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Sustainable Production Practices In The Amazon: A Systematic Review

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ABSTRACT
This article aims to reveal, through academic studies, the sustainable production practices in production systems in the Amazon. The study contributes to a theoretical approach to production systems in the Amazon and examines the sustainable production practices that have been adopted, highlighting the importance of more sustainable production methods. This article is a systematic review based on the method of Tranfield et al. (2003). Through research in the Web of Science, Scopus, and Scielo databases, an initial sample of 79 articles was obtained, from which 22 were selected for analysis. Among the various approaches, the authors highlight the use of systems such as: Integrated Crop-Livestock-Forestry Systems (ICLFS), Agroforestry Systems (AFS), Agrosilvopastoral Systems, as well as more traditional systems, including Traditional Agroforestry Systems, Traditional Agricultural Systems, Organic and Conventional Production Systems, among others. The results indicate the need to implement strategies to enhance productivity efficiency, alongside public policies and practices aimed at promoting sustainable development. Furthermore, attention to social and ecological structures is essential to identify potential obstacles to establishing an inclusive and sustainable production system.

Keywords: Sustainable Production, Production Systems, Amazon.

INTRODUCTION
The Brazilian Amazon has a diverse ecology. In addition to the Amazon rainforest, other types of vegetation are found in this region (Falesi, 1976). Growing demands for natural resources and economic pressures have placed the region under constant threat, resulting in deforestation, forest degradation, and loss of natural habitats. Deforestation in the Amazon has grown exponentially, driven by the installation of megaprojects in mining, hydroelectric power, agribusiness, and other natural resource exploitation activities (Brondízio, 2016). Combating deforestation in Brazil is a

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priority for both the government and international organizations (Fearnside, 2005). Production activities in the Amazon, encompassing agriculture, livestock, and fishing, are often associated with adverse environmental and social impacts.

Given this context, the search for sustainable production practices in the Amazon becomes relevant, not only for productivity but also for environmental conservation (Balbino, 2011). This systematic review article aims to analyze and synthesize the existing literature on sustainable production practices in the Amazon to answer the fundamental research question: What are the sustainable production practices in production systems in the Amazon?

A systematic review is a tool for assessing the current state of knowledge. It includes all published works that provide a comprehensive examination of the literature on specific topics (Galvão & Ricarte, 2019). This introduction presents the challenges faced in the Amazon region, the justification for conducting this systematic review, and the structure of this article, which will cover the review methodology, sustainable production practices, environmental and social impacts, challenges, support policies, and successful case studies.

Through this systematic review, we hope to contribute to the understanding of sustainable production practices in the Amazon and provide a solid foundation for developing strategies that promote sustainability, environmental conservation, and the well-being of communities in the region.

SUSTAINABLE PRODUCTION PRACTICES IN THE AMAZON

The pursuit of sustainable production practices in the Amazon is essential to preserving the world's largest tropical forest (Kohlhepp, 2002) while simultaneously meeting the region's socioeconomic needs. According to Marchesan (2011), sustainability involves economic development, while sustainable production aims at environmental conservation, ensuring that human activities do not irreversibly compromise natural resources. Carvalho et al. (2015) emphasize that for a society to be sustainable, there must be an integration between development and environmental conservation. In the Amazon, sustainable production is closely linked to agriculture (Santos et al., 2022), livestock (Barreto & Silva, 2009), and natural resource exploitation (Silva et al., 2020). Promising strategies have emerged, focusing on the integration of agroecological methods, responsible forest management, and the promotion of sustainable production chains (Leripio & Leripio, 2015).

Sustainable family farming, for example, seeks to minimize the use of harmful agrochemicals, promoting crop rotation, intercropping, and the preservation of native vegetation areas. Hurtienne (2005) states that sustainable rural development depends on the implementation of land-use systems and production systems adapted to the conditions of family farming.
In the livestock sector, Crop-Livestock Integration (CLI) has emerged as a sustainable production strategy for the region (Alvaregnga, 2018). The implementation of good animal welfare practices

is also a crucial aspect of sustainable production, promoting not only herd health but also the preservation of surrounding ecosystems.

The promotion of sustainable production chains in the Amazon is another important pillar (Leripio & Leripio, 2015). This involves encouraging commercial practices that value environmental preservation and social justice, ensuring fair compensation for local producers and fostering the adoption of clean technologies throughout the production chain.

Sustainable production in the Amazon is not just a desirable option but an urgent necessity. The implementation of agricultural, livestock, and natural resource exploitation practices that respect environmental limits and promote the prosperity of local communities is fundamental to ensuring a balanced future for this region, which is crucial for global climate stability. According to Gadotti (2008), sustainability is a dynamic balance with others and the environment—it is harmony between differences. Economic development cannot be discussed without the proper use of natural resources (Ferreira, 2013), as the balance between economic growth and environmental conservation emerges as both a challenge and an opportunity in the pursuit of sustainability in the Amazon.

In this context, this article seeks to conduct a systematic review to analyze and synthesize the existing literature on sustainable production practices in the Amazon region. The objective is to highlight key scientific studies addressing sustainable production practices in the Amazon and provide a comprehensive perspective on the subject.

METHODOLOGY

A systematic literature review is a modern method for simultaneously evaluating a set of data (Atallah & Castro, 1998). A systematic review is a tool used to summarize and assess existing knowledge on a topic, identify research gaps, and support informed decision-making in academic and practical fields. It is frequently used in disciplines such as medicine, social sciences, and education, among others.

For data collection in this review, a research protocol was established based on the methodology of Tranfield et al. (2003). According to them, the protocol is a plan that helps ensure objectivity by providing explicit descriptions of the steps to be followed. For data analysis, the Rayyan web application (a free tool) was used to assist authors in conducting systematic reviews.
For this review, three major peer-reviewed scientific literature databases were used: Web of Science (WoS), Scopus, and SciELO. The Table 1 presents the article selection criteria.

Table 1. Research Protocol

Criterion	Web of Science	Scopus	SciELO
Term	sustainable production* AND production systems* AND amazon	"sustainable production" AND "production systems" AND amazon	sustainable production* AND production systems* AND amazon
Field	Title	Title	Title
Period	2014 - 2023	2014 - 2023	2014 - 2023
Document Type	Journal Article	Journal Article	Journal Article
Research Area	Agronomy; Biology; Agricultural Engineering; Forestry; Zoology	Agricultural and Biological Sciences; Environmental Science; Social Sciences; Economics, Econometrics and Finance	Agricultural Sciences; Multidisciplinary; Engineering
Language	English/Portuguese	English/Portuguese	English/Portuguese

The initial search, without applying specific criteria, resulted in 79 articles, with 35 from Web of Science, 24 from Scopus, and 20 from SciELO. It is important to highlight that the search terms used were: *sustainable production AND production systems AND amazon*. However, a broader search was also conducted using the terms: *sustainable production AND production systems*, removing *amazon*. Nevertheless, since *amazon* was included in the research question and was an essential part of the review, it was ultimately retained in the search terms.

The refinement criteria applied were: journal articles published between 2014 and 2023, written in English or Portuguese, and belonging to the following research areas: Agronomy; Biology; Agricultural Engineering; Forestry; Zoology; Agricultural and Biological Sciences; Environmental Science; Social Sciences; Economics, Econometrics, and Finance; Agricultural Sciences; Multidisciplinary; and Engineering.

After applying the selection criteria, 33 articles were retained for analysis: 10 from Web of Science, 14 from Scopus, and 9 from SciELO. Below, Table 2 details the article selection procedures.

Table 2. Research procedures for article selection

Activity	Number of Articles
Search by keywords in WoS, Scopus, and SciELO	33
Removal of duplicates	3
Reading of article abstracts	30
In-depth reading of remaining articles	22

After the removal of 3 duplicate articles and the reading of the abstracts of the remaining 30 articles, 22 articles were selected for in-depth reading.

ANALYSIS OF RESULTS AND FINDINGS

The first published article among those selected was conducted by Oliveira et al. (2014), in which the authors concluded that 80% of grain production systems using traditional technology are not sustainable in the studied region and have higher production costs. This article has a total of 12 citations.

The second study was conducted by Zenero et al. (2016), identifying that the soils of two extractive settlements in Pará are chemically poor and predominantly kaolinitic, which contributes to farmers replacing forests with pastures in favor of adopting sustainable production systems in the Amazon. This article has 10 citations.

The 22 articles together account for a total of 200 citations. Table 3 shows the articles with the highest number of citations.

Table 3. Articles with the highest number of citations

Authors	Title	Year	Journal	Citations	Database
Cherubin, M.R.; Chavarro-Bermeo, J.P.; Silva-Olaya, A.M.	Agroforestry systems improve soil physical quality in northwestern Colombian Amazon	2019	Agroforestry Systems	41	Scopus
Torres, B.; Vasco, C.; Günter, S.; Knoke, T.	Determinants of agricultural diversification in a hotspot area: Evidence from colonist and indigenous communities in the Sumaco Biosphere	2018	Sustainability (Switzerland)	24	Scopus

	Reserve, Ecuadorian Amazon				
Giudice, R.; Börner, J.; Wunder, S.; Cisneros, E.	Selection biases and spillovers from collective conservation incentives in the Peruvian Amazon	2019	Environmental Research Letters	24	Scopus
Silva; Gomide; Figueiredo; Carvalho; Ferraz-Filho	Optimal selective logging regime and log landing location models: a case study in the Amazon forest	2018	Acta Amazonica	19	WoS
Rieger; Zolin; Paulino; Souza; Matos; Magalhães; Farias Neto	Water Erosion on an Oxisol under Integrated Crop-Forest Systems in a Transitional Area between the Amazon and Cerrado Biomes	2016	Revista Brasileira de Ciência do Solo	18	SciELO

Among all the articles selected for review, the years 2016, 2021, and 2023 had the highest number of published articles (4 publications each, totaling 12 publications), followed by 2018 (3 publications), 2017 and 2019 (2 publications each, totaling 4 publications), and 2014, 2020, and 2022 (1 publication each). Below, Figure 1 shows the total number of publications per year.

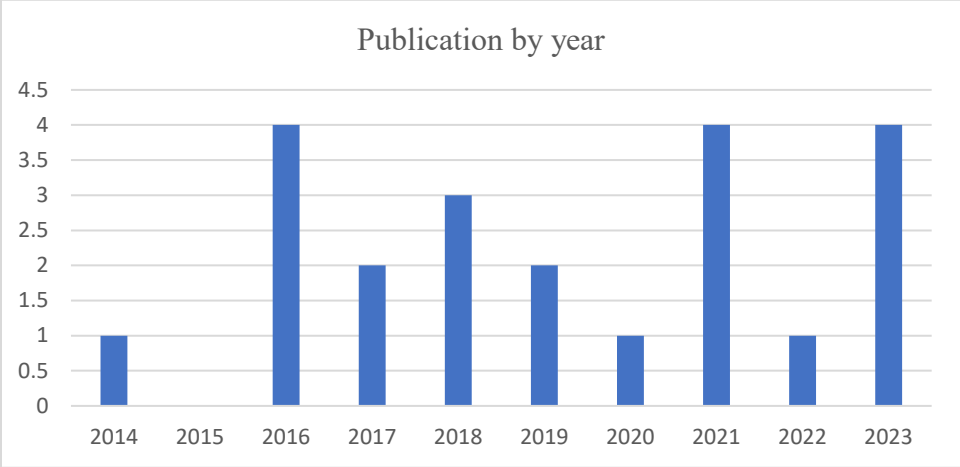

Figure 1. Total publications by year

The study objects in these articles are: Sustainable agricultural production systems and agroforestry systems that can improve soil physical attributes (Silva et al., 2018) and (Cherubin et. al., 2019); More sustainable soybean production systems (Ribeiro et al., 2020); Use of leguminous species in agroforestry systems influencing dragon fruit (Vargas-Tierras, 2021); Improvement with nitrogen-fixing leguminous species can contribute to greater biomass production and nutrient accumulation, being considered a sustainable production technology (Rangel-Vasconcelos, 2016); Variability in cassava root yield in cropping systems (Abrell et al., 2022); Sawn wood yield and log quality (Silva Luz et al., 2021); Identifying factors contributing to efficient cattle production in the Amazon (Hamid et al., 2023); Proper soil use and management for sustainable production (Rodrigues et al., 2017); Analyzing whether land use change influences soil attributes (Zenero et al., 2016); Determinants of Agricultural Diversification as a strategy to promote more sustainable production systems (Torres et al., 2018); Assessing the diversity and abundance of soil-dwelling Gamasina in grain production plots managed under conventional and agro-silvopastoral systems (Castro et al., 2021); Small farmers growing cocoa compared to those raising cattle (Braga et al., 2023); Investigation of mineral commodity residues as a source for a sustainable production system (Santos et al., 2023); Local Land Management System (Castro, 2016); Integer Linear Programming (ILP) to fill knowledge gaps in the decision support system for logging operations (Silva et al., 2018); Stable production systems combined with strong credit mechanisms (Moreira-Dantas et al., 2023); Peru's National Forest Conservation Program (NFCP) conditioned on deforestation and the adoption of sustainable production systems (Giudice et al., 2019); Crop-livestock-forest integration (ILPF) as a sustainable agricultural management system (Zolin et al., 2021); Grain production systems using traditional technology (Oliveira et al., 2014); Possibilities for the sustainable use of Permanent Preservation Areas (APP) and Legal Reserves (RL) (Feistauer et al., 2017); and Evaluating soil and water losses in different integrated production systems (Rieger et al., 2016).

Below, the Figure 2 presents the word cloud of the most frequently occurring terms in the articles.

Figure 2. Word cloud of the most frequently occurring terms in the articles
Source: Image generated using the Rayyan application.

It is important to emphasize that all 22 articles highlight or mention production systems or sustainable production methods, either explicitly through study methods or even in the study objects themselves.

Production Systems and Sustainable Practices

The predominant production systems in the research range from conventional or traditional systems to more sustainable systems. The Table 4 below presents all the production systems identified in the studies.

Table 4. Production Systems Adopted in the Studies

Study	Year	Title	Production Systems
1	2018	Aggregation, carbon, and total soil nitrogen in crop-livestock-forest integration in the Eastern Amazon	Crop-Livestock-Forest Integration Systems (ILPF)
2	2019	Agroforestry systems improve soil physical quality in northwestern Colombian Amazon	Agroforestry Systems (SAFs)
3	2020	Agronomic performance of soybean crops under integrated production systems in the Southwestern Brazilian Amazon	Crop-Livestock-Forest Integration Systems (ILPF)
4	2021	Benefits of Legume Species in an Agroforestry Production System of Yellow Pitahaya in the Ecuadorian Amazon	Agroforestry Systems (SAFs) and Monoculture
5	2018	Biomass and nutrient accumulation of two leguminous trees in an improved fallow in Amazon rainforest	Fallow System
6	2022	Cassava root yield variability in shifting cultivation systems in the eastern Amazon region of Brazil	Shifting Cultivation System
7	2021	Challenges of the lumber production in the Amazon region: relation between sustainability of sawmills, process yield, and logs quality	Forest Harvesting System
8	2021	Changes and Factors Determining the Efficiency of Cattle Farming in the State of Pará, Brazilian Amazon	Extensive Traditional System

9	2017	Changes in chemical properties by use and management of an oxisol in the Amazon biome	Conventional Soil Management System
10	2016	Characterization and classification of soils under forest and pasture in an agroextractivist Project in Eastern Amazon	Fallow and Shallow Root Systems
11	2018	Determinants of Agricultural Diversification in a Hotspot Area: Evidence from Colonist and Indigenous Communities in the Sumaco Biosphere Reserve, Ecuadorian Amazon	Agroforestry System
12	2020	Gamasina edaphic communities (Acari: Mesostigmata) in grain production systems of the southwestern Brazilian Amazon	Agrosilvopastoral and Traditional System
13	2021	Good life in the Amazon? A critical reflection on the standard of living of cocoa and cattle-based smallholders in Pará, Brazil	Agroforestry Systems (SAFs)
14	2023	Investigation of mineral commodity residues based on alkalinity, solubility, and other physicochemical aspects aiming at the management of Amazonian acidic soils	Solo-Plant System
15	2016	Local politics of floodplain tenure in the Amazon	Lacustrine System
16	2018	Optimal selective logging regime and log landing location models: a case study in the Amazon forest	Traditional Agroforestry System
17	2021	Rural credit acquisition for family farming in Brazil: Evidence from the Legal Amazon	Traditional Agricultural System
18	2019	Selection biases and spillovers from collective conservation incentives in the Peruvian Amazon	Traditional Agroforestry System
19	2021	Short-term effect of a crop-livestock-forestry system on soil, water, and nutrient loss in the Cerrado Amazon nexus	Crop-Livestock-Forest Integration Systems (ILPF)
20	2022	The cost of production and profitability of soybeans in the municipalities of Santarém and Belterra, State of Pará	Direct Planting System
21	2018	Using indicators based on Brazilian environmental laws for analysis of family farms in the Amazon region	Sustainable Organic Production System
22	2016	Water erosion on an oxisol under integrated crop-forest systems in a transitional area between the Amazon and Cerrado biomes	Crop-Livestock-Forest Integration Systems (ILPF)

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There is a diversification of production systems, with four studies highlighting the Crop-Livestock-Forest Integration System (ILPF); three studies focusing on Agroforestry Systems (SAFs); three on the Traditional Agroforestry System; two studies on the Fallow System; and ten studies on different systems, namely: Shifting Cultivation System, Forest Harvesting System, Extensive Traditional System, Conventional Soil Management System, Agrosilvopastoral System, Soil-Plant System, Lacustrine System, Traditional Agricultural System, No-Till System, and Organic and Conventional Production System. It is worth noting that two studies identified two types of systems in their research, adding Monoculture and Root System to the list. The Table 5 describes the number of production systems found in the review.

Table 5. Frequency of Production Systems

Type of System	**Frequency**
Crop-Livestock-Forest Integration System (ILPF)	4
Agroforestry Systems (AFS)	3
Traditional Agroforestry System	3
Fallow System	2
Others: Shifting cultivation system, Forest harvesting subsystem, Traditional extensive system, Conventional soil management system, Silvopastoral system, Soil-plant system, Lacustrine system, Traditional agricultural system, No-till system, and Organic and conventional production system.	1

Based on the studies presented, the most sustainable systems are the Crop-Livestock-Forest Integration System (ILPF) and Agroforestry Systems (AFS), with emphasis on other practices such as the Fallow System and the Silvopastoral System.

DISCUSSION

Some studies emphasize productive systems that focus on soil quality, such as the study by Silva et al. (2018), which observed that the Crop-Livestock-Forest Integration System (ILPF) has the capacity to provide important nutrients for soil fertility. Similarly, Ribeiro et al. (2020) found that ILPF contributes to higher soybean grain productivity.

The study by Abrell et al. (2022) highlights that shifting cultivation systems face a significant risk of greater soil fertility depletion and increased weed pressure due to the current trend of shorter fallow periods. Cassava productivity declines rapidly when soils become exhausted and/or weed pressure increases.

Conventional soil preparation reduces nutrient availability, as cited by Rodrigues et al. (2017). The author highlights that land use and management systems with minimal soil disturbance, such as minimum tillage, are recommended to minimize environmental degradation in the Amazon biome. Zenero et al. (2016) mentions that soil responses under pastureland have changed due to alterations in vegetation cover. The chemical and mineralogical properties characterize the studied soils as poor and predominantly kaolinitic.

Zolin et al. (2021) demonstrated that ILPF systems can prevent soil quality loss and thus improve agricultural sustainability in the Cerrado-Amazon region. Rieger et al. (2016) showed that treatments including ILPF were more effective in reducing water and soil losses compared to other treatments.

Cherubin et al. (2019) demonstrated through their studies that the adoption of AFS can be a strategy to recover soil quality and reincorporate degraded lands into productive and sustainable production systems. Vargas-Tierras (2021) showed that agroforestry systems produced sufficient biomass and nutrients to meet the demand for dragon fruit cultivation.

The study by Rangel-Vasconcelos (2016), based on a fallow system, identified that improving fallow with nitrogen-fixing leguminous species can contribute to greater biomass production and nutrient accumulation compared to spontaneous vegetation. This meets the nutritional demands of subsequent crops and can be considered a sustainable production technology.

Silva Luz et al. (2021) identified challenges in timber production and found that the most common defects in logs were swelling, surface cracks, and pith eccentricity. They believe that inferences can be made about logging yield and, consequently, the sustainability of the timber industry in the Brazilian Amazon.

Hamid et al. (2023) identified that among the studied microregions, nine showed increased productivity over the years, five showed declines, and three had no significant changes. This indicates that despite productivity increases in some microregions, the lack of change or decline in others may impact the overall performance of the livestock sector.

Torres et al. (2018) believes that traditional systems facilitate agricultural diversification and that promoting diversified systems should be encouraged. Meanwhile, Castro et al. (2021) highlight that both systems studied had results but mention that future studies are necessary to allow more time for the adoption of silvopastoral systems to produce possible ecological changes.

Braga et al. (2023) link the balance between environment and economic stability, stating that it is essential for sustainable rural development. They also show that subsistence strategies can generate an acceptable standard of living despite significant logistical and environmental challenges.

The study by Abrell et al. (2022) emphasized that the large amounts of mineral waste generated by the bauxite-alumina industries in the Amazon, with production scales comparable to their raw commodities, have been seen as new sources of raw materials and/or an inseparable part of a sustainable production system, contributing to circular economy initiatives.

Castro (2016) evidenced that conflicts related to access and control over lacustrine systems are less severe since landowners have less economic interest in this subsystem. Silva et al. (2018) used mathematical models to support forest management planning, estimating a reduction in vegetation damage and ensuring regulated timber production in uneven-aged forests.

Moreira-Dantas et al. (2023) argue that stable production systems and strong credit mechanisms could facilitate market access. Meanwhile, Giudice et al. (2019) highlights that the National Forest Conservation Program provides direct payments to indigenous communities in the Amazon, conditioned on avoided deforestation and the adoption of sustainable production systems.

The study by Feistauer et al. (2017) showed that the use of environmental assessment indicators can contribute to targeted technical assistance for environmental compliance on rural properties and support techniques aimed at the sustainability of production systems. Oliveira et al. (2014) cite that soy cultivated in conventional and environmentally harmful systems increases costs for pesticides, fertilizers, seeds, and machinery, leading to reduced profit margins in recent years.

CONCLUSIONS AND SUGGESTIONS

Cherubin et al. (2019) conclude that agroforestry systems can be an alternative to recover soil quality and reincorporate degraded lands into productive and sustainable production systems in the Amazon region.

According to Abrell et al. (2022), there is an urgent need for a transition from slash-and-burn agriculture to more sustainable and resilient practices, such as agroforestry or cut-and-mulch systems, which allow for higher cassava productivity while reducing soil depletion and weed pressure.

Silva Luz et al. (2021) conclude that their results enabled the use of linear models to estimate sawn timber yield. Through principal component analysis, it was possible to group species according to their suitability for sawmill processing, resulting in more efficient raw material use and sustainable production in the Amazon region.

Hamid et al. (2023) suggest that the government could develop guidelines to address the specific challenges faced by the livestock production sector. This could include conditional financial incentives to promote the adoption of advanced agricultural technologies, infrastructure improvements, and efficient production practices.

Rodrigues et al. (2017) recommend that land use and management systems with minimal soil disturbance, such as minimum tillage, can minimize environmental degradation in the Amazon biome. Torres et al. (2018) believe that agricultural diversification in the Ecuadorian Amazon region can play an important role in ensuring food security, self-employment, and sustainable product production to increase rural incomes.

Braga et al. (2023) confirm that cocoa agroforestry can be an alternative to unsustainable livestock farming. Similarly, Zolin et al. (2021) highlighted that ILPF systems can provide benefits for sustainable agricultural management in the Cerrado-Amazon region by reducing soil and water loss.

FINAL CONSIDERATIONS

The comprehensive set of studies analyzed highlights the diversity of production systems and sustainable practices in the Amazon, underscoring the complexity of the region's agricultural context. The importance of sustainable production systems in the Amazon is evident, considering the environmental and socio-economic challenges faced by the region.

The integration of different systems and cooperation among various actors, including producers, researchers, and governments, are crucial for sustainable development in the Amazon. Considering environmental legislation as a sustainability indicator reinforces the importance of legal compliance in production processes. Thus, the effective implementation of sustainable production systems in the Amazon not only addresses specific challenges but also represents an opportunity to ensure the preservation of this vital ecosystem, promoting long-term economic and social prosperity.

REFERENCES

Abrell, T., Naudin, K., Bianchi, F. J. J. A., Aragao, D. V., Tittonell, P., & Corbeels, M. (2022). Cassava root yield variability in shifting cultivation systems in the eastern Amazon region of Brazil. *Experimental Agriculture*, 58, e38. https://doi.org/10.1017/S0014479722000333

Balbino, L. C., Cordeiro, L. A. M., Porfírio-da-Silva, V., Moraes, A. D., Martínez, G. B., Alvarenga, R. C., ... & Galerani, P. R. (2011). Evolução tecnológica e arranjos produtivos de sistemas de integração lavoura-pecuária-floresta no Brasil. *Pesquisa agropecuária brasileira*, 46. https://doi.org/10.1590/S0100-204X2011001000001

Barreto, P., & Silva, D. (2009). Os desafios para uma pecuária mais sustentável na Amazônia. *Série O Estado da Amazônia*, 14(1). https://imazon.org.br/PDFimazon/Portugues/estado_da_amazonia/os-desafios-para-uma-pecuaria-mais-sustentavel-na.pdf

Braga, D. P., Pokorny, B., Porro, R., & Vidal, E. (2023). Good life in the Amazon? A critical reflection on the standard of living of cocoa and cattle-based smallholders in Pará, Brazil. *World Development Perspectives*, 31, 100520. https://doi.org/10.1016/j.wdp.2023.100520

Brondizio, E. (2016). The elephant in the room: Amazonian cities deserve more attention in climate change and sustainability discussions. *The Nature of Cities*, 2.

Carvalho, N. L., Kersting, C., Rosa, G., Fruet, L., & Barcellos, A. L. (2015). Desenvolvimento sustentável X desenvolvimento econômico. *Revista Monografias Ambientais*, 14(3), 109–117. https://doi.org/10.5902/2236130817768

Cherubin, M. R., Chavarro-Bermeo, J. P., & Silva-Olaya, A. M. (2019). Agroforestry systems improve soil physical quality in northwestern Colombian Amazon. *Agroforestry Systems*, 93, 1741-1753. https://doi.org/10.1007/s10457-018-0282-y

Castro, F. de. (2016). Local politics of floodplain tenure in the Amazon. *International Journal of the Commons*, 10(1). https://thecommonsjournal.org/articles/10.18352/ijc.472

Castro, M. C. de, Azevedo, E. B. de, Britto, E. P., Barreto, M. R., Pitta, R. M., Castilho, R. C., & De Moraes, G. J. (2021). Gamasina mite communities (Acari: Mesostigmata) in grain production systems of the southwestern Brazilian Amazon. *Systematic and Applied Acarology*, 26(1), 1-14.
https://doi.org/10.11158/saa.26.1.1

Feistauer, D., Lovato, P. E., Siminski, A., & Castilho, A. C. D. C. (2017). Using indicators based on Brazilian environmental laws for analysis of family farms in the Amazon region. *Ciencia Florestal*, 27(1), 249-262. https://doi.org/10.5902/1980509826463

Fearnside, P. M. (2005). Deforestation in Brazilian Amazonia: history, rates, and consequences. *Conservation biology*, 19(3), 680-688. https://doi.org/10.1111/j.1523-1739.2005.00697.x

Ferreira, A. B. D. B. (2013). Pantanal Mato-Grossense: considerações sobre a proteção constitucional para um desenvolvimento econômico sustentável. *Interações (Campo Grande)*, 14, 11-20. https://doi.org/10.1590/S1518-70122013000100002

Gadotti, M. (2008). Educar para a sustentabilidade. *Inclusão social*, 3(1). https://revista.ibict.br/inclusao/article/view/1624

Galvão, M. C. B., & Ricarte, I. L. M. (2019). Revisão sistemática da literatura: conceituação, produção e publicação. *Logeion: Filosofia da informação,* 6(1), 57-73. https://doi.org/10.21728/logeion.2019v6n1.p57-73

Giudice, R., Börner, J., Wunder, S., & Cisneros, E. (2019). Selection biases and spillovers from collective conservation incentives in the Peruvian Amazon. *Environmental Research Letters*, 14(4), 045004. https://iopscience.iop.org/article/10.1088/1748-9326/aafc83/meta

Hamid, S. S., Santos, M. A. S. D., Aguiar, A. F., Andreatta, T., Costa, N. L., Lopes, M. L. B., & Lourenço-Júnior, J. D. B. (2023). Changes and Factors Determining the Efficiency of Cattle Farming in the State of Pará, Brazilian Amazon. *Sustainability*, 15(13), 10187. https://doi.org/10.3390/su151310187

Hurtienne, T. P. (2005). Agricultura familiar e desenvolvimento rural sustentável na Amazônia. *Novos Cadernos NAEA*, Belém, 8 (1). https://repositorio.ufpa.br/bitstream/2011/3173/1/Artigo_AgriculturaFamiliarDesenvolvimento.pdf

Kohlhepp, G. (2002). Conflitos de interesse no ordenamento territorial da Amazônia brasileira. *Estudos avançados*, 16, 37-61. https://doi.org/10.1590/S0103-40142002000200004

Leripio, A. de Ávila, & Leripio, D. C. (2015). Cadeias produtivas sustentáveis: Sustainable production chains. *MIX Sustentável*, 1(1), 142–159. https://doi.org/10.29183/2447-3073.MIX2015.v1.n1.142-159

Moreira-Dantas, I. R., Martínez-Zarzoso, I., Henning, C., & Dos Santos, M. S. (2023). Rural credit acquisition for family farming in Brazil: Evidence from the legal Amazon. *Journal of Rural Studies*, 101, 103041. https://doi.org/10.1016/j.jrurstud.2023.103041

Oliveira, C. M. D., Santana, A. C. D., & Homma, A. K. O. (2013). The cost of production and profitability of soybeans in the municipalities of Santarém and Belterra, State of Pará. *Acta Amazonica*, 43, 23-31. https://doi.org/10.1590/S0044-59672013000100004

Rangel-Vasconcelos, L. G. T., Kato, O. R., Vasconcelos, S. S., & Oliveira, F. D. A. (2016). Biomass and nutrient accumulation of two leguminous trees in an improved fallow in Amazon rain forest. *Ciência Florestal*, 26(3), 735-746. https://doi.org/10.5902/1980509824197

Ribeiro, R. D. S., Passos, A. M. D., & Aker, A. M. (2020). Agronomic performance of soybean crops under integrated production systems in the Southwestern Brazilian Amazon biome. *Revista Brasileira de Engenharia Agrícola e Ambiental*, 24(12), 793-799. https://doi.org/10.1590/1807-1929/agriambi.v24n12p793-799

Rieger, F. A., Zolin, C. A., Paulino, J., Souza, A. P. D., Matos, E. D. S., Magalhães, C. A. D. S., & Farias, A. L. D. (2016). Water erosion on an Oxisol under integrated crop-forest systems in a transitional area between the Amazon and Cerrado biomes. *Revista Brasileira de Ciência do Solo*, 40. https://doi.org/10.1590/18069657rbcs20150111

Rodrigues, M., Rabêlo, F. H. S., CASTRO, H. A. D., Roboredo, D., CARVALHO, M. A. C. D., & Roque, C. G. (2017). Changes in chemical properties by use and management of an oxisol in the Amazon biome1. *Revista Caatinga*, 30, 278-286. https://doi.org/10.1590/1983-21252017v30n202rc

Santos, G. R. dos, Silva, R. P. da., & Santana, A. S. D. (2022). Agricultura na Amazônia: desflorestamento, escala e desafios à produção sustentável. In: G. R. Santos, & R. P. da Silva (Orgs.)*Agricultura e Diversidades: trajetórias, desafios regionais e políticas públicas no Brasil*. Instituto de Pesquisa Econômica Aplicada (Ipea). https://repositorio.ipea.gov.br/handle/11058/11302

Santos, L., Angélica, R., & Paz, S. (2023). Investigation of mineral commodity residues based on alkalinity, solubility and other physicochemical aspects aiming the management of amazonian acidic soils. *Journal of Environmental Management*, 335, 117558. https://doi.org/10.1016/j.jenvman.2023.117558

Silva, J. C., Silva, A. R., Veloso, C. A., Dantas, E. F., & do Sacramento, J. A. (2018). Aggregation, carbon, and total soil nitrogen in crop-livestock-forest integration in the Eastern Amazon. *Revista Brasileira de Engenharia Agrícola e Ambiental*, 22, 837-842. https://doi.org/10.1590/1807-1929/agriambi.v22n12p837-842

Silva, P. H. D., Gomide, L. R., Figueiredo, E. O., Carvalho, L. M. T. D., & Ferraz-Filho, A. C. (2018). Optimal selective logging regime and log landing location models: a case study in the Amazon forest. *Acta Amazonica*, 48(1), 18-27. https://doi.org/10.1590/1809-4392201603113

Silva, T. P. da, Pontes, A. N., & Albuquerque, A. R. (2020). Cadeias de produção sustentáveis no extrativismo de castanha do Brasil na Amazônia brasileira / Sustainable production chains in Brazil brown extractivism in brazilian amazon. *Brazilian Journal of Development*, 6(8), 63460–63478. https://doi.org/10.34117/bjdv6n8-687

Silva Luz, E. da, Soares, Á. A. V., Goulart, S. L., Carvalho, A. G., Monteiro, T. C., & de Paula Protásio, T. (2021). Challenges of the lumber production in the Amazon region: relation between sustainability of sawmills, process yield and logs quality. *Environment, Development and Sustainability*, 23(4), 4924-4948. https://doi.org/10.1007/s10668-020-00797-9

Torres, B., Vasco, C., Günter, S., & Knoke, T. (2018). Determinants of agricultural diversification in a hotspot area: Evidence from colonist and indigenous communities in the Sumaco Biosphere Reserve, Ecuadorian Amazon. *Sustainability*, 10(5), 1432. https://doi.org/10.3390/su10051432

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, 14(3), 207-222. https://doi.org/10.1111/1467-8551.00375

Vargas-Tierras, Y., Díaz, A., Caicedo, C., Macas, J., Suárez-Tapia, A., & Viera, W. (2021). Benefits of legume species in an agroforestry production system of yellow pitahaya in the Ecuadorian Amazon. *Sustainability*, 13(16), 9261. https://doi.org/10.3390/su13169261

Zenero, M. D. O., Silva, L. F. S. D., Castilho, S. C. D. P., Vidal, A., Grimaldi, M., & Cooper, M. (2016). Characterization and classification of soils under forest and pasture in an agroextractivist project in Eastern Amazonia. *Revista Brasileira de Ciência do Solo*, 40, e0160165. https://doi.org/10.1590/18069657rbcs20160165

Zolin, C. A., Matos, E. D. S., Magalhães, C. A. D. S., Paulino, J., Lal, R., Spera, S. T., & Behling, M. (2021). Short-term effect of a crop-livestock-forestry system on soil, water and nutrient loss in the Cerrado-Amazon ecotone. *Acta Amazonica*, 51, 102-112. https://doi.org/10.1590/1809-4392202000391