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# Healthy Food from Nature: The Potential of Inocarpus fagifer in Supporting Nutrition and Public Health

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**ABSTRACT**
ABSTRACT Hidden hunger, characterized by micronutrient deficiencies despite adequate caloric intake, has emerged as a global challenge affecting child development, immune function, and overall public health. In response, local food-based strategies have gained attention for their potential to combat undernutrition and support the Sustainable Development Goals (SDGs) 2 and 3. This study aimed to evaluate the potential of Inocarpus fagifer (known as gayam) as a functional food through a Systematic Literature Review (SLR) of ten scientific articles published between 2014 and 2024. Findings revealed that gayam seeds contained high levels of fiber, complex carbohydrates, and plant-based protein, making them suitable as a nutritional alternative. Various plant parts—leaves, bark, and stems—also possessed bioactive compounds such as flavonoids, phenols, and steroids with antioxidant and antidiabetic activities. Gayam flour was tested in processed foods like steamed cakes and received favorable sensory evaluations. However, most studies were limited to in vitro or animal testing, with minimal human clinical trials. The lack of toxicological evaluation and market-ready product development indicated a research gap. This review highlighted the promising role of Inocarpus fagifer as a culturally rooted, sustainable, and health-promoting local food, while emphasizing the need for further interdisciplinary and applied research.

**Keywords:** Inocarpus fagifer, sustainable, local food, nutrition, public health

## 141 Introduction

Hidden hunger had become a significant global challenge, characterized by deficiencies in essential micronutrients such as iron, vitamin A, iodine, and zinc, which did not always manifest clinically despite adequate calorie intake (Bailey et al., 2015). This condition directly affected child growth, immune system performance, cognitive development, and increased the risk of chronic and infectious diseases (Prentice et al., 2008). According to the WHO, more than two billion people worldwide experienced micronutrient deficiencies, making hidden hunger a silent threat to global well-being (WHO, 2023).

Meanwhile, the transition of dietary patterns toward processed and energy-dense but nutrient-poor foods had worsened nutritional status, especially in developing countries (Popkin et al., 2020). This contributed to the high rate of the double burden of malnutrition—micronutrient deficiencies occurring alongside overweight or obesity—which had become a complex public health issue.

To address this challenge, local food-based approaches through the use of food biodiversity became important. SDG 2 (Zero Hunger) emphasized the importance of access to nutritious and sustainable food, while SDG 3 (Good Health and Well-being) targeted improving health and quality of life for all. Local foods, particularly those derived from underutilized crops, held

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great potential to provide essential nutrients and strengthen food security and community independence (Chivenge et al., 2015).

Various studies showed that local foods often contained high levels of micronutrients and thrived well in local environments, making them a strategic choice in sustainable food systems (Hunter et al., 2019). Additionally, utilizing local food strengthened cultural wisdom and encouraged rural economies through community-based agriculture.

Inocarpus fagifer (gayam) was an endemic plant in several tropical regions, including Indonesia, known for its seeds rich in carbohydrates, fiber, and protein. Although it had good nutritional value, the use of gayam was still limited due to public perception viewing it as an outdated traditional food or due to limited scientific information on its health benefits (Rahayu et al., 2024). Research showed that gayam seeds could be processed into nutritious flour and had potential as a gluten-free alternative food ingredient (Pambayun et al., 2020).

Beyond its nutritional content, gayam also contained bioactive compounds with antioxidant and antidiabetic potential (Setyawati et al., 2021), which, if further developed, could support innovation in locally based functional foods. This article aimed to evaluate the potential of Inocarpus fagifer as a functional food that could support nutrition and public health improvement through a Systematic Literature Review (SLR) approach. This review was expected to provide a comprehensive scientific understanding of its nutritional value, health benefits, and the challenges and opportunities for utilizing gayam in support of SDG 2 and SDG 3 in a sustainable manner.

## 142 Literature Review

Several key studies referenced in this review are described below:

### 1. Global Challenges in Nutrition and Public Health

Complex nutritional issues such as hidden hunger have become a significant challenge worldwide. WHO (2023) reported that over two billion people suffer from deficiencies in essential micronutrients, including iron, vitamin A, and zinc. Despite adequate calorie intake, micronutrient deficiencies negatively impact immune function, child growth, and increase the risk of chronic diseases (Bailey et al., 2015; Prentice et al., 2008). Moreover, the shift in dietary patterns towards high-energy but nutrient-poor foods has worsened the double burden of malnutrition (Popkin et al., 2020).

### 2. The Role of Local Food in Supporting the SDGs

Local food plays a vital role in addressing sustainability and food security challenges, in line with Sustainable Development Goals (SDG) 2 (Zero Hunger) and SDG 3 (Good Health and Well-being). Local crops, particularly those categorized as underutilized, are believed to contain high nutritional value and are well adapted to local environments (Chivenge et al., 2015; Hunter et al., 2019). Utilizing local food not only supports community nutrition but also strengthens rural economies and preserves biodiversity and cultural heritage.

### 3. Nutritional Properties of Gayam

Inocarpus fagifer (gayam) is a tropical plant with seeds rich in complex carbohydrates, fiber, and protein. Studies have indicated that gayam flour holds promise as an alternative gluten-free food ingredient (Rahayu et al., 2024; Pambayun et al., 2020). Beyond its macronutrient content, parts of the plant—such as the leaves, bark, and stem—contain bioactive compounds

like flavonoids, phenols, and steroids, which exhibit antioxidant and antidiabetic properties (Lestari et al., 2018; Wambrauw et al., 2021; Santi & Sukadana, 2015).

### 4. Application and Utilization of Gayam

Several studies have explored the incorporation of gayam into food products, such as steamed cakes made with gayam flour, which have received positive sensory evaluations (Agustina et al., 2024). Ethnobotanical and conservation aspects of gayam, especially in Yogyakarta, further highlight its potential for sustainable local food utilization (Wawo et al., 2018). However, a key limitation of existing studies is the lack of clinical trials on humans and the absence of gayam-based food products ready for widespread commercialization.

### 5. Challenges and Research Recommendations

To date, most research on gayam has been exploratory and limited to laboratory or animal studies (in vitro/in vivo). To fully optimize its use as a functional local food, further research is needed, including preclinical trials, formulation of consumer-ready products, and public education and awareness campaigns. An interdisciplinary approach that integrates nutrition, food science, botany, and economics is crucial to enable gayam to make a meaningful contribution to improving public health and food security sustainably.

## 143 Research Methods

This study employs a systematic literature review approach to comprehensively analyze relevant literature on the potential of Inocarpus fagifer (gayam) as a natural healthy food in supporting nutrition and public health. The systematic review aims to identify, evaluate, and summarize relevant research findings to provide a clear overview of the effectiveness and potential of Inocarpus fagifer as a source of nutritious food.

Data collection is carried out through literature searches in academic databases such as Google Scholar, Scopus, and Publish or Perish, using keywords such as "Inocarpus fagifer", "nutritional value", "functional food", "public health", and "local food innovation". Identified articles are then screened based on their abstracts, titles, and publication years (2014–2024), and their eligibility is assessed based on inclusion and exclusion criteria, which include relevance to the research focus and availability of complete data.

The quality of each article included in this review will be assessed using criteria for internal and external validity to ensure that the conclusions drawn are reliable and relevant to the context of public health. The analysis results will be presented in the form of summary tables of studies, key findings, and an in-depth discussion of the potential of Inocarpus fagifer as a natural healthy food.

## 144 Result and Discussion

From the analysis conducted on articles relevant to the title "Healthy Food from Nature: The Potential of Inocarpus fagifer (Gayam) in Supporting Nutrition and Public Health," it was found that Inocarpus fagifer or gayam demonstrated significant potential as a local food source that supports nutrition and public health. The results of the analysis are presented in the following table:

Table 16: Information on Instruments Used in Each Reference

| No | Researcher (s) | Year | Keywords | Research Findings |
|---|---|---|---|---|
| 1 | Rahayu et al. | 2024 | Nutrition, Fiber, Gayam Flour | The analysis of nutrient and fiber content in *Gayam* flour showed its potential as an alternative food source. |
| 2 | Wambrauw et al. | 2021 | Antidiabetic, Bark, Ethanol Extract | The ethanol extract of *Gayam* bark demonstrated antidiabetic activity by reducing blood glucose levels in test animals. |
| 3 | Lestari et al. | 2018 | Antioxidant, Gayam Leaf, Phenol | The phenolic extract of *Gayam* leaves exhibited significant antioxidant activity based on the DPPH assay. |
| 4 | Surya Adi Krisna et al. | 2014 | Steroid, Antioxidant, DPPH | The isolation of steroid compounds from *Gayam* leaves showed antioxidant activity against free radicals. |
| 5 | Rohama & Zainuddin | 2021 | Secondary Metabolites, Gayam Leaf, TLC | The identification of secondary metabolites such as alkaloids, flavonoids, and saponins in *Gayam* leaf extract was conducted using TLC. |
| 6 | Agustina et al. | 2024 | Gayam Flour, Steamed Cake, Organoleptic Test | The use of *Gayam* flour in steamed cake production resulted in a product with good organoleptic acceptance. |
| 7 | Sukadana et al. | 2020 | Antifeedant, Gayam Stem, *Epilachna sparsa* | The extract of *Gayam* stem exhibited antifeedant activity against the pest *Epilachna sparsa*. |
| 8 | Wawo et al. | 2018 | Distribution, Utilization, Yogyakarta | The study on the distribution and utilization of *Gayam* in Yogyakarta revealed its potential as a local food source. |
| 9 | Santi & Sukadana | 2015 | Flavonoids, Phenols, Antioxidant | The extract of *Gayam* bark contained flavonoids and phenols with antioxidant activity. |
| 10 | Pambayun et al. | 2020 | Gayam Flour, Characterization, Alternative Food | The characterization of *Gayam* flour showed its potential as an alternative food ingredient with good nutritional content. |

Based on the review of 10 scientific articles, Inocarpus fagifer or gayam demonstrated significant potential as a local food source supporting nutrition and public health. Nutritionally, gayam flour was proven to contain high fiber and macronutrients, making it a promising alternative food (Rahayu et al., 2024; Pambayun et al., 2020). In addition, various parts of the gayam plant such as leaves, bark, and stems contained bioactive compounds like flavonoids, phenols, and steroids, which showed antioxidant and antidiabetic activities (Lestari et al., 2018; Wambrauw et al., 2021; Santi & Sukadana, 2015).

Studies also showed that gayam had been tested in processed food products such as steamed cakes and received positive sensory responses (Agustina et al., 2024), although most of the studies remained at the laboratory or in vitro testing stage. The ethnobotanical potential and conservation of gayam were also documented, especially in the Yogyakarta region, strengthening the foundation for further exploration as a sustainable local food source (Wawo et al., 2018).

The SLR results supported that gayam was a highly potential local plant in addressing nutrition and public health challenges, particularly in achieving SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being). Its fiber content, complex carbohydrates, and bioactive compounds in various plant parts supported its utilization as a functional food that not only provided basic nutrition but also additional benefits in preventing degenerative diseases.

However, a major limitation of the reviewed literature was the lack of clinical or in vivo trials on humans. Most studies were still exploratory and used in vitro or animal testing approaches. Moreover, although product application potential had been attempted (e.g., steamed cakes from gayam flour), there had been no comprehensive evaluation of long-term consumption safety and nutrient content of the final products. This indicated a gap between scientific knowledge and the development of gayam-based food products ready for commercialization.

Therefore, future efforts needed to include pre-clinical trials, functional food product formulation, and public awareness campaigns regarding the value of local food. Gayam had the potential to serve as a local solution for global problems—especially in tropical areas with high biodiversity such as Indonesia. With appropriate development strategies, gayam could make a tangible contribution to strengthening food security and improving quality of life in a sustainable way.

## 145 Conclusion

Based on the systematic review of 10 scientific articles, it was concluded that Inocarpus fagifer (gayam) was a local plant with great potential as a functional food source. Nutritional content such as fiber and complex carbohydrates in gayam flour, along with the presence of bioactive compounds like flavonoids, phenols, and steroids in its leaves, bark, and stems, showed promising health benefits, particularly antioxidant and antidiabetic activities. Several studies also demonstrated gayam's applicability in processed food product development with acceptable sensory results.

However, the utilization of gayam still faced several challenges, such as the lack of human clinical trials, no long-term toxicity evaluations, and minimal integration of research findings into commercial food products. Therefore, further applied and interdisciplinary research was required so that gayam could be optimized as a healthy, locally based food solution in support of achieving the Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 3 (Good Health and Well-being).

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