Sustainable, Diverse, and Nutritious?

A study of nutritional characteristics of forest food products in agroforestry systems in the Amazon Region

Laura Vega Quintero

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LUCSUS
Lund University Centre for
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Abstract

The path to achieving food security is complex due to the linkage between human health and environmental impacts. Alternative approaches to industrial monoculture agriculture, such as agroforestry, are increasingly being explored due to the variety of forest foods it provides and the environmental benefits associated with its use. I conducted a meta-analysis of 15 published studies that reported 39 forest food products from agroforestry systems in the Amazon region. Of these, a majority are associated as sources of essential macro and micronutrients, relevant for human health. I then defined an agroforestry system model with 5 species, capable of supplying 44% of the daily caloric needs. I recreated several scenarios of this model to observe changes in caloric contribution and to compare these with three common types of monoculture systems. Although in some cases the monoculture system can provide a higher caloric contribution, other nutrients are lacking challenging the aim for food security.

Resumen

Alcanzar la seguridad alimentaria es un camino complejo debido a su conexión entre la salud humana y los impactos ambientales. Cada vez se exploran más enfoques alternativos a la agricultura de monocultivo industrial, como la agroforestería, debido a la variedad de alimentos forestales que proporciona y los beneficios ambientales asociados a su uso. Realicé un metaanálisis de 15 estudios publicados en el que se relacionen 39 productos forestales provenientes de sistemas agroforestales de la región Amazónica. La mayoría de ellos se consideraban fuentes de macro y micronutrientes esenciales para la salud humana. Adicionalmente, establecí un modelo de sistema agroforestal con 5 especies, las cuales pueden ser capaz de suministrar el 44% de las necesidades calóricas diarias. Consideré varios escenarios de este modelo para observar los cambios en el aporte calórico y compararlos con tres tipos comunes de sistemas de monocultivo. Aunque en algunos casos el sistema de monocultivo puede proporcionar un mayor aporte calórico, la ausencia en la obtención de otros nutrientes pone en riesgo el cumplimiento de la seguridad alimentaria en esta área.

Keywords:

Food security, SDG 2, Macronutrients, Micronutrients, Sustainable Healthy Diet.

Word count: 11.038

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> *This is a reminder for you—a reminder of what you deserve and what you can achieve.*
> *You have always accomplished whatever you set your mind to.*

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1 Introduction

Achieving food security is an intricate endeavor, crucial not only for human health but also for its broader implications on social equality and environmental sustainability. As noted by Pérez-Escamilla (2017), addressing food security involves tackling social inequalities, adapting agricultural practices to climate change, and managing the environmental downsides of increased food production. In response to these challenges, the United Nations, through Sustainable Development Goal (SDG) 2, has established specific objectives. Through the support of sustainable agriculture, which in turn promotes social well-being and increases food production, these aims seek to advance solutions that improve food security (UN, 2015). In section 3, the concept of food security will be introduced.

The agriculture sector is central in order to overcome these challenges. Historically, the focus in this sector has been on intensifying production to satisfy the escalating global demand (Godfray et al., 2010). However, conventional farming methods have led to several adverse outcomes, including environmental degradation, increased vulnerability to climatic variations, and a heavy reliance on agrochemicals and technological interventions (Crews et al., 2018; Gabriel et al., 2013; The World Bank, 2007). These practices have resulted in the overexploitation of vital resources such as land and water (Crews et al., 2018; The World Bank, 2007). Consequently, there is a growing exploration of alternative agricultural methods that aim to achieve a sustainable equilibrium between enhancing food supply and minimizing harmful impacts on the environment, society, and economy (FAO & WHO, 2019).

In this context, the agricultural practice of agroforestry becomes relevant as a viable solution. This age-old practice, which is widely used by native and rural communities across the world, combines the raising of trees with crops and cattle to create a harmonious agricultural model that offers advantages beyond those of regular farming.(FAO, n.d.-a, 2013a; Nair et al., 2021). Current literature emphasizes the environmental benefits of agroforestry, such as enhancing soil quality, preserving biodiversity, and capturing carbon (FAO, n.d.-a).

Economically, it provides a sustainable income source while contributing significantly to the dietary needs of rural communities through the production of forest foods, also known as non-wood forest products (NWFP), which are crucial for the sustenance and economic resilience of these populations (FAO, 2013a; Graefe et al., 2013; Kodahl, 2020; Nair et al., 2021).

Moreover, these systems play a pivotal role in nutritional security, particularly for vulnerable groups such as infants and children, by providing access to forest food rich in micronutrients (Kodahl, 2020).

Despite the apparent benefits, there is a noticeable gap in research regarding the nutritional value of these forest-derived foods, including their macro and micronutrient profiles (FAO, 2013a).

In regions such as the Amazon (See Figure 1), agroforestry systems have been integral to local communities that rely on forest resources (Porro et al., 2012). However, challenges such as changing dietary habits, land use alterations, and the diminishing practice of traditional agroforestry continue to perpetuate food insecurity in the region (Ortiz et al., 2013; Torres-Vitolas et al., 2019). Furthermore, the absence of detailed nutritional data on forest foods complicates the ability of local governments and organizations to formulate effective strategies based on these forest resources, thus preventing progress towards the achievement of food security (FAO & WHO, 2019; Lopes et al., 2021; Pilnik et al., 2023).

Figure 1. The Amazon region area.

The highlighted purple line shows the region that covers areas in Colombia, Venezuela, French Guiana, Guyana, Suriname, Brazil, Bolivia, Ecuador, and Peru (RAISG, 2022).

1.1 Thesis Roadmap

This thesis is organized into several sections to methodically explore the topic of agroforestry and its nutritional impact in the Amazon Region. Section 2 begins with an introduction to the basic concepts of agroforestry, describing its variations, and outcomes by its use. This is followed by the case description (section 2.2) and the research questions that guided this study (section 2.3). In section 3, I describe the Sustainable Healthy Diet Framework, which is used to analyze the nutritional benefits of agroforestry systems. The methodology implemented for my research is detailed in section 4, starting with the overall research approach in section 4.1, moving through a literature review in section 4.2, and concluding with a meta-analysis in section 4.3 that helped synthesize data and findings. The results of the study are presented in section 5, where I discuss the answers to each research question. In sections 6 and 7, I reflect on these results and discuss the nutritional contributions of forest foods in agroforestry systems, present suggestions for future research and policy concerning nutrition, and acknowledge the limitations of my research. The thesis concludes in section 8, summarizing the main findings and their implications.

2 Background

2.1 Definition of Agroforestry

Agroforestry represents a sustainable land management strategy that integrates woody perennials with crops and/or livestock to create a diverse, productive, and sustainable agricultural system (Nair et al., 2021). This approach to agriculture can differ greatly in terms of the size of the area utilized, the density of planting, and the level of human intervention required, making it a versatile method for various agricultural and ecological contexts (FAO, 2013a).

Agroforestry systems are often categorized into three primary types based on the combination of components they incorporate (see Figure 2). The first type, agrosilviculture, involves a combination of crops and trees, utilizing the benefits of both agricultural and forestry practices (FAO, n.d.-a; Miller & Nair, 2006). The second type, silvopastoral systems, includes a mix of trees, pasture, and livestock, promoting an environment where each component benefits the others, for instance, the trees providing shade and shelter to animals (FAO, n.d.-a; Nair et al., 2021). Lastly, agrosilvopastoral systems encompass a blend of crops, pasture, livestock, and trees, creating a comprehensive system that maximizes the use of land and resources (FAO, n.d.-b; Gonçalves et al., 2021).

This integration leads to enhanced biodiversity, improved soil structure, and increased productivity. Each of these systems reflects the adaptability of agroforestry practices to meet the needs of different farming communities, optimize the use of natural resources, and contribute to the sustainability of agricultural practices.

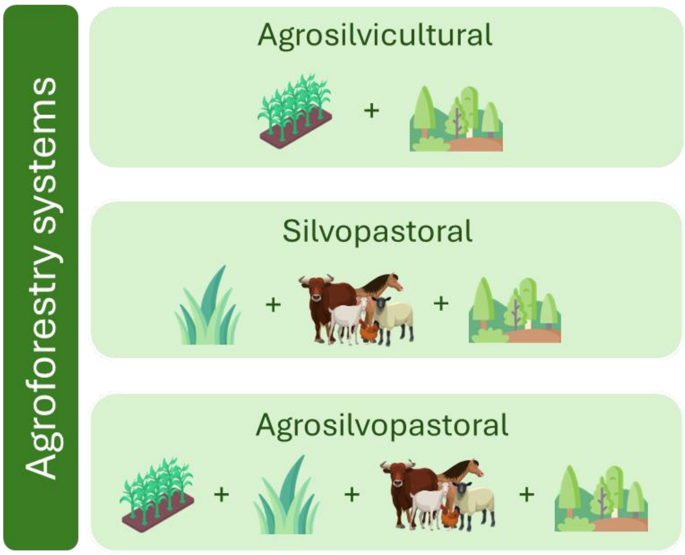

Figure 2. The most common types of classification of an agroforestry system (Adapted from (FAO, n.d.-b)).

In academic literature, the practice of integrating agriculture with forestry is known under various terms: *Agro-silviculture*, *Syntrophic Agriculture*, or more traditionally as *Chakras* or *Chagras*—terms derived from indigenous and rural communities— (Nair et al., 2021; Porro et al., 2012). Additionally, when such agroforestry systems are implemented on a smaller scale or close to family homes, they are often referred to as *Homegardens* (Sharma et al., 2022).

The fundamental principle of an agroforestry system is to mimic the natural biotic interactions found in a diverse forest ecosystem, as illustrated in Figure 3 (Porro et al., 2012). This approach fosters ecological and economic dynamics vastly different from those observed in intensive monoculture systems (Nair et al., 2021). In an agroforestry system, a variety of fruit, vegetable, and timber species are planted together (Porro et al., 2012). These plants contribute organic matter—such as leaves, flowers, and branches—to the soil, which in turn provides nutrients essential for their growth and development (Eslava et al., 2005). This cycle helps maintain a balanced nutrient supply in the soil, reducing or eliminating the need for chemical fertilizers (Eslava et al., 2005; Nair et al., 2021).

Figure 3. Photographs of different agroforestry systems in the Amazon.
a) In northeast Brazil, an agroforestry system featuring a mix of cupuaçu, açaí, and andiroba trees was established on land previously utilized for cattle ranching (Prado et al., 2022)**;** b) In Puerto Nariño, a southern region of Colombia, communities utilize agroforestry systems (Krause, 2022); c) A growing agroforestry system in west Bolivia incorporates a mix of trees and shrubs (Milz, 2019).

Moreover, the diversity inherent in agroforestry systems offers natural pest resistance. The presence of multiple species means that some can naturally repel pests that might otherwise affect neighboring plants, thereby reducing the reliance on chemical pesticide systems (Eslava et al., 2005; Nair et al., 2021). Beyond food production, agroforestry systems also play a significant role in enhancing soil fertility, improving water retention, and mitigating climate change impacts by reducing greenhouse gas emissions associated with conventional farming (Béliveau et al., 2017; Bravo et al., 2017; Lugo-Pérez et al., 2023). This multifaceted approach not only supports sustainable agricultural practices but also aligns with broader environmental conservation goals.

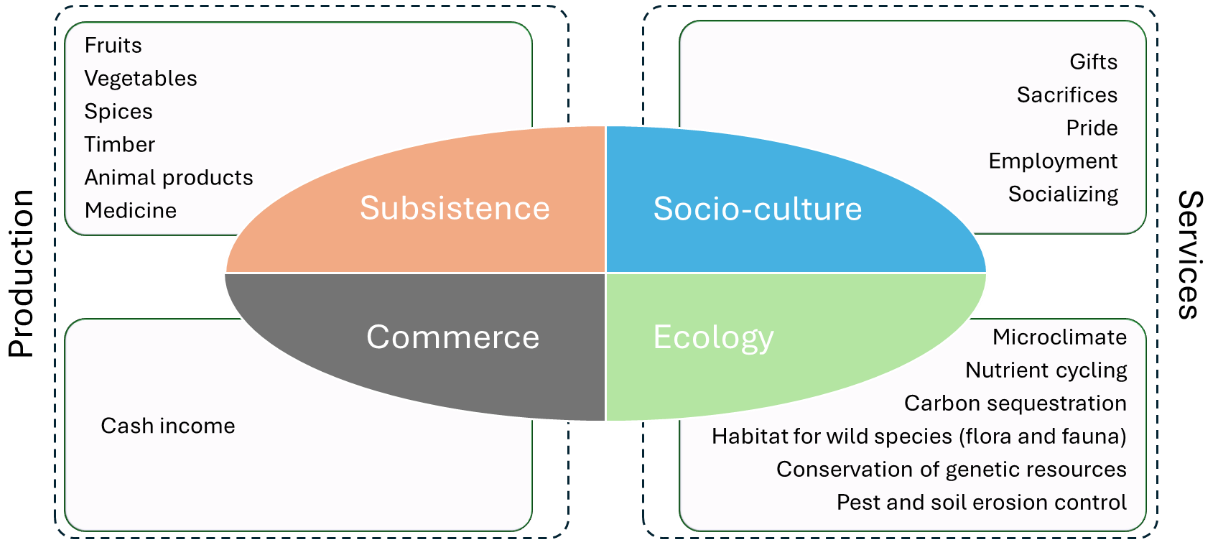

Figure 4. Outcomes provided by an agroforestry system (Adapted from Kehlenbeck et al., 2007).

Figure 4 indicates the multifaceted benefits that agroforestry systems offer, encompassing ecological enhancement, economic opportunities, and social advantages. These systems play a crucial role in subsistence by supplying a variety of food products that can be used directly for nutrition or can be processed into spices and medicines (Kehlenbeck et al., 2007; Silva Neto et al., 2022). This makes them integral to both daily sustenance and traditional healthcare practices. Additionally, certain species within these systems are cultivated for timber production, further diversifying their utility (Porro et al., 2012).

Beyond their direct agricultural output, agroforestry systems contribute significantly to biodiversity. They create nurturing habitats for a wide array of wildlife, including species that local communities may rely on for hunting and subsequent food sources (Caetano et al., 2023; Krause, 2019). This aspect of agroforestry not only supports ecological balance but also sustains the food security and dietary diversity of these communities.

The products derived from these systems, whether wood-based or non-wood forest products, serve dual purposes. Locally, they can be used for personal consumption, supporting the self-sufficiency of rural households (Nair et al., 2021). Commercially, these products can be sold, providing vital income for households, and contributing to the local economy (Porro et al., 2012).

Socially and culturally, agroforestry systems hold substantial importance. They are not just sites of agricultural activity but also social hubs where communities gather, share knowledge, and celebrate successful harvests (Acosta et al., 2011). These systems offer employment opportunities and serve as venues for cultural exchange and learning, reinforcing their role in community building and social cohesion (Garavito et al., 2021). Thus, agroforestry systems are pivotal not only in environmental and economic terms but also as keystones of social and cultural infrastructure.

2.2 Case Description

Trees are pivotal in transforming agricultural landscapes within agroforestry systems, shifting from uniform and simple to richly forested and diverse environments (FAO, 2013b). This diversity results in a variety of wood and forest food products that are integral to the livelihoods of local communities, providing both economic and nutritional benefits (FAO, 2013b). Unlike traditional agricultural practices, agroforestry systems consistently offer a range of products throughout the year, ensuring a continuous supply of resources (FAO, 2013b; Vinceti et al., 2008).

The Food and Agriculture Organization (FAO) underscores the nutritional value of forest food products, highlighting their role in delivering essential macro and micronutrients, in addition to offering dietary diversity. These nutrients, which include vitamin A, iron, and calcium, are crucial for health and development but are often lacking in staple diets (FAO, 2013b; Vinceti et al., 2008). Traditional measures of food security primarily focus on caloric intake, as recommended by nutritionists, but fail to consider the comprehensive criteria necessary for a nutritious diet (FAO et al., 2012). A balanced diet should incorporate a diverse range of foods in varying quantities and proportions to meet all dietary needs (FAO et al., 2012; FAO & WHO, 2019; USDA, 2010).

Agroforestry systems offer a broader array of food options from a single plot of land compared to monoculture farms, making them especially valuable in regions with a high reliance on forest foods (FAO, 2013b). Despite their potential, agroforestry practices often remain underrepresented in policy and development strategies aimed at alleviating food insecurity (FAO, 2013a). Recognizing and addressing the role of agroforestry systems in food security and nutrition is vital for informed decision-making at local, regional, and national levels (FAO, 2013a).

In my thesis, I focus on compiling and analyzing nutritional information from products derived from agroforestry systems in the Amazon, data that is currently scattered or unrecorded in existing databases. This research is intended to enrich future studies and provide information to decision-makers. Additionally, considering the active involvement of various private and academic entities in the Amazon region in environmental conservation, training, and community development, the insights from my thesis could also benefit these organizations and the communities they serve.

2.3 Research Questions

Acknowledging the intricate challenges associated with achieving food security, and recognizing the potential benefits that agroforestry systems can offer in the Amazon Region, my research aims to explore the contribution that these systems can play in reducing food insecurity and malnutrition in this ecologically vital area. The primary research question guiding this investigation is:

> *Main RQ: To what extent can agroforestry systems reduce food insecurity and malnutrition in the Amazon?*

To thoroughly address this overarching question, I have formulated two specific sub-questions that will help unpack the nutritional dynamics and contributions of agroforestry systems:

> *RQ1: What macro and micronutrients can be obtained from forest food products produced in agroforestry systems in the Amazon Region?*
>
> *RQ2: How does the caloric contribution of agroforestry food products compare with those of intensive monoculture food production in the Amazon Region?*

By exploring these questions, my research seeks to provide an assessment of the nutritional benefits of agroforestry as a sustainable farming practice in the Amazon, potentially informing future agricultural policies and practices in the region.

3 Theoretical Framework

Food is a fundamental human necessity, essential for survival and well-being (UN General Assembly, 1948). Since 1948, the Universal Declaration of Human Rights, through Article 25, has recognized the right to food as a basic human right. It states that *"Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control"* (UN General Assembly, 1948).

The concept of food security, as defined by the FAO during the 2009 World Summit on Food Security, further elaborates on this right. Food security is achieved *"when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life."* This concept is supported by four pillars which seek to ensure its effectiveness and sustainability. The first pillar emphasizes the availability of a sufficient quantity and quality of food that meets the nutritional requirements of a population (FAO, 2009; FAO & WHO, 2019). The second pillar focuses on ensuring that there is accessible and reliable access to these food products in ways that are both sustainable and safe (FAO, 2009; FAO & WHO, 2019). The third pillar pertains to the need for a conducive environment that supports the proper utilization of these food products, enabling individuals to maximize their dietary benefits (Clapp et al., 2022; FAO, 2009). Finally, the fourth pillar calls for a consistent and stable supply of food, ensuring that fluctuations in availability do not compromise food security (Clapp et al., 2022; FAO, 2009).

To assess food security, a variety of metrics are employed at multiple levels—national, regional, household, and individual (Leroy et al., 2015). These metrics, which vary in their indicators and accessibility of data, help track the different dimensions of food security, such as availability, access, utilization, and stability (Jones et al., 2013; Leroy et al., 2015). However, the diversity of these metrics and their global applicability often complicate the determination of whether food security has been truly achieved, given the variability in what these indicators measure (FAO et al., 2012; Leroy et al., 2015).

Another significant aspect of addressing food security is the type of diet promoted. The **Sustainable Healthy Diet**, which considers nutritional content as well as the environmental and climate impacts of food production, has gained traction as an important framework in recent years (Harrison et al., 2022; Meybeck & Gitz, 2017). Although the parameters for nutrition and diet are complex and vary based on geographical, cultural, and social factors, I have chosen to use the Sustainable Healthy Diet framework as a guide for this thesis. This framework holds great potential for government organizations and stakeholders to develop programs that support this type of diet, aiming to enhance overall food security and promote sustainable eating habits (FAO & WHO, 2019).

3.1 Sustainable Healthy Diet Framework

> *"Sustainable Healthy Diets are dietary patterns that promote all dimensions of individuals' health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable"* (FAO & WHO, 2019, P. 11).

In 2019, the FAO and the World Health Organization (WHO) held an international consultation to explore the multitude of factors affecting food systems and diets. This included examining the roles of social and cultural practices as well as economic contexts (FAO & WHO, 2019). During this consultation, the concept of a *'Sustainable Healthy Diet'* was defined as represented in Figure 5. Based on this, a framework was presented integrating the ideas of a *'Healthy Diet'* with those of a *'Sustainable Diet'* to address the environmental impacts of current food systems, while also laying out guidelines for nutrition, environmental sustainability, and societal benefits (FAO, 2013b; FAO & WHO, 2019).

Figure 5. Key components that define what a Sustainable Healthy Diet must consider (Adapted from FAO, 2010).

The Sustainable Healthy Diet framework emphasizes the health benefits, environmental considerations, and socio-cultural factors involved in dietary choices (See Table 1). It goes beyond traditional dietary recommendations by advocating for the consumption of fresh and natural products while advising against the intake of highly processed foods (FAO & WHO, 2019). This approach is particularly significant as it offers a new perspective on dietary planning, especially for communities with restricted access to commercial food markets. It ensures that these communities can still receive the necessary nutrients essential for human health and development (FAO & WHO, 2019).

Table 1. Characteristics of a Sustainable Healthy Diet regarding health aspects, environmental impacts, and sociocultural aspects (FAO & WHO, 2019).

HEALTH
• Breastfeeding since the early stages and continued until 2 years and beyond with complementary feeding. • A variety of unprocessed or minimal processed food and a balance between food groups. • A variety of fruits and vegetables, in addition to whole grains, legumes, and nuts. • A moderate portion of animal products, such as eggs, dairy, and meat. • Safe and clean water is the fluid of choice. • An adequate intake of energy and nutrients for growth, development, and active lifestyle. • Consistent with the WHO recommendations to reduce the risk of non-communicable diseases (NCDs). • Minimal or no exposure to agents that can cause foodborne diseases.
ENVIRONMENTAL
• Maintaining GHG emissions, water and land use, nitrogen (N) and phosphorus (P) application, and chemical pollution within set targets. • Preserve the biodiversity of all living species. • Minimize the use of antibiotics and hormones in food production. • Minimize the use of plastic and derivates in food packaging.
SOCIAL
• Reduction of food loss and waste. • Implementation according to cultural and social practices throughout the production and consumption of the food. • Accessible and desirable. • Prevent gender-related impacts.

Additionally, this framework promotes diets that have minimal environmental impact, thereby supporting both forest conservation and nutritional security for current and future generations (FAO, 2013b). The FAO further discusses the role of forest foods in these diets, identifying various strategies to enhance their contribution to sustainable healthy diets. These strategies include respecting cultural practices, preventing overexploitation of resources, encouraging dietary diversity and the consumption of forest-derived foods, increasing stakeholder knowledge, and integrating food production into forest management practices (FAO, 2013b).

The *Sustainable Healthy Diet* framework recognizes the importance of forest foods and has compiled a list of factors to enhance their contribution to sustainable diets for communities reliant on them (FAO, 2013b). These factors include:

1. Cultural Challenges: It is essential to consider traditional knowledge when selecting species for marketing and domestication, as cultural challenges can significantly impede the promotion of nutritious forest foods.
2. Sustainability of NWFP Use: To ensure the sustainability of NWFP and mitigate the risk to the resource base, measures must be implemented to manage the threat of overexploitation during extraction.
3. Promotion of Dietary Diversification: It is important to promote dietary diversification and the nutritional contributions of forest foods.
4. Enhancement of Knowledge: Increasing awareness among policymakers, healthcare workers, and extension agents is crucial. Providing information and nutritional education based on solid scientific knowledge will increase the use and consumption of diverse, including traditional, forest foods.
5. Forest Management Adaptation: Adapting forest management to balance timber and food products is essential. This requires negotiating forest management plans with timber concessions to accommodate the interests of local communities and timber companies, paying particular attention to the needs of women and children.
6. Access Rights to Forest Foods: Providing communities with access rights to forest foods empowers them through biodiversity management, enabling better management of biological resources and informed conservation and usage decisions.
7. Innovation in Agro-Ecosystems: Researchers and practitioners must develop innovative roles for agro-ecosystems and heterogeneous landscapes to ensure nutrition-sensitive food production while minimizing the ecological footprint.

4 Methodology

In my research, I primarily employed the term ‘agroforestry’ as the central search keyword to gather a broad and comprehensive range of information relevant to my study. This term is detailed in Section 2.1 of my document, where I also note that agroforestry systems are known by various other names. Despite experimenting with these alternative terms in my searches, I found that they produce fewer results (see Section 4.2). Consequently, to ensure the most extensive coverage and depth in my research findings, I consistently used "agroforestry" as my primary search term.

4.1 Methodology Approach

My involvement in this research is crucial to acknowledge as it shapes the examination and perspective brought to the study. As a Colombian, my choice of topic was driven by a desire to deepen my understanding of agricultural practices within the Amazon region of Colombia. My connection to this area has been primarily through tourism, driven by the natural landscape of the Colombian Amazon and a personal curiosity about a region often perceived as neglected by governmental efforts. This thesis is an extension of my personal interest in the Amazon, recognizing its critical environmental significance not just for Colombia, but for neighboring countries as well.

Despite my personal connection, I have aimed to maintain a neutral point of view throughout my research to avoid biasing the outcomes. Initially, my focus was solely on Colombia; however, early in my research, I realized the interconnected nature of the Amazon transcending national borders, highlighting the ecosystem's disregard for political borders. This revelation led me to expand the scope of my study to include the wider Amazon region, aiming to produce findings that could benefit various stakeholders across South America, regardless of their specific location.

In my research, I explore agroforestry as a viable alternative agricultural approach for enhancing food security. Utilizing a positivist epistemological framework, my study begins with a systematic review of the existing literature to empirically examine the nutritional contributions of food forest products within agroforestry systems in the Amazon region. This involves a meta-analysis of academic and published articles, adhering to the principles of objectivity, transparency, and replicability to ensure that the findings are solidly based on empirical evidence (Freese & Peterson, 2017; Ryan, 2006).

Aligned with a realist ontology, my research acknowledges the presence of an objective reality that exists independently of human perception (Moon & Blackman, 2014). By focusing on nutritional outcomes within agroforestry systems, the goal is to objectively evaluate the benefits that these alternative agricultural practices offer. Additionally, this research aims to uncover the complex relationships between agriculture, nutrition, and sustainability. This approach not only broadens our understanding of agroforestry's role in sustainable development but also underscores its potential in addressing food security challenges.

4.2 Literature Review

My research began with a thorough consultation of three distinct databases to gather relevant literature. I utilized Scopus, which is renowned for its extensive repository of peer-reviewed articles. Alongside Scopus, I accessed Web of Science, which offers a broader range of academic content that extends beyond peer-reviewed articles. Additionally, I included Google Scholar in my search process due to its wide coverage of both academic and grey literature, making it one of the most commonly used databases for comprehensive academic research (Gusenbauer & Haddaway, 2020).

To initiate the search, I employed a combination of search terms designed to capture the breadth of literature available on my topic. This preliminary search was crucial for establishing a baseline understanding of the volume of existing research. The results of this initial search, including the number of articles and documents retrieved from each database, are systematically presented in Table 2. This step not only helped in quantifying the available research but also in refining further searches to be more targeted and specific.

Table 2. Search terms used for the literature view and their corresponding results for each database.

N°	Search Terms	Results [1]		
		Scopus	Web of Science	Google Scholar [2]
1	Agroforestry AND Amazon AND Nutri*	65	37	12.800 (0)
2	Agroforestry AND Amazon AND Calori*	3	2	2.210 (0)
3	Agroforestry AND Amazon AND Nutritional composition	1	0	389 (160)
4	Chagra* AND Amazon AND Nutri*	0	1	188 (79)
5	Chagra* AND Amazon AND Calori*	0	0	294 (20)
6	Chagra* AND Amazon AND Nutritional composition	0	0	664 (20)

[1] The number of results can vary depending on the date of consultation. This search includes results until the 4th of March of 2024.

[2] For the Google Scholar database, the number in brackets corresponds to the actual number of articles reviewed.

Based on the extensive results from initial searches, I decided to exclude Google Scholar for the first two searches due to the high number of publications. When analyzing results using the search term "Nutri*", I found that they lacked specific details on the nutritional contributions of forest food products. Consequently, I refined my search terms to include "Nutritional contribution" alongside other predefined terms in subsequent searches (searches 3 and 6). Due to the low volume of results from Scopus and Web of Science for these searches, my focus shifted primarily to Google Scholar. However, I had to cap the number of articles reviewed per search as the relevance of results tended to diminish the deeper I looked into the list, even after sorting by relevance. The number in brackets in the fifth column of Table 2 corresponds to the actual number of publications registered from the total of results obtained from the correspondent database.

Google Scholar was particularly useful despite its limited filtering options, which include language selection, peer-reviewed articles, citations, and patents. It provided academic outputs including books and regional publications that offered critical insights not typically available in Scopus or Web of Science, enhancing the scope of my research.

When using Scopus, the search terms were entered within the "Article title, Abstract, Keywords" field, an option already available on the website. However, this option was not available in Web of Science. Therefore, the search terms were individually typed to find results in the "Title, Abstract, and Author Keywords" fields ("Agroforestry" AND "Amazon" AND nutri* in Title or Abstract or Author Keywords). This was done to ensure consistency with the search options used in Scopus. In the case of Google Scholar, due to the limitations of filter options mentioned earlier, no filter was applied.

After completing the literature review, I proceeded to the second stage, which involved reading the title and abstract of articles, book chapters, or other documents to determine their relevance to my research. Basic information such as title, author, year of publication, and country of research (if specified) was recorded for each of the literature found (see Appendix 1). While scanning each of them, I chose to create several categories of relevance. This approach also allowed me to identify the primary objectives of the information concerning the use of agroforestry systems in the Amazon region. The relevance was categorized as follows:

- Nutritional Contribution: whether the focus of the publication included measuring the nutritional contribution of a food product that is used in an agroforestry system in the Amazon.
- Environmental Contribution: whether the focus of the publication is on the environmental impacts that the agroforestry systems provide in the Amazon.
- Soil Contribution: whether the focus of the publication is on soil impacts that the agroforestry systems provide in the Amazon.
- Social Contribution: whether the focus of the publication is on social impacts that can be obtained through the use of agroforestry systems in the Amazon.
- Economic Contribution: whether the focus of the publication is on economic impacts that can be obtained in the use of agroforestry systems in the Amazon.

- Not Relevant: whether the focus of the publication is not relevant at all to the aim of my research (e.g., versatility of a plant species, nutritional contribution of traditional agricultural practices) and its research is not in the Amazon.
- Repeated: whether the publication was already found in another database and has been already reported in the 'List of reviewed publications obtained from the Literature Review.'

As a result of this second stage, I identified a total of 15 relevant academic publications for the meta-analysis which I categorized as "Nutritional Contribution" (See Table 3 and Figure 6). Although I initially included a category for environmental benefits, which encompassed benefits such as soil restoration or remediation, I decided to create a separate category to specifically assess the level of importance given in research to this topic. Additionally, while Scopus is recognized for its broad scope and coverage, including articles in the press, most of the articles obtained using the search terms described in Table 2 did not align with the focus of this thesis. This discrepancy may be attributed to various challenges researchers face, such as language barriers, quality standards, and publication fees to publish in this kind of database (Salager-Meyer, 2008).

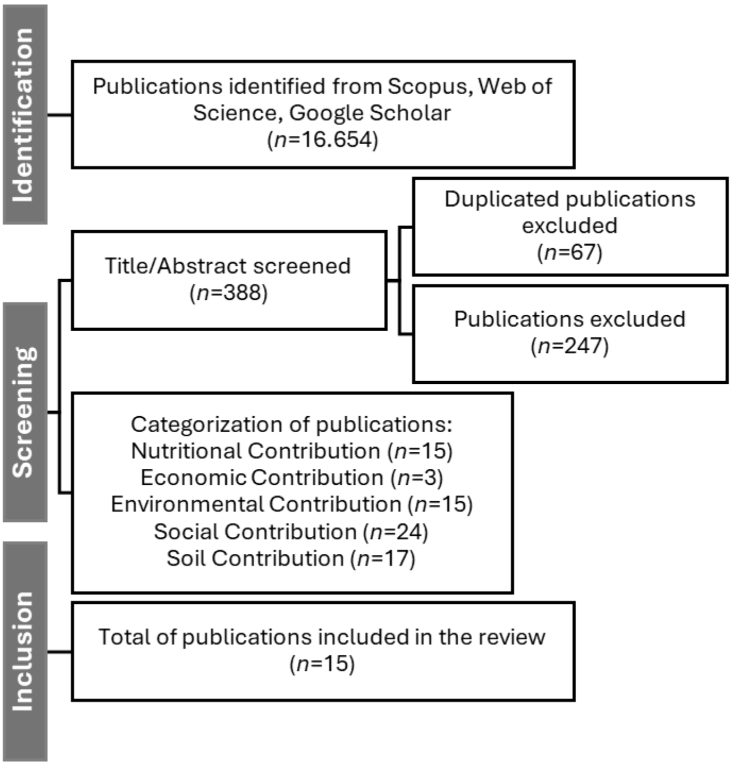

Figure 6. PRISMA schematic diagram of identification, screening, and inclusion results obtained through the literature review (Page et al., 2021).

The results presented in Table 3 represent the final numbers obtained. The majority of publications was excluded due to the focus of the research was not about agroforestry systems or it was focus in an are different than the Amazon region. Other publications were excluded, especially those obtained from Web of Science, since their results had already been found in databases such as Scopus. The rest of results could be categorized in the different type of contributions of agroforestry systems.

Following the initial review of titles and abstracts in the databases, a second review was conducted on the relevant articles, this time focusing on their conclusions and results. Some adjustments were made, and then the final selection of 15 articles was made (See Appendix 2).

Table 3. Number of publications categorized by each of the databases, with a total of 388 reviewed.

Relevance Criteria	Databases			Total
	Scopus	Web of Science	Google Scholar	
Nutritional Contribution	1	0	14	15
Economic Contribution	3	0	0	3
Environmental Contribution	10	1	4	15
Social Contribution	1	1	22	24
Soil Contribution	16	1	0	17
Repeated	3	35	29	67
Not Relevant	35	2	210	247
Total	**69**	**40**	**279**	**388**

4.3 Meta-analysis

When examining the role of nutrition for human health, the combination of macro and micronutrients is crucial for functional health and longevity (Espinosa-Salas & Gonzalez-Arias, 2023). While both are necessary for bodily functions, macronutrients are required in larger quantities, while micronutrients are needed in smaller amounts (Espinosa-Salas & Gonzalez-Arias, 2023; Lean, 2019). The primary macronutrients include proteins, carbohydrates, and lipids, which not only provide energy but also play essential roles in hormone production and have biochemical properties affecting the human body (Espinosa-Salas & Gonzalez-Arias, 2023). In contrast, micronutrients are vital for metabolism and the maintenance of tissue functions, including calcium (Ca), magnesium (Mg), iron (Fe), zinc (Zn), selenium (Se), and vitamins A, C, D, E, K, and the B vitamins some of the most essentials (Shenkin, 2006; WHO, 2004).

Therefore, to conduct the meta-analysis, I decided to focus on registering the nutritional characteristics mentioned for each of the forest food product, focusing primarily on those mentioned above but not restricted to them (See Appendix 3). This information was also organized by region.

In order to have a detailed analysis of the agroforestry systems used in the Amazon, specific values and quantities of the food products and their characteristics would be useful to find for each research.

However, each of the publications used different methodologies, making it complex and out of the scope of this thesis to directly compare such results. Despite this, I recorded a check mark if the information was mentioned (e.g., the article mentions that a specific type of product is a source of Calcium, but it does not specify any value), or the numeric value if this was mentioned.

One important assumption that I took into the report of the nutritional contribution of forest food products is that the values presented are calculated from the raw product. This is due to the change of composition of the number of calories or nutrients that the product can have if it is converted into flour, beverages (including fermented ones), and oil, among others.

To address my second research question, I based the list of species for my agroforestry system model on one of the articles obtained from the literature review. This one describes the species that were part of the agroforestry system where the collection was made (Publication code: R5). Although all the publications obtained from the literature review mentioned their nutritional analysis from forest food products from agroforestry systems, they did not specify other of the species that where part of the agroforestry where the products were obtained. Given the variety of mixes possible in this type of system, I chose to focus on the one described in my literature review for time efficiency.

For the monoculture model, I focused on three of the common monoculture crops that are used in different parts of the Amazon region: soybean (*Glycine max),* banana (*Musa* spp.), and cassava (*Manihot esculenta*) (Clement et al., 2009; Lojka et al., 2011; Nair et al., 2021; Ortiz et al., 2013). For this comparative analysis, I conducted additional research to gather information such as yield and energy value for each of them.

In both the meta-analysis and this analysis, I used the scientific name of the species to reduce the margin of error and to be able to find additional data in languages such as Spanish and Portuguese, which are official languages in the countries where the Amazon region is located.

5 Results

Agroforestry systems are prevalently utilized across tropical regions, including Central and South America, Africa, and Southeast Asia serving as vital components of local agriculture and food systems (FAO, 2013a; Gonçalves et al., 2021; Nair et al., 2021). Despite their widespread application, there remains a discernible gap in research specifically addressing the nutritional contributions of these systems. This lack of detailed scientific data undermines their potential recognition and wider adoption. One of the primary challenges I faced in my investigation was the limited availability of nutritional data on agroforestry systems within renowned academic databases such as Scopus and Web of Science. This challenge was particularly presented when attempting to gather information on the nutritional benefits of forest food products derived from agroforestry systems in the Amazon region. During my literature review, only 4% of the publications proved relevant to my specific research focus, highlighting a significant oversight in existing academic studies.

Moreover, my analysis of the geographic distribution of these studies revealed an uneven focus of literature. After filtering out duplicates and irrelevant entries among a group of 74 resources, 23 significant studies were conducted in Brazil, accounting for 31% of the total. Colombia, Ecuador, and Peru followed with 12%, 11%, and 7%, respectively. The remaining research focused either on non-wood forest products, or forest food products, cultivated in agroforestry systems in the Amazon (16%), or those products that are commonly cultivated in Central and South America, but have been applied in agroforestry systems located in other parts of the world (8%). Notably, the Amazon basin spans beyond these nations into Bolivia, Guyana, Suriname, Venezuela, and French Guiana—regions that the current literature review shows as overlooked. This oversight underscores a profound regional imbalance in research, which is critical given the diverse applications and implications of agroforestry systems in these underrepresented areas. The remaining 11% of publications comprises resources focusing on the functionality of agroforestry practices as a potential alternative for agriculture or the nutritional role of forest food, without specifying a particular region's contribution. These studies were not deemed relevant due to their lack of direct association with the Amazon region, a crucial aspect of my research categorization criteria.

In the following sections of this document, I will present the findings corresponding to each specific research question presented in section 2. The results are organized systematically to provide a clear and comprehensive understanding of the data collected and the insights derived from the analysis, offering a thorough exploration of the themes and hypotheses that have guided my research.

5.1 Research Question 1

> *RQ1: What macro and micronutrients can be obtained from forest food products produced in agroforestry systems in the Amazon Region?*

Given the importance of both macro and micronutrients for overall well-being and nutrition, I gathered and analyzed the nutritional data from 15 articles categorized under 'Nutritional Contribution.' These articles collectively mentioned a total of 39 forest food products, with detailed findings presented in Table 4 and Appendix 3 of my research.

In my study, while I did not focus on comparing the values of macro and micronutrients directly, I consistently aimed to report as comprehensively as possible the nutritional information provided by each source during the meta-analysis process. As I was reporting the results of the articles, it became increasingly apparent that there were significant gaps in the data, particularly in when it came to comparing detailed levels of macro and micronutrients across different species. This inconsistency emphasized the need for more uniform reporting standards in nutritional studies to facilitate more effective comparisons and comprehensive evaluations of the nutritional profiles of forest-derived food products.

The macronutrient values, specifically carbohydrates, proteins, and lipids, were quantified in grams per 100 grams of each forest food product. Similarly, the energy value was measured in kilocalories per 100 grams. To handle variations in the data provided by the sources, I employed two different statistical techniques to ensure accuracy and consistency in my analysis:

1. Average Calculation: When the reported values for a nutrient were relatively close to one another, indicating a smaller variance, I computed the average. This method provides a central value that represents the typical amount of the nutrient in the food product.
2. Mean Calculation: In instances where the reported values showed a wide range of differences, suggesting significant variability, I calculated the mean value. This approach helps to mitigate the effect of extreme values, thus providing a more representative figure of the nutrient content across diverse samples.

These methodologies allowed for a more precise and reliable interpretation of the nutritional content in various forest food products, accommodating the inherent discrepancies found in the collected data.

Table 4. List organized by the scientific name of the 39 species reported in the articles categorized as 'Nutritional Contribution'.

Resources code	Scientific name	Common name	Type of specie	References
R9	*Acioa edulis* Prance	Cutia nut	Nut tree	(Lopes et al., 2021)
R9	*Acioa longipendula* Pilg.	Egg nut	Nut tree	(Lopes et al., 2021)
R2	*Astrocaryum vulgare* Mart.	Tucum	Palm tree	(Filho et al., 2023)
R3	*Auricularia nigricans*		Mushroom	(Silva Neto et al., 2022)
R13	*Averrhoa bilimbi* L.	Bilimbi	Tree	(Ferreira et al., 2021)
R1, R4, R8, R10	*Bactris gasipaes* Kunth	Peach palm	Palm tree	(Costa et al., 2022; González-Jaramillo et al., 2022; Graefe et al., 2013; Jaramillo-Vivanco et al., 2022)
R9	*Bertholletia excels* Bonpl.	Brazil nut	Nut tree	(Lopes et al., 2021)
R6	*Brosimum lactescens* (S. Moore) C.C. Berg	Baxawa	Tree	(Pilnik et al., 2023)
R15	*Calathea allouia*	Guinea arrowroot	Root	(Orjuela et al., 2016)
R15	*Canna indica*	Edible canna, Queensland arrowroot	Root	(Orjuela et al., 2016)
R2	*Caryocar villosum* (Aubl.)	Pequi	Tree	(Filho et al., 2023)
R2	*Endopleura uchi* (Huber.)	Uxi	Tree	(Filho et al., 2023)
R6	*Euterpe precatoria* Mart.	Açaí, Acai	Palm tree	(Pilnik et al., 2023)
R5	*Favolus brasiliensis* (Fr.) Fr.	(not found)	Mushroom	(Silva-Neto et al., 2020)
R6	*Genipa americana* L.	Genipa americana	Tree	(Pilnik et al., 2023)
R6	*Gynerium sagittatum* (Aubl.)	Wild cane	Herb	(Pilnik et al., 2023)
R6	*Herrania mariae* (Mart.) Deckne. *ex* Goudot	Cacauí	Small tree	(Pilnik et al., 2023)
R6	*Inga thibaudiana* DC. Spp *thibaudiana*	Ingá	Tree	(Pilnik et al., 2023)
R9	*Lecythis Pisonis* Miers	Sapucaia nut	Nut tree	(Lopes et al., 2021)
R7	*Lentinus citrinus*	(not found)	Mushroom	(Machado et al., 2016)
R15	*Maranta ruiziana*	(not found)	Rhizome	(Orjuela et al., 2016)
R6	*Matisia cordata* Kunth	Sapote	Tree	(Pilnik et al., 2023)
R10	*Mauritia flexuosa*	Buriti	Palm tree	(Jaramillo-Vivanco et al., 2022)
R6	*Muntingia calabura* L.	Kersen fruits	Tree	(Pilnik et al., 2023)
R2, R6	*Oenocarpus bacaba* Mart.	Bacaba	Palm tree	(Filho et al., 2023; Pilnik et al., 2023)
R6, R10	*Oenocarpus bataua* Mart.	Seje	Palm tree	(Jaramillo-Vivanco et al., 2022; Pilnik et al., 2023)
R6	*Passiflora foetida* L.	Stinking passion flower	Liana	(Pilnik et al., 2023)
R6	*Passiflora nitida* Kunth	Breath passion fruit	Liana	(Pilnik et al., 2023)
R2	*Physalis angulat* L.	Gooseberry	Herb	(Filho et al., 2023)
R6	*Phytelephas macrocarpa* Ruiz & Pav.	Ivory nuts	Palm tree	(Pilnik et al., 2023)
R11	*Plukenetia volubilis L.*	Sacha inchi	Small tree/Shrub	(Kodahl, 2020)
R6	*Pourouma cecropiifolia* Mart.	Amazon grape	Tree	(Pilnik et al., 2023)
R6	*Pouteria torta* Radlk. subsp. Glabra Mart. T.D.Penn	(not found)	Tree	(Pilnik et al., 2023)
R6	*Pseudolmedia laevis* (Ruiz & Pav.) J.F.Macbr.	Pama	Tree	(Pilnik et al., 2023)
R10, R12	*Rhynchophorus palmarum*	Palm weevil	Insect	(Cartay et al., 2020; Jaramillo-Vivanco et al., 2022)
R3	*Schizophyllum commune*	(not found)	Mushroom	(Silva Neto et al., 2022)
R10, R14	*Theobroma grandiflorum*	Cupuassu	Palm tree	(Jaramillo-Vivanco et al., 2022; Todorov, 2018)
R6	*Theobroma microcarpum* (Mart.)	Cacau jacaré	Tree	(Pilnik et al., 2023)
R6	*Trichostigma octandrum* (L.) H. Walter	Nawãti	Liana	(Pilnik et al., 2023)

For instance, one of the most common forest food products mentioned was the *Bactris gasipaes* Kunth, also known as peach palm in English, which has been extensively researched due to its significant potential for food security (Costa et al., 2022; González-Jaramillo et al., 2022). Although mentioned in four of the resources found (Publications code: R1, R4, R8, and R10), only two of them (Publications code: R1 and R4) provided energy values. This product has been classified into three types of races depending on the thickness of its pulp: microcarpa, mesocarpa, and macrocarpa (Costa et al., 2022). This variability causes the nutritional composition to differ for each type, and it may also vary within the same race due to factors such as cultivation techniques, climate, and soil conditions (Costa et al., 2022).

Micronutrients were reported in micrograms per 100 grams across the studies. In the specific case of peach palm, it was frequently noted for its substantial quantities of carbohydrates, lipids, and vitamin A, marking it as a vital food source in tropical Latin America and a key contributor to regional food security (Costa et al., 2022; González-Jaramillo et al., 2022).

Other palm fruits also contribute to nutritional benefits. Buriti (*M. flexuosa*), for example, is a source of lipids, Vitamin A and E, carotenoids, and fatty acids, essential in Amazonian diets and commercially available in various forms: raw, cooked, or as a non-alcoholic or fermented alcoholic beverage (Jaramillo-Vivanco et al., 2022). Seje (*O. bataua*) is notable for its dietary fiber content, which can meet up to 35 to 50% of the recommended intake, and it also contains significant levels of resveratrol, providing anti-inflammatory and antioxidant effects (Jaramillo-Vivanco et al., 2022). Sacha inchi (*P. volubilis*) plays a crucial role in preventing malnutrition, especially in children, as it is rich in carbohydrates, proteins, and lipids (Kodahl, 2020). Fruits such as pequi (*C. villosum*), gooseberry (*P. angulat*), tucum (*A. vulgare*), uxi (*E. uchi*), and bacaba (*O. bacaba*) have high nutritional potential due to their macronutrient content and high concentration of vitamins (Filho et al., 2023).

Edible nuts found within the Amazon, particularly in Brazil, are significant nutritional resources, as they contain considerable amounts of protein, according to research by Lopes et al. (2021). Additionally, tubers and roots like edible canna (*C. indica*), *M. ruiziana*, and guinea arrowroot (*C. allouia*), which are reported in the Colombian Amazon, offer not only calories but also valuable nutrients such as fiber, carbohydrates, and essential minerals such as calcium, potassium, and phosphorus (Orjuela et al., 2016).

Furthermore, certain species, including peach palm and Sacha inchi, extend beyond their nutritional benefits to serve as significant sources of income for local communities. These species are particularly valuable in rural areas where their cultivation is straightforward, providing a crucial economic boost for small-scale farmers (González-Jaramillo et al., 2022; Graefe et al., 2013; Kodahl, 2020). Additionally, species such as pequi, gooseberry, tucum, uxi, and bacaba can naturally propagate and are easily integrated into home gardens, which helps reduce the costs of production and management, thereby minimizing financial burdens for communities that have access to these plants (Filho et al., 2023).

While my research primarily focused on food products cultivated within agroforestry systems, it also uncovered additional nutritional resources naturally occurring within these ecosystems. For instance, two of the studies explored mushrooms that grow spontaneously in agroforestry settings, noting their consumption due to their protein and mineral content, which are comparable to exotic and commercially available mushroom varieties (Silva Neto et al., 2022; Silva-Neto et al., 2020). *A. nigricaris*, a mushroom prized in traditional oriental cuisine and medicine, is recognized for its various health benefits, including cholesterol reduction, anticoagulant, antioxidant, and anti-inflammatory properties (Silva Neto et al., 2022). Another mushroom, *S. commune*, is noted for its antioxidant capabilities and its role in providing iron and zinc, stemming from its capacity to accumulate metals (Silva Neto et al., 2022).

Other noteworthy sources of nutrition are insects, particularly the palm weevil (*R. palmarum*). Insects, in general, play multiple roles as pollinators, indicators of environmental changes, and biological pest controllers (Cartay et al., 2020). The palm weevil, for instance, may appear on certain fruit trees and cause damage, but it is not considered a pest (Cartay et al., 2020). On the contrary, it serves as an important protein source that is easily digested and is already consumed by native indigenous communities throughout the Amazon basin (Cartay et al., 2020). This insect is rich in protein, lipids, and micronutrients such as vitamin A and E, iron, copper, and zinc (Jaramillo-Vivanco et al., 2022). Edible insects like this specie play a significant role in the nutrition of indigenous Amazonian communities, especially during seasons when access to other animal protein is limited (Cartay et al., 2020).

The forest food products identified in my research are categorized into various species types, as detailed in the fourth column of Table 4. The classification of these species reveals a diverse array of forest-derived foods. Notably, trees constitute the largest group, making up 31% of the species reported, followed by palm trees at 21%. Additionally, nut trees and mushrooms each represent 10% of the total number of forest products documented. Lianas account for 8% of the species, while roots, herbs, and small trees or shrubs collectively comprise 5% of the total. At the lower end of the spectrum, only one species each of rhizome and insect were reported, which together contribute to 3% of the overall species count. This distribution highlights the variety and richness of forest-based food resources, emphasizing the ecological diversity and nutritional potential inherent in these forest ecosystems.

In Figures 7 and 8, I provide a detailed summary of the macro and micronutrient contributions of the 39 species identified in this study. This summary is aligned with the essential nutrients listed and presented in section 4.3. The data reveal a substantial nutritional presence among these species: 87% of them are noted as sources of protein, 64% provide carbohydrates, and 59% offer lipids.

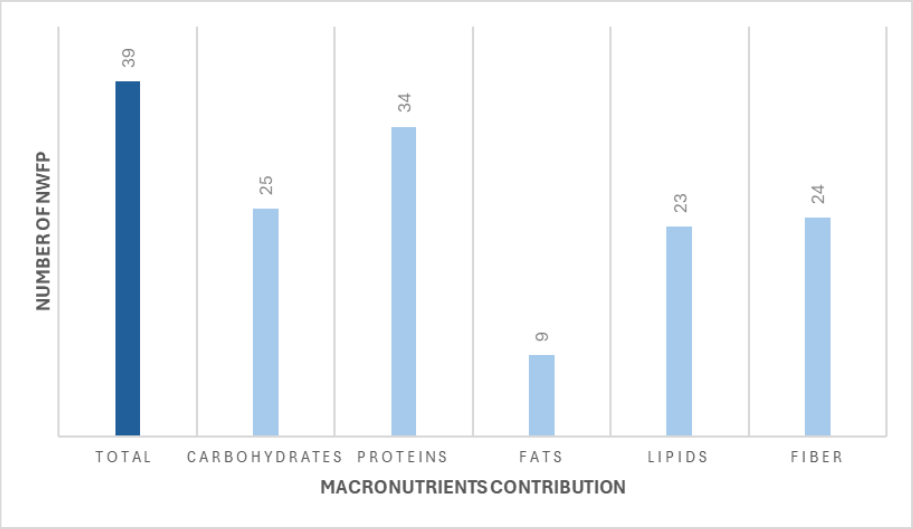

Figure 7. Number of forest food products that were reported as macronutrient contributors in the Amazon Region.

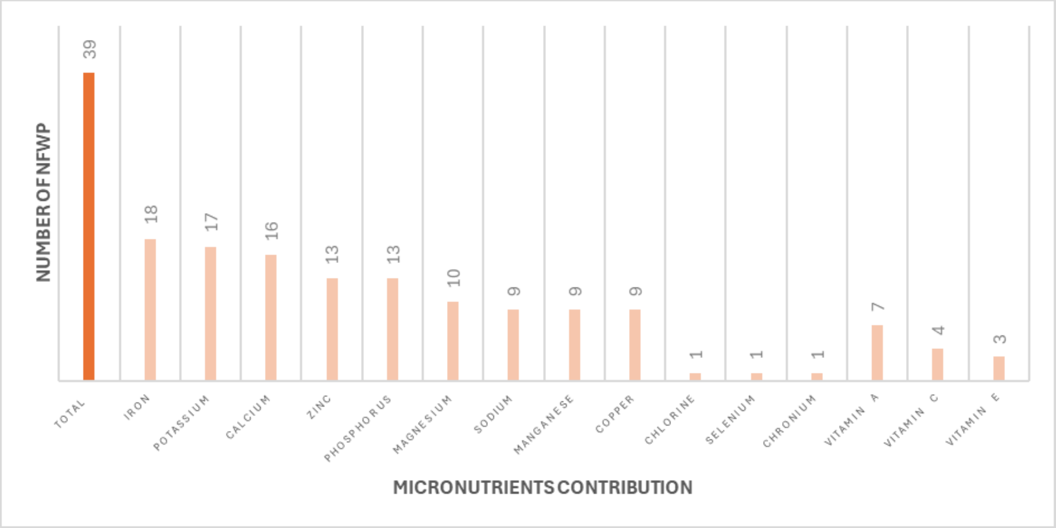

Figure 8. Number of forest food products that were reported as micronutrient contributors in the Amazon Region.

When examining essential micronutrients, the distribution is also notable, though less uniform. Iron is provided by 46% of the species, calcium by 41%, zinc by 33%, magnesium by 26%, and vitamin A by

18%. Lesser quantities of selenium, vitamin C, and vitamin E are found within this spectrum of forest food products. It is important to acknowledge that other micronutrients such as vitamins D, E, K, and various B vitamins were not frequently mentioned in the analyzed publications. This omission does not necessarily indicate their absence in these species, but rather that they were not the focus of the reported analyses or were overlooked in the research documented. This overview underscores the rich nutritional profile of these forest-derived species and highlights areas for further research to explore additional nutrient contributions.

5.2 Research Question 2

> *RQ2: How does the caloric contribution of agroforestry food products compare with those of intensive monoculture food production in the Amazon Region?*

Given the fact that agroforestry systems offer a great variety of food products, it could be hypothesized that they have the potential to yield higher caloric outputs when compared with intensive monoculture systems. Quantifying this caloric contribution could provide valuable scientific insights and data for stakeholders interested in aspects such as land productivity, nutrition, and enhancing farmers' income.

In Table 5, I present the calculations derived from the yield and caloric content per forest food product within an agroforestry system. For this analysis, I based the agroforestry model on the system outlined by Silva-Neto et al., 2020, while intentionally excluding coffee (*Coffea arabica* L.) and ginger (*Zingiber officinale* R.), which are predominantly used for beverages or in traditional medicine (Marchiori, 2008; Messina et al., 2015). The yield of each food product was derived from the academic literature found in my research and the references are included in the tables.

Table 5. Proportional contribution of an agroforestry system model in 1 hectare of land with equal use by all the system's species.

AGROFORESTRY SYSTEM BASE MODEL					
Food product	**Scientific name**	**Yield (t/ha)**	**Energy value (kcal 100 g-1/unit)**	**Land use**	**Proportional contribution (kcal/ha)**
Cassava	*Manihot esculenta*	8,98[a]	151,00[b]	20%	2.711.960,00
Maize	*Zea mays*	2,95[c]	361,00[b]	20%	2.129.900,00
Yam	*Dioscorea sp.*	1,25[d]	357,90[e]	20%	894.748,88
Taioba	*Xanthosoma sagittifolium* Schott	20,55[f]	34,00[b]	20%	1.397.128,00
Banana	*Musa* spp.	19,40[g]	122,50[b]	20%	4.753.000,00
TOTAL			**1.026,40**		**11.886.736,88**

[a] (Mata et al., 2024), [b] (NEPA & UNICAMP, 2011), [c] (Chemura et al., 2021), [d] (Nascimento et al., 2015), [e] (Polycarp et al., 2012), [f] (Calzadilla, 2012), [g] (Fratoni et al., 2017)

Assuming that each species occupies an equal area of land (1 hectare), the potential production was calculated to be approximately 1.026 kcal per gram of each food product, resulting in a total caloric contribution of 11,886.737 kcal per hectare.

To contextualize these findings, I compared the total energy yield from this agroforestry model to the daily caloric needs of an average adult, which are estimated at 2,330 kcal per day (FAO et al., 2023). If an average adult were to consume 100 grams of each product from this system, it would fulfill about 44% of their daily caloric requirements, as demonstrated in Equation 1.

Equation 1. Calculation of caloric contribution ratio of an average agroforestry system for an average adult.

$$\frac{1.026{,}4\ \frac{kcal}{gr\ unit} x\ 100\%}{2.330\ \frac{kcal}{day}} = 44\%$$

Subsequently, I calculated the potential caloric output if the species predominantly used in the Amazon—cassava, maize, and banana—were to occupy the largest portions of land within the agroforestry model (Lojka et al., 2011; Nair et al., 2021; Ortiz et al., 2013; Porro et al., 2012). While the Taioba showed higher yield values, I based my calculations on the academic literature which highlighted cassava, maize, and banana as the most commonly used food products in Amazonian agroforestry systems.

According to this, I performed 4 scenarios that were created according to different land proportions of the main food products on a total of one hectare. This approach allowed me to explore various configurations of agroforestry systems and to identify the cases where higher potential caloric yields could be obtained. The first scenario I analyzed assigned the greatest land area equally among the three key species: 30% of the land was dedicated to cassava, 30% to maize, and 30% to banana, with the remaining 10% divided between the latter two crops. This scenario provides for a total caloric contribution of 14'965.259,22 kcal per hectare which is higher than the agroforestry model with equal proportion among food products. This can be explained by the different yield values that these main crops have. The detailed results are illustrated in Table 6.

In further scenarios, I varied this distribution assigning 50% of the land to each of the primary food crops and the other 50% to a mix of other food products.

Table 6. Scenario 1 - Proportional contribution of an agroforestry system model in 1 hectare of land with higher proportional use of land for cassava, maize, and banana crops.

AGROFORESTRY SYSTEM - SCENARIO 1					
Food product	Scientific name	Yield (t/ha)[1]	Energy value (kcal 100 g-1/unit)[2]	Land use	Proportional contribution (kcal/ha)
Cassava	*Manihot esculenta*	8,98	151,00	30,0%	4.067.940,00
Maize	*Zea mays*	2,95	361,00	30,0%	3.194.850,00
Yam	*Dioscorea sp.*	1,25	357,90	5,0%	223.687,22
Taioba	*Xanthosoma sagittifolium* Schott	20,55	34,00	5,0%	349.282,00
Banana	*Musa* spp.	19,40	122,50	30,0%	7.129.500,00
TOTAL					**14.965.259,22**

[1] For yield references, see notes in Table 5, [2] For energy value references, see notes in Table 5

These different land-use configurations, detailed in Tables 7, 8, and 9, allowed me to explore how varying the distribution of land to these staple crops could enhance the overall caloric contribution of the agroforestry system.

In scenario 2, where cassava occupies 50% of the land, its proportional contribution to caloric output increases. However, the taioba and banana crops, which typically yield higher, are assigned less land in this scenario, leading to a reduced overall caloric yield. As a result, the total caloric output for this setup is 12,514.135,55 kcal per hectare (see Table 7).

Table 7. Scenario 2 - Proportional contribution of an agroforestry system model in 1 hectare of land with higher proportional use of land for cassava crops.

AGROFORESTRY SYSTEM - SCENARIO 2					
Food product	Scientific name	Yield (t/ha) [1]	Energy value (kcal 100 g-1/unit)[2]	Land use	Proportional contribution (kcal/ha)
Cassava	*Manihot esculenta*	8,98	151,00	50,0%	6.779.900,00
Maize	*Zea mays*	2,95	361,00	12,5%	1.331.187,50
Yam	*Dioscorea sp.*	1,25	357,90	12,5%	559.218,05
Taioba	*Xanthosoma sagittifolium* Schott	20,55	34,00	12,5%	873.205,00
Banana	*Musa* spp.	19,40	122,50	12,5%	2.970.625,00
TOTAL					**12.514.135,55**

[1] For yield references, see notes in Table 5, [2] For energy value references, see notes in Table 5

On the contrary, when maize is the predominant crop, the caloric output is not significant due to its relatively low yield. This scenario mirrors the conditions of scenario 2, where high-yield crops are underutilized, resulting in a lower total caloric output of 11,422.773,05 kcal per hectare—less than what is achieved in the base agroforestry model (See Table 8).

In contrast, the banana crop, known for its high yield within the model, significantly boosts the caloric contribution when it occupies 50% of the land. In this scenario, the total caloric yield soars to 16,341.085,55 kcal per hectare, underscoring the impact of land allocation on the productivity of agroforestry systems (See Table 9).

Table 8. Scenario 3 - Proportional contribution of an agroforestry system model in 1 hectare of land with higher proportional use of land for maize crops.

AGROFORESTRY SYSTEM - SCENARIO 3					
Food product	Scientific name	Yield (t/ha)	Energy value (kcal 100 g-1/unit)	Land use	Proportional contribution (kcal/ha)
Cassava	*Manihot esculenta*	8,98	151,00	12,5%	1.694.975,00
Maize	*Zea mays*	2,95	361,00	50,0%	5.324.750,00
Yam	*Dioscorea sp.*	1,25	357,90	12,5%	559.218,05
Taioba	*Xanthosoma sagittifolium* Schott	20,55	34,00	12,5%	873.205,00
Banana	*Musa* spp.	19,40	122,50	12,5%	2.970.625,00
TOTAL					**11.422.773,05**

[1] For yield references, see notes in Table 5, [2] For energy value references, see notes in Table 5

Table 9. Scenario 4 - Proportional contribution of an agroforestry system model in 1 hectare of land with higher proportional use of land for banana crop.

AGROFORESTRY SYSTEM - SCENARIO 4					
Food product	Scientific name	Yield (t/ha)	Energy value (kcal 100 g-1/unit)	Land use	Proportional contribution (kcal/ha)
Cassava	*Manihot esculenta*	8,98	151,00	12,5%	1.694.975,00
Maize	*Zea mays*	2,95	361,00	12,5%	1.331.187,50
Yam	*Dioscorea sp.*	1,25	357,90	12,5%	559.218,05
Taioba	*Xanthosoma sagittifolium* Schott	20,55	34,00	12,5%	873.205,00
Banana	*Musa* spp.	19,40	122,50	50,0%	11.882.500,00
TOTAL					**16.341.085,55**

[1] For yield references, see notes in Table 5, [2] For energy value references, see notes in Table 5

After establishing the baseline model and exploring various scenarios of the agroforestry system, I detailed the caloric contributions of three monoculture crops in Table 10: soybean (Glycine max), banana (Musa spp.), and cassava (Manihot esculenta). The choice of these specific species is grounded in their widespread cultivation and typical usage within the Amazon region. This selection aims to reflect the practical agricultural choices and potential land-use conflicts that are common in this area, providing a realistic comparison between monocultures and agroforestry configurations (Clement et al., 2009; Lojka et al., 2011; Nair et al., 2021; Ortiz et al., 2013).

Table 10. Caloric contribution of soybean, cassava, and banana monoculture systems.

MONOCULTURE SYSTEM MODEL				
Food product	Scientific name	Yield (t/ha)	Energy value (kcal 100 g-1)	Total contribution (kcal/ha)
MODEL 1				
Soybean	*Glycine max*	2,85[a]	464,87[b]	13.248.795,00
MODEL 2				
Cassava	*Manihot esculenta*	8,98[c]	151,00[d]	13.559.800,00
MODEL 3				
Banana	*Musa* spp.	19,40[e]	122,50[d]	23.765.000,00

[a] (Martorano et al., 2016), [b] (Rodríguez & Cuervo, 2010), [c] (Mata et al., 2024), [d] (NEPA & UNICAMP, 2011), [e] (Fratoni et al., 2017)

According to the simulations previously presented, two particular scenarios stand out for their high caloric contributions. In scenario 1, where land use is evenly divided among the main crops—cassava, maize, and banana—and in scenario 4, where 50% of the land is dedicated to banana cultivation, the caloric outputs exceed those observed in soybean and cassava monoculture systems. When compared to the base model, these scenarios, 1 and 4, exhibit substantial improvements in caloric yield. Specifically, there is a 26% increase in caloric output per hectare when the land is equally shared among the three main crops, and a 37% increase when half of the land is allocated to banana cultivation.

In relation to caloric productivity, the monoculture of bananas is demonstrated to contribute the highest number of calories per unit area, as indicated by the results. This can be attributed to its high yield value compared to other monoculture crops.

In Table 11, I have compiled a summary of the results from my research to facilitate an easy comparison between various agroforestry system configurations and the three monoculture options analyzed. These results are intended to provide a clear overview of the hypothetical caloric contribution that can be obtained through different agricultural practices.

Table 11. Total contribution calculated for monocultures and different agroforestry system scenarios.

AGROFORESTRY SYSTEM SCENARIOS	Description	Proportional contribution (kcal/ha)	Total contribution of soybean (kcal/ha)	Total contribution of cassava (kcal/ha)	Total contribution of banana (kcal/ha)
Base Model	Equal use of land	11.886.736,88	13.248.795,00	13.559.800,00	23.765.000,00
Scenario 1	Main use of land for cassava, maize, and banana	14.965.259,22			
Scenario 2	Main use of land for cassava	12.514.135,55			
Scenario 3	Main use of land for maize	11.422.773,05			
Scenario 4	Main use of land for banana	16.341.085,55			

6 Discussion

To address the ambitious goals outlined in Sustainable Development Goal 2 – Zero Hunger, set by the United Nations in 2015, it is crucial to explore and implement strategies that are effective, sustainable, and scalable. Among these strategies, the use of agroforestry systems in the Amazon region stands out as a particularly promising approach. This thesis further describes how agroforestry systems can play a pivotal role in meeting these objectives, which include ending all forms of malnutrition, doubling the agricultural productivity and income of small-scale food producers, and ensuring sustainable food production systems while implementing resilient agricultural practices.

6.1 The Role of Agroforestry Systems

Agroforestry systems integrate trees, crops, and sometimes livestock into a single system. This integration creates a symbiotic environment where each component benefits the others (FAO, n.d.-a; Nair et al., 2021). Trees provide shade and help retain moisture in the soil, crops bring in annual yields, and organic matter can contribute to enrich the soil (Eslava et al., 2005). Such systems are inherently designed to promote ecological balance and biodiversity, which are crucial for sustainable agriculture (FAO, 2010, 2013b; Porro et al., 2012).

The ecological synergies established within these systems mean that agriculture becomes more than just a primary activity; it also fosters significant environmental benefits. These include biodiversity conservation, as the variety of species within agroforestry systems provides habitats for various forms of wildlife, and climate change adaptation, through the sequestration of carbon in tree biomass and soil, reducing the overall carbon footprint of agricultural operations (FAO, n.d.-a; Kodahl, 2020; Lugo-Pérez et al., 2023).

While the harvest of certain forest products may vary seasonally, the diverse mix of crops and tree products ensures access to food throughout the year (de Carvalho Machado et al., 2021). This is crucial in regions like the Amazon, where traditional monoculture systems can fail to provide year-round food security. In contrast, the natural interplay between nutritional cycles and forests in the agroforestry systems mirrors the ecosystems' inherent resilience, enabling continuous and reliable food production (de Carvalho Machado et al., 2021).

6.2 Challenges of Monoculture

Intensive monoculture agriculture, where large tracts of land are devoted to a single crop, disrupts these bioecological cycles (FAO, 2013b). This disruption necessitates external inputs such as synthetic fertilizers and pesticides, which not only cause pollution but also degrade the soil's health over time (FAO, 2013b). Additionally, monoculture systems are labor-intensive and rely heavily on fossil fuels for the operation of machinery, which has a significant environmental impact (Caicedo-Vargas et al., 2023; Pérez Neira, 2016).

This type of agricultural practice, which focus on the cultivation of a single crop, typically produce all their yield at once, confining both economic gain and food production to a limited part of the year (Altieri et al., 2012; Bennett et al., 2012). This can lead to periods of abundance followed by times of scarcity. In contrast, agroforestry systems facilitate a continuous and significant production plan. By cultivating a variety of crops and forest products, these systems ensure a more evenly distributed food supply and income stream throughout the year, significantly reducing the risks associated with relying on a single crop (Bowman & Zilberman, 2013).

6.3 Advantages in the Use of Agroforestry Systems

The diverse species found in agroforestry systems encourage a similarly diverse ecological community. This diversity not only supports various animal and plant species but also provides a range of products that are crucial for nutrition and economic stability in rural households. For instance, in addition to traditional crop yields, agroforestry environments can support the growth of nuts, mushrooms, and even edible insects, all of which are valuable sources of proteins, fats, and fibers. These systems are also pivotal in providing essential micronutrients that are crucial for various human bodily functions and overall development, contributing significantly to the dietary diversity and nutritional security of local communities (Cartay et al., 2020; Jaramillo-Vivanco et al., 2022; Lopes et al., 2021; Silva Neto et al., 2022; Silva-Neto et al., 2020).

Agroforestry becomes an alternative agricultural practice which implementation provides a wide range of outcomes that include economic, nutritional, and environmental benefits. This combination is essential for the strength and stability of rural communities, particularly in areas that are susceptible to the effects of climate change and economic shifts. By promoting biodiversity and reducing the dependence on damaging agricultural chemicals, agroforestry systems provide a progressive answer to the problems faced by contemporary agriculture.

Enhancing the understanding of the nutritional properties of forest foods is crucial, particularly in assessing their significance in regions where food access is limited (Rowland et al., 2017). The findings from my thesis and presented in section 5.1, highlight that the identification of 39 forest food products, although significant, is merely a portion of the diversity of food products that are cultivated and utilized by communities in the Amazon Region (Miller & Nair, 2006). While the majority of existing research has predominantly focused on major staple crops, there remains a variety of wild fruits that are under-researched, primarily due to their specialized use within specific regional contexts (Lopes et al., 2021; Pilnik et al., 2023).

By diversifying the range of species grown within their agricultural practices allows farmers to develop a broader number of crops, which includes these underutilized forest food products. Such diversification not only ensures a more consistent and varied supply of food but also contributes to reducing household expenses by decreasing the need for purchased food (Cotta, 2017; de Carvalho Machado et al., 2021; Lagneaux et al., 2021). Furthermore, for small-scale farmers, the use of agroforestry systems—particularly those established close to their homes—plays a significant role in reducing their dependence on industrially produced goods, which are often less accessible due to the distance from markets (de Carvalho Machado et al., 2021; Miller & Nair, 2006).

This strategic incorporation of diverse crops into their farming systems not only enhances the nutritional intake and food security of the household but also strengthens the economic stability of these communities by providing a range of products that can be directly consumed or sold. By leveraging the benefits of agroforestry, these farmers can more effectively manage their resources and sustain their livelihoods even in the face of market fluctuations and logistical challenges.

6.3.1 Food Security through Forest Food Products

If the success of agricultural systems is measured entirely by caloric output, then outcomes such as those detailed in section 5.2 may influence the decision in favor of monocultures rather than agroforestry systems. These results compare the caloric contributions of intensive monocultures with those of various agroforestry scenarios, based largely on the productivity of the specific crops involved. Monoculture systems, which focus on high-yield crops, may initially appear more successful under such a narrow metric. However, the nutritional characteristics that need to be supplied for the human body are not fully guaranteed (Lean, 2019).

Recognizing this, international organizations such as FAO and WHO have introduced the Sustainable Healthy Diet framework. This initiative encourages a broader evaluation of agricultural productivity and nutritional standards. The framework not only addresses the nutritional content of food but also considers the significant environmental and social repercussions that arise from intensive monoculture farming practices (FAO & WHO, 2019). By promoting this more comprehensive approach, the FAO and WHO aim to shift the focus from mere caloric intake to the overall quality and sustainability of diets, highlighting the crucial role of diverse farming systems like agroforestry in achieving this goal (FAO & WHO, 2019). This shift is essential for fostering agricultural practices that are sustainable, environmentally friendly, and socially equitable.

One of the objectives of this framework is to mitigate food insecurity by adjusting the characteristics of a nutritious diet in order to match different environmental and cultural contexts (FAO & WHO, 2019). It emphasizes the importance of a diverse array of food products that provide the essential nutrients required for health. This diversity is particularly crucial for indigenous and rural communities, where livelihoods are deeply intertwined with forest ecosystems (FAO, 2013a). Forest food products play a vital role in these communities, offering a source of dietary diversification (FAO, 2013a).

Findings from section 5.1 illustrate that agroforestry systems can provided a variety of 39 forest food products, highlighting their potential to enhance dietary diversity. A balanced diet should include a combination of different food items, enriched with vital vitamins and minerals sourced from varied nutritional backgrounds. The presence of basic macronutrients such as proteins, carbohydrates, and fats, along with essential micronutrients such as vitamins and minerals in these forest foods, is integral to shaping healthy dietary patterns in regions like the Amazon (Rowland et al., 2017).

The discovery of key micronutrients such as iron, zinc, and vitamin A in forest-derived foods is particularly significant. These nutrients are crucial not just for basic health but also for their role in reducing malnutrition, which can lead to increased rates of disease and mortality, and negatively impact cognitive development and learning (Cartay et al., 2020). Therefore, the nutritional value provided by agroforestry systems extends beyond pure subsistence; it plays a critical role in enhancing the overall health and well-being of a population, contributing to a foundation for better life quality and sustainable community development.

6.5 Monoculture Impact on Households

Monoculture farming is often driven by economic factors, market demands, and government incentives, leading to its widespread adoption (Bennett et al., 2012). However, the profits generated from these monocultures are typically reinvested into the agricultural systems to prepare for future planting cycles, which can limit the funds available for enhancing household nutrition (Crews et al., 2018; Gonçalves et al., 2021). Over time, this economic model has influenced dietary habits in the Amazon, pushing communities towards increased consumption of processed foods available in markets (Ortiz et al., 2013).

Recognizing these issues, the concept of land productivity has evolved to prioritize the cultivation of a broader variety of food products that communities can either consume directly or process to enhance their nutritional intake (FAO & WHO, 2019). Households that incorporate a high volume of forest foods into their diet are more likely to meet the recommended intake of fruits and vegetables (Rowland et al., 2017). It is important to note, however, that simply having access to forest food products does not automatically translate into their utilization in local diets (Rowland et al., 2017). Efforts by national and local organizations to promote the benefits of agroforestry systems can help shift these dynamics, encouraging communities to rely more on locally available, nutritious food sources.

6.6 Socio-cultural Dynamics

The cultural heritage and identity of communities living in forested areas are deeply interconnected with the natural resources they access, including food (FAO, 2013b). This cultural connection influences the social dynamics within the community and defines the roles of its members (Eslava et al., 2005; Rodriguez, 2010; Vinceti et al., 2008). Although my thesis research did not explore the social role of communities practicing agroforestry in the Amazon region, it is important to note that household responsibilities play a crucial role in nutrition. In many of these communities, men typically take on roles such as hunting, with the entire community benefiting from the shared resources (Rodriguez, 2010). This communal sharing helps children learn from a young age how to identify various species and understand the functioning of their agroforestry ecosystems system (Instituto SINCHI, 2023; Rodriguez, 2010). On the contrary, women often manage the agricultural spaces and are responsible for preparing meals, utilizing both the hunted protein and gathered forest foods, and providing for their families through both cooking and breastfeeding (León Taborda, 2011).

6.7 Future Objectives

The continuation of research into forest foods is vital for informing public policy and program development aimed at enhancing the nutritional well-being of these communities. Such research provides a scientific basis for developing nutritional programs that capitalize on the availability of forest-based foods. This research agenda should be holistic, encompassing aspects of agriculture, nutritional programming, and cultural heritage, and should involve cross-sector collaboration to ensure long-term monitoring and adaptability in regional practices (de Carvalho Machado et al., 2021). Such comprehensive approaches are necessary to ensure that shifts in dietary patterns and agricultural practices are sustainable and aligned with the needs and traditions of local populations.

7 Limitations

The focus of my research was primarily on finding publications that outline the nutritional contributions of agroforestry systems in the Amazon region. During the literature review process, I also recognized other dimensions of contributions provided by this type of agriculture, such as economic and social aspects. While I acknowledge the significance of these areas in sustainability, I did not incorporate them into my thesis due to the predefined scope that I determined.

In conducting the literature review, the reliance on Google Scholar for research outcomes may raise some debate regarding the quality of the results obtained (Gusenbauer & Haddaway, 2020). However, given the limited findings from Scopus and Web of Science, I objectively established criteria to select reliable information and data. Utilizing Google Scholar enabled access to publications in multiple languages, such as Spanish and Portuguese, using the same English search terms I had determined. Additionally, these publications included reports from organizations, as well as master's and PhD theses incorporating fieldwork, among others, providing valuable data that would have been excluded with the use of other databases (Gehanno et al., 2013; Haddaway et al., 2015).

My research scope was concentrated on literature explicitly specifying forest food products in combination with agroforestry systems, as further verification would expand beyond the intended scope of my thesis. Consequently, I omitted several other forest food products utilized in the Amazon region, as I did not find academic information linking them to agroforestry systems use by communities. This omission does not imply that these products do not contribute to local nutrition; rather, it highlights an opportunity for further research to explore the connection between local production and agricultural practices in the region.

Further research on the nutritional benefits of forest food from agroforestry systems is necessary; however, the dependence on data from third-party sources limits the depth of information that can be gathered from existing systems in the Amazon region. Only one of the publications I utilized provided detailed information about the agroforestry system from which the forest food products were extracted, with no further explanation of other systems. This limitation hindered my understanding of the variety of species used, as well as the extent of these systems, which are pertinent for future studies seeking to expand on the results obtained for research question 2. Additionally, direct engagement with communities utilizing agroforestry systems would provide more cultural and social-behavioral insights into the forest food products present in this system, and calculations of the average of this type of agricultural system would have been more accurately adjusted.

One of the limitations encountered in reporting the nutritional contribution of forest food products was the variety of reporting methods employed by different authors. As demonstrated in Appendix 3, I simplified the registration of macro and micronutrients reported due to inconsistencies in units or instances where authors only referenced nutritional attributes without providing specific values. Given that the focus of my research was to highlight nutritional contributions, I did not explore analyzing the quantity of nutrients provided, as this falls outside my professional and background skills. A detailed analysis of these nutritional contributions could be a subject for further research and comparison to nutritional intake recommendations.

8 Conclusion

Agroforestry systems represent a transformative approach to agriculture, offering a productive and sustainable use of land. These systems not only facilitate biodiversity conservation by nurturing a diverse range of plant and animal species but also enhance the quality of natural resources such as soil and water. The consistent presence of trees within these systems provides a steady supply of both wood and forest food products crucial for the livelihoods of communities in the Amazon region. These communities not only rely on such products for their day-to-day nutritional needs but also as a means of income generation.

Although further research is needed to explore the full nutritional potential of forest food products, existing studies highlight the significant contributions of macro and micronutrients these products offer. This nutritional value underscores the critical role that forest products can play in local diets and supports their incorporation into health and nutritional programs. Malnutrition remains a persistent issue in the Amazon, yet the integration of forest foods into diets has the potential to alleviate some of its impacts.

The concept of diet itself is evolving, broadening to include sustainable perspectives as outlined in the Sustainable Healthy Diet framework by the FAO. This framework promotes dietary approaches that are not only nutritious but also environmentally sustainable. The findings from this thesis demonstrate that agroforestry systems in the Amazon embody many of the framework’s ideals. They provide an array of fruits and vegetables, enhance the availability of essential nutrients necessary for health and development, and reduce the environmental degradation typically associated with intensive monoculture systems. Furthermore, these systems bolster biodiversity and lessen reliance on chemical inputs, making them a more sustainable option accessible to local populations.

To fully realize the benefits of agroforestry systems and achieve sustainable nutritional goals, active engagement from various stakeholders is essential. This involves not just the dissemination and implementation of agroforestry practices but also education about their benefits. Stakeholder involvement is crucial in fostering a shift towards sustainable agricultural practices that support the health and well-being of the Amazon’s communities. Through collaborative efforts, the potential of agroforestry to provide environmental, economic, and nutritional benefits can be maximized, ensuring a resilient and sustainable future for the region.

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10 Appendices

Appendix 1. List of reviewed publications obtained from the Literature Review

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
"Agroforestry" AND "Amazon" AND nutri*					
Resource: Scopus - Results: 65 documents found and reviewed - Search within "Article title, Abstract, Keywords"					
Environmental Contribution	Scopus	1	Agroforestry Systems of Cocoa (Theobroma cacao L.) in the Ecuadorian Amazon	Tinoco-Jaramillo, L., Vargas-Tierras, Y., Habibi, N., ...Almeida, M., Vásquez-Castillo, W.	2024
Soil Contribuition	Scopus	2	Soil Management in Indigenous Agroforestry Systems of Guarana (Paullinia cupana Kunth) of the Sateré-Mawé Ethnic Group, in the Lower Amazon River Region	Vignoli, C.P., Leeuwen, J., Miller, R.P., ...Fernandes Neto, J.G., Alfaia, S.S.	2022
Environmental Contribution	Scopus	3	Contribution of Agroforestry Systems in the Cultivation of Naranjilla (Solanum quitoense) Grown in the Amazon Region of Ecuador	Vargas, Y., Viera, W., Díaz, A., … Almeida, M., Vásquez-Castillo, W.	2022
Not Relevant	Scopus	4	No Reduction in Yield of Young Robusta Coffee When Grown under Shade Trees in Ecuadorian Amazonia	Piato, K. , Subía, C., Lefort, F., … Calderón, D., Norgrove, L.	2022
Not Relevant	Scopus	5	Advances in Brazil Nut Tree Ecophysiology: Linking Abiotic Factors to Tree Growth and Fruit Production	da Costa, K.C.P., de Carvalho Gonçalves, J.F., Gonçalves, A.L. , … Martins, G.A., Rodrigues, M.O.	2022
Nutritional Contribution	Scopus	6	The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview	da COSTA, R.D.S., Rodrigues, A.M.D.C., da SILVA, L.H.M.	2022
Not Relevant	Scopus	7	Forage nutritive value of Marandu palisade grass under clipping in a silvopastoral system	Gomes, F.J., Cavalli, J., Pedreira, B.C. , … Holschuch, S.G., Pereira, D.H.	2022
Not Relevant	Scopus	8	Browse from three tree legumes increases forage production for cattle in a silvopastoral system in the southwest Amazon	Dablin, L., Lewis, S.L., Milliken, W., Monro, A., Lee, M.A.	2021
Soil Contribuition	Scopus	9	Apparent nitrogen limitation of Robusta coffee yields in young agroforestry systems	Chavez, E., Wade, J., Miernicki, E.A., ... Tinoco, L., Margenot, A.J.	2021
Soil Contribuition	Scopus	10	Soil nitrogen cycling under contrasting management systems in Amazon Coffea canephora agroecosystems	López, R.E.I., Navarrete, E.F.C., Rosado, J.T.P., García, C.R.S., Margenot, A.J.	2021
Environmental Contribution	Scopus	11	Benefits of legume species in an agroforestry production system of yellow pitahaya in the Ecuadorian amazon	Vargas-Tierras, Y., Díaz, A., Caicedo, C., … Suárez-Tapia, A., Viera, W.	2021
Not Relevant	Scopus	12	Growth, physiological, nutrient-uptake-efficiency and shade-tolerance responses of cacao genotypes under different shades	Arévalo-Gardini, E., Farfán, A., Barraza, F., … Alegre, J., Baligar, V.C.	2021
Not Relevant	Scopus	13	Organic farming practices and shade trees reduce pest infestations in robusta coffee systems in amazonia	Piato, K., Subía, C., Pico, J., … Norgrove, L., Lefort, F.	2021
Economic Contribution	Scopus	14	Diversity bears fruit: Evaluating the economic potential of undervalued fruits for an agroecological restoration approach in the peruvian amazon	Lagneaux, E., Jansen, M., Quaedvlieg, J., … Corvera-Gomringer, R., Kettle, C.J.	2021
Soil Contribuition	Scopus	15	Oil palm (Elaeis guineensis) shows higher mycorrhizal colonization when planted in agroforestry than in monoculture	da Silva Maia, R., Vasconcelos, S.S., Viana-Junior, A.B., Castellani, D.C., Kato, O.R.	2021
Soil Contribuition	Scopus	16	Beta diversity and fallow length regulate soil fertility in cocoa agroforestry in the Northern Ecuadorian Amazon	Vera-Vélez, R., Cota-Sánchez, J.H., Grijalva-Olmedo, J.	2021
Not Relevant	Scopus	17	Stable isotope evidence for dietary diversification in the pre-Columbian Amazon	Colonese, A.C., Winter, R., Brandi, R. , … Von Tersch, M., Bandeira, A.M.	2020

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Repeated	Scopus	18	Correction to: Carbon sequestration and nutrient cycling in agroforestry systems on degraded soils of Eastern Amazon, Brazil (10.1007/s10457-020-00496-3)	Celentano, D., Rousseau, G.X., Paixão, L.S., … Rocha, A.E., de Oliveira Reis, F.	2020
Not Relevant	Scopus	19	Herbage accumulation, nutritive value and beef cattle production on marandu palisadegrass pastures in integrated systems	da Silva, F.S., Domiciano, L.F., Gomes, F.J., … Pereira, D.H., Pedreira, B.C.	2020
Environmental Contribution	Scopus	20	Carbon sequestration and nutrient cycling in agroforestry systems on degraded soils of Eastern Amazon, Brazil	Celentano, D., Rousseau, G.X., Paixão, L.S., … Rocha, A.E., de Oliveira Reis, F.	2020
Soil Contribuition	Scopus	21	Soil fertility and organic carbon in two decades of agroforestry systems composed of Brazil nut, cupuaçuzeiro and peach palm in the Western Amazon	Butzke, A.G., De Oliveira, T.K., De Paula, A.E.B., Da Silva Fiuza, S.	2020
Not Relevant	Scopus	22	Intensification of shifting cultivation reduces forest resilience in the northern Amazon	Villa, P.M., Martins, S.V., de Oliveira Neto, S.N., … Cancio, N.M., Gastauer, M.	2018
Soil Contribuition	Scopus	23	Spatial dependency and correlation of properties of soil cultivated with oil palm, elaeis guineensis, in agroforestry systems in the eastern Brazilian Amazon | Dependência espacial e correlação das propriedades do solo cultivado com dendezeiro, elaeis guineensis, em sistemas agroflorestais na amazônia oriental	da Silva, C.S., de Mendonça, B.A.F., Pereira, M.G., de Araújo, E.J.G., Castellani, D.C.	2018
Not Relevant	Scopus	24	Relationship between macroinvertebrates and soil properties under different agroforestry arrangements in the Colombia Andean Amazon. | Relación entre macroinvertebrados y propiedades del suelo bajo diferentes arreglos agroforestales en la Amazonia-Andina, Caquetá, Colombia	Bautista, E.H.D., Suárez, L.R., Salazar, J.C.S.	2018
Environmental Contribution	Scopus	25	Reduction of soil erosion and mercury losses in agroforestry systems compared to forests and cultivated fields in the Brazilian Amazon	Béliveau, A., Lucotte, M., Davidson, R., … Passos, C.J., Romana, C.A.	2017
Soil Contribuition	Scopus	26	Factors associated with soil fertility in different land uses of the Ecuadorian Amazon Region | Factores asociados a la fertilidad del suelo en diferentes usos de la tierra de la Región Amazónica Ecuatoriana	Bravo, C., Ramírez, A., Marín, H., … Navarrete, H., Changoluisa, D.	2017
Economic Contribution	Scopus	27	Revisiting Bora fallow agroforestry in the Peruvian Amazon: Enriching ethnobotanical appraisals of non-timber products through household income quantification	Cotta, J.N.	2017
Not Relevant	Scopus	28	Improved fallow: growth and nitrogen accumulation of five native tree species in Brazil	Joslin, A., Markewitz, D., Morris, L.A., de Assis Oliveira, F., Kato, O.	2016
Not Relevant	Scopus	29	Soil attributes and resistance to penetration in agroforestry system areas in southwestern amazon | Atributos edáficos e resistência a penetração em áreas de sistemas agroflorestais no sudoeste amazônico	do Couto, W.H., dos Anjos, L.H.C., Wadt, P.G.S., Pereira, M.G.	2016
Not Relevant	Scopus	30	Biomass and nutrient accumulation of two leguminous trees in an improved fallow in amazon rain forest | Acúmulo de biomassa e nutrientes de duas leguminosas arbóreas introduzidas em sistema de pousio na amazônia	Rangel-Vasconcelos, L.G.T., Kato, O.R., Vasconcelos, S.S., Oliveira, F.A.	2016
Environmental Contribution	Scopus	31	Carbon in soil, accumulation and quality litter in family production systems | Carbono no solo, acúmulo e qualidade da serapilheira em sistemas de produção familiar	De Freitas, I.C., Veloso Dos Santos, F.S., Custódio Filho, R.D.O., Correchel, V.	2016
Not Relevant	Scopus	32	Alley cropping on an acid soil in the upper amazon: Mulch, fertilizer, and hedgerow root pruning effects	Fernandes, E.C.M., Davey, C.B., Nelson, L.A.	2015
Not Relevant	Scopus	33	Effect of an intensive silvopastoral system (iSPS) with Tithonia diversifolia on the production and quality of milk in the Amazon foothills, Colombia | Efecto de la oferta y el consumo de Tithonia diversifolia en un sistema silvopastoril intensivo (SSPi), en la calidad y productividad de leche bovina en el piedemonte Amazónico Colombiano	Rivera, J.E., Cuartas, C.A., Naranjo, J.F., … Chará, J., Murgueitio, E.	2015
Not Relevant	Scopus	34	Changes in soil physical and chemical properties in long term improved natural and traditional agroforestry management systems of cacao genotypes in Peruvian Amazon	Arévalo-Gardini, E., Canto, M., Alegre, J., … Julca, A., Baligar, V.	2015
Not Relevant	Scopus	35	Growth and nutrient accumulation of Brazil nut trees (Bertholletia excelsa) in agroforestry at different fertilizer levels	Schroth, G., da Mota, M.S.S., de Assis Elias, M.E.	2015
Not Relevant	Scopus	36	Fragmentation, fiber separation, decomposition, and nutrient release of secondary-forest biomass, mechanically chopped-and-mulched, and cassava production in the Amazon	Reichert, J.M., Rodrigues, M.F., Bervald, C.M.P., … Kato, O.R., Schumacher, M.V.	2015

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Scopus	37	Cocoa production in West Africa, a review and analysis of recent developments	Wessel, M., Quist-Wessel, P.M.F.	2015
Social Contribution	Scopus	38	Land use in the Brazilian Amazon: Agriculture in smallholdings and the exploitation of non-timber forest products	Costa, M.C.G., Tonini, H.	2013
Soil Contribuition	Scopus	39	Soil and plant N-budget 1 year after planting of a slash-and-mulch agroforestry system in the eastern Amazon of Brazil	Joslin, A.H., Markewitz, D., Morris, L.A. , … Figuereido, R.O., Kato, O.R.	2013
Soil Contribuition	Scopus	40	The Maintenance of Soil Fertility in Amazonian Managed Systems	Luizão, F.J., Fearnside, P.M., Cerri, C.E.P., Lehmann, J.	2013
Soil Contribuition	Scopus	41	Stonemeal of amazon soils with sediments from reservoirs: A case study of remineralization of the tucuruí degraded land for agroforest reclamation	Theodoro, S.H., Leonardos, O.H., Rocha, E., Macedo, I., Rego, K.G.	2013
Not Relevant	Scopus	42	Nutritional limitations in multi-strata agroforestry system with native Amazonian plants	Moreira, A., Moraes, L.A.C., Fageria, N.K.	2012
Not Relevant	Scopus	43	Litter dynamics and fine root production in Schizolobium parahyba var. amazonicum plantations and regrowth forest in Eastern Amazon	Silva, A.K.L., Vasconcelos, S.S., de Carvalho, C.J.R., Cordeiro, I.M.C.C.	2011
Not Relevant	Scopus	44	Five native tree species and manioc under slash-and-mulch agroforestry in the eastern Amazon of Brazil: Plant growth and soil responses	Joslin, A.H., Markewitz, D., Morris, L.A. , … Figueiredo, R.O., Kato, O.R.	2011
Not Relevant	Scopus	45	Termite (Insecta: Isoptera) species composition in a primary rain forest and agroforests in central Amazonia	Ackerman, I.L., Constantino, R., Gauch Jr., H.G., … Riha, S.J., Fernandes, E.C.M.	2009
Economic Contribution	Scopus	46	The home garden and fruits: Economic and food resources in the black community of Itacoã, Acará, Pará, Brazil | El quintal y las frutas: Recursos económicos y alimentares en la comunidad negra de Itacoã, Acará, Pará, Brasil	Scoles, R.	2009
Soil Contribuition	Scopus	47	Yield of cupuaçu fruits in response to liming and potassium fertilization in agroforestry systems in the Western Amazon | Calagem e adubação potássica na produção do cupuaçuzeiro em sistemas agroflorestais da Amazônia Ocidental	Ayres, M.I.D.C., Alfaia, S.S.	2007
Not Relevant	Scopus	48	Geoenvironmental characterization and land use in the Purus National Forest, Western Amazon, Brazil: A contribution to the management plan	Brandão, P.C., Soares, V.P., Simas, F.N.B., Schaefer, C.E.R.G., De Souza, A.L.	2006
Soil Contribuition	Scopus	49	Carbon and nutrient stocks in the litter layer of agroforestry systems in central Amazonia, Brazil	Tapia-Coral, S.C., Luizão, F.J., Wandelli, E., Fernandes, E.C.M.	2005
Not Relevant	Scopus	50	Variation in coppice-shoot growth among provenances of Calycophyllum spruceanum Benth. in the Peruvian Amazon Basin	Boivin-Chabot, S., Margolis, H.A., Weber, J.C.	2004
Soil Contribuition	Scopus	51	Arbuscular mycorrhizal association and foliar nutrient concentrations of cupuassu (theobroma grandiflorum) and guaraná (Paullinia cupana) plants in an agroforestry system in Manaus, AM, Brazil | Associação micorrízica e teores de nutrientes nas folhas de cupuaçuzeiro (theobroma grandiflorum) e guaranazeiro (paullinia cupana) de um sistema agroflorestal em Manaus, Amazonas	Oliveira, A.N., Oliveira, L.A.	2004
Soil Contribuition	Scopus	52	Inorganic and organic soil phosphorus and sulfur pools in an amazonian multistrata agroforestry system	Lehmann, J., Günther, D., Socorro Da Mota, M., … Zech, W., Kaiser, K.	2001
Not Relevant	Scopus	53	Root activity patterns in an Amazonian agroforest with fruit trees determined by 32P, 33P and 15N applications	Lehmann, J., Muraoka, T., Zech, W.	2001
Not Relevant	Scopus	54	Sustainable land-use in Peruvian flood plain forests: Options, planning and implementation	Nebel, G.	2001
Not Relevant	Scopus	55	Soil phosphorus availability and fine root proliferation in Amazonian agroforests 6 years following forest conversion	McGrath, D.A., Duryea, M.L., Cropper, W.P.	2001
Not Relevant	Scopus	56	Growth, yields and mineral nutrition of cupuaçu (Theobroma grandiflorum) in two multi-strata agroforestry systems on a ferralitic amazonian upland soil at four fertilization levels	Schroth, G., Elias, M.E.A., Macêdo, J.L.V., D'Angelo, S.A., Lieberei, R.	2001
Not Relevant	Scopus	57	Litter dynamics and monthly fluctuations in soil phosphorus availability in an Amazonian agroforest	McGrath, D.A., Comerford, N.B., Duryea, M.L.	2000
Not Relevant	Scopus	58	Nitrogen and phosphorus cycling in an Amazonian agroforest eight years following forest conversion	McGrath, D.A., Duryea, M.L., Comerford, N.B., Cropper, W.P.	2000
Environmental Contribution	Scopus	59	Traditional fallows in Latin America	Kass, D.C.L., Somarriba, E.	1999

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Scopus	60	The effect of cattle grazing on soil physical and chemical properties in a silvopastoral system in the Peruvian Amazon	Arevalo, L.A.	1998
Soil Contribuition	Scopus	61	Shifting cultivation on the tidal floodplains of Amazônia: Impacts on soil nutrient status	Zarin, D.J., Duchesne, A.L., Hiraoka, M.	1998
Environmental Contribution	Scopus	62	Agroforestry systems as an ecological approach in the Brazilian Amazon development	Brienza Junior, S., Gazel Yared, J.A.	1991
Not Relevant	Scopus	63	Iterative increase of economic tree species in managed swidden-fallows of the Amazon	Unruh, J.D.	1990
Environmental Contribution	Scopus	64	A review of soil and soil-related constraints to development in Amazonia	Nortcliff, S.	1989
Environmental Contribution	Scopus	65	Ecological aspects of site recovery under swidden-fallow management in the Peruvian Amazon	Unruh, J.D.	1988
Resource: Web of Science - Results: 37 documents found - Search within "Title", "Abstract", and "Author Keywords"					
Repeated	Web of Science	1	Agroforestry Systems of Cocoa (Theobroma cacao L.) in the Ecuadorian Amazon	Tinoco-Jaramillo, L; Vargas-Tierras, Y; (...); Solorio-Sanchez, FJ	2024
Repeated	Web of Science	2	Contribution of Agroforestry Systems in the Cultivation of Naranjilla (Solanum quitoense) Grown in the Amazon Region of Ecuador	Vargas, Y; Viera, W; (...); Vásquez-Castillo, W	2022
Repeated	Web of Science	3	Advances in Brazil Nut Tree Ecophysiology: Linking Abiotic Factors to Tree Growth and Fruit Production	da Costa, KCP; Gonçalves, JFD; (...); Rodrigues, MO	2022
Repeated	Web of Science	4	The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview	da Costa, RDS; Rodrigues, AMD and da Silva, LHM	2022
Repeated	Web of Science	5	Benefits of legume species in an agroforestry production system of yellow pitahaya in the Ecuadorian amazon	Vargas-Tierras, Y; Díaz, A; (...); Viera, W	2021
Repeated	Web of Science	6	Growth, physiological, nutrient-uptake-efficiency and shade-tolerance responses of cacao genotypes under different shades	Arévalo-Gardini, E; Farfán, A; (...); Baligar, VC	2021
Repeated	Web of Science	7	Apparent nitrogen limitation of Robusta coffee yields in young agroforestry systems	Chavez, E; Wade, J; (...); Margenot, AJ	2021
Repeated	Web of Science	8	Organic farming practices and shade trees reduce pest infestations in robusta coffee systems in amazonia	Piato, K; Subía, C; (...); Lefort, F	2021
Repeated	Web of Science	9	Oil palm (Elaeis guineensis) shows higher mycorrhizal colonization when planted in agroforestry than in monoculture	Maia, RD; Vasconcelos, SS; (...); Kato, OR	2021
Repeated	Web of Science	10	Diversity bears fruit: Evaluating the economic potential of undervalued fruits for an agroecological restoration approach in the peruvian amazon	Lagneaux, E; Jansen, M; (...); Kettle, CJ	2021
Environmental Contribution	Web of Science	11	Special issue "Scaling up of agroforestry innovations: Enhancing food, nutrition and income security" Cacao, copoazu and macambo: Exploring Theobroma diversity in smallholder agroforestry systems of the Peruvian Amazon	Lagneaux, E; Andreotti, F and Neher, CM	2021
Repeated	Web of Science	12	Stable isotope evidence for dietary diversification in the pre-Columbian Amazon	Colonese, AC; Winter, R; (...); Bandeira, AM	2020
Repeated	Web of Science	13	Carbon sequestration and nutrient cycling in agroforestry systems on degraded soils of Eastern Amazon, Brazil	Celentano, D; Rousseau, GX; (...); Reis, FD	2020
Repeated	Web of Science	14	Carbon sequestration and nutrient cycling in agroforestry systems on degraded soils of Eastern Amazon, Brazil	Celentano, D; Rousseau, GX; (...); Reis, FD	2020
Repeated	Web of Science	15	Intensification of shifting cultivation reduces forest resilience in the northern Amazon	Villa, PM; Martins, SV; (...); Gastauer, M	2018
Repeated	Web of Science	16	Spatial dependency and correlation of properties of soil cultivated with oil palm, elaeis guineensis, in agroforestry systems in the eastern Brazilian Amazon | Dependência espacial e correlação das propriedades do solo cultivado com dendezeiro, elaeis guineensis, em sistemas agroflorestais na amazônia oriental	da Silva, C.S., de Mendonça, B.A.F., Pereira, M.G., de Araújo, E.J.G., Castellani, D.C.	2018
Repeated	Web of Science	17	Reduction of soil erosion and mercury losses in agroforestry systems compared to forests and cultivated fields in the Brazilian Amazon	Béliveau, A; Lucotte, M; (...); Romana, CA	2017

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Repeated	Web of Science	18	Biomass and nutrient accumulation of two leguminous trees in an improved fallow in amazon rain forest | Acúmulo de biomassa e nutrientes de duas leguminosas arbóreas introduzidas em sistema de pousio na amazônia	Rangel-Vasconcelos, LGT; Kato, OR; (...); Oliveira, FD	2016
Repeated	Web of Science	19	Soil attributes and resistance to penetration in agroforestry system areas in southwestern amazon | Atributos edáficos e resistência a penetração em áreas de sistemas agroflorestais no sudoeste amazônico	do Couto, WH; dos Anjos, LHC; (...); Pereira, MG	2016
Repeated	Web of Science	20	Growth and nutrient accumulation of Brazil nut trees (Bertholletia excelsa) in agroforestry at different fertilizer levels	Schroth, G; da Mota, MDS and Elias, MED	2015
Repeated	Web of Science	21	Stonemeal of amazon soils with sediments from reservoirs: A case study of remineralization of the tucuruí degraded land for agroforest reclamation	Theodoro, SH; Leonardos, OH; (...); Rego, KG	2013
Repeated	Web of Science	22	Nutritional limitations in multi-strata agroforestry system with native Amazonian plants	Moreira, A; Moraes, LAC and Fageria, NK	2012
Repeated	Web of Science	23	Five native tree species and manioc under slash-and-mulch agroforestry in the eastern Amazon of Brazil: Plant growth and soil responses	Joslin, AH; Markewitz, D; (...); Kato, OR	2011
Repeated	Web of Science	24	Carbon and nutrient stocks in the litter layer of agroforestry systems in central Amazonia, Brazil	Tapia-Coral, SC; Luizao, FJ; (...); Fernandes, ECM	2005
Repeated	Web of Science	25	Arbuscular mycorrhizal association and foliar nutrient concentrations of cupuassu (theobroma grandiflorum) and guaraná (Paullinia cupana) plants in an agroforestry system in Manaus, AM, Brazil | Associação micorrízica e teores de nutrientes nas folhas de cupuaçuzeiro (theobroma grandiflorum) e guaranazeiro (paullinia cupana) de um sistema agroflorestal em Manaus, Amazonas	Oliveira, AN and Oliveira, LA	2004
Repeated	Web of Science	26	Variation in coppice-shoot growth among provenances of Calycophyllum spruceanum Benth. in the Peruvian Amazon Basin	Boivin-Chabot, S; Margolis, HA and Weber, JC	2004
Repeated	Web of Science	27	Sustainable land-use in Peruvian flood plain forests: Options, planning and implementation	Nebel, G	2001
Repeated	Web of Science	28	Growth, yields and mineral nutrition of cupuaçu (Theobroma grandiflorum) in two multi-strata agroforestry systems on a ferralitic amazonian upland soil at four fertilization levels	Schroth, G; Elias, MEA; (...); Lieberei, R	2001
Repeated	Web of Science	29	Soil phosphorus availability and fine root proliferation in Amazonian agroforests 6 years following forest conversion	McGrath, DA; Duryea, ML and Cropper, WP	2001
Repeated	Web of Science	30	Inorganic and organic soil phosphorus and sulfur pools in an amazonian multistrata agroforestry system	Lehmann, J; Günther, D; (...); Kaiser, K	2001
Repeated	Web of Science	31	Root activity patterns in an Amazonian agroforest with fruit trees determined by 32P, 33P and 15N applications	Lehmann, J; Muraoka, T and Zech, W	2001
Repeated	Web of Science	32	Nitrogen and phosphorus cycling in an Amazonian agroforest eight years following forest conversion	McGrath, DA; Duryea, ML; (...); Cropper, WP	2000
Repeated	Web of Science	33	Shifting cultivation on the tidal floodplains of Amazônia: Impacts on soil nutrient status	Zarin, DJ; Duchesne, AL and Hiraoka, M	1998
Social Contribution	Web of Science	34	POEMA: A proposal for sustainable development in Amazonia	Mitschein, TA and Miranda, PS	1998
Soil Contribuition	Web of Science	35	AGROFORESTRY STRATEGIES FOR ALLEVIATING SOIL CHEMICAL CONSTRAINTS TO FOOD AND FIBER PRODUCTION IN THE BRAZILIAN AMAZON	FERNANDES, ECM and MATOS, JCD	1995
Repeated	Web of Science	36	Agroforestry systems as an ecological approach in the Brazilian Amazon development	BRIENZA, S and YARED, JAG	1991
Not Relevant	Web of Science	37	DECOMPOSITION AND NUTRIENT RELEASE PATTERNS OF THE LEAVES OF 3 TROPICAL LEGUMES	PALM, CA and SANCHEZ, PA	1990
"Agroforestry" AND "Amazon" AND calori*					
Resource: Scopus - Results: 3 documents found - Search within "Article title, Abstract, Keywords"					
Not Relevant	Scopus	1	Infrared Thermal Profiles in Silvopastoral and Full-Sun Pastures in the Eastern Amazon, Brazil	Cândido, A.C.T.F., Guerreiro Martorano, L., Cândido, B.U.F., … Dias-Filho, M.B., Beldini, T.P.	2023
Not Relevant	Scopus	2	Tannin quantification and chemical-energetic characterization of biomass residues of Bertholletia spp. And Lecythis' spp. Fruits | Quantificação de tanino e caracterização química-energética de resíduos de biomassa de frutos de Bertholletia spp. E Lecythis' spp	Carmona, I.N., Da Sampaio, J.S., Da Luz, P.A.S.A., Andrade, F.W.C.	2021

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Repeated	Scopus	3	Stable isotope evidence for dietary diversification in the pre-Columbian Amazon	Colonese, A.C., Winter, R., Brandi, R. , … Von Tersch, M., Bandeira, A.M.	2020
Resource: Web of Science - Results: 2 documents found - Search within "Title", "Abstract", and "Author Keywords"					
Repeated	Web of Science	1	Stable isotope evidence for dietary diversification in the pre-Columbian Amazon	Colonese, A.C., Winter, R., Brandi, R. , … Von Tersch, M., Bandeira, A.M.	2020
Repeated	Web of Science	2	Tannin quantification and chemical-energetic characterization of biomass residues of Bertholletia spp. And Lecythis' spp. Fruits | Quantificação de tanino e caracterização química-energética de resíduos de biomassa de frutos de Bertholletia spp. E Lecythis' spp	Carmona, I.N., Da Sampaio, J.S., Da Luz, P.A.S.A., Andrade, F.W.C.	2021
"Agroforestry" AND "Amazon" AND "nutritional composition"					
Resource: Scopus - Results: 1 document found - Search within "Article title, Abstract, Keywords"					
Repeated	Scopus	1	The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview	da COSTA, R.D.S., Rodrigues, A.M.D.C., da SILVA, L.H.M.	2022
Resource: Google Scholar - Results: 389 documents found - Not including patents and citations					
Nutritional Contribution	Google Scholar	1	Nutrients and bioactive compounds in wild fruits from the Brazilian Amazon rainforest	PAULA FILHO, G., SOUZA, C., LUCIA, C. D., SANT'ANA, H., & SANTOS, R. H.	2023
Not Relevant	Google Scholar	2	Food Composition Data: Edible Plants from the Amazon	Tomchinsky, B., Gonçalves, G.G., Ferreira, A.B.	2021
Nutritional Contribution	Google Scholar	3	Food and nutritional potential of two mushrooms native species to the Brazilian savanna	de Melo e Silva-Neto,Carlosand Calaça,Francisco Junior Simõesand Santos,Leovigildo Aparecido Costaand Machado,Jason Carvalhoand de Moura,Jadson Belemand Pinto,Diogo de Souzaand Ferreira,Tânia Aparecida Pinto de Castroand dos Santos,Solange Xavier	2023
Nutritional Contribution	Google Scholar	4	Peach palm (Bactris gasipaes) in tropical Latin America: implications for biodiversity conservation, natural resource management and human nutrition	Graefe, S., Dufour, D., van Zonneveld, M. et al.	2013
Repeated	Google Scholar	5	Food and nutritional potential of two mushrooms native species to the Brazilian savanna	de Melo e Silva-Neto,Carlosand Calaça,Francisco Junior Simõesand Santos,Leovigildo Aparecido Costaand Machado,Jason Carvalhoand de Moura,Jadson Belemand Pinto,Diogo de Souzaand Ferreira,Tânia Aparecida Pinto de Castroand dos Santos,Solange Xavier	2023
Not Relevant	Google Scholar	6	The Microbial Community Structure in the Rhizosphere of Theobroma cacao L. and Euterpe oleracea Mart. Is Influenced by Agriculture System in the Brazilian Amazon	Sousa, R. D., Lima, G. V., Garcias, J. T., Gomes, G. D., Mateus, J. R., Madeira, L. D., Seldin, L., Rogez, H. L., & Marques, J. M.	2024
Not Relevant	Google Scholar	7	Edible Fruits from the Ecuadorian Amazon: Ethnobotany, Physicochemical Characteristics, and Bioactive Components	Corell González, M.	2022
Repeated	Google Scholar	8	The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview	da COSTA, R.D.S., Rodrigues, A.M.D.C., da SILVA, L.H.M.	2022
Not Relevant	Google Scholar	9	Bamboo forage in Peruvian Amazon: a potential feed for cattle	Altamirano-Gutiérrez, W., Molina-Botero, I.C., Fuentes-Navarro, E. et al.	2023
Not Relevant	Google Scholar	10	Effect of thermal processing on phenolic content, tocopherols and antioxidant activity of sacha inchi kernels	Štěrbová, L., Čepková, P. H., Viehmannová, I., & Huansi, D. C.	2017
Not Relevant	Google Scholar	11	Homegarden agroforestry systems in achievement of Sustainable Development Goals. A review	Sharma, R., Mina, U. & Kumar, B.M.	2022
Nutritional Contribution	Google Scholar	12	Food production potential of Favolus brasiliensis (Basidiomycota: Polyporaceae), an indigenous food.	Silva-Neto, Carlos & Souza Pinto, Diogo & Santos, Leovigildo & Calaça, Francisco & Almeida, Sara.	2020
Not Relevant	Google Scholar	13	Potentials of Indigenous Fruit Trees in Enhancing Nutrition, Income and Biodiversity Conservation in African Agroforestry	Sileshi, G.W., Dagar, J.C., Akinnifesi, F.K., Mng'omba, S.A.	2023
Not Relevant	Google Scholar	14	Chemical profile and sensory perception of coffee produced in agroforestry management	Oliveira Martins, E., da Luz, J.M.R., da Silva Oliveira, E.C. et al.	2023
Not Relevant	Google Scholar	15	Sacha Inchi (Plukenetia volubilis L.) Is an Underutilized Crop with a Great Potential	Kodahl, N.; Sørensen, M.	2021
Not Relevant	Google Scholar	16	Conceptualizing multiple stressors and their consequences in agroforestry systems	Mustafa, M., Szalai, Z., Gál, I., & Csambalik, L.	2022
Nutritional Contribution	Google Scholar	17	Traditional botanical knowledge: food plants from the Huni Kuĩ indigenous people, Acre, western Brazilian Amazon	Pilnik, Málika Simis et al.	2023

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	18	Gliricidia sepium (Jacq.) Walp Applications for Enhancing Soil Fertility and Crop Nutritional Qualities: A Review	Alamu, E. O., Adesokan, M., Fawole, S., Mehreteab, T., & Chikoye, D.	2023
Not Relevant	Google Scholar	19	Performance of Various Agroforestry Wastes for the Cultivation of Elm Oyster Mushroom Hypsizygus ulmarius (Agaricomycetes) in India and Its Biochemical Constituents	Aditya, R. S. Jarial, J.N. Bhatia	2023
Not Relevant	Google Scholar	20	Enteric methane emission in buffaloes in the Eastern Amazon: TIER 2 and sulfur hexafluoride.	Castro, Vinícius & Amaral Júnior, João & Martorano, Lucieta & Fernandes, Paulo & Monteiro, Samanta & Lourenço Júnior, José.	2017
Not Relevant	Google Scholar	21	Nutritional composition of meat from tartaruga-da-Amazônia (Amazonian turtle) Podocnemis expansa bred in captivity and at slaughter age.	Gaspar,A.and Silva,T. J. P.	2009
Not Relevant	Google Scholar	22	Agroforestry: essential for sustainable and climate-smart land use	Pancel L, Köhl M	2016
Repeated	Google Scholar	23	Food production potential of Favolus brasiliensis (Basidiomycota: Polyporaceae), an indigenous food.	Silva-Neto, Carlos & Souza Pinto, Diogo & Santos, Leovigildo & Calaça, Francisco & Almeida, Sara.	2020
Not Relevant	Google Scholar	24	Participatory Domestication of New Crops using Agroforestry Techniques	Atangana, A., Khasa, D., Chang, S., Degrande, A.	2014
Nutritional Contribution	Google Scholar	25	Nutritional value and proteases of Lentinus citrinus produced by solid state fermentation of lignocellulosic waste from tropical region	Machado, A. R. G., Teixeira, M. F. S., De Souza Kirsch, L., Campelo, M. D. C. L., & De Aguiar Oliveira, I. M.	2016
Not Relevant	Google Scholar	26	Nutritional composition, polyphenolic compounds and biological activities of marula fruit (Sclerocarya birrea) with its potential food applications: a review	Mpho Edward Mashau, Tsietsie Ephraim Kgatla, Mashudu Viginia Makhado, Masiza Samuel Mikasi & Shonisani Eugenia Ramashia	2022
Not Relevant	Google Scholar	27	8 Chemical and Functional Properties of Amazonian Fruits	Elaine Pessoa, Josilene Lima Serra, Hervé Rogez, Sylvain Darnet	2019
Not Relevant	Google Scholar	28	Effect of storage condition on the nutritional and anti-nutritional composition of kurkura (Ziziphus mauritiana Lam.) fruit from North-Eastern Ethiopia	Tsegaye, M., Alemu, T., Dilnessa, A., Tolessa, A., Tantu, T., Bekalu, Y., & Haile, F.	2023
Not Relevant	Google Scholar	29	Influence of the arboreal component in the productive and nutritional parameters of Brachiaria mutica grass in northeastern Peru	Valqui, L., Lopez, E. L., Lopez, C. A., Valqui-Valqui, L., Bobadilla, L. G., Vigo, C. N., & Vásquez, H. V.	2022
Nutritional Contribution	Google Scholar	30	Peach Palm (Bactris gasipaes Kunth.): Ancestral Tropical Staple with Future Potential	González-Jaramillo, N.; Bailon-Moscoso, N.; Duarte-Casar, R.; Romero-Benavides, J.C.	2022
Not Relevant	Google Scholar	31	Beetles, ants, wasps, or flies? An ethnobiological study of edible insects among the Awajún Amerindians in Amazonas, Peru	Casas Reátegui, R., Pawera, L., Villegas Panduro, P.P. et al.	2018
Not Relevant	Google Scholar	32	Agrosilvopastoril v 19.1: Modeling Cattle Production and Environment Contribution of Silvopastoral Systems in the Peruvian Tropics.	Carlos Gómez, Eduardo Fuentes, Dante Pizarro, Miguel Castillo, C.U. LeonVelarde	2020
Repeated	Google Scholar	33	8 Chemical and Functional Properties of Amazonian Fruits	Elaine Pessoa, Josilene Lima Serra, Hervé Rogez, Sylvain Darnet	2019
Not Relevant	Google Scholar	34	Influence of the Arboreal Component in the Productive and Nutritional Parameters of Brachiaria mutica Grass in Northeastern Peru	Valqui, L., Lopez, E. L., Lopez, C. A., Bobadilla, L. G., Vigo, C. N., & Vásquez, H. V.	2022
Not Relevant	Google Scholar	35	The Effect of Cultivation Conditions on Sacha Inchi (Plukenetia volubilis L.) Seed Production and Oil Quality (Omega 3, 6, 9)	Supriyanto, S., Imran, Z., Ardiansyah, R., Auliyai, B., Pratama, A., & Kadha, F.	2022
Not Relevant	Google Scholar	36	Effects of Organic Fertilization on Biomass Production in Urochloa spp. Pastures and Soil Biological and Physical Properties in the Colombian Amazon Region	Alvarez, F., Ríos, P., & Sterling, A.	2022
Environmental Contribution	Google Scholar	37	Conceptualizing Multiple Stressors and Their Consequences in Agroforestry Systems	Mustafa, M.; Szalai, Z.; Divéky-Ertsey, A.; Gál, I.; Csambalik, L.	2022
Social Contribution	Google Scholar	38	Assessment of biodiversity goods for the sustainable development of the chagra in an indigenous community of the Colombian Amazon: local values of crops	Garavito, G., Clavijo, R., Luengas, P. et al.	2021
Social Contribution	Google Scholar	39	The Nutritional Role of Forest Plant Foods for Rural Communities	Barbara Vinceti, Pablo Eyzaguirre, Timothy Johns	2008
Nutritional Contribution	Google Scholar	40	Non-timber Amazonian Forest products and their valuable edible nuts: Cutia nut, Egg nut, Sapucaia nut and Brazil nut	de Oliveira Lopes, B.; Correa de Souza Coelho, C.; Souza, A. G.C.; Freitas-Silva, O.	2021
Not Relevant	Google Scholar	41	Crop-livestock-forestry systems as a strategy for mitigating greenhouse gas emissions and enhancing the sustainability of forage-based livestock systems in the Amazon biome	Monteiro, A., Barreto-Mendes, L., Fanchone, A., Morgavi, D. P., Pedreira, B. C., Magalhães, C. A., Abdalla, A. L., & Eugène, M.	2023

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Nutritional Contribution	Google Scholar	42	Three Amazonian palms as underestimated and little-known sources of nutrients, bioactive compounds and edible insects	Jaramillo-Vivanco, T., Balslev, H., Montúfar, R., Cámara, R. M., Giampieri, F., Battino, M., Cámara, M., & Alvarez-Suarez, J. M.	2022
Not Relevant	Google Scholar	43	Pharmacological Potential and Mechanisms of Action Involved in Oil Species from the Brazilian Amazon: The Case of Abelmoschus esculentus L. Moench, Euterpe oleracea Martius and Bixa orellana Linné	Sales, P. F., de Carvalho Rocha Koga, R., de de Souza, A. A., Nascimento, A. L. do, Pinheiro, F. C., Alberto, A. K. M., Costa, M. J. da, & Carvalho, J. C. T.	2023
Repeated	Google Scholar	44	Tannin quantification and chemical-energetic characterization of biomass residues of Bertholletia spp. And Lecythis' spp. Fruits | Quantificação de tanino e caracterização química-energética de resíduos de biomassa de frutos de Bertholletia spp. E Lecythis' spp	Carmona, I.N., Da Sampaio, J.S., Da Luz, P.A.S.A., Andrade, F.W.C.	2021
Social Contribution	Google Scholar	45	Wild food plants with the potential to improve food and nutrition security may be threatened by timber extraction: A systematic review of the Brazilian context	Caetano, R., Monique da Costa Santos, Élida, Zago Poian, R. ., Rosa Carvalho, A. ., Ricardo Vasconcelos da Silva, R., & Muniz de Medeiros, P.	2023
Social Contribution	Google Scholar	46	The Contribution of Forests and Trees to Sustainable Diets	Vinceti, B., Termote, C., Ickowitz, A., Powell, B., Kehlenbeck, K., & Hunter, D.	2013
Not Relevant	Google Scholar	47	Parkia roxburghii, an underutilized tree bean for food, nutritional and regional climate security	Singha, W. R., Kurmi, B., Sahoo, U. K., Sileshi, G. W., Nath, A. J., & Das, A. K.	2021
Not Relevant	Google Scholar	48	Morphological and genetic diversity of camu-camu [Myrciaria dubia (Kunth) McVaugh] in the Peruvian Amazon	Šmíd, J., Kalousová, M., Mandák, B., Houška, J., Chládová, A., Pinedo, M., & Lojka, B.	2017
Not Relevant	Google Scholar	49	A systematic review of domestication, ethnopharmacological use, phytochemistry, nutritional composition, and biological activities of Parkia biglobosa (Jacq.) R.Br. ex G.Don	Dauda Muhammed, Abubakar A. Yusuf, Bernard O. Odey, Adenike R. Alawode, Gbolagade A. Adegbola, Abdulhakeem Rotimi Agboola	2021
Repeated	Google Scholar	50	The contributions of forest foods to sustainable diets	Vinceti, B., Ickowitz, A., Powell, B., Kehlenbeck, K., Termote, C., Cogill, B., & Hunter, D.	2013
Social Contribution	Google Scholar	51	Understanding the roles of forests and tree-based systems in food provision	Jamnadass, R.; McMullin, S.; Iiyama, M.; Dawson, I.K.; Powell, B.; Termote, C.; Ickowitz, A.; Kehlenbeck, K.; Vinceti, B.; van Vliet, N.; Keding, G.; Stadlmayr, B.; Van Damme, P.; Carsan, S.; Sunderland, T.; Njenga, M.; Gyau, A.; Cerutti, P.; Schure, J.; Kouame, C.; Darko Obiri, B.; Ofori, D.; Agarwal, B.; Neufeldt, H.; Degrande, A.; Serban, A.	2015
Not Relevant	Google Scholar	52	Shrubs and trees of the Colombian Amazonian foothills: Nutritional and environmental potential in livestock systems	Narváez-Herrera, J.P.; Angulo-Arizala, J.; Barragán-Hernández, W.; Mahecha-Ledesma, L.	2023
Nutritional Contribution	Google Scholar	53	Sacha inchi (Plukenetia volubilis L.)—from lost crop of the Incas to part of the solution to global challenges?	Kodahl, N.	2020
Not Relevant	Google Scholar	54	Rhythm of the rivers: an ecosystem approach to child nutrition and health on the Amazon frontier	Murray, T. P. C.	2006
Not Relevant	Google Scholar	55	Nutritional composition of cricket, Brachytrupes membranaceus (Drury, 1770) and selected animal source foods in Cross River State, Nigeria	Simon Idoko Okweche, Queendaline. O Ugwu, Pius Agaji Oko	2023
Not Relevant	Google Scholar	56	Understanding the Technical-Scientific Gaps of Underutilized Tropical Species: The Case of Bactris gasipaes Kunth	Kramer, Y. V., Clement, C. R., De Carvalho, J. C., Fernandes, A. V., Da Silva, C. V., Koolen, H. H., Aguiar, J. P., Ramos, M. V., Araújo, W. L., & Gonçalves, J. F.	2022
Not Relevant	Google Scholar	57	The palm Mauritia flexuosa, a keystone plant resource on multiple fronts	van der Hoek, Y., Álvarez Solas, S. & Peñuela, M.C.	2019
Not Relevant	Google Scholar	58	Contents of flavonoids and nutrients in noni plants grow in soils with different chemical properties.	R. A. Teixeira, A. D. de S. Brandão, E. S. de Souza, A. R. Fernandes, C. B. do Amarante, P. A. P. Ferreira, G. das Neves	2016
Not Relevant	Google Scholar	59	Non-timber forest products in the food security and nutrition of smallholders afflicted by HIV/AIDS in sub-Saharan Africa	MARC BARANY, A. L. HAMMETT , KATHLEEN M. STADLER & EDOUARD KENGNI	2004
Not Relevant	Google Scholar	60	Potential of underutilized traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems	Ebert, A. W.	2013
Environmental Contribution	Google Scholar	61	Trying to Feed the World without Destroying it: The Problems with Modern Agriculture and the Potential of Agroforestry as Part of the Solution	Dodds, B.	2023
Not Relevant	Google Scholar	62	Efficiency of Amazonian tubers flours in modulating gut microbiota of male rats	Teixeira, L. S., Martim, S. R., Silva, L. S. C., Kinupp, V. F., Teixeira, M. F. S., & Porto, A. L. F.	2016

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	63	Critical insights into the ecological and invasive attributes of Leucaena leucocephala, a tropical agroforestry species	Sharma, P., Kaur, A., Batish, D. R., Kaur, S., & Chauhan, B. S.	2022
Repeated	Google Scholar	64	Contribution of pecan (Carya illinoinensis [Wangenh.| K. Koch) to Sustainable Development Goal 2 under the dual perspective of carbon storage and human nutrition	Cambareri, G., Frusso, E. A., Zoppolo, R., Leite, F. F., Beltrán, M., Martins, C., & Mendoza, C.	2023
Not Relevant	Google Scholar	65	Harnessing the nutritional and commercial benefits of jackfruit (artocarpus heterophyllus) in the tropics and subtropics	Benkeblia, N.	2018
Not Relevant	Google Scholar	66	Book of Abstracts on Agroforestry, Area Exclosure, Participatory Forest Management, Management of Dry Forests and Plantations	Tadesse, W.; Mengesha, G.	2015
Not Relevant	Google Scholar	67	Photosynthetic response of Plukenetia volubilis L. to light intensity and soil water availability in young plants	Vitar, J., Barrera, J., Alvarado, C., Giraldo, B., Hernández, M.S. and Martínez, O.	2023
Not Relevant	Google Scholar	68	Effects of diets containing different levels of prebiotic inulin on the growth rate, body composition and some blood parameters in black Pacu (Colossoma macropomum)	Bahrekazemi, M., & Esbouchin, A.	2019
Not Relevant	Google Scholar	69	From the Amazon to the Supermarket: Innovation and the integration of small-scale Amazonian chilli-pepper producers in green markets (Leticia, Colombia)	Bolivar, E.E.; Verschoor, G., Muradian, R.; Ochoa, G.	2008
Not Relevant	Google Scholar	70	Accelerated domestication and commercialization of indigenous fruit and nut trees to enhance better livelihoods in the tropics: Lessons and way forward	Akinnifesi, Festus & Sileshi, Gudeta & Ajayi, Oluyede Olu & Tchoundjeu, Zac.	2007
Not Relevant	Google Scholar	71	Biodiversity towards sustainable food systems: four arguments	Jacob, M.C.M., Chaves, V.M., Rocha, C.	2021
Not Relevant	Google Scholar	72	Exploring fruit lipid diversity in a neglected group of tropical palms: The tribe Phytelepheae	Romero-Estévez, D., Vaissayre, V., Morcillo, F., Montúfar, R., & Dussert, S.	2023
Not Relevant	Google Scholar	73	Nutritional Composition and Bioactive Constituents of Artificial Culture of Ophiocordyceps longissima (Ascomycetes)	Zhang, Y. Y., Liu, Y., Cheng, W., Nam, S. H., Li, C.R.	2015
Not Relevant	Google Scholar	74	Callus induction and pro-embryogenic mass formation in Myrciaria dubia, an important medicinal and nutritional plant	Araújo, Maria da Conceição da Rocha et al.	2021
Not Relevant	Google Scholar	75	Paraglomus occidentale, a new arbuscular mycorrhizal fungus from the sources of the Amazon river in Peru, with a key to the Paraglomeromycetes species	Corazon-Guivin M.A., Cerna-Mendoza A., Guerrero-Abad J.C.,Vallejos-Tapullima A., Ríos-Ramírez O., Vallejos-Torres G., de la Sota-Ricaldi A.M., Santos V.M., da Silva G.A. & Oehl F.	2020
Not Relevant	Google Scholar	76	Dynamics of soil characteristics in eight-years old agri-horti-silviculture model in Bundelkhand region of Central India	Prasad Rajendra, Singh Ramesh, Handa A.K., Alam B., Shukla Ashok, Singh Prashant, Tripathi V.D., Kumar Dhiraj, Kumar Anil, Prasad Niranjan	2019
Social Contribution	Google Scholar	77	The contribution of Forests to Sustainable Diets	Barbara Vinceti,Amy Ickowitz, Bronwen Powell, Katja Kehlenbeck, Céline Termote, Bruce Cogill, Danny Hunter	2013
Not Relevant	Google Scholar	78	Rollinia mucosa biriba.	Janick, J., Paull, R.E.	2008
Not Relevant	Google Scholar	79	THE ORINOCONUT—A PROMISING TREE CROP FOR THE TROPICS	J. RECKIN	1983
Not Relevant	Google Scholar	80	Connecting rural non-timber forest product collectors to global markets: The case of baobab (Adansonia digitata L.)	Meinhold, K., Dumenu, W. K., & Darr, D.	2021
Not Relevant	Google Scholar	81	Managing insect services and disservices in cocoa agroforestry systems	Ambele, C.F., Bisseleua, H.D.B., Djuideu, C.T.L. et al.	2023
Repeated	Google Scholar	82	Accelerated domestication and commercialization of indigenous fruit and nut trees to enhance better livelihoods in the tropics: Lessons and way forward	Akinnifesi, Festus & Sileshi, Gudeta & Ajayi, Oluyede Olu & Tchoundjeu, Zac.	2007
Not Relevant	Google Scholar	83	Bromatological composition and ruminal degradability of Xaraés palisade grass under grazing in integrated systems	Silva, Francyelle Ruana Faria da et al.	2021
Not Relevant	Google Scholar	84	Moths & Legends The contribution of chitoumou, the edible caterpillar Cirina butyrospermi, to food security, agriculture and biodiversity in a low-intensity agroforestry system	Payne, C. L. R.	2020
Nutritional Contribution	Google Scholar	85	An Insect Bad for Agriculture but Good for Human Consumption: The Case of Rhynchophorus palmarum: A Social Science Perspective	R Cartay, V Dimitrov, M Feldman	2020

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Nutritional Contribution	Google Scholar	86	Chemical composition, vitamins, and minerals of family farming biribiri (Averrhoa bilimbi L.) in the Middle Doce River region, Minas Gerais, Brazil	Ferreira, Jéssica Nunes et al.	2022
Not Relevant	Google Scholar	87	Could Biomass Revolution Be Achieved with Silvopastoral Systems?	Mauricio, R.M., Abdalla, A.L., Perez, S., Paciullo, D.S.	2023
Social Contribution	Google Scholar	88	Rediscovering the Contributions of Forests and Trees to Transition Global Food Systems	Chamberlain, J. L., Darr, D., & Meinhold, K.	2020
Not Relevant	Google Scholar	89	Nutritional reserves of Vochysiaceae seeds: chemical diversity and potential economic uses	Mayworm, Marco A. S et al.	2011
Not Relevant	Google Scholar	90	The roles and values of wild foods in agricultural systems	Bharucha, Z., Pretty J.	2010
Social Contribution	Google Scholar	91	Amazonian Fruits: An Overview of Nutrients, Calories and Use in Metabolic Disorders	de Andrade Jr., M.C. and Andrade, J.S.	2014
Social Contribution	Google Scholar	92	Small Brazilian wild fruits: Nutrients, bioactive compounds, health-promotion properties and commercial interest	Neri-Numa, I. A., Soriano Sancho, R. A., Pereira, A. P. A., & Pastore, G. M.	2017
Repeated	Google Scholar	93	The contribution of Forests to Sustainable Diets	Barbara Vinceti,Amy Ickowitz, Bronwen Powell, Katja Kehlenbeck, Céline Termote, Bruce Cogill, Danny Hunter	2013
Not Relevant	Google Scholar	94	Sustainable, efficient livestock production with high biodiversity and good welfare for animals	Broom DM, Galindo FA, Murgueitio E.	2013
Nutritional Contribution	Google Scholar	95	Tropical Fruits: From Cultivation to Consumption and Health Benefits, Fruits from the Amazon	Todorov, S. D., Pieri, F. A.	2018
Environmental Contribution	Google Scholar	96	Contribution of pecan (Carya illinoinensis [Wangenh.| K. Koch) to Sustainable Development Goal 2 under the dual perspective of carbon storage and human nutrition	Cambareri, G., Frusso, E. A., Zoppolo, R., Leite, F. F., Beltrán, M., Martins, C., & Mendoza, C.	2023
Not Relevant	Google Scholar	97	Selectivity of Leguminous Trees by Water Buffaloes in Semi-intensive Systems	Galloso-Hernández MA, Rodríguez-Estévez V, Alvarez-Díaz CA, Soca-Perez M, Dublin DR, Iglesias-Gómez J and Guelmes LS	2020
Not Relevant	Google Scholar	98	Variations in nutrient composition of oyster nuts (Telfairia pedata) across different agro-climatic conditions	Emmanuel Mwakasege, Anna Treydte, Otmar Hoeglinger, Neema Kassim & Edna Makule | Manuel Tejada Moral	2021
Social Contribution	Google Scholar	99	Born to Eat Wild: An Integrated Conservation Approach to Secure Wild Food Plants for Food Security and Nutrition	Borelli, T., Hunter, D., Powell, B., Ulian, T., Mattana, E., Termote, C., Pawera, L., Beltrame, D., Penafiel, D., Tan, A., Taylor, M., & Engels, J.	2020
Not Relevant	Google Scholar	100	The role of wild fruits and vegetables in delivering a balanced and healthy diet	Bvenura, C., Sivakumar, D.	2017
Not Relevant	Google Scholar	101	The Therapeutic Potential of Medicinal Foods	N Ramalingum, MF Mahomoodally	2014
Not Relevant	Google Scholar	102	Value Addition of Southern African Monkey Orange (Strychnos Spp.): Composition, Utilization and Quality	Ngadze, R. T.	2018
Not Relevant	Google Scholar	103	The nutritional role of indigenous foods in mitigating the HIV/AIDS crisis in West and Central Africa	Kengni, E.; Mbofung, C.M.F.; Tchouanguep, M.F.; Tchoundjeu, Z.	2004
Not Relevant	Google Scholar	104	A critical review of superfoods from a holistic nutritional and environmental approach	Fernández-Ríos, A., Laso, J., Hoehn, D., Amo-Setién, F. J., Abajas-Bustillo, R., Ortego, C., Fullana-i-Palmer, P., Bala, A., Batlle-Bayer, L., Balcells, M., Puig, R., Aldaco, R., & Margallo, M.	2022
Not Relevant	Google Scholar	105	Influence of planting geometry of 8-year-old gum-yielding trees on soil chemical properties in the Bundelkhand region	Rajendra Prasad, A.K.Handa, Badre Alam, A. Arunachalam, Ashok Shukla, Prashant Singh and Niranjan Prasad	2021
Not Relevant	Google Scholar	106	First successful domestication and determination of nutritional and antioxidant properties of the red ear mushroom Auricularia thailandica (Auriculariales, Basidiomycota)	Bandara, A.R., Karunarathna, S.C., Mortimer, P.E. et al.	2017
Not Relevant	Google Scholar	107	Towards a productive model for the Sacha Inchi value chain: A scientometric approach	Flórez-Martínez, Diego Hernando, Amado-Saavedra, Gina Marcela, Flórez-Tuta, Natalia, Barragán-Quijano, Eduardo, & Morales-Castañeda, Alexis.	2023
Not Relevant	Google Scholar	108	EFFECT OF SHADE TREES ON COCOA YIELD IN SMALL-HOLDER COCOA (Theobroma cacao) AGROFORESTS IN TALBA, CENTRE CAMEROON	Ngala, T. J.	2015

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	109	South American fermented legume, pulse, and oil seeds-based products	Sandoval-Cañas, G., Casa-López, F., Criollo-Feijoó, J., Landines-Vera, E. F., & Ordoñez-Araque, R.	2022
Not Relevant	Google Scholar	110	Accumulation and decomposition of cultural residues of Theobroma grandiflorum, Paullinia cupana, Bixa orellana and forest in the southern region of Amazonas	Paula, E. M. B. et al.	2023
Social Contribution	Google Scholar	111	Improving diets with wild and cultivated biodiversity from across the landscape	Powell, B., Thilsted, S.H., Ickowitz, A. et al.	2015
Not Relevant	Google Scholar	112	Proposition of critical levels of nutrients in citrus leaves, grown in a subtropical climate, for fresh market fruit production	Krug, A. V., Papalia, D. G., Marques, A. L. D. L., Hindersmann, J., Soares, V. M., Grando, D. L., Moura-Bueno, J. M., Trapp, T., Rozane, D. E., Natale, W., & Brunetto, G.	2023
Social Contribution	Google Scholar	113	Connecting Global Priorities: Biodiversity and Human Health	Hunter, D.; Burlingame, B.; Remans, R.; Borelli, T.; Cogill, B.; Coradin, L.; Golden, C.D.; Jamnadass, R.; Kehlenbeck, K.; Kennedy, G.; Kuhnlein, H.; McMullin, S.; Myers, S.; Moura de Oliveira Beltrame, D.; Jorge da Rocha Silva, A.; Saha, M.; Scheerer, L.; Shackleton, C.; Neves Soares Oliveira, C.; Termote, C.; Teofili, C.; Thilsted, S.; Valenti, R.	2015
Not Relevant	Google Scholar	114	Cacao (Theobroma cacao L.)	Gardea, A. A., García-Bañuelos, M. L., Orozco-Avitia, J. A., Sánchez-Chávez, E., Sastré-Flores, B., & Ávila-Quezada, G.	2017
Not Relevant	Google Scholar	115	The Carao (Cassia grandis L.): Its Potential Usage in Pharmacological, Nutritional, and Medicinal Applications	Marcía-Fuentes, J., Santos-Aleman, R., Borrás-Linares, I., Sánchez, J.L.	2021
Not Relevant	Google Scholar	116	The Potential of Oyster Nuts (Telfairia pedata) for Environmental Conservation and Food Security in Tanzania: A Review	Shayo, P.F., Mbega, E.R. & Treydte, A.C.	2021
Not Relevant	Google Scholar	117	For services rendered? Modeling hydrology and livelihoods in Andean payments for environmental services schemes	Quintero, M., Wunder, S., & Estrada, R.	2009
Not Relevant	Google Scholar	118	Chemical Composition and Bioctivity of the Giant Polypore or Black-Staining Mushroom, Meripilus giganteus (Agaricomycetes), from Serbia	Petrovic, N., Tosti, T., Srbljak, I., Đurić, A., Kosanic, M.	2022
Not Relevant	Google Scholar	119	Cacao plantations on Sulawesi Island, Indonesia: I—an agro-ecological analysis of conventional and organic farms	Cruz, A.F., Suwastika, I.N., Sasaki, H. et al.	2019
Not Relevant	Google Scholar	120	Environmental manipulation for edible insect procurement: a historical perspective	Van Itterbeeck, J., van Huis, A.	2012
Not Relevant	Google Scholar	121	Biological nitrification inhibition and forage productivity of Megathyrsus maximus in Colombian dry tropics	Carvajal-Tapia J.I., Morales-Velasco S., Villegas D.M., Arango J., Vivas-Quila N.J.	2021
Not Relevant	Google Scholar	122	Agricultural Systems Located in the Forest-Savanna Ecotone of the Venezuelan Amazonian. Are Organic Agroforestry Farms Sustainable?	Hernández, C. L., Netuzhilin, I., & Yamila, A.	2009
Repeated	Google Scholar	123	Variations in nutrient composition of oyster nuts (Telfairia pedata) across different agro-climatic conditions	Emmanuel Mwakasege, Anna Treydte, Otmar Hoeglinger, Neema Kassim & Edna Makule | Manuel Tejada Moral	2021
Not Relevant	Google Scholar	124	The Chemical Composition of Oils and Cakes of Ochna serrulata (Ochnaceae) and Other Underutilized Traditional Oil Trees from Western Zambia	Frankova, A., Manourova, A., Kotikova, Z., Vejvodova, K., Drabek, O., Riljakova, B., Famera, O., Ngula, M., Ndiyoi, M., Polesny, Z., Verner, V., & Tauchen, J.	2020
Not Relevant	Google Scholar	125	Baru (Dipteryx alata Voug.), the Brazilian savanna's brown gold: A scientometric analysis of investigative trend	AZEVEDO, V. M. de .; SANDER, N. L. .; MORAIS, M. de .; LEMES, S.; ARRUDA, J. C. de .	2022
Not Relevant	Google Scholar	126	Thermoregulatory and Feeding Behavior under Different Management and Heat Stress Conditions in Heifer Water Buffalo (Bubalus bubalis) in the Tropics	Andrés, M., Dublin, D., & Armando, C.	2021
Not Relevant	Google Scholar	127	Pigeon pea intercropping with pastures as mitigation strategy for emissions of greenhouse gases (GHG)	Furtado, Althieres José	2022
Not Relevant	Google Scholar	128	Ecosystem Services from Edible Insects in Agricultural Systems: A Review	Payne, C. L., & Van Itterbeeck, J.	2017
Not Relevant	Google Scholar	129	Funneliglomus, gen. nov., and Funneliglomus sanmartinensis, a new arbuscular mycorrhizal fungus from the Amazonia region in Peru	Corazon-Guivin M.A., Mendoza A.C., Guerrero-Abad J.C., Vallejos-Tapullima A., Carballar-Hernández S., da Silva G.A. & Oehl F.	2019

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	130	Oenocarpus bataua	Smith, N.	2014
Not Relevant	Google Scholar	131	Use of Amazonian Floodplain Trees	Wittmann, F., Wittmann, A.d.O.	2010
Not Relevant	Google Scholar	132	Influence of Substrate Properties on Communities of Arbuscular Mycorrhizal Fungi Isolated from Agroecosystems in Peru	Corazon-Guivin, M.A., Vallejos-Tapullima, A., Rengifo-Del Aguila, S. et al.	2022
Not Relevant	Google Scholar	133	Chemical, Botanical and Pharmacological Aspects of the Leguminosae	Benjamim JKF, Costa KAD, Santos AS.	2020
Not Relevant	Google Scholar	134	Geographic distribution, conservation, and genomic resources of cacao Theobroma cacao L	Nieves-Orduña, H. E., Krutovsky, K. V., & Gailing, O.	2023
Social Contribution	Google Scholar	135	Latin-American Seeds: Agronomic, Processing and Health Aspects	Haros, C.M., Reguera, M., Sammán, N., & Paredes-López, O. (Eds.).	2023
Not Relevant	Google Scholar	136	Agronomic and physicochemical characteristics of cowpea genotypes/varieties	Karaman, R.	2022
Not Relevant	Google Scholar	137	Biocultural diversity and crop improvement	Gepts, P.	2023
Not Relevant	Google Scholar	138	Food for two seasons: Culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village	Andrea Pieroni, Sabine Nebel, Rocco Franco Santoro & Michael Heinrich	2005
Not Relevant	Google Scholar	139	ISOLATION AND IDENTIFICATION OF ENDOPHYTIC FUNGI FROM THE AMAZONIAN PALM Oenocarpus bataua MART	Fernanda Viana Diniz, Songila Maria da Silva Rocha Doi, Márcia Cristina Pereira de Melo Fittipaldy, Roberta de Freitas Lopes, Sabrina Sondre de Oliveira Reis Margarido, Suelem Marina de Araújo Pontes, Dawerson da Paixão Ramos, Atilon Vasconcelos de Araújo, Clarice Maia Carvalho	2021
Not Relevant	Google Scholar	140	NUTRITIONAL AND ANTINUTRITIONAL EVALUATION OF GRAPE FRUIT (Citrus paradisi) JUICE USING DIFFERENT EXTRACTION METHODS	Ekanah, Kolawole & Obueh, Henrietta & Emokpae, B.	2017
Not Relevant	Google Scholar	141	Effects of chemical treatment on nutrient content and palatability of Senegalia Mellifera and Cataphractes Alexandraii bush-based feeds	Ndozi, H. M.	2019
Not Relevant	Google Scholar	142	Carbon Sequestration: Pathway to Increased Agricultural Productivity and Zero Hunger for Developing Countries	Onwonga, R.N.	2020
Not Relevant	Google Scholar	143	Bioactivity-guided fractionation of antimalarial active extract of Spondias mombin Linn stem bark	Orumwensodia, K.O. and Uadia, P.O.	2023
Not Relevant	Google Scholar	144	Economic valuation and vulnerability of the pollination ecosystem service and nutritional components of pollinator dependent and nondependent crops	PORTO, Rafaella Guimarães	2019
Not Relevant	Google Scholar	145	A review of the use of chestnut in traditional and innovative food products	Raquel P. F. Guiné, Cátia Costa, Sofia G. Florença, Paula M. R. Correia	2023
Not Relevant	Google Scholar	146	Sustainable food systems for food security	Thomas, A., Alpha, A., Barczak, A., Zakhia-Rozis, N.	2022
Not Relevant	Google Scholar	147	A review of the polysaccharide, protein and selected nutrient content of Auricularia, and their potential pharmacological value	Asanka R. Bandara, Sylvie Rapior, Peter E. Mortimer, P Kakumyan, Kevin D. Hyde, et al.	2019
Not Relevant	Google Scholar	148	Ethnopharmacological Potential of Tithonia diversifolia (Hemsl) A. Gray	SILVA , G. A. de S. .; SILVA, A. R. da .; OLIVEIRA, E. G. de .; ALMEIDA-BEZERRA, J. W.	2020
Not Relevant	Google Scholar	149	State-of-the-Art Chocolate Manufacture	Hernández-Ortega, M., Plazola-Jacinto, C.P., Valadez-Carmona, L.	2022
Not Relevant	Google Scholar	150	Building value chains for indigenous fruits: lessons from camu-camu in Peru	Blare T, Donovan J.	2018
Not Relevant	Google Scholar	151	CHARACTERIZATION AND USE OF SUBSTRATES COMPOSED OF ORGANIC WASTE IN THE PRODUCTION OF Colubrina glandulosa PERKINS SEEDLINGS	MONTEIRO MENDONÇA, V. M. et al.	2021
Not Relevant	Google Scholar	152	Evaluation of the Mineral Composition, Antioxidant Properties, Phytochemical and Anti-nutrient Composition of African Palmyra Palm (Borassus aethiopum) Fruit Flour	Arthur, Christine	2019
Not Relevant	Google Scholar	153	Germplasm resources, ethnobotanical uses and phytochemical components of Ziziphus Mill. in Pakistan	N. Uddin, Z.G. Liu, Z.H. Zhao, M.J. Liu	2020
Not Relevant	Google Scholar	154	The Genus Dacryodes Vahl.: Ethnobotany, Phytochemistry and Biological Activities	Swana, L., Tsakem, B., Tembu, J. V., Teponno, R. B., Folahan, J. T., Kalinski, J., Polyzois, A., Kamatou, G., Sandjo, L. P., & Chamcheu, J. C.	2023

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	155	Wild berries and related wild small fruits as traditional healthy foods	José Miguel Aguilera & Tamar Toledo	2022
Not Relevant	Google Scholar	156	Intensive Silvopastoral Systems Mitigate Enteric Methane Emissions from Cattle	H., J., Diaz, D., J., F., & Galindo, F.	2023
Not Relevant	Google Scholar	157	Famine Foods: Thoughts from a Caatinga Research Experience	do Nascimento, V.T., Campos, L.Z.	2021
Social Contribution	Google Scholar	158	The role of non-wood forest products in diets and livelihoods: quantifying the contributions	Muir, G.	2021
Not Relevant	Google Scholar	159	Lentinus crinitus: Traditional use, phytochemical and pharmacological activities, and industrial and biotechnological applications	Filho, J. R. D. S., Santos, É. D. S., Linde, G. A., Colauto, N. B., Gonçalves, R. A. C., & De Oliveira, A. J. B.	2023
Not Relevant	Google Scholar	160	Growth curve establishment of Cratylia argentea for harvest timing	Leonardo Campos Teatini Climaco, Elaine Cristina Teixeira, Lucas Freires Abreu et al.	2023
Chagra* AND Amazon AND Nutri*					
Resource: Web of Science - Results: 1 documents found - Search within "Title", "Abstract", and "Author Keywords"					
Not Relevant	Web of Science	1	Chagra system on degraded soils in a Ticuna community in the Colombian Amazon	Fajardo-Cano, M; Peña-Venegas, CP; Colorado, GJ	2023
Resource: Google Scholar - Results: 187 documents found - Not including patents and citations					
Social Contribution	Google Scholar	1	Intercultural interpretations about concepts of nutrition: body formation among the tikuna indians of the colombian amazon trapeze	León Taborda, A.	2011
Not Relevant	Google Scholar	2	Chagras y alimentación: espacios culturales que se transforman|| Chagras and Nutrition: Cultural Spaces that are Transformed	Uruburu-Gilí¨de, S., & Ortiz-Nova, Y.	2017
Not Relevant	Google Scholar	3	¿ Por qué se pierde la agrobiodiversidad?: caso de la chagra inga en la Amazonía colombiana	Escárraga, L.J., Gutiérrez, I., Van Etten, J., Ramírez, F., y Sibelet, N.	2020
Nutritional Contribution	Google Scholar	4	Diversity of roots and tubers cultivated in traditional chagras from the Colombian Amazon	Orjuela-Baquero, N.M., Hernández, M.S., Carrillo, M. and Fernández-Trujillo, J.P.	2016
Not Relevant	Google Scholar	5	Traditional forest-related knowledge and agrobiodiversity preservation: the case of the chagras in the Indigenous Reserve of Monochoa (Colombia)	Hernandez Marentes, M.A., Venturi, M., Scaramuzzi, S. et al.	2022
Not Relevant	Google Scholar	6	He says, she says: Ecosystem services and gender among indigenous communities in the Colombian Amazon	Gisella S. Cruz-Garcia, Martha Vanegas Cubillos, Carlos Torres-Vitolas, Celia A. Harvey, Charlie M. Shackleton, Kate Schreckenberg, Simon Willcock, Carolina Navarrete-Frías, Erwan Sachet	2019
Social Contribution	Google Scholar	7	Várzea floodplain agriculture in the Colombian Amazon	Ellen Rietberg	2014
Repeated	Google Scholar	8	Chagras y alimentación: espacios culturales que se transforman|| Chagras and Nutrition: Cultural Spaces that are Transformed	Uruburu-Gilí¨de, S., & Ortiz-Nova, Y.	2017
Social Contribution	Google Scholar	9	Uso y Manejo de las especies sembradas en las chagras de dos comunidades murui-muinane de la Amazonia Colombia	Sierra, S. M., & Raz, L.	2014
Repeated	Google Scholar	10	Chagras y alimentación: espacios culturales que se transforman|| Chagras and Nutrition: Cultural Spaces that are Transformed	Uruburu-Gilí¨de, S., & Ortiz-Nova, Y.	2017
Not Relevant	Google Scholar	11	Indigenous knowledge interaction network between host plants and edible insects in the Ecuadorian Amazon	M. Guachamin-Rosero, M.C. Peñuela, M.G. Zurita-Benavides	2022
Repeated	Google Scholar	12	Extractivisms, Existences, and Extinctions: Monoculture Plantations and Amazon Deforestation	Kröger, Markus	2022
Not Relevant	Google Scholar	13	Comparative Analysis of Composition and Biodiversity of Saltlicks Forest and Control Forests, TICOYA Resguardo, Tikuna Indigenous Community, San Martin de Amayacu Sector (Colombia Amazonian Trapeze)	Monsalve-Cuartas, A. , Rego, F. and Vásquez, M.	2019
Not Relevant	Google Scholar	14	Approximation to the Composition and Biodiversity of Saltlicks Forest for Two Indigenous Communities in the Colombia Amazonas Trapeze	Monsalve-Cuartas, A. , Castro Rego, F. and Sanchez, I.	2019
Not Relevant	Google Scholar	15	The Socio-Ecological Dynamics of Food Insecurity among Subsistence-Oriented Indigenous Communities in Amazonia: a Qualitative Examination of Coping Strategies among Riverine Communities along the Caquetá River, Colombia.	Torres-Vitolas, C.A., Harvey, C.A., Cruz-Garcia, G.S. et al.	2019

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	16	Análisis de la distribución y abundancia de dos especies de uña de gato (Uncaria sp.) con base en el conocimiento de comunidades indígenas Tikuna del sur de la Amazonia colombiana.	Garzón, L. P.	2023
Not Relevant	Google Scholar	17	Ride, shoot, and call: wildlife use among contemporary urban hunters in Três Fronteiras, Brazilian Amazon	van Vliet, N., Cruz, D., Quiceno-Mesa, M. P., de Aquino, L. J. N., Moreno, J., Ribeiro, R., & Fa, J.	2015
Not Relevant	Google Scholar	18	Indicators of well-being among indigenous peoples of the Colombian Amazon: Tensions between participation in public policy making and autonomy	Pablo De La Cruz, Luis Eduardo Acosta, Delio Mendoza, Eduardo Bello Baltazar, Ana Minerva Arce Ibarra, Erín I.J Estrada Lugo.	2020
Not Relevant	Google Scholar	19	Formación de cuerpo entre los tikuna: una aproximación intercultural a los conceptos de nutrición infantil	León Taborda, A. M.	2011
Not Relevant	Google Scholar	20	Uso de las palmas en la Amazonia Colombiana	MESA, LAURA, & GALEANO, GLORIA.	2013
Environmental Contribution	Google Scholar	21	Relación entre el estado de conservación de las semillas tradicionales de la chagra y el buen vivir en las comunidades indígenas inga en la Amazonía colombiana	Laura J. Escárraga Torres	2017
Not Relevant	Google Scholar	22	Bushmeat in the tri-frontier region of Brazil, Peru and Colombia: Demise or persistence?	Nathalie van Vliet, Maria Paula Quiceno Mesa, Daniel Cruz Antia, Carla Morsello, Cristina Adams, Flavia Mori, Blanca Yagüe, Sara Hernandez, Tamara Bonilla, Leady Tellez, Lindon Neves de Aquino, Jessica Moreno, Tatiana Schor, Michael De Oliveira Princi, Enio Haiden, Fernando Trujillo, Robert Nasi	2014
Social Contribution	Google Scholar	23	Food Security in Amazonia	Rodomiro Ortiz*, Andreea Nowak**, Angela Lavado**, Louis Parker**	2013
Social Contribution	Google Scholar	24	Inga food and medicine systems to promote community health	Caicedo,S.and Chaparro,A. M., H. V. Kuhnlein, B. Erasmus, D. Spigelski, B. Burlingame	2013
Not Relevant	Google Scholar	25	Sacred Natural Places in the Tropical Forest. Case Study Saltlicks (Salados) in the Tikuna and Uitoto Indigenous Communities (Colombia Amazon Trapeze)	Cuartas, Ana Maria Monsalve	2021
Not Relevant	Google Scholar	26	Classification and Use of Natural and Anthropogenic Soils by Indigenous Communities of the Upper Amazon Region of Colombia	Peña-Venegas, C.P., Stomph, T.J., Verschoor, G. et al.	2016
Not Relevant	Google Scholar	27	Manioc mothers: Subsistence stability and the influence of tourism among the Napo Kichwas in the Ecuadorian Amazon	Allison, Kerensa Louise	2010
Not Relevant	Google Scholar	28	Design and Evaluation of Processes to Obtain Antioxidant-Rich Extracts from tropical fruits cultivated in Amazon, Caldas and Northern Tolima Regions	Cerón Salazar, Ivonne Ximena	2013
Not Relevant	Google Scholar	29	Preserving the world: Indigenous Peoples’ Food Systems	Harriet V. Kuhnlei, Barbara Burlingame, Bill Erasmus	2013
Not Relevant	Google Scholar	30	Will the trade of Amazonian fruits help recover the Amazon forest? Sustainable consumption of Acai in Metro Vancouver	Melgarejo P., Luis F.	2020
Not Relevant	Google Scholar	31	Indigenous ecological knowledge in the Colombian Amazon–challenges and prospects for a more sustainable use of local forest fauna	Torsten Krause, Maria Paula Quiceno Mesa, Uldarico Matapí Yucuna	2020
Not Relevant	Google Scholar	32	Bushmeat networks link the forest to urban areas in the trifrontier region between Brazil, Colombia, and Peru	van Vliet, N., Quiceno, M. P., Cruz, D., de Aquino, L. J. N., Yagüe, B., Schor, T., Hernandez, S., & Nasi, R.	2015
Not Relevant	Google Scholar	33	Chagras’ agroforestal system dynamics as the basis for indigenous production in the Amazonian Trapezium (Colombia)	TRIANA-MORENO, Luz Amparo; RODRIGUEZ, Nohra Cecilia and GARCIA, Jesús	2006
Not Relevant	Google Scholar	34	Territory, Autonomy and Rights: Indigenous Politics and COVID-19 in the Amazon Basin	Cifuentes, Silvia	2020
Not Relevant	Google Scholar	35	Amazonia as pharmacopia	Davidov, V.	2013
Not Relevant	Google Scholar	36	Perceived Intergenerational Differences in the Transmission of Traditional Ecological Knowledge (TEK) in Two Indigenous Groups from Colombia and Guatemala	Cristancho, S., & Vining, J.	2009
Not Relevant	Google Scholar	37	Current Levels, Recent Historical Trends, and Drivers of Wildmeat Trade in the Amazon Tri-Frontier Region Between Colombia, Peru, and Brazil	Van Vliet, N., Moreno, J., Gomez, J., L’haridon, L., Neves de Aquino, L., Sandrin, F., Vanegas, L., & Nasi, R.	2017

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	38	Rationality as a Social Construction: What Does Individual Behavior Have to Say about Development in an Amazon Community?	Andrés Marroquín Gramajo	2008
Not Relevant	Google Scholar	39	Bushmeat in the tri-frontier region of Brazil, Peru and Colombia: Demise or persistence?	Nathalie van Vliet, Maria Paula Quiceno Mesa, Daniel Cruz Antia, Carla Morsello, Cristina Adams, Flavia Mori, Blanca Yagüe, Sara Hernandez, Tamara Bonilla, Leady Tellez, Lindon Neves de Aquino, Jessica Moreno, Tatiana Schor, Michael De Oliveira Princi, Enio Haiden, Fernando Trujillo, Robert Nasi	2014
Not Relevant	Google Scholar	40	Prácticas agrícolas y consecuencias genéticas que permitieron una mejor adaptación de los indígenas a la Amazonía Colombiana	Heliodoro Arguello Arias	1988
Not Relevant	Google Scholar	41	Flujo de Energía a través de los Hogares Tatuyo	Dufour, Darna L.	1981
Not Relevant	Google Scholar	42	Edible Insects in Latin America: A Sustainable Alternative for Our Food Security	Abril, S., & Pinzón, M.	2022
Not Relevant	Google Scholar	43	INDIGENOUS PERCEPTIONS OF ENVIRONMENTAL CHANGE: LOCAL REALITIES AND COPING STRATEGIES IN THE COLOMBIAN AMAZON	Rodríguez Granados, R.	2016
Not Relevant	Google Scholar	44	Pineapple: the Queen of Tropical Fruits	Cartay, R.	2020
Not Relevant	Google Scholar	45	Transmission and transformation of traditional ecological knowledge in indigenous communities from the Amazon and the Peten: Cultural and generational variations	Cristancho Marulanda, Sergio	2005
Social Contribution	Google Scholar	46	BIODIVERSITY AND INDIGENOUS AGROECOLOGY IN AMAZONIA: THE INDIGENOUS PEOPLES OF PASTAZA	Garí, J. A.	2001
Not Relevant	Google Scholar	47	Environmentalizing indigeneity: A comparative ethnography on multiculturalism, ethnic	Del Cairo Silva, Carlos Luis	2012
Not Relevant	Google Scholar	48	The cassava value web and its potential for Colombia's bioeconomy	Nella Canales, Mónica Trujillo	2023
Not Relevant	Google Scholar	49	Los sistemas productivos tradicionales y el programa RESA en el resguardo Ticoya de Puerto Nariño	Juan José Vieco	2015
Not Relevant	Google Scholar	50	Ethnoecology in the Colombian Amazon: Tikuna-Wildlife Interactions in Amacayacu National Park	Hannah E Parathian	2014
Not Relevant	Google Scholar	51	Mauritia flexuosa	Smith, N.	2015
Not Relevant	Google Scholar	52	Los sistemas productivos tradicionales y el programa RESA en el resguardo Ticoya de Puerto Nariño	Juan José Vieco	2015
Not Relevant	Google Scholar	53	Soil Practitioners and Vital Spaces: Agricultural Ethics and Life Processes in the Colombian Amazon	Lyons, Kristina Marie	2013
Not Relevant	Google Scholar	54	The Senhora Who Doesn't Speak Portuguese: Following Francisco de Orellana Across the Amazon Jungle	Pawling, Colleen Lynnette	2014
Not Relevant	Google Scholar	55	Perception and use of edible insects in Santa María de Itapinima and Piracemo indigenous communities, Mitú, Vaupés, Colombia	Héctor Jaime GASCA-ÁLVAREZ, William GONZÁLEZ	2022
Not Relevant	Google Scholar	56	Facteurs socioculturels impliqués dans la dissémination de la bactériose vasculaire du manioc dans les Caraïbes Colombiennes	Dario Antonio Perez Gonzalez	2022
Not Relevant	Google Scholar	57	The Role of Agroforestry Systems in Enhancing Climate Resilience and Sustainability- A Review	Pancholi, Roshan and Yadav, Ravi and Gupta, Hitesh and Vasure, Narendra and Choudhary, Shishpal and Singh, Moirangthem Nobinchandra and Rastogi, Mausmi	2023
Repeated	Google Scholar	58	Aproximación al uso y aprovechamiento de insectos comestibles en las comunidades indígenas del oriente amazónico colombiano	GASCA-ALVAREZ, Héctor Jaime y GONZALEZ, William	2021
Not Relevant	Google Scholar	59	Ethnogeology at the Core of Basic and Applied Research: Surface Water Systems and Mode of Action of a Natural Antibacterial Clay of the Colombian Amazon	Londono Arias, Sandra Carolina	2016
Repeated	Google Scholar	60	Prácticas agrícolas y consecuencias genéticas que permitieron una mejor adaptación de los indígenas a la Amazonía Colombiana	Heliodoro Arguello Arias	1988
Not Relevant	Google Scholar	61	The Therapeutic Ecologies of Napo Runa Wellbeing	Bridges, Nora Colleen	2017
Repeated	Google Scholar	62	Uso de las palmas en la Amazonia Colombiana	MESA, LAURA, & GALEANO, GLORIA.	2013
Not Relevant	Google Scholar	63	Cassava – Root, Flour, Recipes and Benefits	Rafael Cartay	2020
Not Relevant	Google Scholar	64	Insectos: Recursos del pasado que podrían ser una solución nutricional para el futuro	Pulido Blanco, V. C. ., González Chavarro, . C. F. ., Tapia Polanco, Y. M. ., & Celis Ruiz, X. M.	2022

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	65	CHALLENGES AND TRENDS IN THE VALUATION OF ECOSYSTEM SERVICES IN AGRO-ECOSYSTEMS: A SYSTEMATIC REVISION	Sandra Cecilia Bautista-Rodríguez, Vladimir Aicardo Melgarejo-Carreño, Mauricio Camargo Pardo	2020
Not Relevant	Google Scholar	66	Extractivisms, Existences, and Extinctions: Monoculture Plantations and Amazon Deforestation	Kröger, Markus	2022
Not Relevant	Google Scholar	67	Nukak: Ethnoarchaeology of an Amazonian People	Politics, Gustavo	2007
Not Relevant	Google Scholar	68	Good to eat, good to think: food, culture and biodiversity in Cotacachi.	Camacho,J.	2006
Not Relevant	Google Scholar	69	El bosque más allá del capitalismo: un contraste entre sistemas de conocimiento	González Piñeros, N. C., y M.Kröger	2020
Not Relevant	Google Scholar	70	Cosmology as Indigenous Land Conservation Strategy: Wildlife Consumption Taboos and Social Norms Along the Papuri River (Vaupes, Colombia)	Yoamara, AK., Hernández Vélez, C.A., Calle, S.R., Roa, E.C.	2020
Not Relevant	Google Scholar	71	Como un padre que da consejo': textitPaullinia yoco entre los airo-pai del Perú	Belaunde, Luisa & Echeverri, Juan Alvaro	2008
Not Relevant	Google Scholar	72	Palm Uses in Northwestern South America: A Quantitative Review	Macía, M.J., Armesilla, P.J., Cámara-Leret, R. et al.	2011
Not Relevant	Google Scholar	73	Pises (Xanthosoma robustum, Araceae): Traditional Knowledge and Sustainable Farming Practices of a Neglected and Underutilized Crop in a Mexican Indigenous Community	Pacheco-Trejo, J., Aquino Torres, E., Prieto Méndez, J. et al.	2023
Social Contribution	Google Scholar	74	Indicators of well-being among indigenous peoples of the Colombian Amazon: Tensions between participation in public policy making and autonomy	Cruz, P. D. L., Acosta, L. E., Mendoza, D., Baltazar, E. B., Arce Ibarra, A. M., & Lugo, E. I. E.	2020
Not Relevant	Google Scholar	75	Potential GIAHS Sites in Central and South America	Agnoletti, M., Santoro, A., Fiore, B., Piras, F., Romano, F., Bazzurro, A.	2023
Not Relevant	Google Scholar	76	Article not found		
Not Relevant	Google Scholar	77	Palm Management in South America	Bernal, R., Torres, C., García, N. et al.	2011
Not Relevant	Google Scholar	78	Soberanía alimentaria y otras soberanías: el valor de los bienes comunes	Giovanna Micarelli	2018
Repeated	Google Scholar	79	El bosque más allá del capitalismo: un contraste entre sistemas de conocimiento	González Piñeros, N. C., y M.Kröger	2020
Chagra* AND Amazon AND Calori*					
Resource: Google Scholar - Results: 291 documents found - Not including patents and citations					
Not Relevant	Google Scholar	1	A methodological approach for the non-monetary valuation of ecosystem services in three communities of the Colombian Amazon	Duran H., Zulma, Arguello A., Heliodoro, & Tapasco, Jeimar	2016
Not Relevant	Google Scholar	2	Conocimientos tradicionales Ticuna en la agricultura de chagra y los mecanismos innovadores para su protección	Acosta Muñoz, Luis Eduardo y Zoria Java, José	2012
Repeated	Google Scholar	3	Intercultural interpretations about concepts of nutrition: body formation among the tikuna indians of the colombian amazon trapeze	León Taborda, A.	2011
Repeated	Google Scholar	4	Conocimientos tradicionales Ticuna en la agricultura de chagra y los mecanismos innovadores para su protección	Acosta Muñoz, Luis Eduardo y Zoria Java, José	2012
Not Relevant	Google Scholar	5	El saber sensible de las mujeres indígenas Gente de Centro: recorriendo sus chagras en Araracuara, Caquetá	Arbeláez Grundmann, María	2019
Social Contribution	Google Scholar	6	The Indicators of Human Wellbeing: social and cultural innovation that seeks to strengthen the governance capacities of indigenous peoples in the Colombian Amazon	Acosta Muñoz, L. E.	2018
Repeated	Google Scholar	7	Relación entre el estado de conservación de las semillas tradicionales de la chagra y el buen vivir en las comunidades indígenas inga en la Amazonía colombiana	Laura J. Escárraga Torres	2017
Not Relevant	Google Scholar	8	Caracterización de los sistemas de producción animal en la Chagra o Jajañ de las comunidades indígenas Inga y Kamëntšá del Alto Putumayo	Muyuy Ojeda, Edison Alexander	2020
Not Relevant	Google Scholar	9	Impacto de centros colonos en la diversidad biológica y cultural de chagras en dos comunidades indígenas de la amazonÍa colombiana	Sierra Vega, Sandra Milena	2013
Not Relevant	Google Scholar	10	Ferias de Chagras en la Amazonia colombiana, contribuciones a los conocimientos tradicionales, y al intercambio de productos de las asociaciones indígenas y de mujeres de Tarapacá	Pablo De La Cruz	2015
Not Relevant	Google Scholar	11	Ecological aspects of swidden cultivation among the Andoke and Witoto Indians of the Colombian Amazon	Eden, M.J., Andrade, A.	1987
Not Relevant	Google Scholar	12	Dɨona uai, komuiya reikɨ: Palabra de tabaco y fuego de vida entre los murui-muina	Laura Tattiana Areiza Serna	2016

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	13	Análisis morfológico de fragmentos sobre inframundo en lengua uitoto murui (Amazonia colombiana	Dary Marcela Ángel Rodríguez'	2014
Repeated	Google Scholar	14	Flujo de Energía a través de los Hogares Tatuyo	Dufour, Darna L.	1981
Not Relevant	Google Scholar	15	Sobre la Gente de Tabaco y Coca en la ciudad de Leticia	Angela Patricia López Urrego	2017
Repeated	Google Scholar	16	Manioc mothers: Subsistence stability and the influence of tourism among the Napo Kichwas in the Ecuadorian Amazon	Allison, Kerensa Louise	2010
Repeated	Google Scholar	17	Design and Evaluation of Processes to Obtain Antioxidant-Rich Extracts from tropical fruits cultivated in Amazon, Caldas and Northern Tolima Regions	Cerón Salazar, Ivonne Ximena	2013
Not Relevant	Google Scholar	18	Los sistemas agrícolas indígenas del Amazonas: Una alternativa agroecológica	Luis Babiano Amelibia	2013
Not Relevant	Google Scholar	19	Voces de la Amazonía: Entre la conservación ancestral y la explotación de los recursos naturales	Julián Tole Martínez	2022
Not Relevant	Google Scholar	20	Cuando el tiempo no hace caso: la memoria profunda de los eventos climáticos extremos y adaptación al cambio climático en comunidades indígenas de la Amazonia colombiana	Carlos A. Rodríguez F, María Clara Van der Hammen	2014
Chagra AND "Amazon" AND "nutritional composition"					
Resource: Google Scholar - Results: 664 documents found - Not including patents and citations					
Repeated	Google Scholar	1	Assessment of biodiversity goods for the sustainable development of the chagra in an indigenous community of the Colombian Amazon: local values of crops	Garavito, G., Clavijo, R., Luengas, P. et al.	2021
Repeated	Google Scholar	2	Diversity of roots and tubers cultivated in traditional chagras from the Colombian Amazon	Orjuela-Baquero, N.M., Hernández, M.S., Carrillo, M. and Fernández-Trujillo, J.P.	2016
Repeated	Google Scholar	3	He says, she says: Ecosystem services and gender among indigenous communities in the Colombian Amazon	Gisella S. Cruz-Garcia, Martha Vanegas Cubillos, Carlos Torres-Vitolas, Celia A. Harvey, Charlie M. Shackleton, Kate Schreckenberg, Simon Willcock, Carolina Navarrete-Frías, Erwan Sachet	2019
Not Relevant	Google Scholar	4	The changing chagras: traditional ecological knowledge transformations in the Colombian Amazon	Fonseca-Cepeda, V., Idrobo, C. J., & Restrepo, S.	2019
Not Relevant	Google Scholar	5	Board Games for Participatory Research: An Experimental Ethnography on the Trade of Chagra Products in Indigenous Communities in the Colombian Amazon	Pablo De La Cruz	2015
Not Relevant	Google Scholar	6	Effectiveness of agroecological practices in creating resilience to climatic variability in Colombia : the Amazon Chagra	Castañeda Sánchez, Alvaro Andrés	2019
Not Relevant	Google Scholar	7	The potential of Amazon indigenous agroforestry practices and ontologies for rethinking global forest governance	Nidia Catherine González, Markus Kröger	2020
Not Relevant	Google Scholar	8	Diet and trophic structure of frugivorous bats (Phyllostomidae) in forests and chagras of the Andean–Amazon piedmont, Ecuador	Hinojosa, M., Méndez-Romero, N. & Peñuela, M.C.	2021
Repeated	Google Scholar	9	A methodological approach for the non-monetary valuation of ecosystem services in three communities of the Colombian Amazon	Duran H., Zulma, Arguello A., Heliodoro, & Tapasco, Jeimar	2016
Not Relevant	Google Scholar	10	Macrofungal diversity in Colombian Amazon forests varies with regions and regimes of disturbance	López-Quintero, C.A., Straatsma, G., Franco-Molano, A.E. et al.	2012
Repeated	Google Scholar	11	Várzea floodplain agriculture in the Colombian Amazon	Ellen Rietberg	2014
Not Relevant	Google Scholar	12	Characterization of native starches from Amazonian roots and tubers	N.M. Orjuela-Baquero, J.P. Fernández-Trujillo, M.S. Hernández	2014
Not Relevant	Google Scholar	13	Antihyperlipidemic and Antioxidant Capacities, Nutritional Analysis and UHPLC-PDA-MS Characterization of Cocona Fruits (Solanum sessiliflorum Dunal) from the Peruvian Amazon	Pertino, M. W., Parra, C., & Simirgiotis, M. J.	2021
Repeated	Google Scholar	14	Indigenous knowledge interaction network between host plants and edible insects in the Ecuadorian Amazon	M. Guachamin-Rosero, M.C. Peñuela, M.G. Zurita-Benavides	2022
Not Relevant	Google Scholar	15	MANIOC BEER AND MEAT: VALUE, REPRODUCTION AND COSMIC SUBSTANCE AMONG THE NAPO RUNA OF THE ECUADORIAN AMAZON	Uzendoski, M. A.	2004
Not Relevant	Google Scholar	16	Moving to produce: Nukak mobility and settlement patterns in Amazonia	Gustavo G. Politis	1996
Not Relevant	Google Scholar	17	Ecological aspects of swidden cultivation among the Andoke and Witoto Indians of the Colombian Amazon	Eden, M.J., Andrade, A.	1987

Criteria of relevance	Database	N°	Name of the resource material	Author	Year
Not Relevant	Google Scholar	18	Healing the planet: traditional spiritual beliefs and sustainable management of ecosystems in the Amazon Forest, Colombia	Ann M. Simpson (Mitchell)	2022
Not Relevant	Google Scholar	19	Conservation of the Cassava Diversity in The Traditional Cultivation Systems of the Amazon	Pérez D, Mora Moreno RE, Camilo Ernesto López Carrascal	2019
Not Relevant	Google Scholar	20	Modern ticuna swidden-fallow management in the Colombian Amazon: Ecologically integrating market strategies and subsistence-driven economies?	Hammond, D.S., Dolman, P.M. & Watkinson, A.R.	1995

Appendix 2. List of publications categorized as ‘Nutritional Contribution’

Criteria of relevance	Database	N°	Publication code	Name of the resource material	Author	Year	Country	Keywords
"Agroforestry" AND "Amazon" AND nutri*								
Nutritional Contribution	Scopus	6	R1	The fruit of peach palm (Bactris gasipaes) and its technological potential: an overview	da COSTA, R.D.S., Rodrigues, A.M.D.C., da SILVA, L.H.M.	2022	Latin America	Bactris gasipaes, carotenoids, fatty acids, nutritional composition, palm peach
"Agroforestry" AND "Amazon" AND "nutritional composition"								
Nutritional Contribution	Google Scholar	1	R2	Nutrients and bioactive compounds in wild fruits from the Brazilian Amazon rainforest	PAULA FILHO, G., SOUZA, C., LUCIA, C. D., SANT’ANA, H., & SANTOS, R. H.	2023	Brazil	regional foods, Amazonian fruits, vitamins, nutritional value
Nutritional Contribution	Google Scholar	3	R3	Food and nutritional potential of two mushrooms native species to the Brazilian savanna	de Melo e Silva-Neto,Carlosand Calaça,Francisco Junior Simõesand Santos,Leovigildo Aparecido Costaand Machado,Jason Carvalhoand de Moura,Jadson Belemand Pinto,Diogo de Souzaand Ferreira,Tânia Aparecida Pinto de Castroand dos Santos,Solange Xavier	2023	Brazil	edible fungi; savannah; composition; protein
Nutritional Contribution	Google Scholar	4	R4	Peach palm (Bactris gasipaes) in tropical Latin America: implications for biodiversity conservation, natural resource management and human nutrition	Graefe, S., Dufour, D., van Zonneveld, M. et al.	2013	Latin America	Agroforestry , Bactris gasipae, Genetic diversity, Livelihoods, Nutrition Processing
Nutritional Contribution	Google Scholar	12	R5	Food production potential of Favolus brasiliensis (Basidiomycota: Polyporaceae), an indigenous food.	Silva-Neto, Carlos & Souza Pinto, Diogo & Santos, Leovigildo & Calaça, Francisco & Almeida, Sara.	2020	Amazon	edible mushrooms, indigenous, tropical polypore, Yanomami
Nutritional Contribution	Google Scholar	17	R6	Traditional botanical knowledge: food plants from the Huni Kuĩ indigenous people, Acre, western Brazilian Amazon	Pilnik, Málika Simis et al.	2023	Brazil	Amazon, ethnobotany, food plants, indigenous knowledge, management and use, sociobiodiversity conservation, transdisciplinarity
Nutritional Contribution	Google Scholar	25	R7	Nutritional value and proteases of Lentinus citrinus produced by solid state fermentation of lignocellulosic waste from tropical region	Machado, A. R. G., Teixeira, M. F. S., De Souza Kirsch, L., Campelo, M. D. C. L., & De Aguiar Oliveira, I. M.	2016	Brazil	Edible mushroom, Basidiomata, Nutritional value, Proteases, Solid state fermentation
Nutritional Contribution	Google Scholar	30	R8	Peach Palm (Bactris gasipaes Kunth.): Ancestral Tropical Staple with Future Potential	González-Jaramillo, N.; Bailon-Moscoso, N.; Duarte-Casar, R.; Romero-Benavides, J.C.	2022	Latin America	palm; Bactris gasipaes; food sovereignty; Amazon; phytochemicals
Nutritional Contribution	Google Scholar	40	R9	Non-timber Amazonian Forest products and their valuable edible nuts: Cutia nut, Egg nut, Sapucaia nut and Brazil nut	de Oliveira Lopes, B.; Correa de Souza Coelho, C.; Souza, A. G.C.; Freitas-Silva, O.	2021	Brazil	Chrysobalanaceae, Lecythidaceae, Acioa edulis Prance, Acioa longipendula Pilg, Bertholletia excels, Lecythis pisonis
Nutritional Contribution	Google Scholar	42	R10	Three Amazonian palms as underestimated and little-known sources of nutrients, bioactive compounds and edible insects	Jaramillo-Vivanco, T., Balslev, H., Montúfar, R., Cámara, R. M., Giampieri, F., Battino, M., Cámara, M., & Alvarez-Suarez, J. M.	2022	Amazon	Mauritia flexuosaBactris gasipaesOenocarpus batauaRhynchophorus palmarum
Nutritional Contribution	Google Scholar	53	R11	Sacha inchi (Plukenetia volubilis L.)—from lost crop of the Incas to part of the solution to global challenges?	Kodahl, N.	2020	Peru	Inca peanut, Underutilized plant, Lipid biosynthesis, Sustainability, Polyunsaturated fatty acids, Omega-3
Nutritional Contribution	Google Scholar	85	R12	An Insect Bad for Agriculture but Good for Human Consumption: The Case of Rhynchophorus palmarum: A Social Science Perspective	R Cartay, V Dimitrov, M Feldman	2020	Amazon	edible insects, Amazonian protein, insect’s nutritional value, Rhynchophorus palmarum, Amazonian indigenous diet
Nutritional Contribution	Google Scholar	86	R13	Chemical composition, vitamins, and minerals of family farming biribiri (Averrhoa bilimbi L.) in the Middle Doce River region, Minas Gerais, Brazil	Ferreira, Jéssica Nunes et al.	2022	Brazil	nutritional value; unconventional food plant; bioactive compounds
Nutritional Contribution	Google Scholar	95	R14	Tropical Fruits: From Cultivation to Consumption and Health Benefits, Fruits from the Amazon	Todorov, S. D., Pieri, F. A.	2018	Amazon	
Chagra* AND Amazon AND Nutri*								
Nutritional Contribution	Google Scholar	4	R15	Diversity of roots and tubers cultivated in traditional chagras from the Colombian Amazon	Orjuela-Baquero, N.M., Hernández, M.S., Carrillo, M. and Fernández-Trujillo, J.P.	2016	Colombia	Marantaceae, rhizomes, proximal composition, metabolites

Appendix 3. Nutritional Data results in the publications categorized as ‘Nutritional Contribution’.

Location	Publication code	Scientific Name	Energy value (kcal 100 g-1)	MACRONUTRIENTS (g 100g-1)					MICRONUTRIENTS (mg)														
				Carbohydrates	Proteins	Fats	Lipids	Fiber	Vitamin A (µg 100 g-1)	Vitamin E	Vitamin C	Calcium (Ca)	Potassium (K)	Sodium (Na)	Magnesium (Mg)	Chlorine (Cl)	Manganese (Mn)	Zinc (Zn)	Selenium (Se)	Iron (Fe)	Chromium (Cr)	Phosphorus (P)	Copper (Cu)
Amazon, Colombia	R1, R4, R8, R10	*Bactris gasipaes* Kunth	266,6	✓	2,93		9,43	3,83		✓		21,8	206,4	12,6	17,6	30,7	0,0826	0,2783	11,4	0,7393	13,9		
Amazon	R10	*Mauritia flexuosa*		✓	✓		✓	✓			✓		✓										
Amazon	R10, R12	*Rhynchophorus palmarum*			✓	✓	✓		✓	✓								✓		✓			✓
Amazon	R11	*Plukenetia volubilis L.*		✓	✓		✓																
Brazil	R2	*Caryocar villosum* (Aubl.)	406,76	42,51	1,1		25,81	2,44	No sample			42,94	26,25		10,31		4,53	1,06		2,17		27,17	0,73
Brazil	R2	*Physalis angulat* L.	86,87	14,71	1,16		2,6	1,9	0,11769			37,88	24,37		12,27		3,93	0,77		3,55		21,87	0,95
Brazil	R2	*Astrocaryum vulgare* Mart.	250,06	19,5	1,85		18,29	3,07	2,63028			43,67	25,97		11,62		4,68	0,62		4,06		25,97	1,38
Brazil	R2	*Endopleura uchi* (Huber.)	464,33	0,77	0,88		50,86	2,37	No sample			57,82	25,03		9,98		5,24	1,27		3,26		38,04	0,69
Brazil	R2, R6	*Oenocarpus bacaba* Mart.	352,5	16,74	3,27		30,27	2,3	0,08263			36,96	24,88	✓	9,44		3,58	0,86		1,47		39,47	0,87
Brazil	R3	*Auricularia nigricans*			7	1,2		2,2															
Brazil	R3	*Schizophyllum commune*			10	1,3		2										✓		✓			
Brazil	R5	*Favolus brasiliensis* (Fr.) Fr.			27																		
Brazil	R6	*Euterpe precatoria* Mart.					✓	✓				✓	✓							✓			
Brazil, Amazon	R6, R10	*Oenocarpus bataua* Mart.		✓	✓		✓	✓			✓			✓	✓		✓			✓			
Brazil	R6	*Phytelephas macrocarpa* Ruiz & Pav.			✓		✓																

Location	Publication code	Scientific Name	Energy value (kcal 100 g-1)	MACRONUTRIENTS (g 100g-1)					MICRONUTRIENTS (mg)														
				Carbohydrates	Proteins	Fats	Lipids	Fiber	Vitamin A (µg 100 g-1)	Vitamin E	Vitamin C	Calcium (Ca)	Potassium (K)	Sodium (Na)	Magnesium (Mg)	Chlorine (Cl)	Manganese (Mn)	Zinc (Zn)	Selenium (Se)	Iron (Fe)	Chromium (Cr)	Phosphorus (P)	Copper (Cu)
Brazil	R6	*Inga thibaudiana* DC. Spp *thibaudiana*		✓	✓		✓																
Brazil	R6	*Herrania mariae* (Mart.) Deckne. *ex* Goudot					✓																
Brazil	R6	*Matisia cordata* Kunth	✓	✓				✓	✓			✓	✓							✓		✓	✓
Brazil	R6	*Theobroma microcarpum* (Mart.)		✓	✓		✓																
Brazil	R6	*Brosimum lactescens* (S. Moore) C.C. Berg			✓			✓															
Brazil	R6	*Pseudolmedia laevis* (Ruiz & Pav.) J.F.Macbr.		✓	✓		✓	✓															
Brazil	R6	*Muntingia calabura* L.		✓	✓	✓		✓				✓								✓		✓	
Brazil	R6	*Passiflora foetida* L.		✓	✓		✓																
Brazil	R6	*Passiflora nitida* Kunth									✓												
Brazil	R6	*Trichostigma octandrum* (L.) H. Walter		✓	✓		✓																
Brazil	R6	*Gynerium sagittatum* (Aubl.)	✓																				
Brazil	R6	*Genipa americana* L.	✓	✓	✓		✓	✓				✓	✓							✓			
Brazil	R6	*Pouteria torta* Radlk. subsp.		✓	✓								✓							✓		✓	

Location	Publication code	Scientific Name	Energy value (kcal 100 g-1)	MACRONUTRIENTS (g 100g-1)					MICRONUTRIENTS (mg)														
				Carbohydrates	Proteins	Fats	Lipids	Fiber	Vitamin A (µg 100 g-1)	Vitamin E	Vitamin C	Calcium (Ca)	Potassium (K)	Sodium (Na)	Magnesium (Mg)	Chlorine (Cl)	Manganese (Mn)	Zinc (Zn)	Selenium (Se)	Iron (Fe)	Chromium (Cr)	Phosphorus (P)	Copper (Cu)
		Glabra Mart. T.D.Penn																					
Brazil	R6	*Pourouma cecropiifolia* Mart.		✓	✓			✓															
Brazil	R7	*Lentinus citrinus*	✓	✓	✓	✓		✓				✓	✓	✓	✓		✓	✓		✓		✓	✓
Brazil	R9	*Acioa edulis* Prance			✓																		
Brazil	R9	*Acioa longipendula* Pilg.			✓			✓															
Brazil	R9	*Lecythis Pisonis* Miers		✓	✓		✓																
Brazil	R9	*Bertholletia excels* Bonpl.			✓		✓																
Brazil	R13	*Averrhoa bilimbi* L.	25,36	4,91	0,71		0,32	0,62		✓	✓	6,32	7,42	5,3	5,25		0,25	0,04		3,21			0,041
Brazil	R10, R14	*Theobroma grandiflorum*			✓	✓	✓	✓				5,5	34,3	2,5	13,1							15,7	
Colombia	R15	*Canna indica*		✓	✓	✓		✓				132,7	433,5	600				1		0,21		114,5	
Colombia	R15	*Maranta ruiziana*		✓	✓	✓		✓				140	570,1	600				0,5		0,1		18,58	
Colombia	R15	*Calathea allouia*		✓	✓	✓		✓				10	340,5	600				1				238,5	