 mg of β-carotene), and 34 mg of vitamin C [53].

4 CONCLUSIONS

- Twenty-nine types of traditional foods were identified as being sold in Gunungkidul traditional markets, categorized into staple foods (carbohydrate sources), side dishes (protein sources), vegetables, and snacks.
- Twenty-seven plant species belonging 24 genera and 14 families were found to be used as ingredients for these traditional foods. The family with the highest number of species was Fabaceae (7 species), followed by Solanaceae and Poaceae (3 species each), and Amaryllidaceae, Euphorbiaceae, and Arecaceae (2 species each), while the remaining families were represented by a single species each.
- The *gatot, tiwul,* and *sayur lombok hijau* (green chili vegetable dish) are indigenous foods developed based on Gunungkidul's local wisdom. The *gatot* and *tiwul* are fermented foods serving as primary and/or alternative sources of carbohydrates, whereas *sayur lombok hijau* serves as a side dish and a source of protein.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

I declare that article there is no conflict of interest.

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