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Mapping of technologies related to bioinputs from the Amazon region

#2 Bioinputs from the Amazon region

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#2 Bioinputs from the Amazon region

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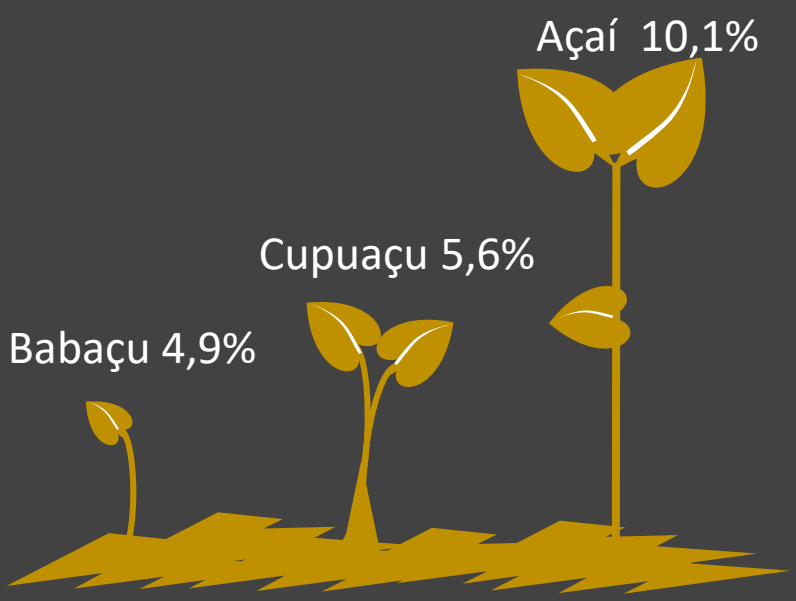
Bioinputs from the Amazon region

Sample 1: Indication of access to PG in the Amazon biome

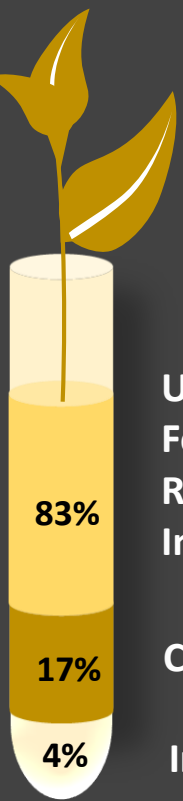
3 Main bioinputs



Main Brazilian States

Kinds of Applicants

4% filed in partnerships presenting two kinds of applicants

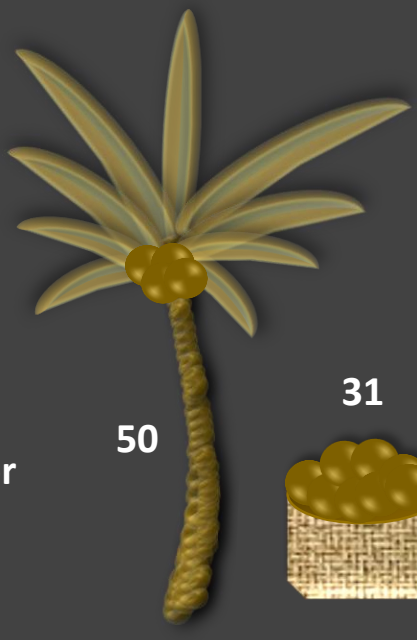


Universities, Foundations, or Research Institutions

Companies

Individuals

Top Applicants



UFPA	INPA	UFMA	UFCE	Natura
50	31	29	28	23

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Bioinputs from the Amazon region

Sample 2: Search by keywords for the selected bioinputs

Origin of the applicant

	1 ª	2 ª	3 ª
World	China (18.965)	US (3.778)	Brazil (1.702)
Brazil	Brazil (1.656)	US (730)	Switzerland (385)

Brazil x World

World 43.399

Brazil 4.068

5 Main bioinputs

1ª Cacau

World 20.745 BR 1.762

2ª Mandioca

World 15.264 BR 989

3ª Guaraná

World 1.254

3ª Babaçu

BR 332

4ª Babaçu

World 1.056

4ª Açaí

BR 232

5ª Unha de Gato

World 1.26

5ª Urucum

BR 178

Nestlé (667) **World** — Cacau (616)

Nestlé (279) Brazil — Cacau (169)

Kvasenkov Oleg Ivanovich (498) **World** — Cacau (495)

BASF (99) Brazil — Cacau (76)

Universidade Guangxi (236) **World** — Mandioca (232)

BAYER (57) Brazil — Cacau (40)

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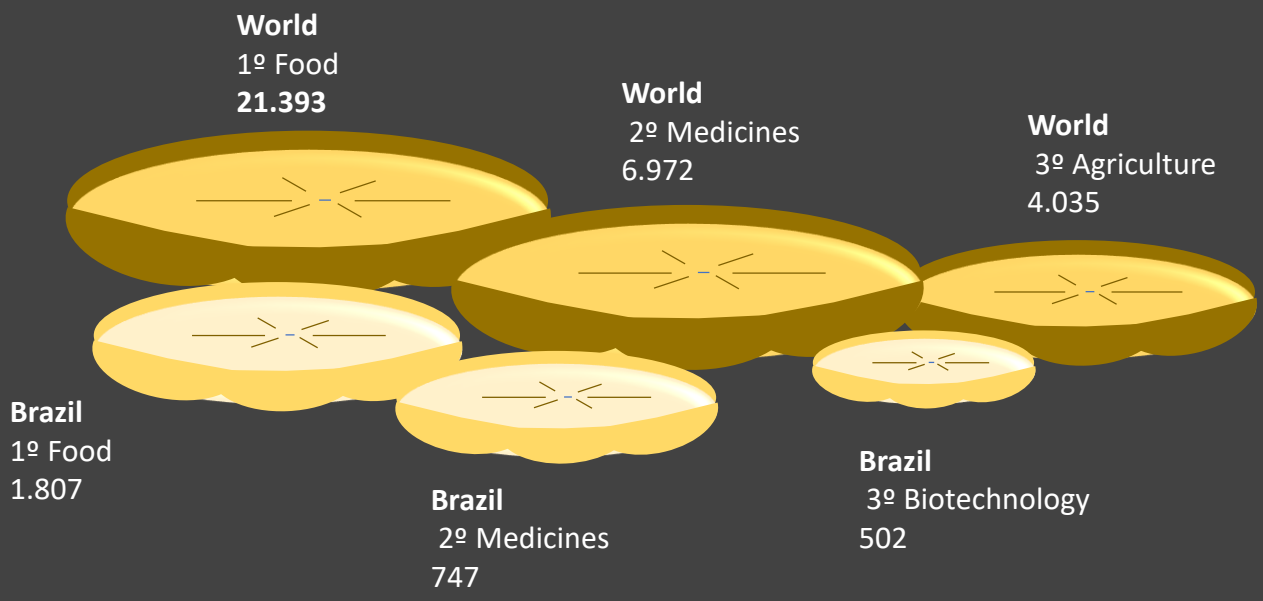
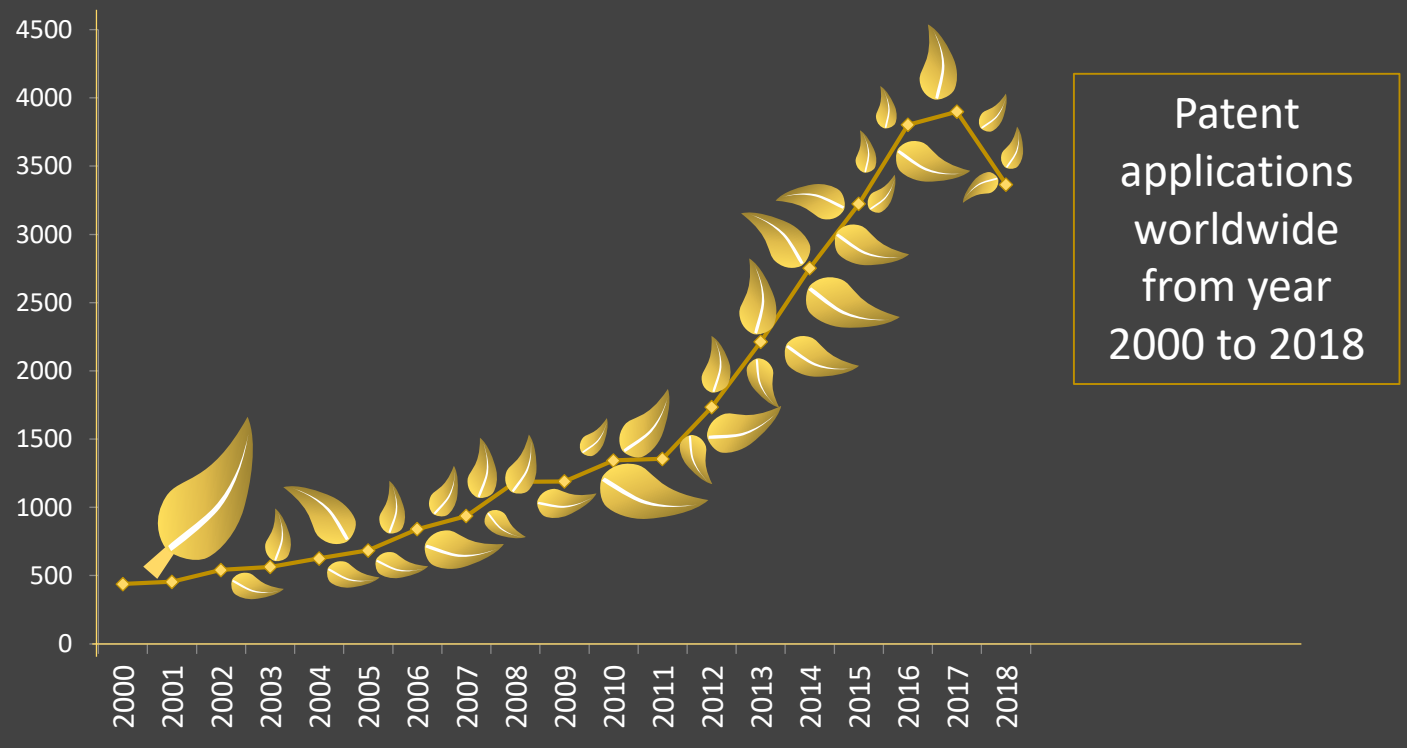
Bioinputs from the Amazon region

Sample 2: Search by keywords for the selected bioinputs

3 Main technological fields



Number of patent applications *X* time (years)



1. Introduction

1. Introduction

In Brazil, there are two main geographic definitions for the Amazon region: "Amazon biome" and "Legal Amazon." The Amazon biome has 4.2 million km^2 and consists of a set of ecoregions, wildlife, flora, dynamics, and similar ecological processes, being composed of humid rainforests, an extensive hydrographic network, and huge biodiversity, representing 48% of the national territory.

On the other hand, the so-called Legal Amazon has approximately 5 million km^2 and includes the entire area of the Amazon biome, in addition to part of the Cerrado and Pantanal biomes, covering all states in the North Region (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, and Tocantins), and also includes Mato Grosso and part of Maranhão. The Legal Amazon represents 59% of the national territory.

Another widely used concept refers to the "Pan-Amazon," a territory that goes beyond Brazil and is also distributed among eight other countries. The Pan-Amazon has an estimated area of 7.8 million km^2, of which Brazil holds 64%. Next come Peru (10%), Bolivia (6%), Colombia (6%), Venezuela (6%), and the remaining (8%), which is distributed between Ecuador, Guyana, French Guiana, and Suriname.

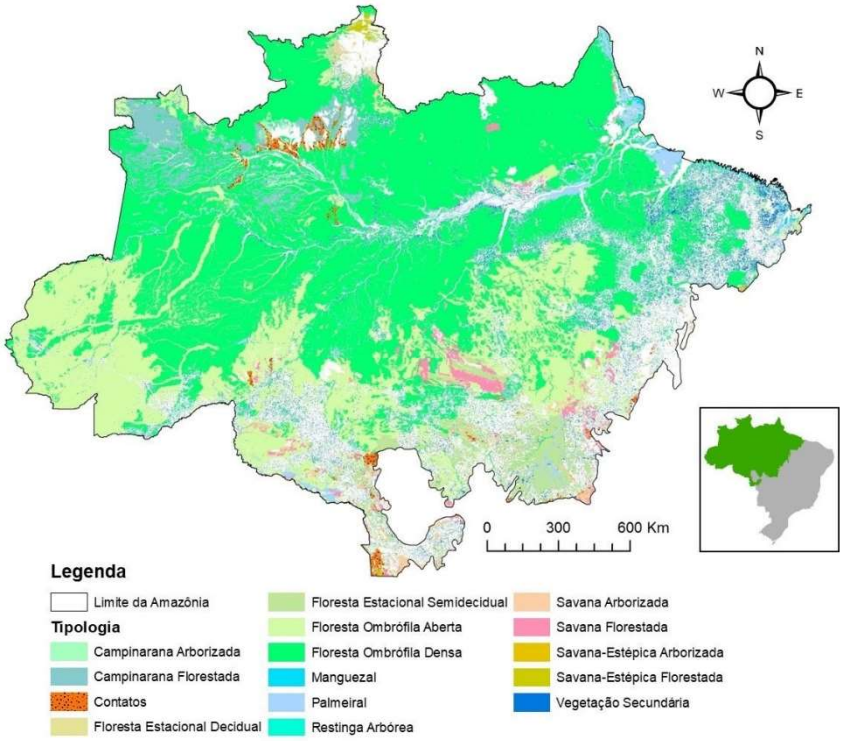
Such immensity positions the Amazon Forest as the largest rainforest, largest drainage basin, and the largest reserve of biological diversity in the world. At least about 40 thousand plant species were scientifically classified in the Amazon biome, including important medicinal and forestry species; 400 species of mammals; 1,300 species of birds; 400 species of reptiles; 3 thousand species of fish, and 128 thousand species of invertebrates – representing 22% of the wildlife species on the planet. Additionally, the Amazon Forest has huge cultural wealth, reflected in the ethnic formation of its population, which houses 56% of the Country's indigenous population, in addition to traditional communities such as *ribeirinhos*, *seringueiros*, *quilombolas*, and "forest peoples." Such a set of factors emphasizes the geopolitical and social importance of the region, and the consequent economic potential, which can be achieved through sustainable activities based on new technologies and in-depth knowledge of the forest – in other words, through the *bioeconomy*.[1]

In the last few years, we have seen alerts appear with increasing frequency regarding the need to change traditional economic models in light of the degradation of natural resources and the global climate emergency. Although there is no consensus on the definition of *bioeconomy*, it is generally understood that it is an economic model based on the preservation of biodiversity. Thus, the perspectives appointed by science on the need for mitigation and adaptation in the short term, against problems such as the depletion of renewable resources or climate change, favor the emergence of several initiatives and movements aimed at sustainability, around a regenerative, low-carbon, transparent, and socio-environmentally responsible economy.

[1] According to IPEA (2017, p. 219), "In general, the bioeconomy can be defined as an economy in which the basic pillars of production, such as materials, chemicals, and energy, are derived from renewable biological resources. In this "new" economy, the transformation of biomass plays a central role in the food production, pharmaceuticals, fibers, industrial products, and energy."

1. Introduction

Figure 1. Map representing the distribution of forests in the Amazon biome



Source: National Forest Information System (SNIF)

In this scenario, the Amazon Forest can be viewed as an important investment location for the development of sustainable production chains. Several initiatives show the multiplicity of players seeking synergies and paths to structuring the bioeconomy of the future in the Amazon. One of these initiatives consists of the search for a better operation model for the Amazon Biotechnology Center (CBA), created within the scope of the Brazilian Molecular Ecology Program for the Sustainable Use of Biodiversity (PROBEM), in 2002, and whose mission is to promote technological innovation of processes and products, encouraging and creating the basic conditions to support the development of the industrial activities based on the sustainable exploitation of Amazonian biodiversity. As a Technological Center, the main purpose of the CBA is to change the knowledge generated from existing research institutes into products with added value throughout the production chain, developing products and processes in partnership with educational and research institutions and the private sector.

Regarding the development of innovative products and processes, information on patent applications are instruments of great value for technological prospecting, providing relevant information on technological development in the areas of interest. In this sense, the technological information obtained from the mapping of patent applications filed in areas related to the bioeconomy can be considered an important component of the CBA's activities, especially for the "Biobusiness" unit, as they may assist in the construction of a strategic view supported by data.

1. Introduction

Based on the list of information generated through the study of patent applications filed, which use regional raw material, for example, the CBA can analyze information from these applications to identify niches or any possible gaps where it could contribute to the development and product or business maturation based on these innovations. There is also the opportunity to identify inventors and applicants in the area, who can be consulted regarding their possible interest in the services that the Center provides. This enables the joining of potential interests of both parties, technologies developers, and CBA, which allows, on the one hand, the achievement of an important purpose of the industrial property rights protection system, which is the generation of revenue and income from the development of products with technologies targeted for patenting, as well as the promotion of business focused on the region, one of the objectives of the CBA.

Therefore, the objective of the study is to build an updateable database, containing patent applications related to the use of bioinputs from the Amazon, filed in Brazil and abroad, aiming to subsidize the development of business prospecting activities that are linked to these bioinputs. Thus, the study aims to support the new competencies to be assumed by the CBA, from identifying and promoting business opportunities, actively searching for potentially interested parties in product development, to using technical resources from the CBA itself to implement the prospected business, carrying out research and development required for the product, depending on the characteristic/nature of the activity.

2. Contextualization

2. Contextualization

This section will contextualize the issue of biodiversity in Brazil, the origin of conservation policies and the use of biotechnology for the development of the Amazon, and the connection with the creation of the Amazon Biotechnology Center (CBA).

2.1. Origin of the current law Framework for biodiversity in Brazil

In June 1992, in Rio de Janeiro, the first United Nations Conference on Environment and Development, Eco-92, was held, when the Convention on Biological Diversity (CDB)[2] was established, one of the most important international instruments related to the environment, structured around three pillars: conservation of biological diversity, sustainable use of biodiversity, and benefit-sharing arising from the use of genetic resources. The CBD was ratified in Brazil by Federal Decree No. 2,519 of March 16, 1998.

In 2001, Brazil became one of the pioneering countries in issuing legal provisions regulating access to biodiversity in line with the Convention – a critical issue when we talk about biotechnological development. Through Provisional Measure No. 2,186-16 of August 23, 2001, the regulation of access to the country's flora and wildlife bioinputs, called "genetic heritage" – PG was initiated, along with associated traditional knowledge and the division of its benefits. The intention was to avoid biopiracy and guarantee the distribution of income arising from the use of this biodiversity fairly and equitably. However, the Provisional Measure (MP) was the target of several criticisms, both from the civil society and the scientific community, who called for laws and regulations that would not create obstacles to innovation[3]. It is important to note that MP No. 2,186-16/2001 also established a close relationship between access and benefit-sharing activities with the obtaining of industrial property rights, the granting of which is the exclusive duty of the Brazilian National Institute of Industrial Property – INPI. In its art. 31, the MP expressly conditioned the granting of industrial property rights to an application/registration or product obtained from a sample of a genetic heritage component on compliance with its provisions.[4]

The recognition of the value of biotechnology for the development of the Amazon, in itself, had as its first milestone the enactment of Decree No. 4,284 of June 26, 2002, that created the Brazilian Molecular Ecology Program for the Sustainable Use of Amazonian Biodiversity (PROBEM), aiming at, among others, implementing and ensuring operation of laboratory structures and technical and scientific training in the fields of bioprospecting, biotechnology, and the creation of bioindustries in the Amazon region.[5] Within the scope of PROBEM, the Amazon Biotechnology Center (CBA) was created

[2] https://www.gov.br/mma/pt-br/assuntos/biodiversidade/convencao-sobre-diversidade-biologica/textoconvenoingles.pdf
[3] https://portal.fiocruz.br/lei-da-biodiversidade
[4] https://www2.camara.leg.br/legin/fed/medpro/2001/medidaprovisoria-2186-16-23-agosto-2001-389646-publicacaooriginal-1-pe.html
[5] http://www.planalto.gov.br/ccivil_03/decreto/2002/D4284.htm

2. Contextualization

aiming at promoting technological innovation of applications/registrations and products, encouraging and creating the basic conditions to support the development of industrial activities based on the sustainable exploitation of Amazon biodiversity.

At the international level, one of the main progress in this post-Eco-92 period was the entry into force in October 2014 of the "Nagoya Protocol" – the simplified name by which the "Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity" is known. The Protocol is an international agreement supplementary to the Convention, to recognize common rules, such as: the sovereignty of the parties over their genetic resources; the country's authority to determine access to these resources; the access and protection of associated traditional knowledge (CTA) through prior and informed consent and mutually agreed terms; and the fair and equitable sharing of benefits arising from the use of genetic resources and CTA. Brazil ratified the Protocol on March 4, 2021, joining 130 other countries.[6]

Returning to Brazilian scenario, after 15 years of discussions and the maturation of the first law framework, Provisional Measure No. 2,186-16 of 2001, was enacted into Law No. 13,123 of May 20, 2015, which still governs access to genetic resources, the protection and access to associated traditional knowledge, and the sharing of benefits in the country[7]. The so-called "Biodiversity Law" was regulated one year after its enactment by Decree No. 8,772 of May 11, 2016, with its management assigned to the Genetic Heritage Management Council (CGEN).[8]

The current laws and regulations have brought progress in relation to the previous one, making the procedure simpler, and better defining what is characterized as genetic heritage, how access activities should be developed, and what the rules are for benefit-sharing. The "Biodiversity Law" applies to individuals or legal entities, both domestic or foreign, who access genetic information from plant, animal, microbial species, among others, as molecules, extracts, or metabolic substances, originating from Brazilian biodiversity, with or without the aid of traditional knowledge from communities (indigenous, traditional, or local), for purposes of scientific research or technological development. With the regulation, to develop any activities based on Brazilian biodiversity, registration in the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen) became necessary. Registration does not need to be before the start of the research, but it has a certain time to happen. The irregular use of genetic heritage and traditional knowledge can be characterized as biopiracy. With the "Biodiversity Law" in effect, the executive branch has been gradually increasing public policies on this theme. More recently, on February 23, 2021, Ordinance No. 4,488 established the Brazil-Biotec Initiative within the scope of the Ministry of Science, Technology, and Innovation – MCTI, aiming at structuring actions that will contribute to the National Policy of Research, Development, and Innovation (RDI) in Biotechnology and, mainly, structuring governance and coordinating the State's efforts

[6] https://www.cbd.int/abs/doc/protocol/Nagoya_Protocol_Portuguese.pdf
[7] http://www.planalto.gov.br/CCIVIL_03/_Ato2015-2018/2015/Lei/L13123.htm
[8] http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/decreto/d8772.htm

in biotechnology[9]. Among other strategic axes, the Brazil-Biotec Initiative intends to prioritize the promotion of scientific and industrial development of biotechnology by using the regional opportunities and potential of different national biomes, including the Amazon biome.

Simultaneously, the Special Secretariat for Productivity and Competitiveness – SEPEC, of the Ministry of Economy – ME, plays a relevant role by acting through "Regional and Sectoral Programs", such as the "New Green Amazon – NAV" Program, in a partnership with the Ministry of the Environment – MMA, which aims at promoting efficient market structures, by increasing the bioeconomy and low environmental impact activities in the business environment. In this sense, SEPEC makes efforts to create the legal personality and management model of the CBA, aiming at positioning it as a center of intelligence, support, and promotion of initiatives that promote the economic, rational, and sustainable use of biodiversity of the Amazon region.

Additionally, when considering the infrastructure and the fact that there is an Industrial Hub in Manaus (PIM), as strategic and complementary to bioeconomy development efforts in the Region, it is not difficult to envisage that, with some investment, the PIM could be easily converted to bioeconomic production.

The Brazilian Industrial Development Agency – ABDI has acted to incorporate the ESG (environmental, social, and governance) agenda both in its business processes and through new projects or strategic programs. Thus, under the umbrella of preparing the Agency 's action plan for 2023, the New Business Unit, in addition to strengthening the green economy aspect in its Smart Cities projects, is outlining other projects with an emphasis on bioeconomy.

We note that on this topic, ABDI joined the Amazon+21 Institute, which has the main objective of supporting the conduction of innovative impact businesses, which are capable of fostering and promoting the social, environmental, and economic development of the Amazon region.

2.2. Publication and objectives of the new CBA

The Amazon Biotechnology Center (CBA) is installed in a built area of 12 thousand square meters in the city of Manaus (AM), where 26 laboratories are distributed, together with an extract production center, an industrial pilot plant, and a business incubator, structured with equipment containing state-of-the-art technology that requires highly specialized human capital. Structured mainly based on investments made by Manaus Free Trade Zone Superintendence – Suframa, the CBA aims at creating economic alternatives through technological innovation for the best economic and social use of Amazon biodiversity sustainably.

The public administration has made efforts to give the Center a legal personality, aiming to expand and give greater flexibility to its activities, including funding efforts, in addition to budgetary allocation and cooperation with other entities, and the best way found to be publicizing the CBA management.

[9] https://www.in.gov.br/en/web/dou/-/portaria-n-4.488-de-23-de-fevereiro-de-2021-304912373

2. Contextualization

In the role of idealizer or builder of the targeted production chains, the new CBA has the potential to develop three business units with the capacity to arouse market interest: (i) Biobusiness Unit (prospecting and organizing business plans); (ii) Research and Open Laboratory Unit – OpenLab (laboratories that can be subdivided into autonomous units); and (iii) Project Office Unit – PMO (management of commissioned projects and technical and financial feasibility studies).

In the publicity study for the new CBA[10], three major fields of action were suggested:

a) Food Industry
b) Wellness Industry
c) Renewable Chemical Industry

To demonstrate the potential for research and future works in these areas, we present below a portrait of patent applications filed in Brazil and abroad related to bio-bioinputs originating from the Amazon biome.

[10] https://www.gov.br/produtividade-e-comercio-exterior/pt-br/assuntos/servicos-sociais-autonomos/cba/arquivos/cba___estudo_de_publicizacao___versao_3.pdf

3. Methodology

3. Methodology

In this study, to retrieve patent applications related to Amazon bioinputs, three different approaches were taken (below referred to as samples 1, 2, and 3). In general, the first approach was based on the recovery of patent documents that indicated to the INPI, that they had accessed the Brazilian genetic heritage (PG) in the Amazon biome; the second approach was based on the recovery of patent applications whose titles or abstracts mention the use of plant species known to belong to the Amazon biome; and, finally, a search was carried out to recover patent applications/patents that had made reference to the Amazon region in their title, abstract, or claims.

3.1. Sample 1– Patent applications that provided access to the genetic heritage of the Amazon

As seen previously, Law No. 13,123 of May 20, 2015 (new Biodiversity Law), provides for access to genetic heritage (PG), protection and access to associated traditional knowledge (CTA), and the benefit-sharing for the conservation and sustainable use of biodiversity. In its Article 47, it conditions the granting of patent applications obtained through access to the PG or the national CTA, to registration or access authorization obtained from the Genetic Heritage Management Council (CGEN). Therefore, all patents filed with INPI whose inventions have access to the PG shall present the registration number or access authorization to the Institute.

Thus, this first approach was based on the identification of patent applications/patents where access to PG in the Amazon biome was declared. To retrieve these documents, all patent applications that contained a positive declaration of access to the PG were searched in INPI database. Then, using public data made available by SisGen (https://sisgen.gov.br/páginas/pubpesqatividade.aspx), a list was generated containing all PG access logs submitted to SisGen that were carried out in the Amazon biome, or in any of the states that compose the legal Amazon. This information was then cross-referenced, identifying among the patent applications/patents that contained an access log to the PG that was carried out in the Amazon. It is important to highlight that, to build the database with patent applications/patents that accessed PG from the Amazon biome, applications/patents that did not contain an identification of the access number or presented an access number granted by other institutions (MMA, Brazilian Institute of Environment and Renewable Natural Resources – IBAMA, CGEN) were verified manually, seeking to identify the PG component accessed and its origin.

It is worth highlighting two considerations in relation to the documents that compose this sample. One is that the patent applications/patents declared that the PG used in the invention was obtained from the Amazon biome, which does not necessarily imply that this PG is endemic, original, typical, or predominant in that region. Also, this strategy allows the search only for patent applications filed in Brazil.

3. Methodology

3.2 Sample 2 – Patent applications that mention the use of bioinputs belonging to the Amazon biome

When evaluating the set of documents from Sample 1 (item 3.1), it can be verified that technological development originating from species obtained from the Amazon is associated, more frequently, with bioinputs originating from plant species and, to a lesser extent, from animal species and microorganisms.

Considering the size of the Amazon biome, which has more than 40 thousand plant species, it was found that carrying out an exhaustive search strategy would not be feasible. Therefore, we sought to establish a list of relevant Amazon species to compose the search strategy. For that purpose, data from the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen) were used, as research and technological development activities developed based on Brazilian biodiversity shall be registered in the system, recording data such as the species used, in addition to the respective biome where access was made (under article 22 of Decree No. 8,772 of May 11, 2016). Thus, we come to the list of flora species with the greater amount of access logs in SisGen, whose declared access location was the Amazon biome.

Annex 1 presents the 72 components of the flora with more than 40 applications for access to the PG, registered in SisGen, for the Amazon biome. As it deals with Amazon flora bioinputs with the greater amount of records associated with research and technological development, we understand that this list reflects the most relevant bioinputs from a scientific and technological perspective, which would indicate a potential economic attraction for them.

The list generated with the main plant species, regarding access to the Amazon PG, revealed both species associated with the Amazon biome, as well as species widely distributed in the Brazilian territory, such as, for example, *Ananas comosus* (pineapple), *Psidium guajava* (guava), *Passiflora edulis* (passion fruit), *Anacardium occidentale* (cashew), among others. Given the focus of the study on species endemic or typical of the Amazon, only species whose distribution was exclusive to the Amazon phytogeographic domain or were distributed in only one other phytogeographic domain (Cerrado, Atlantic Forest, Pantanal, Caatinga, or Pampa), in addition to the Amazon itself, were selected from this list, according to data related to each species available in *Flora e Funga do Brasil* (*Jardim Botânico do Rio de Janeiro*). Available at: < http://floradobrasil.jbrj.gov.br/ >.

Additionally, to enrich the sample, some other species were included in the list, whose distribution occurs in the Amazon phytogeographic domain, and which, although they did not appear among the most accessed in SisGen, are well-known and recurrently evidenced in bibliographies as being of relevance to the region.

Thus, based on such criteria, a list of plant bioinputs from the Amazon relevant to composing the search strategy was created, containing 59 bioinputs where, for each of them, a search strategy was written using the binomial names associated with the plant bioinput, their respective synonyms defined in the scientific nomenclature (according to

the species data in *Flora e Funga do Brasil*) and, when possible, the popular names in Portuguese, English, and/or Spanish, according to Annex 2.

Each bioinput was named and will be treated throughout the text according to its most common popular name. Such a choice was necessary given that the same element of flora can have several different associated species, such as, for example, *açaí*, which represents the species *Euterpe oleracea* and *Euterpe precatoria*. For bioinputs that did not have a popular name, we maintained the scientific nomenclature to designate them, for example, *Piper aleyreanum*.

In a search for the bioinputs "*sangue-de-drago*", "*unha-de-gato* (cat's claw)", and "*arroz silvestre*" (wild rice), the respective popular names were not used as keywords, as such common names designate very distinct plant species, not related to the Amazon or even Brazilian flora. In these cases, it was decided to restrict the search to the binomial names of plant species. The keywords for each of these strategies were searched in the title and abstract fields, in the *Derwent Innovation – DWPI* patent database. Each of the strategies was validated by reading the titles and abstracts of the documents retrieved, aiming to identify potential situations in which foreign contents were recovered, not related to the plant species sought, which, perhaps, were covered by the use of the keywords that composed the search strategy[11]. In samples with more than 500 documents, reading was carried out by sampling. Such validation of the results also allows us to verify whether the search strategies could be executed automatically, allowing periodic monitoring of patent applications related to the use of bioinputs in the region.

Finally, data arising from the different searches were compiled and harmonized using the *Vantage Point* tool.

3.3. Sample 3 – Patent applications that mention the Amazon region

In this search strategy, keywords linked to the Amazon region were used, using the spellings in Portuguese or English searched in the title, abstract, or claims (CTB) fields of the *Derwent Innovation* database. The search strategy is structured in Chart 1. The recovered documents were read to validate the search strategy and verify how much content can be aggregated in an automatic execution.

[11] When validating the search results for each of the bioinputs, some applications retrieved by the keywords were identified, but which were not related to the bioinputs, which were manually removed from the sample. Namely: i) *açaí*: endocunlease AcaI and Borrelia strain ACAI; ii) *Mandioca* (cassava): cassava vein mosaic virus CsVMV; iii) *Castanha do Brasil* (Brazil Nuts): Brazil nut effect; iv) *Bacuri*: Romanian applications (*bacuri* means tank); v) cocoa: synthetic cocoa butter; vi) *Jambu*: *jambu* wax, *jambu* beej, *jambu* biji, and applications from Indonesia (*jambu* means guava);

3. Methodology

Chart 1 – Search strategy for surveying patent applications related to the Amazon region.

Keywords used to search titles, abstracts, and claims
CTB=((amazonia OR amazonense OR amazonica OR amazonico OR amazonian OR (amazon NEAR5 (plant* OR seed* OR extract* OR animal* OR insect* OR specie* OR fish* OR frog* OR wood* OR snake* OR vegetal* OR spider* OR root* OR fruit* OR mushroom* OR leaves OR grass OR tree* OR flower* OR stalk* OR forest)) NOT azospirillum) OR CTB=((brazilian NEAR5 forest) OR (Floresta NEAR Tropical) OR (tropical NEAR Forest))

Chart 2 summarizes the main characteristics of the samples analyzed.

Chart 2. Main characteristics of the samples analyzed

	Sample 1	Sample 2	Sample 3
Data recovery strategy	Indication of access to PG in the Amazon biome	By keywords for the selected bioinputs	By keywords related to the Amazon region
Coverage	Applications filed only in Brazil	Applications filed in Brazil and the World	Applications filed in Brazil and the World
Database where the search was carried out	BINTEC (INPI – technological information)	*Derwent Innovation*	*Derwent Innovation*
Recovered bioinputs	Any bioinput whose genetic heritage was accessed in the Amazon (flora, wildlife, microorganisms)	Restricted to selected Amazon flora species	Any type of technology that mentions the Amazon region

3.4. Determination of the technological areas of patent applications regarding the Amazon bioinputs

To map the technological areas of the applications raised in this study, the international patent classification (IPC) and the cooperative patent classification (CPC) were used, considering that these classifications organize patent documents into types of technologies. The classifications were grouped according to related technological areas, leading to the division of the sample into 13 categories. It is important to note that almost the entire sample was included in the created categories and that the same patent application can be categorized into more than one technological area. Chart 3 lists the 13 categories, presenting a brief description of the types of technologies covered in them.

3. Methodology

Chart 3 – Technological areas for categorizing patent applications related to the use of bioinputs from the Amazon

Category	Description
Agriculture	This category includes technologies related to planting and sowing, harvest, baling, horticulture, and new plants, including machines, equipment, and agricultural tools in general.
Food and tobacco industry	This category includes food or food products, in addition to machines, equipment, tools, ovens, etc.; processing or preserving food; tobacco and cigarettes.
Biofuels	This category includes fuel obtained from biomass.
Biotechnology	This category includes microorganisms or enzymes, their detailing, propagation, and conservation, in addition to technologies involving genetic engineering or mutations.
Cement	This category includes cement, concrete, artificial stone, ceramics, refractories, and mortar.
Macromolecular organic compounds	This category includes organic macromolecular compounds and their detailing, including natural polymers and their derivatives.
Cosmetics	This category includes cosmetics or similar preparations for personal hygiene.
Packaging and packaging machines	This category includes packaging, packaging and transport machines.
Fertilizers	This category includes the composition and manufacturing of fertilizers.
Medicines	This category includes medicinal preparations.
Vegetable oils	This category includes animal or vegetable oils, fats, fatty substances or waxes, fatty acids derived therefrom, and detergents.
Pesticides and pest control	This category includes pesticide or herbicide compounds and compositions, pest repellents or attractants, as well as non-chemical means for capturing or repelling harmful animals or plants.
Textile and paper	This category includes elements for textile production and papermaking and pulp production.

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Patent applications that indicated access to the Amazon's genetic heritage

The patent documents filed in Brazil, in which the applicants state that they have accessed the genetic heritage of Brazilian biodiversity in the Amazon to develop potential new products and/or applications/registrations, were retrieved through the search strategy described in item 3.1 (Sample 1). Among the patent applications that presented a positive declaration of access to genetic heritage to INPI, about 14% were identified as having the location of this access in the Amazon biome, amounting to 287 documents.

In relation to these patent applicants, it was verified that they all have Brazilian ownership, with 1% of the applications recording foreign co-ownership. About 6% of these patent applications sought international patent protection for their potential inventions, through the submission of an international patent application under the Patent Cooperation Treaty (PCT), among which it is possible to mention applications filed, for example, by Natura, the National Institute of Amazonian Research – INPA, and the company Amazônia Fitomedicamentos LTDA. It was also observed that approximately 3.5% of these patent applications have foreign priority, i.e., they were initially filed outside Brazil and were later filed with INPI. As an example, there were applications from Natura with French priority and American priority.

Figure 2 shows the main patent applicants at INPI who declared having accessed the genetic heritage of Brazilian biodiversity in the Amazon. There is a predominance of patent applications filed by public, federal, and state universities, with only one company in the list of the 10 largest applicants: Natura, with 28 patent applications. It is also observed that five of the 10 largest applicants in this sample are institutions located in the territory of the Legal Amazon, the first 3 being the Federal University of the State of Pará, INPA, and the Federal University of Maranhão, in addition to the University of Amazonas Foundation and the State University of Pará in seventh and eighth position, respectively.

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Figure 2. Number of patent applications from the main applicants who state having accessed the genetic heritage of Brazilian biodiversity linked to the Amazon

It is worth mentioning that a patent application can have more than one applicant, and among company applications, 4% were filed in partnerships with universities, foundations, or research institutions. This demonstrates how research and the generation of patents are still very concentrated in the academic environment. This pattern is similar to that observed for the largest national patent applicants, whose ranking is dominated by public universities[12]. Figure 3 shows the distribution of applications/patents by type of applicant.

[12] https://www.gov.br/inpi/pt-br/central-de-conteudo/estatisticas/estatisticas

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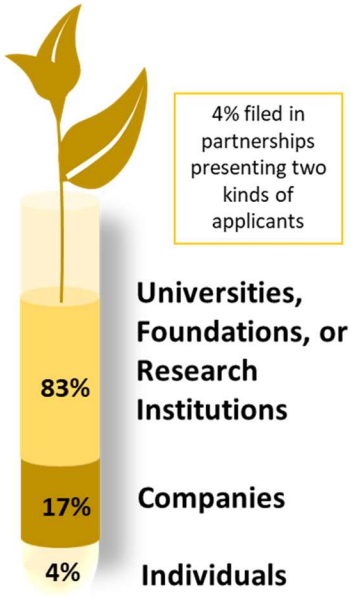
Figure 3. Distribution of patent applications filed with INPI that indicated access to the Amazon PG, according to the type of applicant.



It is possible to verify a wide variety of Brazilian biodiversity bioinputs associated with the potential inventions described in the patent applications that declared access to the PG of the Amazon biome, including microorganisms and animals, however, we note a clear predominance of the application of Brazilian flora species to technologies described in these documents.

When analyzing this group of patent documents (Sample 1), the main bioinputs identified in descending order of quantity are: *açaí* (10.1%), *cupuaçu* (5.6%), *babaçu* (4.9%), *castanha de caju* (cashew nut) (3.5%), *buruti* (3.1%), *castanha do Brasil* (Brazil nuts) (3.1%), *pupunha* (peach palm) (3.1%), *camu-camu* (2.8%), *copaíba* (2.8%), *jambu* (2.8%), *mandioca* (cassava) (2.8%), *cacau* (cocoa) (2.4%), *murumuru* (2.4%), *andiroba* (2.1%), *maracujá* (passion fruit) (2.1%), *tucumã* (2.1%), and *cubiu* (cocona) (1.7%). The percentage values of the three main bioinputs are represented in Figure 4.

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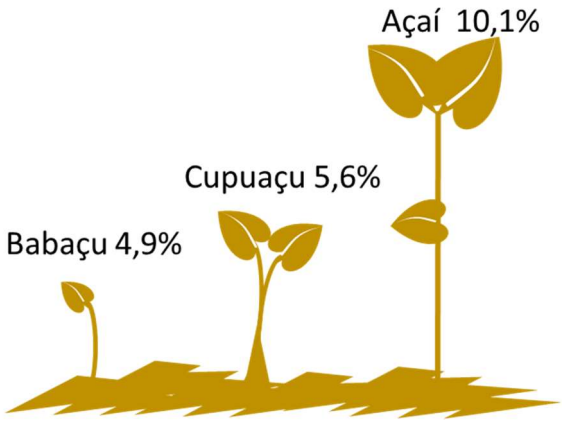
Figure 4. Percentage of patent applications that refer to the three main bioinputs originating in the Amazon when analyzing the sample of applications that indicated access to the Amazon PG.

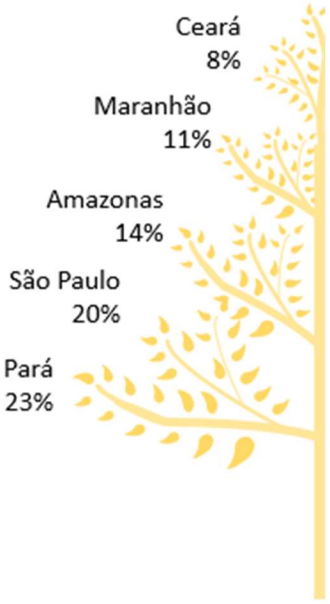


We also note that in relation to the technological areas referred to in the patent applications that declared access to the Amazon PG, about 40% are technologies related to "Medicines", 19% "Food," and 16% "Cosmetics." Patent applications related to "Biotechnology" and "Pesticides and pest control" each represent around 8% of the sample (data not shown). It is worth mentioning that the same patent application can be categorized into more than one technological area. Thus, it can be noticed that the two areas, the "Food Industry" and "Wellness Industry", defined as CBA's fields of action, match the areas that have relevant patent filing activity in the set of documents under analysis.

Considering the Brazilian states where the patent applicants that compose sample 1 reside, we noted that the states of Pará and São Paulo are the locations of the applicants with the greatest representativeness, followed by Amazonas, Maranhão, and Ceará. Figure 5 shows the 5 federative units (state) with the greater amount of patent applications with access to the Amazon PG registered in INPI database.

4. Results and Discussion

Figure 5. Percentage of applications from the 5 states that presented the greater amount of patent applications with access to the Amazon PG in INPI database.



Also, with respect to applications declaring access to the PG, there is a concentration of applicants in the Amazon region, especially the states of Pará, Amazonas, and Maranhão. Such a confluence of applications in the states of the North region deviates from the general pattern of national applications, suggesting a differentiated and specialized competence in the development of research and innovations based on Amazon biodiversity.

Despite being located outside the region of the Legal Amazon, the states of São Paulo and Ceará are among the 5 main states with patent applications. The strong presence of applications originating in the state of São Paulo is not surprising and is a trend in patent applications by Brazilian residents, due to the location of the largest research institutions in that state.

It is worth noting that, on the one hand, this search strategy can be considered more-restrictive, as it only retrieves patent applications filed in Brazil, and which declared to have accessed the genetic heritage in the Amazon region, on the other hand, when considering the source of the PG, it can be considered a more comprehensive strategy, as it recovers patent applications developed from any Brazilian species that has been obtained in this region, regardless of whether it is original or endemic to the Amazon, including animals, plants, bacteria, fungi, and virus.

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Patent applications that mention the use of bioinputs known to belong to the Amazon biome

A broader overview regarding the development of technologies related to the Amazon was built on the definition of a list of 59 bioinputs from the Amazon flora of relevance to science and technological development. For each of the bioinputs, an extensive search was performed using keywords, including the several binomial and popular names attributed to it, aiming to retrieve the patent documents associated with that bioinput, filed around the world. The method used is detailed in item 3.2. The search strategies, as well as the number of patent documents filed in Brazil and abroad, for each bioinput, can be found in Annex 2, which also presents the year of filing of the oldest application found for each bioinput[13]. Among the 59 bioinputs searched, no patent documents were found for five of them, namely: *chichuá; cipó-tuira; matamatá; Piper aleyreanum,* and *tachi-branco*.

The results of all 59 searches were gathered into a single set, reaching a total of 43,399 patent families that mention the use of these Amazon bioinputs filed around the world, of which 4,063, about 9%, are filed in Brazil, as represented in Figure 6.

Figure 6. Total number of patent families referring to Amazon flora bioinputs filed in the world and Brazil

Figure 7 shows the number of applications per year, from 1980 onwards, for the world sample (in orange) and Brazil (green). Considering the world sample (including Brazil), composed of more than 43,000 documents, there are patents whose year of publication dates back to 1830. However, the number of patent applications published until 1980 is very small, encompassing 5% of the total, and mostly related to *cacau* (cocoa). The apparent drop in the number of applications observed over the last few years represented in the graph should not be considered, as the patent applications, through a rule, take at least 18 months to be published (secrecy period).

[13] The identification of the oldest patent filed is directly related to the coverage of the patent database used. The *Derwent Innovation* – DWPI database has worldwide geographic coverage, but there is variation in chronological coverage according to the country/office.

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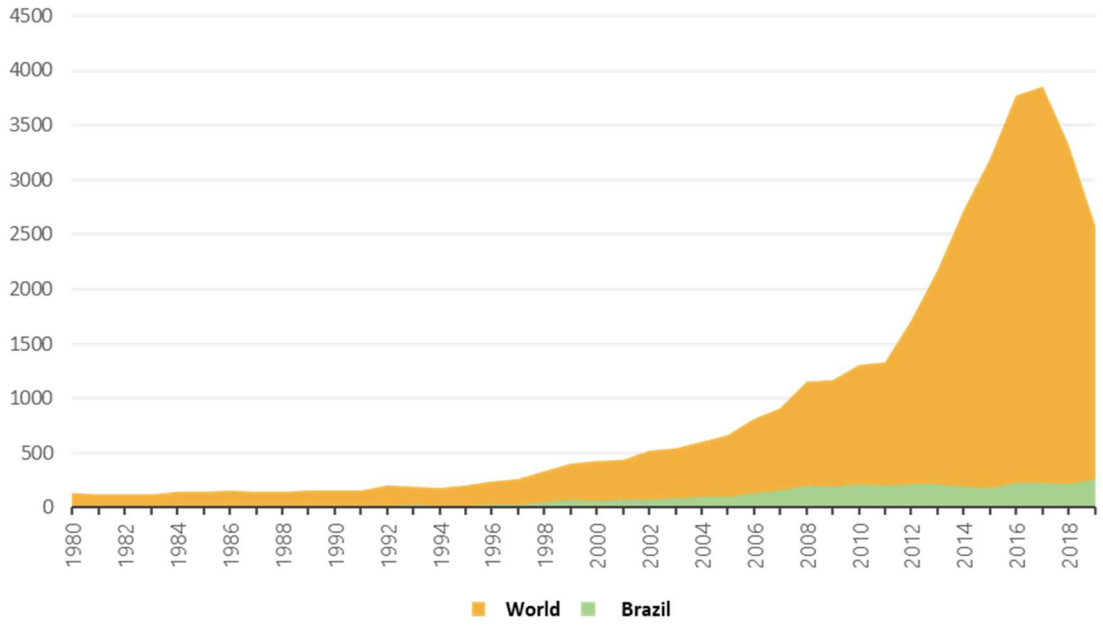
Figure 7. Number of patent applications related to Amazon bioinputs made in the world and Brazil since 1980



The number of families of patent applications for the 20 main Amazon bioinputs is presented in Table 1. The patent applications retrieved in the databases are associated with each of the bioinputs by mentioning its binomial and/or popular name in the title and/or abstract that describes the invention. Thus, it is important to note that this scope covers not only applications where the plant bioinput is described as the core of the invention but also applications where the plant bioinput is mentioned as an accessory or occasional item, regarding the invention.

The bioinputs "*cacau*" (cocoa) and "*mandioca*" (cassava) have a significant number of applications filed, highlighting them in relation to the other bioinputs analyzed in this study: they comprise 82% of the applications filed in the world and 66% of the applications filed in Brazil. Not only *cacau* (cocoa) and *mandioca* (cassava) but also *seringueira* (brazilian rubber tree) are examples of Brazilian flora bioinputs that were taken to other locations in past centuries, aiming for their economic exploitation. Thus, it is possible to note that such bioinputs are widely produced and consumed around the world, and have also been the object of research and technological development for a long time, which is manifested in the high number of applications observed.

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Table 1. List of the 20 main bioinputs identified in patent databases and the total number of applications/patents filed in Brazil and the World.

	Applications in the World	Applications in Brazil
***CACAU* (COCOA)**	20745	1758
***MANDIOCA* (CASSAVA)**	15264	988
GUARANÁ	1254	136
BABAÇU	1056	332
***UNHA-DE-GATO* (CAT'S CLAW)**	1026	16
AÇAÍ	1019	232
***URUCUM* (ACHIOTE)**	864	178
***CASTANHA DO BRASIL* (BRAZIL NUTS)**	690	148
SACHA-INCHI	579	22
***SERINGUEIRA* (BRAZILIAN RUBBER TREE)**	478	81
JAMBU	335	51
COPAÍBA	291	112
CUPUAÇU	263	105
CAMU-CAMU	210	29
***BURITI* (MORICHE PALM)**	185	88
ANDIROBA	177	104
MURUMURU	169	47
MUIRAPUAMA	139	24
JABORANDI	88	38
TUCUMÃ	83	34

In the overview of patent applications presented, it is possible to note the interest, on a global scope, in technological development using Amazon bioinputs. Several well-known bioinputs, such as *guaraná* and *castanha do Brasil* (Brazil nuts) (exclusively from the Amazon biome), and *açaí* and *babaçu* (belonging to the Amazon and Cerrado biomes), are associated with hundreds of patent applications around the world.

Among the bioinputs analyzed, it is possible to highlight, due to the most significant share of applications made in Brazil when compared to total applications (Brazil/world ratio higher than 50%), the following bioinputs: *andiroba* (104/117), *pupunha* (peach palm) (48/64), *curaruá* (34/48), *bacuri* (24/32), *patauá* (17/30), *sacaca* (12/15), *araçá-boi* (araza) (10/20), *breu branco* (9/18), *cubiu* (cocona) (9/9), *ajuru* (cocoplum) (4/8), *paricá* (brazilian fern tree) (5/5), and *piquiá* (2/3).

On the other hand, it is possible to verify a reduced number of applications in Brazil in relation to the total number of applications in the world (Brazil/world ratio less than 20%) for bioinputs: *unha-de-gato* (cat's claw) (16/1026), *guaraná* (136/ 1254), *sacha inchi* (22/579), *seringueira* (brazilian rubber tree) (81/478), *jambu* (51/335), *camu-camu* (29/210), *muirapuama* (24/139), *mogno brasileiro* (brazilian mahogany) (5/75), *sangue-*

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de-drago (10/74), *pau rosa* (5/46), *ayahuasca* (1/33), *carapanaúba* (1/6), *lacre* (0/5), *mururé* (0/3), *acapu* (0/1), *casca preciosa* (0/1), and *cunane* (0/1).

It is worth noting that several of the bioinputs analyzed had a very low or even inexistent number of patent applications filed around the world, namely: *cubiu* (cocona) (9), *mulateiro* (capirona) (9), *ajuru* (cocoplum) (8), *carapanaúba* (6), *sucuúba* (5), *saracura mirá* (5), *lacre* (5), *paricá* (brazilian fern tree) (5), *mururé* (3), *piquiá* (3), *acapu* (1), *cunane* (1), *casca preciosa* (1), *chichuá* (0); *cipó-tuira* (0); *matamatá* (0); *Piper aleyreanum* (0), and *tachi-branco* (0), indicating the still little explored potential for development and appropriation of inventions developed from these bioinputs.

Figure 8 presents the main applicants of patent applications that mention the use of bioinputs from Amazon in the world, where we noted that Nestlé leads the list amounting to 667 applications/patents and the Russian researcher Kvasenkov, Oleg Ivanovich ranks second place with 498 applications which were filed only in their country of origin, using mostly *cacau* (cocoa) as a bioinput in their applications. Among the main applicants, it is possible to identify the strong presence of affiliates of the food industry and the wellness industry, in addition to a relevant amount of applications made by Chinese universities.

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Figure 8. Main applicants in the world considering applications/patents related to Amazon flora bioinputs

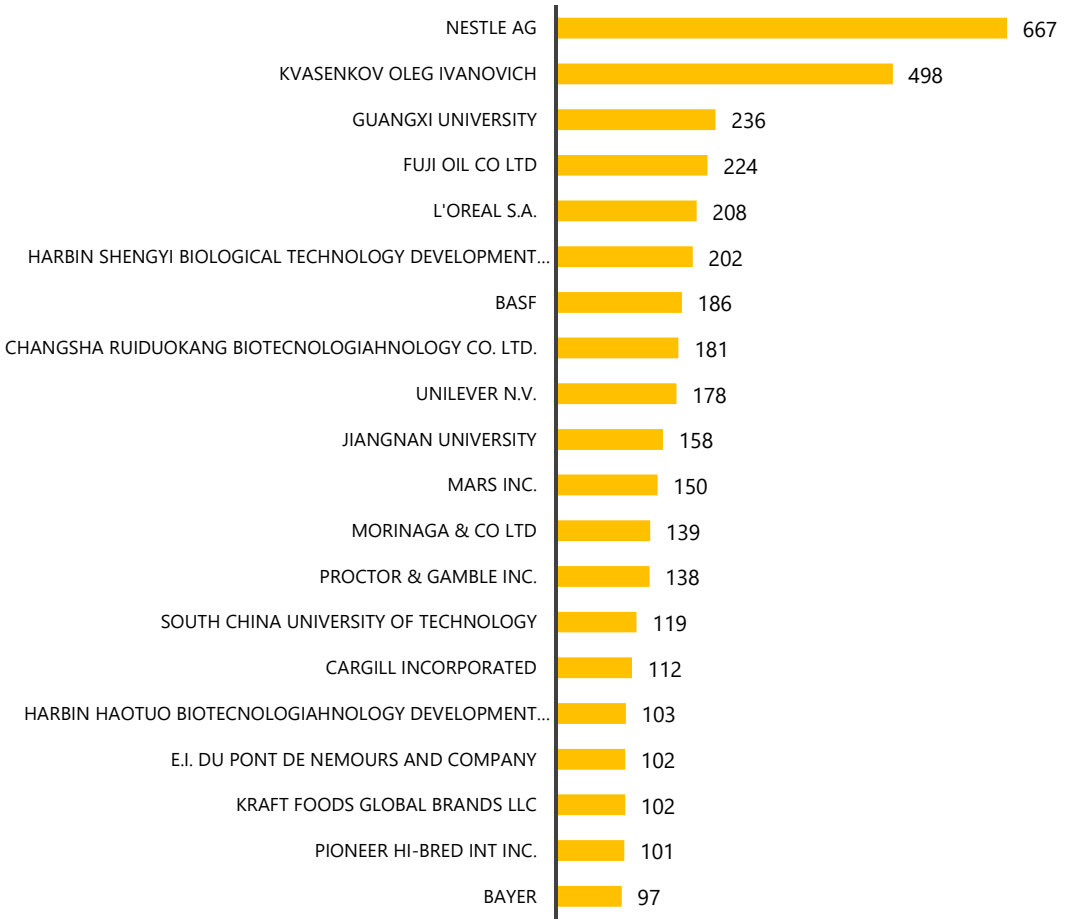

Figure 9 shows the main applicants who filed patent applications in Brazil. Among the main applicants, the company Nestlé occupies the first position, followed by the companies Basf, Bayer, and Natura. It is also worth highlighting the number of applications filed by Brazilian universities and research institutions, including some located in the Amazon.

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Figure 9. Main applicants in Brazil and total applications/patents filed in Brazil

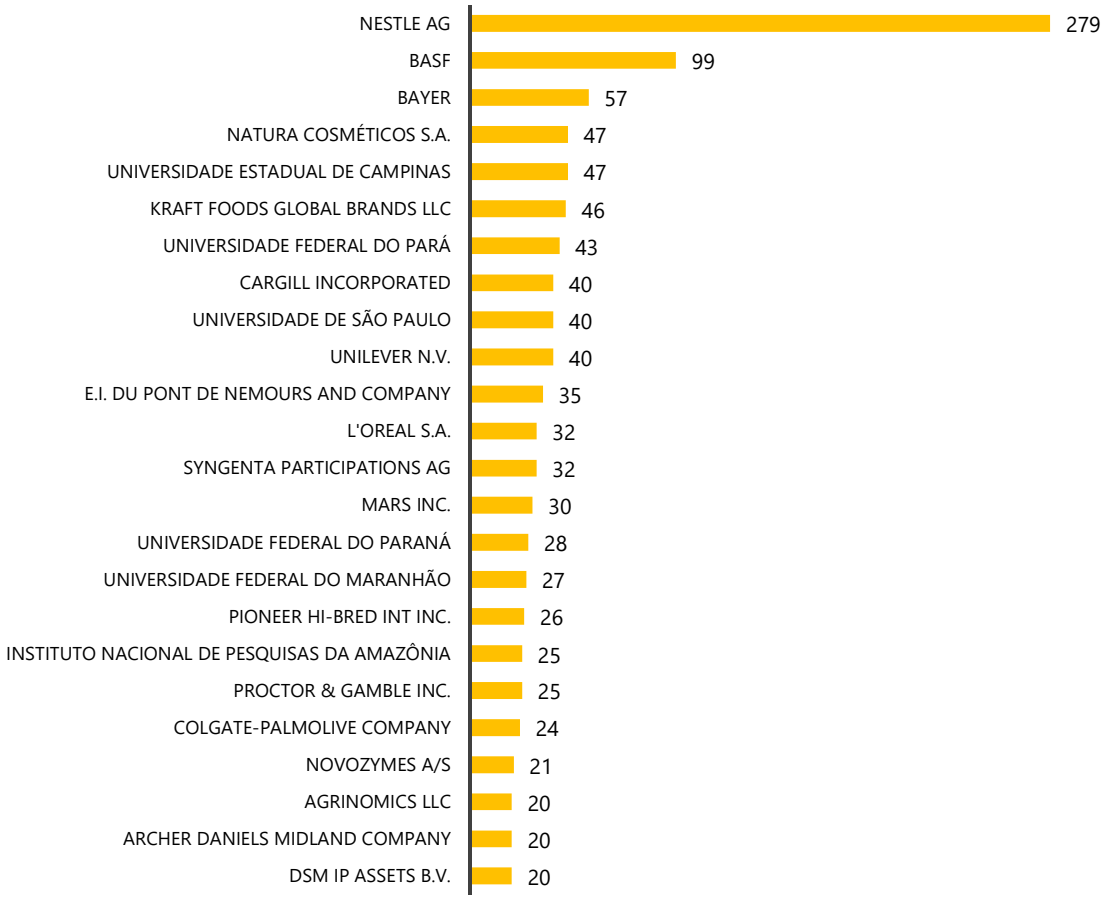

Figure 10 shows the main Brazilian applicants considering the number of patent applications in the world related to Amazon bioinputs. In the world scenario, it is possible to note that the main Brazilian applicant of patent applications with bioinputs from Amazon is the company Natura. It is also possible to note the predominance of public universities and research institutions in the list of main national applicants, among which it is worth highlighting the Federal University of the State of Pará, the Federal University of Maranhão, and the National Institute of Amazonian Research, all located in the Amazon region.

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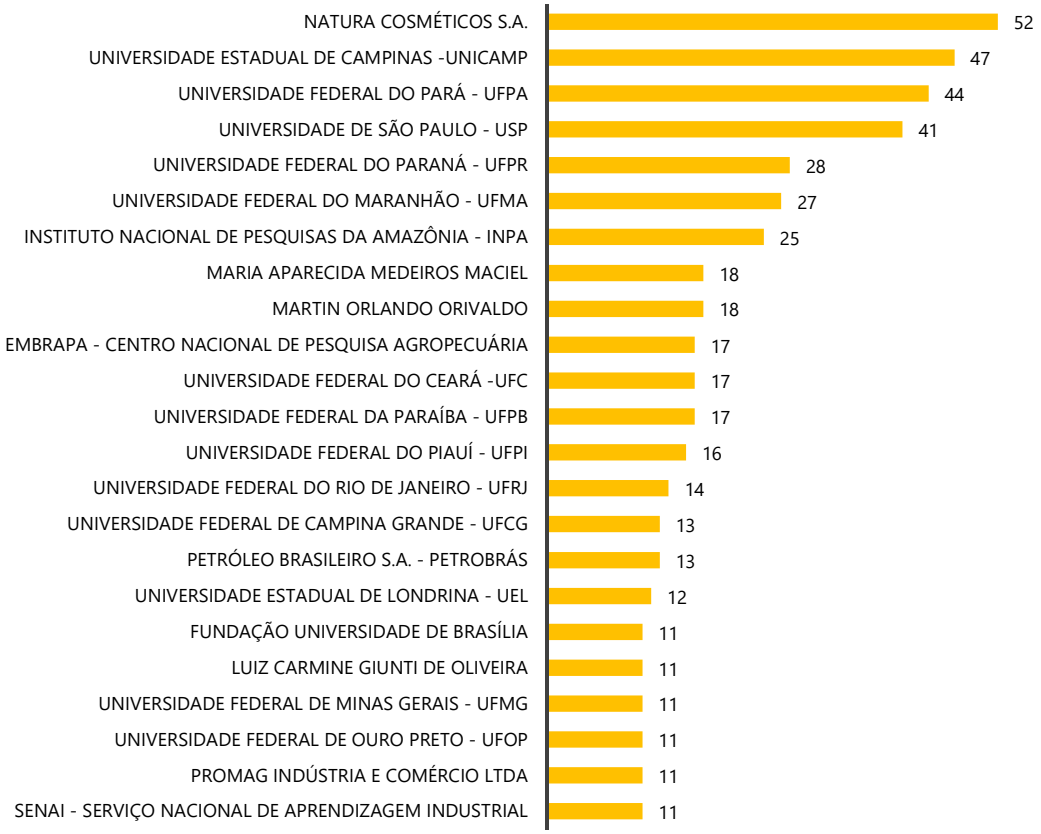
Figure 10 – Main Brazilian applicants in the world with patent applications related to Amazon flora bioinputs



It was observed that part of Brazilian applicants, in addition to filing their applications in Brazil, also sought international protection for their inventions, by submitting an international patent application under the PCT, reaching 13% of the total applications filed by Brazilians. On the international landscape, the main countries/regions where Brazilian applicants sought to file their applications were the United States, the European Union (EPO), Canada, Australia, Mexico, and China.

Another analysis performed sought to identify the main technological fields of patent applications involving bioinputs from the Amazon. To this end, the applications that compose this study were categorized into 13 technological fields, determined through the international patent classification (IPC) and the Cooperative Patent Classification (CPC). Figure 11 presents correlation matrices of the main bioinputs with each of these technological fields in the world (A) and in Brazil (B). It is worth mentioning that the same application may have been categorized into more than one technological field. For each bioinput, the first, second, and third technological fields that present the highest concentration of applications were marked in the matrix (in red, orange, and yellow, respectively).

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Figure 11. Number of patent applications referring to the main Amazon bioinputs according to their technological fields.

(A) World

Total number of Applications	20745	15264	1254	1056	1026	1019	864	690	579	478	335	291	263
Technological fields	*CACAU* (COCOA)	*MANDIOCA* (CASSAVA)	*GUARANÁ*	*BABAÇU*	*UNHA-DE-GATO* (CAT'S CLAW	*AÇAÍ*	*URUCUM* (ACHIOTE)	*CASTANHA DO BRASIL* (BRAZIL NUTS)	*SACHA INCHI*	*SERINGUEIRA* (BRAZILIAN RUBBER TREE)	*JAMBU*	*COPAÍBA*	*CUPUAÇU*
Food	12821	5966	854	204	173	584	382	412	268	11	100	25	55
Medicines	3351	682	539	202	900	355	204	83	150	32	179	131	51
Agriculture	619	3150	22	7	8	17	19	39	40	169	2	1	4
Cosmetics	1905	251	155	375	41	211	149	119	178	8	150	87	159
Macromolecular organic compounds	359	2370	10	73	3	17	31	9	6	74	2	20	10
Biotechnology	872	1735	18	26	12	35	31	67	16	167	1	5	7
Fertilizers	113	2106	3	2	5	4	2	4	6	3	3	2	1
Pesticides and pest control	788	581	28	32	14	29	36	34	20	44	17	37	4
Vegetable oils	991	66	9	214	5	29	28	27	39	8	17	39	18
Packaging and packaging machines	806	204	17	8	0	16	11	11	3	2	3	5	2
Textile and paper	198	665	6	22	1	8	24	9	4	6	0	15	3
Biofuels	105	656	2	115	0	9	4	7	2	11	1	5	1
Cement	41	250	1	3	1	3	5	11	1	1	0	3	1

(B) Brazil

Total number of Applications	1762	989	332	232	178	148	136	112	105	104	88	81	51
Technological fields	*CACAU* (COCOA)	*MANDIOCA* (CASSAVA)	*BABAÇU*	*AÇAÍ*	*URUCUM* (ACHIOTE)	*CASTANHA DO BRASIL* (BRAZIL NUTS)	*GUARANÁ*	*COPAÍBA*	*CUPUAÇU*	*ANDIROBA*	*BURITI* (MORICHE PALM)	*SERINGUEIRA* (BRAZILIAN RUBBER TREE)	*JAMBU*
Food	102	391	91	106	74	67	88	6	36	1	13	0	20
Medicines	305	71	45	52	49	21	55	61	22	43	25	6	25
Biotechnology	205	256	13	15	3	15	5	1	5	2	2	8	0
Cosmetics	165	31	67	27	22	30	14	33	36	34	28	1	26
Pesticides and pest control	248	96	9	4	5	12	2	11	2	19	0	17	2
Agriculture	140	204	4	8	3	10	4	1	4	1	0	37	0
Macromolecular organic compounds	43	115	35	13	9	2	2	4	9	9	10	11	1
Vegetable oils	105	16	58	8	11	5	0	9	5	14	8	1	5
Biofuels	23	78	47	8	0	3	0	2	1	2	8	1	0
Packaging and packaging machines	87	15	3	6	2	0	3	0	2	2	1	0	0
Textile and paper	24	24	7	4	7	3	0	4	2	1	5	1	0
Fertilizers	10	17	0	1	0	1	1	1	1	1	0	1	0
Cement	3	4	2	2	3	2	0	0	1	0	0	0	0

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When analyzing applications filed around the world (Figure 11A), the analysis of the Amazon bioinputs covered by the study reveals a concentration of applications in technological areas related to food, medicines, agriculture, and cosmetics. However, it is possible to notice that each bioinput has its profile of distribution of applications between the different technological fields, evidencing the unique technological development dispositions of each bioinput.

In the matrix of Figure 11A, we note bioinputs more strongly linked to the food area, such as *cacau* (cocoa), *mandioca* (cassava), *guaraná*, *açaí*, *castanha do Brasil* (Brazil nuts), *urucum* (achiote), and *sacha inchi*. There are also bioinputs with a smaller total quantity of applications, which, therefore, are not included in the matrix, which also have a relevant association with the food area, such as, for example, *camu-camu*, *sorva*, *pupunha* (peach palm), and *araçá-boi* (araza).

Some bioinputs have a stronger association with the area of medicines, such as *unha-de-gato* (cat's claw) and *copaíba*. In addition to these, we can mention other bioinputs with a smaller number of applications that also have a high proportion of applications related to the area of medicines such as *muirapuama*, *sangue-de-drago*, *caiaué* (american oil palm), *breu branco*, *priprioca* (jointed flatsedge) and *sacaca*. Many of these bioinputs are included in the Amazon medicinal flora, linked to traditional knowledge, especially Indigenous knowledge, which suggests their application in the treatment of diseases.

In relation to the technological field of cosmetics, it is worth highlighting the bioinputs *babaçu* and *cupuaçu*, in addition to *buriti* (moriche palm), *murmuru*, and *mulateiro* (capirona) for which it is observed that this technological field has greater relevance. Some bioinputs present a significant amount of applications concentrated in the fields of medicines and cosmetics, in similar proportions, such as *jambu*, *jatobá* (courbaril), *andiroba*, *tucumã*, *jaborandi*, *pracaxi*, *ucuúba* (baboonwood) and *patauá*.

In relation to *mandioca* (cassava) and *seringueira* (brazilian rubber tree) bioinputs, an important technological field is macromolecular organic compounds. This field covers technologies involving polymers, especially natural polymers obtained from these two bioinputs: starch and rubber.

Another category with a relevant quantity of applications is vegetable oils, according to the fact that several of the bioinputs analyzed consist of oilseed species, with emphasis on palm trees native to the Amazon region, from which these vegetable oils are extracted. The potential for applying vegetable oils to generate new products and/or applications/registrations is recognized in several technological fields, such as medicine, cosmetics, nutraceuticals, and also in electricity generation.

The biofuels category, which forms part of the renewable chemical industry, was found to be most associated with applications related to *mandioca* (cassava) and *babaçu*.

There is also a relevant amount of applications in technological fields related to products and applications/registrations, including machinery, aimed at agricultural practice associated with the bioinputs studied: agriculture, pesticides, and fertilizers.

In Figure 11B, it is possible to note the correlation matrix of the 13 main bioinputs with the patent applications filed in Brazil and the technological fields to which they

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correlate. It can be noticed that 8 of the 13 main Amazon bioinputs with the highest number of applications in Brazil have the food technological field as the one with the highest concentration of patent applications. It is possible to note that *cacau* (cocoa) and *mandioca* (cassava) have very impressive numbers of applications in all 13 technological fields mapped, including those abovementioned, in addition to fertilizers, pesticides, vegetable oils, packaging and packaging machines, biofuels, and cement. In the field of fuel, the highlights, in addition to these two bioinputs, are *babaçu*.

When we analyzed the sample of applications filed in Brazil, we noted that Biotechnology has become one of the main technological fields with patent applications that use bioinputs from the Amazon occupying third position in the ranking (which in the world sample was occupied by the technological field related to agriculture).

To enable a more detailed characterization of the bioinputs analyzed in the study, chart 4 was prepared, listing the main applicants, technological fields (categories), countries developing technologies (origin of the applicant), and markets of interest (filing countries) of Amazon bioinputs with more than 60 patent families. For all bioinputs (collectively and individually) analyzes can be performed using a dashboard built from the patent database created in this study (***Access the Dashboard here***).

Chart 4. Bioinputs from Amazon with more than 60 patent families: Main applicants, countries of origin of technologies, main technological fields (categories), and markets of interest (filing countries).

BIOINPUT (Total patent families)	MAIN APPLICANTS (Number of patent families)	COUNTRY OF ORIGIN (No. of families)	MAIN CATEGORIES (No. of patent families)	FILING COUNTRY (No. of patent families)
CACAU **(COCOA) (20745)**	• NESTLE AG (619) • KVASENKOV OLEG IVANOVICH (495) • FUJI OIL CO LTD (217) • UNILEVER N.V. (145) • MARS INC (142) • BASF (141) • MORINAGA & CO LTD (138) • L'OREAL S.A. (118)	CN (4677) US (2326) DE (1058) CH (975) RU (768) KR (683) JP (391) NL (359) FR (352) BR (318)	– Food (12821) – Medicines (3351) – Cosmetics (1905) – Vegetable oils (991) – Biotechnology (872) – Packaging and packaging machines (806) – Pesticides and pest control (788)	CN (6524) US (5064) JP (4226) EP (3522) CA (2028) AU (1900) BR (1758) DE (1756) RU (1746)
MANDIOCA **(CASSAVA) (15264)**	• GUANGXI UNIVERSITY (232) • HARBIN SHENGYI BIOLOGICAL TECHNOLOGY DEVELOPMENT CO. LTD. (200) • CHANGSHA RUIDUOKANG BIOTECNOLOGIAHNOLOGY CO. LTD. (181) • JIANGNAN UNIVERSITY (132) • HARBIN HAOTUO BIOTECNOLOGIAHNOLOGY DEVELOPMENT CO. LTD. (101)	CN (11804) US (667) BR (485) ID (212) DE (153) FR (108) KR (105) PH (101) JP (94)	– Food (5966) – Agriculture (3150) – Macromolecular organic compounds (2370) – Fertilizers (2106) – Medicines (682) – Textile and paper (665) – Biofuels (656)	CN (12327) US (1098) BR (988) EP (756) JP (453) CA (441) AU (430) ID (348) IN (347)
GUARANÁ **(1254)**	• BEIJING CPT SPORTS TECHNOLOGY CO. LTD. (14) • L'OREAL S.A. (10) • ANHUI SIJIE FOOD CO. LTD. (8) • NORTHERN INNOVATIONS HOLDING CORP. (7) • NESTLE AG (7) • ICHIMORE DRINK (SHANGHAI) CO. LTD (7)	CN (361) US (175) DE (80) BR (79) KR (42) RU (30) FR (29) CH (28) CA (22)	– Food (854) – Medicines (539) – Cosmetics (155) – Pesticides and pest control (28) – Agriculture (22)	CN (441) US (327) EP (169) JP (164) BR (136) DE (115) KR (100) AU (98) CA (92)
BABAÇU **(1056)**	• L'OREAL S.A. (45) • PROCTOR & GAMBLE INC. (24) • UNILEVER N.V. (22) • UOP LLC (21) • HENKEL AG & CO. KGAA (16) • COLGATE-PALMOLIVE COMPANY (16)	US (260) BR (199) CN (166) FR (83) DE (46) KR (27)	– Cosmetics (375) – Vegetable oils (214) – Food (204) – Medicines (202) – Biofuels (115)	US (378) BR (332) CN (285) EP (244) JP (150) CA (142)

4. Results and Discussion

BIOINPUT (Total patent families)	MAIN APPLICANTS (Number of patent families)	COUNTRY OF ORIGIN (No. of families)	MAIN CATEGORIES (No. of patent families)	FILING COUNTRY (No. of patent families)
		NL (23) GB (14)		AU (122) GB (99) KR (98)
UNHA-DE-GATO **(CAT'S CLAW)** **(1026)**	• GUANGZHOU WANGLAOJI PHARMACEUTICAL CO. LTD. (15) • OLALDE R J A (9) • LI CHENG-PING (8) • TIANJIN PACIFIC PHARMACEUTICAL CO. LTD. (7) • QINGDAO XINLIDE TRADITIONAL CHINESE MEDICINE TECHNOLOGY RESEARCH AND DEVELOPMENT CO. LTD. (7)	CN (839) US (64) JP (7) IL (6) BR (6) FR (5) IT (4) RU (4)	– Medicines (900) – Food (173) – Cosmetics (41)	CN (860) US (93) JP (54) EP (51) AU (35) CA (34) KR (17) BR (16)
AÇAÍ **(1019)**	• MARY KAY INC. (15) • JINSHANMEI BIOTECNOLOGIAHNOLOGY CO. LTD (15) • BEAURICA INFORMATION TECHNOLOGY (BEIJING) CO. LTD. (13) • JIASHI RUIKANG (BEIJING) PHARMACEUTICAL CO. LTD. (12) • NANNING PINDI BIOENGINEERING CO. LTD. (8)	US (247) CN (216) BR (176) KR (121) DE (24) CA (15) JP (14) FR (9) RU (7)	– Food (584) – Medicines (355) – Cosmetics (211)	US (302) CN (291) BR (232) KR (174) EP (123) JP (90) CA (86) AU (59) IN (43)
URUCUM **(ACHIOTE)** **(864)**	• L'OREAL S.A. (17) • MPLUS-F&C (8) • INNER MONGOLIA MENGNIU DAIRY INDUSTRY (GROUP) CO. LTD. (8) • BIOPHYTIS (7)	CN (161) US (159) BR (110) KR (32) FR (27) IN (25) DE (20) JP (15)	– Food (382) – Medicines (204) – Cosmetics (149)	US (289) CN (229) BR (178) JP (154) EP (153) CA (93) AU (88) IN (73) KR (73)
CASTANHA DO BRASIL **(BRAZIL NUTS)** **(690)**	• L'OREAL S.A. (21) • INSECTERGY LLC (13) • LEO DANIEL MICHAEL (9) • SEMBIOSYS GENETICS INC. (9) • NATURA COSMETICOS S/A (9)	US (161) CN (96) BR (81) DE (35) FR (34) KR (32) CA (24) GB (19) CH (12) JP (11)	– Food (412) – Cosmetics (119) – Medicines (83)	US (277) CN (176) EP (150) BR (148) CA (107) AU (94) JP (89) KR (75) MX (48)
SACHA INCHI **(579)**	• JINSHANMEI BIOTECNOLOGIAHNOLOGY CO. LTD. (47) • RONGDING (GUANGDONG) BIOTECNOLOGIAHNOLOGY CO. LTD. (23) • SOUTH CHINA AGRICULTURAL UNIVERSITY (22) • ZHUZHOU QIANJIN PHARMACEUTICAL CO. LTD. (18) • GUANGXI NINGMING XINGYU BIOLOGICAL RESOURCES DEVELOPMENT CO. LTD. (14)	CN (410) US (42) KR (24) DE (19) FR (12) TW (6) CA (5) LA (4) NL (4) BR (4) CO (4) IL (4)	– Food (268) – Cosmetics (178) – Medicines (150)	CN (431) US (66) EP (39) KR (36) CA (26) JP (24) BR (22) DE (16) AU (14)
SERINGUEIRA **(BRAZILIAN RUBBER TREE)** **(478)**	• RUBBER RESEARCH INSTITUTE OF CHINESE ACADEMIC OF TROPICAL AGRICULTURAL SCIENCES (55) • BRIDGESTONE CORP (52) • XU SHUANG (20) • SUMITOMO GROUP (20) • BADAN PENGKAJIAN DAN PENERAPAN TEKNOLOGI (BPPT) (18)	CN (54) BR (54) KR (34) MY (27) ID (24) JP (19) US (18) DE (17)	– Agriculture (169) – Biotechnology (167) – Macromolecular organic compounds (74)	CN (146) JP (109) US (93) BR (81) EP (64) KR (46) GB (36) AU (29)
JAMBU **(335)**	• TAKASAGO INTERNATIONAL CORP. (24) • OGAWA & CO (13) • PROCTOR & GAMBLE INC. (7) • LION CORP (7) • ISHIDA KENYA (6)	CN (116) US (57) BR (24) JP (22) KR (15) DE (14) IT (6) FR (5) IN (4)	– Medicines (179) – Cosmetics (150) – Food (100)	CN (159) US (108) JP (78) EP (66) BR (51) KR (35) IN (32) CA (24) MX (20)
COPAÍBA **(291)**	• UNIVERSIDADE DE SAO PAULO – USP (9) • YAMAUCHI ROBERTO HIDEO (9) • RIFURE KK (6) • PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (6)	BR (99) US (56) CN (23) IL (9) CA (9) FR (7)	– Medicines (131) – Cosmetics (87) – Vegetable oils (39)	BR (112) US (81) JP (49) CN (45) EP (39) CA (24)

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BIOINPUT (Total patent families)	MAIN APPLICANTS (Number of patent families)	COUNTRY OF ORIGIN (No. of families)	MAIN CATEGORIES (No. of patent families)	FILING COUNTRY (No. of patent families)
	• UNIVERSIDADE ESTADUAL DE CAMPINAS – UNICAMP (6) • COLGATE-PALMOLIVE COMPANY (6) • MARIA APARECIDA MEDEIROS MACIEL (6)	JP (6) DE (6) KR (3)		GB (19) AU (18) IN (12)
CUPUAÇU **(263)**	• COSMETIC WARRIORS LTD (12) • NATURA COSMETICOS S/A (12) • L'OREAL S.A. (9) • AAK (8) • AMOREPACIFIC (7) • LG HOUSEHOLD & HELTH CARE LTD (7)	BR (88) US (37) KR (25) CN (20) FR (18) GB (13) DE (12) SE (6)	– Cosmetics (159) – Food (55) – Medicines (51)	BR (105) US (74) JP (58) EP (56) KR (48) CN (46) CA (35) AU (31) ES (18)
CAMU-CAMU **(210)**	• GENIC CO LTD (12) • INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA – INPA (7) • KOSE CORP (6) • MARY KAY INC. (4) • T HASEGAWA CO LTD (4) • TOYO SHINYAKU KK (4)	KR (28) CN (24) US (24) BR (23) DE (11) JP (8) FR (5) ES (3)	– Food (106) – Medicines (86) – Cosmetics (68)	US (46) JP (43) CN (39) KR (35) BR (29) EP (26) PE (12) DE (12) AU (12)
BURITI **(MORICHE PALM) (185)**	• PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (6) • UNIVERSIDADE FEDERAL DO PARÁ (6) • COLGATE-PALMOLIVE COMPANY (6) • L'OREAL S.A. (6) • ORIZA YUKA KK (5) • UNIVERSIDADE DE SAO PAULO – USP (5) • UNIVERSIDADE FEDERAL DE OURO PRETO (5)	BR (79) CN (46) US (18) FR (9) DE (4) NL (2) CA (2)	– Cosmetics (108) – Medicines (57) – Food (23)	BR (88) CN (54) US (30) EP (18) AU (12) JP (12) CA (9) ES (6) MX (6) FR (6)
ANDIROBA **(177)**	• COLGATE-PALMOLIVE COMPANY (12) • YAMAUCHI ROBERTO HIDEO (9) • PHB INDUSTRIAL S.A. (6) • PACHEKOSKI WAGNER MAURÍCIO (6) • PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (6) • NASCIMENTO JEFTER FERNANDES (6) • NATURA COSMETICOS S/A (6)	BR (86) US (38) FR (12) CN (5) KR (2) IT (2) PH (2) DE (2) CI (2)	– Medicines (76) – Cosmetics (74) – Pesticides and pest control (30)	BR (104) US (58) EP (38) JP (26) CN (26) AU (23) CA (21) MX (16) TW (13)
MURUMURU **(169)**	• L'OREAL S.A. (25) • COSMETIC WARRIORS LTD (13) • NATURA COSMETICOS S/A (12) • AMOREPACIFIC (8) • PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (6)	BR (37) FR (31) US (27) CN (20) KR (14) GB (14) NL (3) DE (3) SE (2) JP (2)	– Cosmetics (123) – Medicines (42) – Vegetable oils (170)	US (55) BR (47) CN (37) EP (37) KR (33) JP (22) FR (21) GB (17) CA (17)
MUIRAPUAMA **(139)**	• TAISHO PHARM CO LTD (16) • H R D CORPORATION (6) • KÖNIG SWANN (4)	US (32) BR (20) JP (19) DE (14) IT (6) CN (5) FR (5)	– Medicines (106) – Food (45) – Cosmetics (24)	US (44) JP (28) BR (24) EP (23) AU (19) DE (17) CN (15)
JABORANDI **(88)**	• TSUMURA & CO (7) • AHMAD KHALIL (4) • LEDI DE CAMPOS CATARINA (3)	BR (30) DE (6) US (5)	– Medicines (47) – Cosmetics (41) – Food (5)	BR (38) JP (16) US (14) DE (10) EP (8) AU (7) IN (7)
TUCUMÃ **(83)**	• L'OREAL S.A. (14) • PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (6) • UNIVERSIDADE DE SAO PAULO – USP (4)	BR (32) FR (22) US (19) CN (2)	– Cosmetics (44) – Medicines (30) – Food (12)	BR (34) US (23) FR (21) EP (12) CN (6) KR (5) JP (4) ES (4) IN (4)

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BIOINPUT (Total patent families)	MAIN APPLICANTS (Number of patent families)	COUNTRY OF ORIGIN (No. of families)	MAIN CATEGORIES (No. of patent families)	FILING COUNTRY (No. of patent families)
PRACAXI **(80)**	• PROFESSIONAL COMPOUNDING CENTERS OF AMERICA (17) • L'OREAL S.A. (16) • DSM IP ASSETS B.V. (4) • ALEXSANDRO ZANCANARO DUTRA (4) • UNIVERSIDADE FEDERAL DE OURO PRETO (4)	US (31) BR (20) FR (18) NL (4) CH (2) CN (2)	– Cosmetics (40) – Medicines (36) – Food (6)	US (41) BR (32) EP (17) CN (16) FR (12) JP (9) CA (7) AU (7) KR (6)
MOGNO BRASILEIRO **(BRAZILIAN MAHOGANY) (75)**	• ZHANG PEI-JUN (5) • PHILIPPINE TÊXTILE RESEARCH INSTITUTE (PTRI) (3)	CN (48) PH (7) US (3) BR (3) MY (2)	– Medicines (31) – Food (26) – Agriculture (6) – Vegetable oils (6)	CN (51) PH (8) AU (5) BR (5) US (4) JP (3)
SANGUE-DE-DRAGO (74)	• NAPO PHARM INC (7) • JAGUAR HEALTH INC (7) • JAGUAR ANIMAL HEALTH INC (6)	US (32) IT (6) MX (4) BR (3)	– Medicines (63) – Cosmetics (24) – Food (15)	US (40) EP (17) JP (14) CA (14) CN (13) AU (13) MX (11) BR (10)
PUPUNHA **(PEACH PALM) (64)**	• INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA – INPA (8) • UNIVERSIDADE FEDERAL DO PARÁ (7) • UNIVERSIDADE FEDERAL DO PARANÁ – UFPR (5)	BR (44) CN (6) US (4) DE (3)	– Food (31) – Medicines (8) – Agriculture (7) – Cosmetics (7)	BR (48) CN (11) US (8) EP (4) CO (3) AU (3) DE (2) JP (2) CA (2) IN (2) KR (2)
CUMARU **(63)**	• TORAY INDUSTRIES INC. (3) • BEIERSDORF AG (3)	CN (19) BR (9) US (7) DE (4) JP (4) CH (2)	– Medicines (21) – Cosmetics (20) – Vegetable oils (11)	CN (26) BR (19) US (17) JP (15) EP (12) ES (7) CA (6)
UCUÚBA **(BABOONWOOD) (60)**	• L'OREAL S.A. (14) • NATURA COSMETICOS S/A (7)	FR (17) BR (15) US (13) JP (2) DE (2)	– Cosmetics (35) – Medicines (28) – Vegetable oils (9) – Food (6)	US (20) EP (17) BR (17) FR (13) JP (8) CA (7) CN (7) AU (6) MX (5) ES (5)

It can be noticed that each bioinput has its profile related to the main applicants, origin of applicants, technical categories, and filing country, requiring an analysis one by one to verify the singularities associated with each bioinput. Thus, through the use of the available dashboard, containing all data obtained from this study, it is possible to view the intended information from different settings, combining different filters to achieve the desired set of data.

Through the analysis of the dashboard, when analyzing the general overview of applications (covering all the bioinputs studied), it is possible to note that the main markets of interest for patent applications for Amazon bioinputs usually are China and the United States. On the other hand, the bioinputs with applications filed predominantly in Brazil are *copaíba*, *cupuaçu*, *buriti* (moriche palm), *andiroba*, *jaborandi*, *tucumã*, and *pupunha* (peach palm). We also note that the United States and China are highlights as

countries of origin for patent applicants, represented mainly by companies with headquarters in their territories, and specifically in the Chinese case, an intense filing activity by their universities and research centers. Brazil appears next as the third country of origin for applicants. Such data suggest that these three countries are the main developers of technologies associated with Amazon bioinputs. Other countries that presented applicants with relevant filing activity were Germany, Korea, Switzerland, Russia, France, and Japan.

It was also verified that there was also technological development activity by applicants from other countries in Latin America, whose territory encompasses the Amazon biome. In this analysis, patent applications were found related to Amazon bioinputs made by applicants from Colombia (35), Peru (6), Ecuador (6), and Venezuela (1), with the bioinputs identified being *cacau* (cocoa) (22), *mandioca* (cassava) (16), *urucum* (achiote) (5), *sacha-Inchi* (4), *guaraná* (2), and *caiaué* (American oil palm) (2).

Patent applications that mention the Amazon region

In the search strategy to survey sample 3 (item 3.3), we use keywords that could be linked to the Amazon region. However, when the documents were read, this strategy proved to be fruitless for this study, due to the high occurrence of applications/patents not related to biological components from the Amazon, such as, for example, navigation methods in large rivers, systems developed for regions of difficult access (for example, Amazonia), sales/advertising systems, Amazon network services (aws), maps, microorganisms (for example, *Microrsporum amazonicum, Azospirillum amazonenses, Shewanella amazonenses, Leishmania amazonensis*...), Amazonstone, among other occurrences. Thus, even if refining is made to the strategy, it continues to require a careful reading of the recovered documents to assess on a case-by-case basis to "decontaminate" the final database, thus making it impossible for this strategy to be used through automatic execution. Additionally, the content aggregated by this strategy when compared to the volume of documents recovered in strategies 1 and 2 does not justify its use.

5. Conclusion

The search strategies developed in this study enabled us to build a database of patent documents filed in Brazil and around the World that refer to bioinputs belonging to the flora of the Amazon biome. The availability of this database, as a dashboard, will contribute not only to the CBA's purpose of prospecting opportunities in biobusinesses in the region but also to assist in carrying out research by others interested in the topic, as a great overview of technological development in different areas using these bioinputs.

The disclosure of the search strategies and categorizations used in this study shall allow for periodic updating of this database by interested actors. The strategies used in obtaining samples 1 and 2 proved to be capable of being replicated automatically, while the strategy used in sample 3 requires manual processing of prospected applications to eliminate those not related to bioinputs.

The resident applicants identified are mainly universities, foundations, and research institutions, and few Brazilian companies have acted to protect their innovations related to bioinputs from the Amazon region. This observation may be an indication of a need to encourage partnerships and technology transfers from universities to companies, which will effectively bring these new products/applications/registrations to the market.

This study demonstrated the great interest of applicants in the Amazon region for technological development using bioinputs from the region. In addition to São Paulo, which always appears as an important hub for national technological development, applicants from the states of Pará and Amazonas and other states in the North region appear as relevant actors in the protection of patents for technologies related to the use of bioinputs from the Amazon region.

Some of the bioinputs studied had a large number of patent families filed not only in Brazil but also around the world. On the other hand, we noted that many bioinputs still have a low number of patents filed, both by residents and foreigners, showing an extensive potential for technological development and innovation that can be fostered.

It can be noticed that some of the bioinputs with the highest number of identified patent families, such as *cacau* (cocoa) and *mandioca* (cassava), despite not being endemic to the Amazon, play an important role in the region's economy.

The technological fields related to food, medicines, and cosmetics generally present the highest concentration of patent applications, both in Brazil and in the world, for most of the bioinputs studied. However, other technological fields also seem to be important, such as biotechnology and macromolecular organic compounds (for the production of biopolymers, for example).

It is also worth noting, in relation to requests for access to the genetic heritage with SisGen, that the access registration is not exclusively related to the development of some utilitarian application of the genetic heritage, or even to the filing of a patent application. This access may be linked, for example, to research and/or the shipment of samples of biological material abroad, linked to basic research and knowledge production. On the other hand, a single access application in SisGen for a certain PG

5. Conclusion

component can give rise to several patent applications, so this relationship is not necessarily linear.

Bioinputs from the Amazon region hold great potential for conducting innovative businesses, which are capable of fostering and promoting the social, environmental, and economic development of the region. In this scenario, we understand that the Amazon region has a comparative advantage for the development of this agenda, operating as a leader in a future national production strategy, as it houses great economic potential in the biodiversity existing in its territory.

Annexes

Annex 1. Main bioinputs of the flora of the Amazon biome according to the number of access applications made in SisGen*.

	Common name	Binomial Name	Number of access applications made in SisGen
1	***açaí***	*Euterpe oleracea* *Euterpe precatoria*	1616
2	***mandioca*** **(cassava)**	*Manihot esculenta*	1097
3	***cupuaçu***	*Theobroma grandiflorum*	777
4	***castanha do Brasil*** **(Brazil nuts)**	*Bertholletia excelsa*	752
5	***guaraná***	*Paullinia cupana*	581
6	***caiaué*** **(american oil palm)**	*Elaeis oleifera*	452
7	***andiroba***	*Carapa guianensis* *Carapa procera* *Carapa surinamensis* *Carapa vasquezii*	344
8	***copaíba***	*Copaifera langsdorffii* *Copaifera multijuga* *Copaifera reticulata* *Copaifera paupera* *Copaifera martii* *Copaiba paupera* *Copaifera officinalis* *Copaifera duckei* *Copaifera pubiflora* *Copaifera glycycarpa* *Copaifera langsdorfii* *Copaifera piresii* *Copaifera publifora* *Copaifera guyanensis* *Copaifera guianensis* *Copaiba langsdorfii* *Copaifera oblongifolia*	270
9	***tucumã***	*Astrocaryum vulgare* *Astrocaryum aculeatum* *Astrocaryum tucuma*	233
10	***seringueira*** **(brazilian rubber tree)**	*Hevea brasiliensis* *Hevea microphylla* *Hevea guianensis* *Hevea pauciflora* *Hevea nitida* *Hevea benthamiana* *Hevea rigidifolia* *Hevea spruceana* *Hevea camargoana* *Hevea paludosa* *Hevea camporum*	230
11	***pupunha*** **(peach palm)**	*Bactris gasipaes*	203
12	***arroz silvestre*** **(wild rice)**	*Oryza glumaepatula* *Oryza grandiglumis* *Oryza alta* *Oryza latifolia*	177
13	***ayahuasca***	*Banisteriopsis caapi* *Psychotria viridis*	177
14	***bacaba*** **(turu palm)**	*Oenocarpus bacaba* *Oenocarpus mapora*	176

Annexes

	Common name	Binomial Name	Number of access applications made in SisGen
		Oenocarpus distichus *Oenocarpus minor*	
15	***acapu***	*Vouacapoua americana*	167
16	***curaruá***	*Ananas comosus* *Ananas comosus var. Comosus* *Ananas comosus var. bracteatus*	161
17	***jatobá* (courbaril)**	*Hymenaea intermedia* *Hymenaea courbaril* *Hymenaea stigonocarpa* *Hymenaea oblongifolia* *Hymenaea parvifolia*	131
18	***bacuri***	*Platonia insignis* *Attalea excelsa* *Attalea phalerata* *Symphonia globulifera* *Ecclinusa guianensis* *Ecclinusa bacuri* *Scheelea phalerata*	129
19	***sacaca***	*Croton cajucara*	120
20	***guaco***	*Mikania glomerata*	120
21	***espinheira santa***	*Maytenus ilicifolia*	120
22	***buriti* (moriche palm)**	*Mauritia flexuosa* *Mauritiella aculeata* *Mauritia venifera* *Mauritia huebneri* *Mauritiella armata*	116
23	***camu-camu***	*Myrciaria dubia*	113
24	***urucum* (achiote)**	*Bixa orellana*	101
25	***lacre***	*Vismia cayennensis* *Vismia guianensis* *Vismia bemerguii* *Vismia tenuinervia* *Vismia gracilis* *Vismia schultesii* *Vismia amazonica* *Vismia cauliflora* *Vismia japurensis* *Vismia sandwithii* *Vismia macrophylla* *Vismia sprucei*	99
26	***babaçu***	*Attalea speciosa* *Orbignya speciosa* *Orbignya phalerata* *Orbignya oleifera* *Orbygnia phalerata* *Orbignya brejinhoensis* *Attalea brejinhoensis* *Orbignya teixeirana*	91
27	***ucuúba***	*Virola mollissima* *Virola venosa* *Virola pavonis* *Virola surinamensis* *Virola sebifera* *Virola theiodora* *Virola calophylla* *Virola multinervia*	88

Annexes

	Common name	Binomial Name	Number of access applications made in SisGen
		Virola caducifolia *Virola duckei* *Virola guggenheimii* *Virola melinonii* *Virola michelii* *Virola cuspidata*	
28	***cumaru***	*Dipteryx odorata* *Dipteryx magnifica* *Dipteryx intermedia* *Dipteryx polyphylla* *Dipteryx punctata*	87
29	***cacau* (cocoa)**	*Theobroma cacao*	86
30	**ingá**	*Inga marginata* *Inga thibaudiana* *Inga cinnamomea* *Inga edulis* *Inga umbratica* *Inga fagifolia* *Inga alba* *Inga paraensis* *Inga laurina* *Inga nobilis* *Inga acicularis*	85
31	***paricá* (brazilian fern tree)**	*Schizolobium amazonicum* *Schizolobium parahyba* *Schizolobium parahyba var. amazonicum*	84
32	***taperebá***	*Spondias mombin* *Spondias lutea*	84
33	***Piper aduncum***	*Piper aduncum*	83
34	***ajuru* (cocoplum)**	*Chrysobalanus icaco*	81
35	***crajiru***	*Arrabidaea chica* *Fridericia chica*	79
36	***goiaba* (guava)**	*Psidium guajava*	78
37	***unha-de-gato* (cat's claw)**	*Uncaria tomentosa* *Uncaria guianensis*	78
38	***breu branco***	*Dacryodes hopkinsii* *Protium crassipetalum* *Protium heptaphyllum* *Protium spruceanum* *Protium paniculatum* *Protium altsonii* *Protium decandrum* *Protium pilosum* *Protium polybotryum*	76
39	***matamatá***	*Eschweilera coriacea* *Eschweilera odora* *Eschweilera amazonica* *Eschweilera atropetiolata* *Eschweilera grandiflora* *Eschweilera pseudodecolorans*	74
40	***tachi branco***	*Tachigali vulgaris* *Sclerolobium paniculatum*	73
41	***Piper aleyreanum***	*Piper aleyreanum*	71
42	***jambu***	*Spilanthes acmella* *Spilanthes oleracea* *Acmella oleracea*	70

Annexes

	Common name	Binomial Name	Number of access applications made in SisGen
		Acmella ciliata *Acmella brachyglossa*	
43	***murici***	*Byrsonima crassifolia*	63
44	***amapá***	*Brosimum potabile* *Brosimum rubescens* *Brosimum alicastrum* *Brosimum parinarioides* *Brosimum utile* *Parahancornia fasciculata*	62
45	***amendoim forrageiro***	*Arachis pintoi* *Arachis repens*	60
46	***Piper hispidinervum***	*Piper hispidinervum*	58
47	***mogno brasileiro*** **(brazilian mahogany)**	*Swietenia macrophylla*	57
48	***piquiá***	*Caryocar villosum*	56
49	***patauá***	*Oenocarpus bataua* *Jessenia bataua*	53
50	***Piper marginatum***	*Piper marginatum*	53
51	***Piper tuberculatum***	*Piper tuberculatum*	52
52	***sucuúba***	*Himatanthus articulatus* *Himatanthus sucuuba* *Himatanthus sucuuba* *Himatanthus drasticus*	51
53	***carapanaúba***	*Aspidosperma exelsum* *Aspidosperma nitidum* *Aspidosperma rigidum* *Aspidosperma desmanthum* *Aspidosperma marcgravianum* *Aspidosperma carapanauba* *Aspidosperma discolor* *Aspidosperma acanthocarpum* *Aspidosperma excelsum* *Aspidosperma album* *Aspidosperma oblongum*	50
54	***sacha inchi***	*Plukenetia volubilis*	50
55	***jaborandi***	*Pilocarpus jaborandi* *Pilocarpus trachylophus* *Pilocarpus racemosus* *Pilocarpus alatus*	50
56	***priprioca*** **(jointed flatsedge)**	*Cyperus articulatus* *Cyperus corymbosus*	48
57	***marcujá*** **(passion fruit)**	*Passiflora edulis*	47
58	***arruda*** **(common rue)**	*Ruta graveolens*	47
59	***erva cidreira***	*Lippia alba*	46
60	***Piper hispidum***	*Piper hispidum*	46
61	***jacareúba***	*Calophyllum brasiliense*	45
62	***dendê***	*Elaeis guineensis*	45
63	***pau-rosa***	*Aniba rosaeodora*	45
64	***pracaxi***	*Pentaclethra macroloba* *Pentaclethra filamentosa*	43
65	***araçá-boi*** **(araza)**	*Eugenia stipitata*	43
66	***murumuru***	*Astrocaryum murumuru* *Astrocaryum ulei*	43
67	***Capsicum chinense***	*Capsicum chinense*	42
68	***aninga-açu***	*Montrichardia linifera*	41

Annexes

	Common name	Binomial Name	Number of access applications made in SisGen
69	***caju* (cashew)**	*Anacardium occidentale* *Anacardium othonianum*	41
70	***mulateiro* (capirona)**	*Calycophyllum spruceanum* *Capirona decorticans* *Capirona huberiana*	41
71	***genipapo***	*Genipa spruceana* *Genipa americana*	41
72	***cedro* (spanish cedar)**	*Cedrela odorata*	40

Annexes

Annex 2. Search strategies carried out for Amazon bioinputs, number of patent documents filed in Brazil and around the world, and year of the filing of the oldest application found.

	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
1	***Açaí***	TAB=(açai OR açaizeiro OR assai OR "palma murrapo" OR "palma manaca" OR "euterpe oleracea" OR "euterpe precatoria" OR "Catis martiana" OR "Euterpe badiocarpa" OR "Euterpe beardii" OR "Euterpe brasiliana" OR "Euterpe cuatrecasana" OR "Euterpe confertiflora" OR "Euterpe jatapuensis" OR "Euterpe langloisii" OR "Euterpe oleracea" OR "Euterpe petiolata" OR "Euterpe stenophylla" OR "Euterpe subruminata");	**232**	**1.019**	**1971**
2	***Acapu***	TAB=("Vouacapoua Americana" OR acapu OR Ritangueira OR Wacapu);	**0**	**1**	**2011**
3	***Ajuru*** **(Cocoplum)**	TAB=(abajeru OR ajuru OR agiru OR guajiru OR cocoplum OR "coco-plum" OR "paradise plum" OR abajeru OR icaco OR hicaco OR icaque OR "Chrysobalanus icaco" OR "Chrysobalanus guianensis" OR "Chrysobalanus luteus" OR "Chrysobalanus purpureus" OR "Chrysobalanus ellipticus" OR "Chrysobalanus interior" OR "Chrysobalanus orbicularis" OR "Chrysobalanus pellocarpus" OR "Chrysobalanus savannarum" OR "Chrysobalanus stuhlmannii");	**4**	**8**	**1999**
4	***Amapá***	TAB=("Parahancornia fasciculata" OR "Couma fasciculata" OR "Malouetia lactiflua" OR "Parahancornia amapa" OR "Tabernaemontana lactiflua" OR "Hancornia amapa" OR "Macoubea fasciculata" OR "Tabernaemontana fasciculata" OR "Thyrsanthus fasciculatus" OR "Brosimum potabile" OR "Brosimum myristicoides" OR "Brosimum parinarioides" OR "Brosimum alicastrum" OR "Brosimum guianense" OR "Piratinera guianensis" OR "Brosimum discolor" OR "Brosimum lecointei" OR "Brosimum palmarum" OR "Piratinera discolor" OR "Brosimum rubescens" OR "Brosimum angustifolium" OR "Brosimum brevipedunculatum" OR "Brosimum lanciferum" OR "Brosimum longistipulatum" OR "Brosimum paraense" OR "Brosimum platyneurum" OR "Piratinera lancifera" OR "Piratinera paraensis" OR "Alicastrum rubescens" OR "Piratinera rubescens" OR "Brosimum utile" OR "Brosimum longifolium" OR "Brosimum ovatifolium" OR "Brosimum rigidum" OR "Brosimum pallescens" OR "Brosimum krukovii") ;	**4**	**14**	**1996**
5	***Andiroba***	TAB=("andiroba" OR "Carapa guianensis" OR "Carapa macrocarpa" OR "Carapa procera" OR "Carapa touloucouna" OR "Carapa vasquezii" OR "Carapa surinamensis");	**104**	**177**	**1943**
6	***Araçá-boi*** **(Araza)**	TAB=("Eugenia stipitata" OR araçá-boi OR araça-mark OR arazá OR "guayabo amazónico");	**10**	**20**	**1976**
7	***Arroz silvestre*** **(Wild rice)**	TAB=("Oryza grandiglumis" OR "Oryza glumipatula" OR "Oryza glumaepatula" OR "Oryza latifolia" OR "Oryza alta");	**7**	**28**	**2003**
8	***Ayahuasca***	TAB=("ayahuasca" OR "caapi" OR "Psychotria viridis" OR "Diplopterys cabrerana" OR "Kaapi" OR "hoasca" OR	**1**	**33**	**1984**

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	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
		"Banisteriopsis caapi" OR "Banisteria inebrians" OR "Banisteria quitensis");			
9	***Babaçu***	TAB=("babaçu" OR "babassu" OR "bagassu" OR "uauaçu" OR "babasú" OR "babassou" OR "bauaçu" OR "auaçu" OR "aguaçu" OR "guaguaçu" OR "Attalea speciosa" OR "Attalea brejinhoensis" OR "Attalea glassmanii" OR "Attalea lydiae" OR "Attalea vitrivir" OR "Heptantra phalerata" OR "Orbignya barbosiana" OR "Orbignya brejinhoensis" OR "Orbignya cuci" OR "Orbignya huebneri" OR "Orbignya lydiae" OR "Orbignya macropetala" OR "Orbignya martiana" OR "Orbignya oleifera" OR "Orbignya phalerata" OR "Orbignya speciosa" OR "Orbignya teixeirana" OR "Attalea teixeirana");	**332**	**1.056**	**1916**
10	***Bacaba*** **(Turu palm)**	TAB=("bacaba" OR "abacaba" OR "bacabinha" OR "ungurauy" OR "koemboe" OR "manoco" OR "punáma" OR "palma milpesos" OR "Turu palm" OR "Oenocarpus bacaba" OR "Oenocarpus grandis" OR "Oenocarpus hoppii" OR "Jessenia bacaba" OR "Oenocarpus balickii" OR "Oenocarpus mapora" OR "Oenocarpus dryanderae" OR "Oenocarpus macrocalyx" OR "Oenocarpus mapora" OR "Oenocarpus multicaulis" OR "Oenocarpus panamanus" OR "Oenocarpus distichus" OR "Oenocarpus discolor" OR "Oenocarpus tarampabo" OR "Oenocarpus minor" OR "Oenocarpus huebneri" OR "Oenocarpus intermedius" OR "Oenocarpus microspadix") ;	**7**	**16**	**2003**
11	***Bacuri***	TAB=("bacuri*" OR "acuri" OR "aricuri" OR "uricuri" OR "maniballi" OR "Platonia insignis" OR "Aristoclesia esculenta" OR "Moronobea esculenta" OR "Platonia esculenta" OR "Attalea phalerata" OR "Attalea amylacea" OR "Attalea anisitsiana" OR "Attalea excelsa" OR "Attalea hoehnei" OR "Attalea huebneri" OR "Attalea lauromuelleriana" OR "Attalea parviflora" OR "Attalea phalerata" OR "Maximiliana princeps" OR "Scheelea amylacea" OR "Scheelea anisitsiana" OR "Scheelea corumbaensis" OR "Scheelea huebneri" OR "Scheelea lauromuelleriana" OR "Scheelea martiana" OR "Scheelea microspadix" OR "Scheelea parviflora" OR "Scheelea princeps" OR "Scheelea quadrisperma" OR "Scheelea quadrisulcata" OR "Naucleopsis inaequalis" OR "Ogcodeia inaequalis" OR "Coussarea brevicaulis" OR "Ecclinusa guianensis" OR "Ecclinusa bacuri" OR "Chrysophyllum guianense" OR "Symphonia globulifera" OR "Symphonia microphylla" OR "Symphonia utilissima") ;	**24**	**32**	**1998**
12	***Breu branco***	TAB=("breu branco" OR "Dacryodes hopkinsii" OR "Protium crassipetalum" OR "Protium heptaphyllum" OR "Protium spruceanum" OR "Protium paniculatum" OR "Protium altsonii" OR "Protium decandrum" OR "Protium pilosum" OR "Protium polybotryum" OR "Protium aromaticum" OR "Protium cordatum" OR "Protium guianense" OR "Protium multiflorum" OR "Protium octandrum" OR "Protium almecega" OR "Protium venosum" OR "Protium paraense" OR "Protium puberulentum" OR "Protium orinocense" OR "Protium schomburgkianum" OR "Tetragastris pilosa" OR "Protium belemense");	**9**	**18**	**1998**
13	***Buriti*** **(Moriche palm)**	TAB=("buriti" OR "buritirana" OR "palma de moriche" OR "moriche palm" OR "muriti" OR "miriti" OR "canangucho"	**88**	**185**	**1973**

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	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
		OR "aguaje" OR "Mauritia flexuosa" OR "Mauritia minor" OR "Mauritia sagus" OR "Mauritia setigera" OR "Mauritia sphaerocarpa" OR "Mauritia vinifera" OR "Saguerus americanus" OR "Mauritia carana" OR "Orophoma carana" OR "Mauritiella aculeata" OR "Mauritia aculeata" OR "Mauritia amazonica" OR "Mauritia cataractarum" OR "Mauritia gracile" OR "Mauritia limnophylla" OR "Mauritiella cataractarum" OR "Lepidococcus aculeatus" OR "Mauritiella armata" OR "Mauritia aculeata" OR "Mauritia armata" OR "Lepidococcus duckei" OR "Lepidococcus huebneri" OR "Lepidococcus intermedius" OR "Lepidococcus martianus" OR "Lepidococcus peruvianus" OR "Lepidococcus subinermis" OR "Mauritia campylostachys" OR "Mauritia duckei" OR "Mauritia huebneri" OR "Mauritia intermedia" OR "Mauritia macrospadix" OR "Mauritia martiana" OR "Mauritia nannostachys" OR "Mauritia peruviana" OR "Mauritiella campylostachys" OR "Mauritiella duckei" OR "Mauritiella huebneri" OR "Mauritiella intermedia" OR "Mauritiella macrospadix" OR "Mauritiella martiana" OR "Mauritiella nannostachys" OR "Mauritiella peruviana" OR "Oenocarpus dealbatus" OR "Orophoma subinermis" OR "Lepidococcus armatus") ;			
14	***Cacau* (Cocoa)**	TAB=(cacau OR cacao OR cocoa OR "Theobroma cacao");	**1.758**	**20.745**	**1830**
15	***Caiaué* (American oil palm)**	TAB=(caiaue OR "Elaeis oleifera" OR "dende americano" OR "Alfonsia oleifera" OR "Elaeis melanococca" OR "Elaeis pernambucana" OR "Corozo oleifera" OR ojon OR "batana oil" OR (American near3 Palm near3 oil);	**13**	**47**	**1974**
16	***Camu-camu***	TAB=("camu-camu" OR "Myrciaria dubia" OR "Psidium dubium" OR "Eugenia grandiglandulosa" OR "Marlierea macedoi" OR "Myrciaria divaricata" OR "Myrciaria lanceolata" OR "Myrciaria obscura" OR "Myrciaria paraensis" OR "Myrciaria phillyraeoides" OR "Myrciaria riedeliana" OR "Myrciaria spruceana");	**29**	**210**	**1995**
17	***Carapanaúba***	TAB=("carapanaúba" OR "Aspidosperma carapanauba" OR "Aspidosperma acanthocarpum" OR "Geissospermum excelsum" OR "Aspidosperma excelsum" ADJ "Macaglia excelsa" OR "Aspidosperma oblongum" OR "Aspidosperma kuhlmannii" OR "Aspidosperma salgadense" OR "Aspidosperma marcgravianum" OR "Aspidosperma desmanthum" OR "Macaglia desmantha" OR "Aspidosperma nitidum" OR "Aspidosperma aquaticum" OR "Aspidosperma rigidum" OR "Aspidosperma acreanum" OR "Aspidosperma jaunechense" OR "Aspidosperma laxiflorum" OR "Aspidosperma rauwolfioides" OR "Aspidosperma subumbellatum" OR "Aspidosperma album" OR "Macaglia alba" OR "Aspidosperma latisiliquum" OR "Aspidosperma woodsonianum" OR "Peltospermum latisiliquum" OR "Peltospermum patrisii") ; "Aspidosperma discolor" OR "Aspidosperma francisii"	**1**	**6**	**1996**
18	***Casca preciosa***	TAB=("casca preciosa" OR "canelillo del Orinoco" OR "canelo de andaquíes" OR "canelo de quijos" OR "canela muena" OR "Aniba canelilla" OR "Cryptocarya canelilla" OR "Laurus canellila");	**0**	**1**	**2000**
19	***Castanha do Brasil***	TAB=("castanha-do-brasil" OR "castanha-do-pará" OR "castanha-da-amazônia" OR "Brazil nut" OR "brazilian nut"	**148**	**690**	**1908**

Annexes

	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
	(Brazil nuts)	OR "Pará nut" OR "amazonia nut" OR "Brazil nuts" OR "brazilian nuts" OR "Pará nuts" OR "amazonia nuts" OR "noz amazônica" OR "noz boliviana" OR "avellana del Brasil" OR "castaña del Brasil" OR "coquito de Brasil" OR "nuez amazónica" OR "nuez boliviana" OR "nuez de Brasil" OR "castaña de Pará" OR "castaña de monte" OR "Bertholletia excelsa" OR "Barthollesia excelsa" OR "Bertholletia nobilis");			
20	***Chichuá***	TAB=("chichuá" OR "xixuá" OR "Monteverdia guyanensis" OR "Maytenus guyanensis" OR "Maytenus micrantha" OR "Monteverdia myrsinoides" OR "Maytenus myrsinoides" OR "Maytenus reissekii" OR "Monteverdia sprucei" OR "Maytenus sprucei" OR "Cheiloclinium hippocrateoides" OR "Salacia hippocrateoides" OR "Cheiloclinium minutiflorum" OR "Salacia divaricata" OR "Salacia minutiflora");	**0**	**0**	**-**
21	***Cipó-tuira***	TAB=("cipó-tuira" OR "Bonamia ferruginea" OR "Calycobolus ferrugineus" OR "Pleonotoma jasminifolia" OR "Bignonia jasminifolia" OR "Bignonia tetragonocaulis" OR "Pleonotoma tetragonocaulis" OR "Calycobolus sericeus" OR "Dufourea sericea" OR "Prevostea sericea");	**0**	**0**	**-**
22	***Copaíba***	TAB=("copaiba*" OR "Copaifera multijuga" OR "Copaiba multijuga" OR "copiabo" OR "Gupay" OR "Copiaba" OR "Palo de Aceite" OR "Copaifera glycycarpa" OR "Copaifera guyanensis" OR "Copaiba guianensis" OR "Copaifera guianensis" OR "Copaifera paupera" OR "Copaiba paupera" OR "Copaifera piresii" OR "Copaifera pubiflora" OR "Copaifera martii var. pubiflora" OR "Copaifera reticulata" OR "Copaifera duckei" OR "Copaifera cearensis Huber ex Ducke var. cearensis" OR "Copaifera langsdorffii" OR "Copaifera laxa" OR "Copaifera sellowii" OR "Copaiba langsdorffii" OR "Copaifera lucens" OR "Copaifera martii" OR "Copaiba martii" OR "Copaifera trapezifolia" OR "Copaifera oblongifolia" OR "Copaifera officinalis") ;	**112**	**291**	**1898**
23	***Cubiu* (Cocona)**	TAB=("cubiu" OR "Solanum sessiliflorum");	**9**	**9**	**2002**
24	***Cumaru***	TAB=("cumaru" OR "Dipteryx odorata" OR "Coumarouna odorata" OR "kumaru" OR "Brazilian teak" OR "haba tonka" OR "cumaruna" OR "sarrapia" OR "Dipteryx tetraphylla" OR "Dipteryx punctata" OR "Coumarouna punctata" OR "Coumarouna trifoliolata" OR "Dipteryx trifoliolata" OR "Dipteryx rosea" OR "Coumarouna rosea" OR "Stryphnodendron paniculatum" OR "Piptadenia poeppigii" OR "Stryphnodendron rizzinianum" OR "Myroxylon balsamum" OR "Dipteryx magnifica" OR "Coumarouna magnifica" OR "Dipteryx polyphylla" OR "Coumarouna polyphylla" OR "Dipteryx intermedia");	**19**	**63**	**1986**
25	***Cunane***	TAB=("Cunaniol" OR "cunane" OR "cunanbi" OR "Clibadium sylvestre" OR "Clibadium appressipilum" OR "Clibadium badieri" OR "Clibadium caudatum" OR "Clibadium havanense" OR "Clibadium latifolium" OR "Clibadium strigillosum" OR "Clibadium vargasii" OR "Clibadium surinamense" OR "Clibadium asperum" OR "Phyllanthus brasiliensis" OR "Conami brasiliensis" OR "Conami conami" OR "Diasperus brasiliensis" OR "Phyllanthus conami" OR "Cicca brasiliensis");	**0**	**1**	**1996**

Annexes

	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
26	***Cupuaçu***	TAB=("cupuaçu" OR "Theobroma grandiflorum" OR "cupuassu" OR "cupuazú" OR "cupu assu" OR "copoasu" OR "copoazú") ;	**105**	**263**	**1990**
27	***Curaruá***	TAB=((Ananas ADJ2 erectifolius) OR "curauá");	**34**	**48**	**2002**
28	***Guaraná***	TAB=("guarana" OR "Paullinia cupana" OR "Paullinia sorbilis" OR "Paullinia claviger") ;	**136**	**1.254**	**1960**
29	***Jaborandi***	TAB=("jaborandi" OR "Pilocarpus microphyllus" OR "Pilocarpus cearensis" OR "Pilocarpus officinalis" OR "Pilocarpus alatus" OR "Pilocarpus jaborandi" OR "Pilocarpus trachylophus" OR "Pilocarpus racemosus");	**38**	**88**	**1899**
30	***Jambu***	TAB=(Jambu OR jamburana OR "mastruço do Pará" OR "nhambú" OR "pimenteira do Para" OR "agrião-do-Pará" OR "Acmella brachyglossa" OR "Spilanthes arrayana" OR paracress OR "Spilanthes caespitosa" OR "Acmella ciliata" OR "Spilanthes ciliata" OR "Spilanthes melampodioides" OR "Acmella oleracea" OR "Spilanthes oleracea" OR "Bidens fervida" OR "Bidens fusca" OR "Acmella kalelii" OR "Acmella brachyglossa" OR "Spilanthes arrayana" OR "Spilanthes caespitosa" OR "Spilanthes acmella" OR "Blainvillea acmella" OR "Verbesina acmella" OR "Blainvillea dichotoma" OR "Blainvillea rhomboidea" OR "Spilanthes acmella" OR Bidens acmella") ;	**51**	**335**	**1970**
31	***Jatobá*** **(Courbaril)**	TAB=("jatoba" OR "courbaril" OR "West Indian locust" OR "guapinol" OR "copinol" OR "cuapinol" OR "curbaril" OR "jatayva" OR "paquió" OR "Hymenaea courbaril" OR "Hymenaea erythrocarpa" OR "Hymenaea intermedia" OR "Hymenaea jeaniana" OR "Hymenaea oblongifolia" OR "Hymenaea parvifolia" OR "Hymenaea reticulata" OR "Hymenaea stigonocarpa" OR "Hymenaea stilbocarpa");	**23**	**51**	**1992**
32	***Mandioca*** **(Cassava)**	TAB=(mandioca OR macaxeira OR macaxera OR aipim OR manioc OR cassava OR "Manihot esculenta" OR "Manihot aipi" OR "janipha aipi" OR "janipha Manihot" OR "Jatropha Manihot");	**988**	**15.264**	**1897**
33	***Matamatá***	TAB=("Eschweilera coriacea" OR "Lecythis coriacea" OR "Chytroma cincturata" OR "Chytroma grandifolia" OR "Chytroma matamata" OR "Eschweilera acuminatissima" OR "Eschweilera eymaana" OR "Eschweilera fractiflexa" OR "Eschweilera grandifolia" OR "Eschweilera matamata" OR "Eschweilera odora" OR "Eschweilera pallida" OR "Eschweilera retroflexa" OR "Eschweilera vageleri" OR "Jugastrum coriaceum" OR "Lecythis acuminatissima" OR "Lecythis grandifolia" OR "Lecythis odora" OR "Lecythis peruviana" OR "Lecythis retroflexa" OR "Neohuberia matamata" OR "Eschweilera amazonica" OR "Eschweilera atropetiolata" OR "Eschweilera pseudodecolorans" OR "Eschweilera apiculate" OR "Chytroma apiculate");	**0**	**0**	**-**
34	***Mogno brasileiro*** **(Brazilian mahogany)**	TAB=("mogno-brasileiro" OR "caoba de Honduras" OR "caoba de hoja grande" OR "caobo de hoja grande" OR "Honduran mahogany" OR "Honduras mahogany" OR "orbig-leaf mahogany" OR "brazilian mahogany" OR "Swietenia macrophylla" OR "Swietenia belizensis" OR "Swietenia krukovii" OR "Swietenia candollei" OR "Swietenia tesomannii" OR "Swietenia tessmannii");	**5**	**75**	**1995**
35	***Muirapuama***	TAB=("Muirapuama" OR "Marapuama" OR "muira-puama" OR "mirantã" OR "Ptychopetalum olacoides" OR "Ptychopetalum uncinatum");	**24**	**139**	**1990**

Annexes

	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
36	***Mulateiro* (Capirona)**	TAB=("mulateiro" OR "pau-mulato" OR "capirona" OR "Capirona macrophylla" OR "Capirona duckei" OR "Capirona huberiana" OR "Capirona leiophloea" OR "Capirona surinamensis" OR "Capirona wurdackii" OR "Condaminea macrophylla" OR "Loretoa peruviana" OR "Monadelphanthus floridus" OR "Capirona decorticans" OR "Calycophyllum spruceanum" OR "Eukylista spruceana");	**4**	**9**	**1994**
37	***Murumuru***	TAB=("murumuru" OR "muru-muru" OR "chonta" OR "chontaloro" OR "schibo" OR "chechana" OR "totose" OR "huilango" OR "huicungo" OR "Orocori" OR "Astrocaryum murumuru" OR "Astrocaryum ciliatum" OR "Astrocaryum faranae" OR "Astrocaryum farinosum" OR "Astrocaryum javarense" OR "Astrocaryum sciophilum" OR "Astrocaryum ulei" OR "Astrocaryum yauaperyense" OR "Astrocaryum horridum" OR "Astrocaryum paramaca var. javarense" OR "Bactris sciophila" OR "Astrocaryum plicatum");	**47**	**169**	**1949**
38	***Mururé***	TAB=("mururé" OR "Brosimum acutifolium" OR "Brosimum lactescens" OR "Brosimopsis lactescens" OR "Brosimopsis amplifolia" OR "Brosimopsis diandra" OR "Brosimopsis oblongifolia");	**0**	**3**	**1997**
39	***Paricá* (Brazilian fern tree)**	TAB=("paricá" OR "Schizolobium amazonicum" OR "Schizolobium parahyba var. amazonicum" OR "Schizolobium parahyba" OR "Schizolobium excelsum");	**5**	**5**	**2009**
40	***Patauá***	TAB=("pataua" OR "batauá" OR "putauá" OR "palma de seje" OR "ungurahua" OR "patabá" OR "hungurahua" OR "mingucha" OR "Oenocarpus bataua" OR "Jessenia bataua");	**17**	**30**	**1994**
41	***Lacre***	TAB=((pau near2 lacre) OR "Vismia cayennensis" OR "Vismia guianensis" OR "Vismia bemerguii" OR "Vismia tenuinervia" OR "Vismia gracilis" OR "Vismia schultesii" OR "Vismia amazonica" OR "Vismia cauliflora" OR "Vismia japurensis" OR "Vismia sandwithii" OR "Vismia macrophylla" OR "Vismia sprucei" OR "Vismia baccifera" OR "Vismia cauliflora" ADJ "Vismia cavalcantei" OR "Vismia confertiflora" OR "Vismia floribunda" OR "Vismia glabra" OR "Vismia lateriflora" OR "Vismia laxiflora" OR "Vismia angustifolia" OR "Vismia falcata" OR "Vismia angusta" OR "Vismia duckei" OR "Vismia minutiflora" OR "Vismia obtusa" OR "Vismia pozuzoensis" OR "Vismia sessilifolia" OR "Hypericum sessilifolium" OR "Vismia rufescens" OR "Hypericum rufescens" OR "Vismia latifolia");	**0**	**5**	**1994**
42	***Pau-rosa***	TAB=("pau-rosa" OR "palo de rosa" OR "Aniba rosiodora" OR "Aniba rosaeodora");	**5**	**46**	**1989**
43	***Piper aleyreanum***	TAB=("João brandinho" OR "Piper aleyreanum");	**0**	**0**	**-**
44	***Piquiá***	TAB=("piquia" OR "Caryocar villosum" OR "Souari villosa" OR "Pekea butyrosa" OR "Pekea villosa" OR "Rhizobolus butyrosus");	**2**	**3**	**2010**
45	***Pracaxi***	TAB=(pracaxi OR paracaxi OR "Pentaclethra macroloba" OR "Pentaclethra brevipila" OR "Pentaclethra filamentosa OR "Pentachletra macrophylla" OR "pentachletra macrofila");	**32**	**80**	**1996**
46	***Priprioca* (Jointed flatsedge)**	TAB=("priprioca" OR "chintul" OR "Cyperus articulatus" OR "Cyperus subnodosus" OR "Chlorocyperus articulatus" OR "Chlorocyperus cordobensis" OR "Cyperus bengalensis" OR "Cyperus borbonicus" OR "Cyperus cordobensis" OR "Cyperus corymbosus" OR "Cyperus enodis" OR "Cyperus	**5**	**16**	**1982**

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	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
		fistulosus" OR "Cyperus gula-metthi" OR "Cyperus gymnos" OR "Cyperus interceptus" OR "Cyperus koenigii" OR "Cyperus niloticus" OR "Cyperus nodosus" OR "Cyperus nudus" OR "Cyperus pallescens" OR "Cyperus pertenuis" OR "Cyperus roestelii" OR "Cyperus seminudus" OR "Cyperus subarticulatus" OR "Cyperus tegetiformis" OR "Cyperus tenuicomus");			
47	***Pupunha* (Peach palm)**	TAB=("pupunha" OR "pupunheira" OR "peach palm" OR "pijiguao" OR "chontaduro" OR "pejibaye" OR "pupuña" OR "pipire" OR "pijuayo" OR "pixbae" OR "cachipay" OR "Bactris gasipaes" OR "Guilielma gasipaes" OR "Bactris insignis" OR "Bactris speciosa" OR "Bactris utilis" OR "Guilielma chontaduro" OR "Guilielma ciliata" OR "Guilielma insignis" OR "Guilielma speciosa" OR "Guilielma utilis" OR "Martinezia ciliata" OR "Palma paripou" OR "Bactris acanthocarpa var. exscapa" OR "Astrocaryum humile" OR "Bactris aculeifera" OR "Bactris devia" OR "Bactris fragae" OR "Bactris humilis" OR "Bactris interruptepinnata" OR "Bactris leptochaete" OR "Bactris macrocalyx" OR "Bactris microcalyx" OR "Bactris pinnatisecta" OR "Bactris tarumanensis" OR "Bactris exscapa");	**48**	**64**	**1994**
48	***Sacaca***	TAB=("Croton cajucara");	**12**	**15**	**1997**
49	***Sacha inchi***	TAB=("amêndoa-lopo" OR "amendoim-da-amazônia" OR "sacha-inchi" OR "sacha peanut" OR "mountain peanut" OR "Inca nut" OR "Inca-peanut" OR "inca inchi" OR "inchi oil" OR "sacha maní" OR "maní del Inca" OR "maní jíbaro" OR "Plukenetia volubilis" OR "Fragariopsis paxii" OR "Plukenetia macrostyla" OR "Plukenetia peruviana" OR "Sajorium volubile");	**22**	**579**	**1992**
50	***Sangue-de-drago***	TAB=("Croton lechleri" OR "Croton palanostigma" OR "Oxydectes benthamiana" OR "Oxydectes palanostigma" OR "Palanostigma crotonoides" OR "Palanostigma martiana");	**10**	**74**	**1971**
51	***Saracura-mirá***	TAB=("saracura-mirá" OR "Ampelozizyphus");	**2**	**5**	**1999**
52	***Seringueira* (Brazilian rubber tree)**	TAB=("seringueira" OR "arbol del caucho" OR "jacio del Orinoco" OR "Pará rubber tree" OR "brasil rubber tree" OR "brazil rubber tree" OR "brazilian rubber tree" OR "sharinga tree" OR "Hevea brasiliensis" OR "Hevea granthamii" OR "Hevea janeirensis" OR "Hevea randiana" OR "Hevea sieberi" OR "Siphonia brasiliensis" OR "Siphonia janeirensis" OR "Siphonia ridleyana" OR "Hevea benthamiana" OR "Hevea discolor" OR "Hevea duckei" OR "Hevea guianensis" OR "Caoutchoua elastica" OR "Caoutchoua guianensis" OR "Hevea apiculata" OR "Hevea brasiliensis" OR "Hevea caucho" OR "Hevea collina" OR "Hevea cuneata" OR "Hevea elastica" OR "Hevea foxii" OR "Hevea glabrescens" OR "Hevea lutea" OR "Hevea marginata" OR "Hevea nigra" OR "Hevea peruviana" OR "Jatropha elastica" OR "Siphonanthus elasticus" OR "Siphonia apiculata" OR "Siphonia cahuchu" OR "Siphonia elastica" OR "Siphonia guianensis" OR "Siphonia lutea" OR "Hevea camargoana" OR "Hevea camporum" OR "Hevea microphylla" OR "Hevea paludosa" OR "Hevea nitida" OR "Hevea viridis" OR "Hevea pauciflora" OR "Hevea confusa" OR "Hevea humilior" OR "Hevea kunthiana" OR "Hevea membranacea" OR "Hevea	**81**	**478**	**1912**

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	Bioinput	Search strategy	No. of documents in BR	No. of documents in the world	Year of oldest application
		minor" OR "Siphonia kunthiana" OR "Siphonia pauciflora" OR "Hevea rigidifolia" OR "Siphonia rigidifolia" OR "Hevea spruceana" OR "Hevea paraensis" OR "Hevea similis" OR "Micrandra ternata" OR "Siphonia discolor" OR "Siphonia spruceana" OR "Hevea spruceana" OR "Hevea paraenesis" OR "Hevea similis" OR "Micrandra ternata" OR "Siphonia discolor" OR "Siphonia spruceana");			
53	***Sorva***	TAB=("sorva" OR "sorvarana" OR "sorveira" OR "cumã-uaçu" OR "leche huayo" OR "Huansoco" OR "fransoco" OR "arbol de la vaca" OR "leche caspi" OR "Couma macrocarpa" OR "Couma utilis" OR "Couma guianensis" OR "Couma capiron" OR "Couma caurensis" OR "Couma guatemalensis" OR "Couma sapida" OR "Collophora utilis" OR "Couma dulcis" OR "Couma multinervis" OR "Cerbera triphylla");	**11**	**49**	**1971**
54	***Sucuúba***	TAB=("Himatanthus articulatus" OR "Plumeria articulata" OR "Himatanthus rigidus" OR "Himatanthus sucuubus" OR "Plumeria floribunda" OR "Plumeria microcalyx" OR "Plumeria paraensis" OR "Plumeria sucuuba" OR "Himatanthus phagedaenicus" OR "Plumeria phagedaenica" OR "Himatanthus revolutus" OR "Plumeria revoluta" OR "Himatanthus stenophyllus" OR "Himatanthus bracteatus var. revolutus" OR "Himatanthus tarapotensis" OR "Plumeria tarapotensis" OR "Himatanthus sucuuba" OR "Himatanthus drasticus" OR "Plumeria drastica" OR "Himatanthus fallax" OR "Plumeria fallax" OR JANAUBA OR SUCUUBA);	**2**	**5**	**1989**
55	***Tachi branco***	TAB=("Sclerolobium paniculatum" OR "Tachigali vulgaris" OR tachi-branco);	**0**	**0**	**-**
56	***Tucumã***	TAB=("tucumã" OR "awara" OR "acaiúra" OR "acuiuru" OR "alcoyure" OR "acaguru" OR "Astrocaryum aculeatum" OR "Astrocaryum chambira" OR "Astrocaryum huaimi" OR "Astrocaryum vulgare" OR "Astrocaryum dasychaetum" OR "Astrocaryum gymnopus" OR "Astrocaryum gynacanthum var. dasychaetum" OR "Astrocaryum gynacanthum var. munbaca" OR "Astrocaryum minus var. terrae-firmae" OR "Astrocaryum minus var. terrafirme" OR "Astrocaryum munbaca" OR "Astrocaryum rodriguesii var. minus" OR "Astrocaryum leiospatha" OR "Astrocaryum awarra" OR "Astrocaryum guianense" OR "Astrocaryum segregatum" OR "Astrocaryum tucumoides");	**34**	**83**	**1950**
57	***Ucuúba* (Baboonwood)**	TAB=("ucuuba" OR "baboonwood" OR "ucuhuba" OR "chalviande" OR "Virola surinamensis" OR "Virola duckei" OR "Virola flexuosa" OR "Virola loretensis" OR "Virola minutiflora" OR "Virola pavonis" OR "Virola elongata" OR "Virola mollissima" OR "Virola peruviana" OR "Virola sebifera" OR "Virola calophylla" OR "Virola multinervia" OR "Virola venosa" OR "Myristica surinamensis" OR "Myristica gracilis" OR "Virola villosa" OR "Myristica elongata" OR "Myristica cuspidata" OR "Myristica membranacea" OR "Myristica punctata" OR "Myristica uaupensis" OR "Virola cuspidata" OR "Myristica mollissima" OR "Myristica peruviana" OR "Myristica cordifolia" OR "Myristica fulva" OR "Myristica mocoa" OR "Myristica panamensis" OR "Myristica virola" OR "Palala mocoa" OR "Virola boliviensis" OR "Virola panamensis" OR "Virola peruviana" OR "Virola	**17**	**60**	**1950**

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		sebifera" OR "Virola theiodora" OR "Virola venezuelensis" OR "Virola warburgii" OR "Myristica sebifera" OR "Palala sebifera" OR "Virola calophylloidea" OR "Myristica venosa" OR "Virola michelii" OR "Virola caducifolia" OR "Virola guggenheimii" OR "Virola melinonii");			
58	***Unha-de-gato*** **(Cat's claw)**	TAB=("Uncaria tomentosa" OR "Uncaria guianensis" OR "Cinchona globifera" OR "Nauclea aculeata" OR "Nauclea polycephala" OR "Nauclea surinamensis" OR "Nauclea tomentosa" OR "Uncaria surinamensis" OR "Ourouparia tomentosa" OR "Ourouparia guianensis" OR "Uncaria aculeata" OR "Uncaria spinosa" OR "Uruparia versicolor" OR "Nauclea guianensis");	**16**	**1.026**	**1981**
59	***Urucum*** **(Achiote)**	TAB=("urucum" OR "annatto" OR "annato" OR "anatto" OR "achiote" OR "urucú" OR "acotillo" OR "achiote" OR "Roucou" OR "urucuzeiro" OR "urucueiro" OR "Bixa orellana" OR "Bixa arborea" OR "Bixa orleana" OR "Bixa purpurea" OR "Bixa sphaerocarpa" OR "Bixa tinctaria" OR "Bixa urucurana" OR "Orellana americana" OR "Orellana orellana");	**178**	**864**	**1941**

THE INDUSTRIAL PROPERTY INTELLIGENCE CENTER (NIPI), ESTABLISHED BY SEPEC/ME ORDINANCE NO. 4,426 OF JUNE 22, 2021, HAS AS ITS MAIN OBJECTIVE TO PRODUCE AND DISSEMINATE STUDIES BASED ON INDUSTRIAL PROPERTY DATABASES, TO SUPPORT THE DEVELOPMENT OF COMPETITIVENESS AND PRODUCTIVITY POLICIES.

MINISTÉRIO DA ECONOMIA

PÁTRIA AMADA BRASIL GOVERNO FEDERAL