REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

SCIENTOMETRIC AND TECHNOLOGICAL LANDSCAPE OF THE GENUS *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.)

CENÁRIO CIENTOMÉTRICO E TECNOLÓGICO DO GÊNERO *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.)

ESCENARIO CIENCIOMÉTRICO Y TECNOLÓGICO DEL GÉNERO *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.)

Maria de Jesus Pereira Gomes
Mestranda em biotecnologia, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.
E-mail: gomesmjp@ufdpar.edu.br

Alessandra Souza dos Santos
Mestra em biotecnologia, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.
E-mail: alebiotany@gmail.com

Raquel Fonteles dos Santos
Mestra em biodiversidade e conservação – UFPI, Seduc – CE, Brasil.
E-mail: raquelfonteles1997@gmail.com

Francisca Rafaela Ferreira de Souza
Mestranda em Ciências Farmacêuticas, Universidade Federal do Piauí (UFPI), Brasil.
E-mail: rafaelaferreira1426@gmail.com

Ruan Pábulo Bandeira Pinto
Mestrando em Biotecnologia, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.
E-mail: pabulobandeira@ufdpar.edu.br

Madalena Santos das Chagas
Mestranda em Biotecnologia, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.
E-mail: madalenasantos7725@gmail.com

Luciana Rocha Faustino
Doutora em Ciências Veterinária – UECE, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

E-mail: lucianafaustino@ufdpar.edu.br

Ivanilza Moreira de Andrade Paiva
Doutora em Botânica – UEFS, Universidade Federal do Delta do Parnaíba (UFDPar), Brasil.
E-mail: ivanilzaandrade@ufdpar.edu.br

ABSTRACT
The genus *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.) comprises tree and shrub species recognized for their food, ornamental, and pharmacological potential. This study aimed to perform a global scientometric and technological analysis of the genus through the evaluation of scientific publications and patent documents published between 2001 and 2025. Searches were conducted in scientific databases (Scopus, PubMed Central, ScienceDirect, and Web of Science) and technological databases (Espacenet, INPI, Lens, and WIPO). A total of 163 scientific articles and 11 patent documents were identified. Scientific production showed a growing trend between 2012 and 2020, reaching a publication peak in 2020 (n = 16), and was predominantly Brazilian (96.4%). Research was mainly focused on antioxidant, anti-inflammatory, and antimicrobial activities, with recent advances in studies investigating selective cytotoxicity against tumor cells. In contrast, the technological landscape remains incipient, with patent applications led by Brazil (n = 10), predominantly classified under IPC class A61K. The analysis revealed a substantial gap between scientific production and protected technological innovation. Most studies remain at early stages of technological maturity (TRL 1–2), focusing on chemical characterization and in vitro assays. The findings indicate that although the genus presents remarkable biotechnological and pharmacological potential, the consolidation of innovation depends on overcoming regulatory barriers, strengthening university–industry interactions, and increasing the technological maturity of research.

Keywords: scientometric analysis; technological innovation; medicinal plants; natural products; intellectual property.

RESUMO

O gênero *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.), compreende espécies arbóreas e arbustivas reconhecidas por seu potencial alimentício, ornamental, e farmacológico. O presente estudo objetivou realizar uma análise cientométrica e tecnológica (documentos de patentes) em escala global sobre o gênero. Para isso, foram realizadas buscas em bases de dados científicas (*Scopus*, *PubMed Central*, *ScienceDirect* e *Web of Science*) e tecnológicas (*Espacenet*, INPI, *Lens* e WIPO), considerando o período de 2001 a 2025. Foram identificados 163 artigos científicos e 11 documentos de patentes. A produção científica exibiu tendência de crescimento entre 2012 e 2020, com pico de publicações em 2020 (n = 16), sendo majoritariamente brasileira (96,4%) e concentrada em estudos sobre as atividades antioxidante, anti-inflamatória e antimicrobiana, com avanços recentes em estudos de citotoxicidade seletiva contra células tumorais. Em contraste, o cenário tecnológico mostrou-se incipiente, com depósitos liderados pelo Brasil (n = 10), predominantemente classificados na Classe IPC A61K, referente a preparações para finalidades médicas, odontológicas ou higiênicas. A análise revelou uma lacuna entre a produção científica e a inovação tecnológica protegida, uma vez que foram identificados apenas 11 documentos de patentes frente aos 163 artigos selecionados. Além disso, verificou-se que a maioria das pesquisas se encontra em níveis iniciais de maturidade tecnológica (TRL 1 e 2), concentrando-se na caracterização química e em ensaios *in vitro*. Conclui-se que, embora o gênero apresente elevado potencial biotecnológico e farmacológico, a consolidação de sua inovação depende da superação de barreiras regulatórias, do fortalecimento da interação entre universidades e setor produtivo e do aumento da maturidade tecnológica das pesquisas, de modo a favorecer a transferência de tecnologia e sua inserção no mercado.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Palavras-chave: Análise cientométrica; inovação tecnológica; plantas medicinais; produtos naturais; propriedade intelectual.

RESUMEN

El género *Campomanesia* Ruiz & Pav. (Myrtaceae Juss.) comprende especies arbóreas y arbustivas reconocidas por su potencial alimentario, ornamental y farmacológico. El presente estudio tuvo como objetivo realizar un análisis cienciométrico y tecnológico (documentos de patentes) a escala mundial sobre este género. Para ello, se efectuaron búsquedas en bases de datos científicas (Scopus, PubMed Central, ScienceDirect y Web of Science) y tecnológicas (Espacenet, INPI, Lens y WIPO), considerando el período comprendido entre 2001 y 2025. Se identificaron 163 artículos científicos y 11 documentos de patente. La producción científica mostró una tendencia creciente entre 2012 y 2020, alcanzando su máximo en 2020 (n = 16), con un marcado predominio de estudios realizados en Brasil (96,4 %). Estas investigaciones se concentraron principalmente en las actividades antioxidante, antiinflamatoria y antimicrobiana, además de evidenciar avances recientes en estudios sobre citotoxicidad selectiva frente a células tumorales. En contraste, el panorama tecnológico resultó aún incipiente, con depósitos de patentes liderados por Brasil (n = 10), clasificados predominantemente en la Clase IPC A61K, correspondiente a preparaciones con fines médicos, odontológicos o higiénicos. El análisis reveló una brecha significativa entre la producción científica y la innovación tecnológica protegida, ya que solo se identificaron 11 documentos de patente frente a los 163 artículos científicos seleccionados. Asimismo, se constató que la mayoría de las investigaciones se encuentra en niveles iniciales de madurez tecnológica (TRL 1 y TRL 2), centrándose principalmente en la caracterización química y en ensayos *in vitro*. Se concluye que, si bien el género presenta un elevado potencial biotecnológico y farmacológico, la consolidación de su innovación depende de la superación de barreras regulatorias, del fortalecimiento de la interacción entre las universidades y el sector productivo, así como del incremento de la madurez tecnológica de las investigaciones, con el fin de favorecer la transferencia de tecnología y su incorporación al mercado.

Palabras clave: análisis cienciométrico; innovación tecnológica; plantas medicinales; productos naturales; propiedad intelectual.

1. Introduction

The growing interest in natural products with pharmacological potential has driven investigations into native plant species as promising sources of bioactive compounds. The family Myrtaceae Juss. stands out as one of the most diverse and representative botanical groups within the Brazilian flora, exhibiting broad distribution across major biomes such as the Cerrado and the Atlantic Forest (Landrum, 1986). Within this family, the genus *Campomanesia* Ruiz & Pav. comprises tree and shrub species widely distributed throughout the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pampa phytogeographic domains (Oliveira *et al.,* 2025). These species are

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

recognized for their nutritional and medicinal value, with documented antioxidant, anti-inflammatory, and antimicrobial properties (Santos *et al.,* 2012; Schneider *et al*., 2020).

From a phytochemical perspective, *Campomanesia* species are characterized by high levels of antioxidant compounds, phenolic constituents, and vitamin C (Cardozo *et al.,* 2018; Da Silva *et al*., 2016; De Andrade Silva & Fonseca, 2016; De Souza Duarte *et al*., 2020; Emer *et al*., 2018; Sá *et al*., 2018; Salmazzo *et al*., 2019). In addition to their abundance of phenolic compounds, including catechins, quercetin, rutin, and gallic acid, these species exhibit a valuable nutritional profile consisting of dietary fiber, proteins, low lipid content, citric acid, and carotenoids such as β-carotene (Alves, 2013; Cristofel, 2014; Silva, 2022). The occurrence of these bioactive constituents reinforces both the remarkable antioxidant capacity and the industrial relevance of species belonging to this genus.

Over the past decades, scientific interest in *Campomanesia* has intensified, largely driven by the search for novel bioactive compounds of natural origin. Phytochemical investigations have revealed a rich composition of polyphenols and flavonoids, compounds frequently associated with anti-inflammatory and antimicrobial activities (Santos *et al*., 2012; Schneider *et al*., 2020). More recent studies have reported additional biological activities, including antitumor effects (Angeli *et al*., 2025; Burigato *et al*., 2024; Silva *et al*., 2024), anthelmintic activity (Bazán *et al*., 2025), inhibitory effects against *Helicobacter pylori* (Neves *et al*., 2022), and prebiotic potential (Barbosa *et al*., 2022). This diversity of biological activities further highlights the relevance of the genus for biotechnological and pharmacological applications.

Despite the extensive body of literature demonstrating the pharmacological and biotechnological potential of *Campomanesia*, a substantial gap remains between the generation of scientific knowledge and its conversion into protected technological innovations. In this context, scientometric and technological analyses provide valuable tools for identifying research trends, assessing the technological maturity of scientific investigations, and evaluating whether advances related to antioxidant, antimicrobial,

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

and antitumor activities have effectively progressed toward technological innovation and intellectual property protection (Paranhos & Ribeiro, 2018).

Therefore, the present study aimed to perform a comprehensive scientometric and technological assessment of scientific and patent production related to the genus *Campomanesia* through the analysis of scientific articles and patent documents published between 2001 and 2025.

2. Materials and Methods

2.1. Study Design

This study adopted a qualitative–quantitative approach structured into two complementary stages: (i) scientometric prospecting, focusing on scientific publications, and (ii) technological or patentometric prospecting, focusing on patent documents related to the genus *Campomanesia*.

2.2. Scientific Prospecting Strategy

The search for scientific publications was conducted on September 27, 2025, using the databases Scopus, PubMed Central, ScienceDirect, and Web of Science. The search strategy employed the genus name *Campomanesia* as the primary descriptor, combined with terms related to chemical and biological properties using the Boolean operator AND (Table 1).

Searches were performed within the title, abstract, and keyword fields to maximize the retrieval of studies associated with the genus.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Table 1. Number of publications indexed in Scopus, PubMed Central, ScienceDirect, and Web of Science obtained through combinations of descriptors associated with the genus *Campomanesia* and its biological, pharmacological, and chemical properties.

Search Query	Scopus	PubMed Central	ScienceDirect	Web of Science	Total
Campomanesia AND antibacterial	16	200	48	14	278
Campomanesia AND antifungal	7	127	28	6	168
Campomanesia AND antimicrobial	32	265	70	32	399
Campomanesia AND antioxidant	94	381	124	113	712
Campomanesia AND anti-inflammatory	35	301	103	33	472
Campomanesia AND "chemical composition"	56	228	68	55	407
Campomanesia AND cytotoxic	13	219	55	12	299
Campomanesia AND "natural products"	10	193	52	14	269
Campomanesia AND pharmacological	14	298	70	13	395
Total	**277**	**2,212**	**618**	**292**	**3,399**

Source: Authors (2026).

The screening process followed predefined eligibility criteria, including original research articles and review papers published in English, Spanish, or Portuguese between 2001 and 2025.

Initially, 3,399 records were identified. After excluding 2,600 records, mainly due to duplication or because they merely mentioned the genus *Campomanesia* without addressing its chemical composition or biological activities, 747 studies remained for title and abstract screening. Following eligibility assessment, 163 articles met the inclusion criteria and were selected for the final analysis.

2.3. Technological Prospecting Strategy

Technological prospecting was carried out using the Espacenet, Brazilian National Institute of Industrial Property (INPI), Lens, and World Intellectual Property Organization (WIPO) databases.

Application of the eligibility criteria reduced the initial dataset of 40 patent families to 11 patent documents directly related to biotechnological innovations involving species of the genus *Campomanesia* (Table 2).

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Table 2. Patent documents related to the genus *Campomanesia* retrieved from Espacenet, INPI, Lens, and WIPO databases after the application of eligibility criteria and document refinement.

Database	Search Term	Raw Records	Patent Families	Selected Patent Documents
Espacenet	*Campomanesia*	22	–	4
INPI	*Campomanesia*	10	–	4
Lens	*Campomanesia*	30	12	2
WIPO	*Campomanesia*	32	21	1
Total		**94**	**40**	**11**

Source: Authors (2026).

Patent documents were analyzed based on their titles, abstracts, and full texts. For each document, information was extracted regarding the reported biological effect, International Patent Classification (IPC), country of origin, and year of publication.

The categorization followed the hierarchical structure of the International Patent Classification system established under the Strasbourg Agreement (1971), which organizes patents into sections A–H and their respective subclasses (WIPO, 2025).

2.4. Data Analysis

Data organization and systematization were performed using the Parsifal platform and Microsoft Excel®, which were employed for the construction of tables, graphs, and descriptive analyses.

Figures were edited and vectorized using Inkscape® software.

The scientometric analysis considered indicators such as annual publication trends, citation frequency, geographic distribution of scientific output, journal distribution, and the most influential publications within the study period.

The technological analysis evaluated patent filing trends, countries of origin, institutional applicants, International Patent Classification (IPC) categories, technological application areas, and technological maturity levels based on the Technology Readiness Level (TRL) framework.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

The integration of scientometric and patentometric indicators enabled the identification of research trends, innovation gaps, technological maturity stages, and opportunities for knowledge transfer related to the genus *Campomanesia*.

3. Results and Discussion

3.1. Scientific Production Landscape

The scientometric analysis revealed a consistent upward trajectory in scientific production related to the genus *Campomanesia* between 2001 and 2025. Although the early years of the evaluated period were characterized by sporadic publications, a substantial increase was observed from 2012 onward, culminating in a publication peak in 2020, with 16 articles published (Figure 1a). This growth can be attributed to the consolidation of research on natural products and the increasing application of advanced analytical techniques, such as LC–MS/MS and GC–MS, which have expanded opportunities for the chemical and biological characterization of plant-derived compounds.

Scientific impact followed a similar pattern, with notable citation peaks recorded in 2012 (549 citations), 2017 (466 citations), and 2020 (387 citations), as illustrated in Figure 1b. The prominence of 2012 is largely associated with the publication of influential studies investigating the bioactive potential of species belonging to the family *Myrtaceae*, particularly *Campomanesia xanthocarpa* Berg. Among these, the work of Pereira *et al*. (2012) significantly contributed to establishing the antioxidant potential of native Brazilian fruits. Another landmark study published during this period was conducted by Moura-Costa *et al*. (2012), who demonstrated the antimicrobial activity of *Campomanesia eugenioides* against several pathogenic microorganisms, including *Leishmania amazonensis*.

From 2017 onward, research evolved beyond basic phytochemical characterization toward more advanced pharmacological and toxicological investigations. Studies addressing the safety profile and toxicity of *Campomanesia velutina* (Araújo *et al*., 2017), as well as investigations of anti-inflammatory activity

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

(Souza *et al*., 2017; Viscardi *et al*., 2017), contributed to expanding the scientific understanding of the genus. A particularly noteworthy advancement was the demonstration that pectins isolated from *C. xanthocarpa* exhibit selective cytotoxicity against human glioblastoma cells while preserving the viability of normal cells (Barbieri *et al*., 2017, 2019; Amaral *et al*., 2019), highlighting the therapeutic potential of these natural compounds.

The scientific literature concerning *Campomanesia* can be organized into three major thematic areas that reflect the progression from fundamental research to applied biotechnological and pharmacological investigations.

The first thematic axis is phytochemical research, which focuses on the characterization of phenolic compounds, flavonoids, tannins, and essential oils. These studies provide the chemical basis necessary for understanding the biological activities reported for the genus.

The second axis encompasses pharmacological investigations, including anti-inflammatory, antinociceptive, antimicrobial, and anticancer activities. This research area reflects the increasing interest in discovering novel therapeutic agents derived from natural products, particularly from *Campomanesia adamantium*, one of the most extensively studied species.

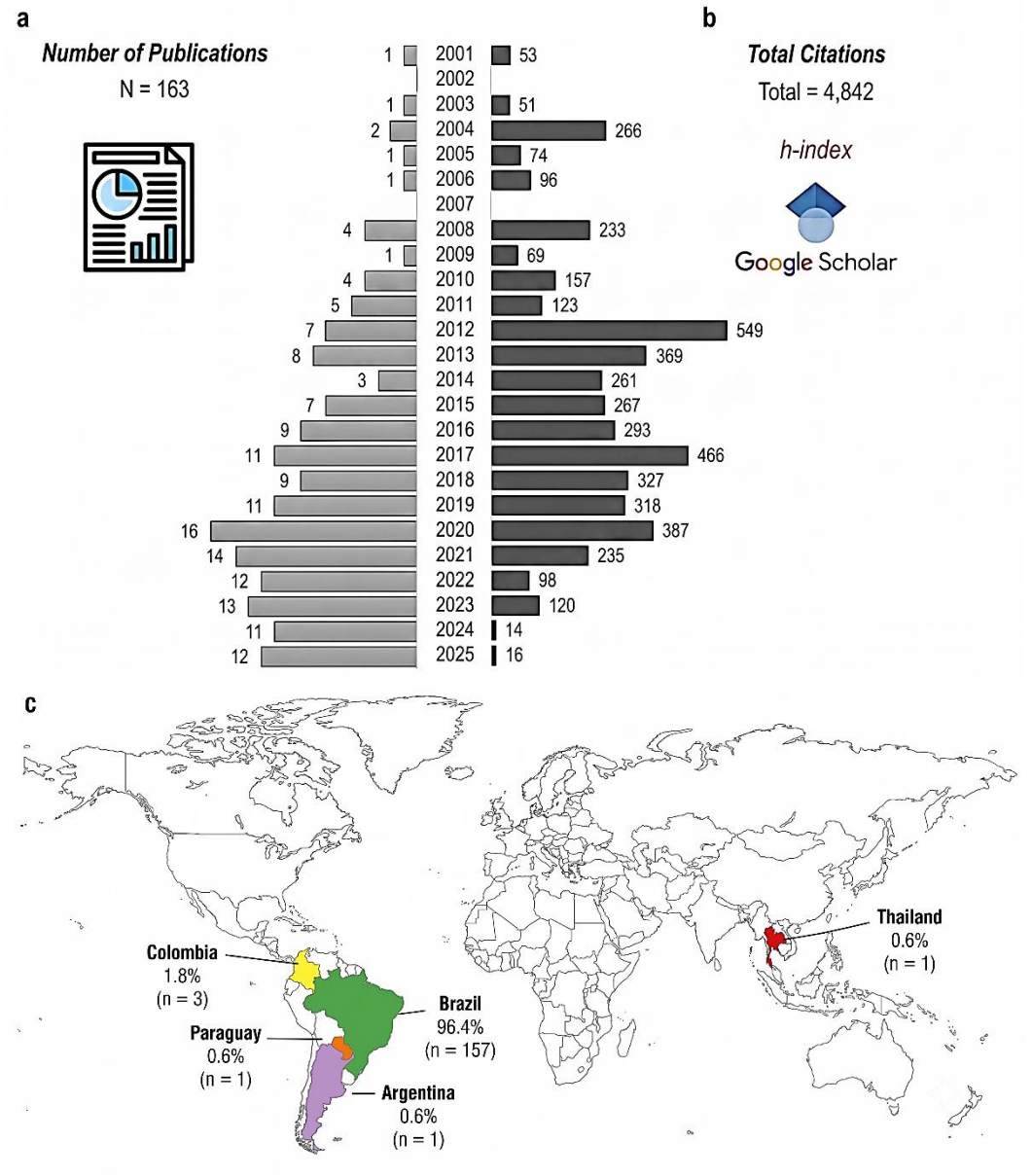
The third axis involves food science and technological applications. Recent investigations have increasingly focused on the exploitation of fruits from *C. xanthocarpa* and *C. phaea* for the development of functional foods, fermentation processes, nutraceutical products, and natural preservatives aimed at extending shelf life.

Across all research areas, “antioxidant activity” remains the central connecting theme among studies, representing the most extensively investigated biological property within the genus. This predominance reflects both the high concentration of phenolic compounds found in *Campomanesia* species and the growing demand for natural antioxidants in pharmaceutical, food, and cosmetic industries.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Figure 1. Global scientific production related to the genus *Campomanesia* between 2001 and 2025. (a) Annual number of publications; (b) annual number of citations; and (c) the five countries with the highest scientific output.



Source: Authors (2026).

Brazil holds an undisputed leadership position in scientific production concerning the genus, accounting for 96.4% of all publications (n = 157). This predominance is closely associated with the neotropical distribution of the genus and the high occurrence of endemic species in Brazilian biomes, particularly the Cerrado and Atlantic Forest.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Figure 1c presents the five countries with the highest number of publications, demonstrating that contributions from countries such as Colombia and Argentina are comparatively limited and often result from international collaborative efforts.

3.2. Editorial Distribution of Publications

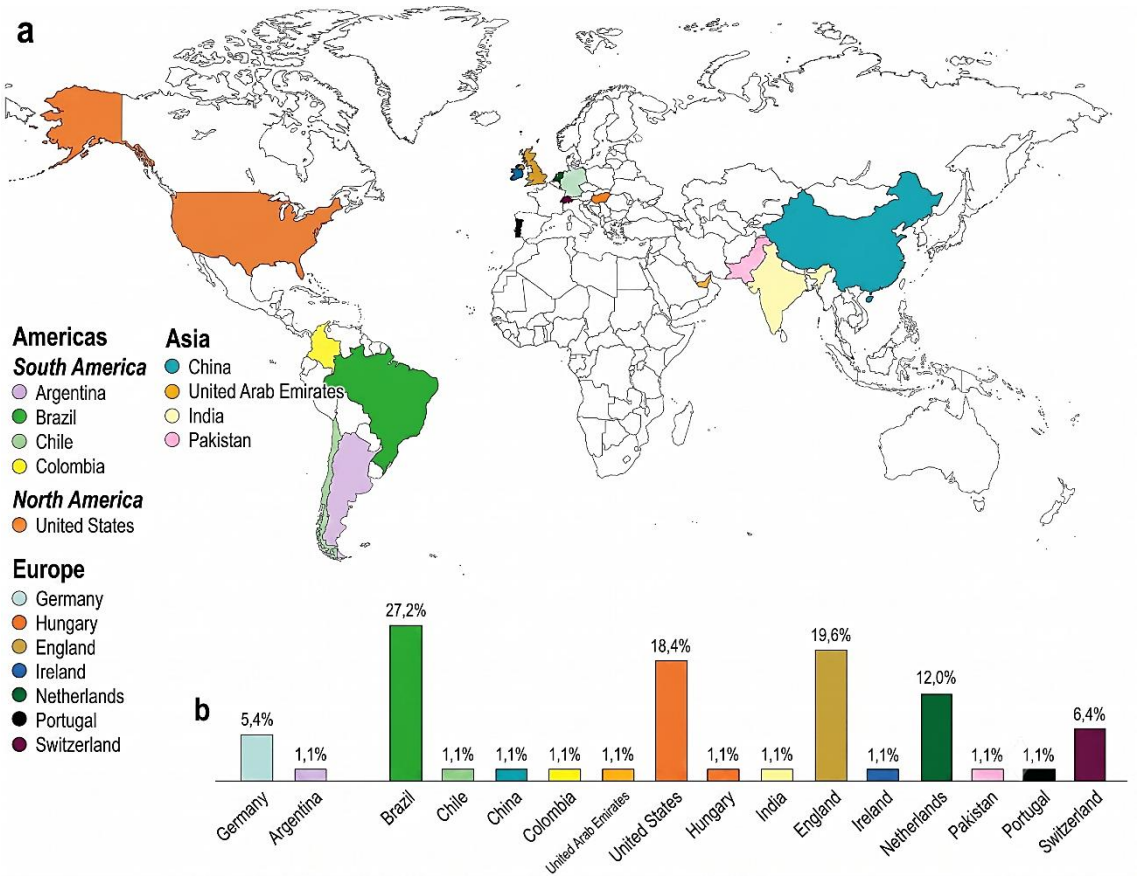
Scientific publications on *Campomanesia* are distributed across journals specializing in pharmacology, food science, natural products, botany, and biotechnology, spanning sixteen different countries. Figure 2 illustrates this editorial distribution, highlighting the predominance of journals based in Brazil (27.2%), the United Kingdom (19.6%), and the United States (18.4%).

The strong representation of Brazilian journals reflects the geographical concentration of species belonging to the genus, whereas the substantial participation of journals from the United Kingdom and the United States demonstrates the growing international relevance of research involving *Campomanesia*.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Figure 2. Scientific publications related to *Campomanesia* spp. distributed according to (A) continents and countries and (B) publication frequency by country.



Source: Authors (2026).

Campomanesia xanthocarpa and *Campomanesia adamantium* are regarded as the anchor species of the genus, accounting for the majority of scientific citations and technological innovations. Table 3 summarizes the principal species and their patent protection status.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Table 3. Main species of the genus *Campomanesia*, their bioactive compounds, associated patents, confirmed biological activities, and potential biotechnological and pharmaceutical applications based on scientific studies published between 2001 and 2025.

Species	Bioactive Compounds	Patent Protection	Biological Activity	Potential Application	References
Campomanesia xanthocarpa	Pectins, quercetin, flavonoids	Yes	Hypoglycemic, antiplatelet, antioxidant	Metabolic therapeutics and nutraceuticals	Barbieri *et al*. (2017; 2019); Amaral *et al*. (2019); Tremea *et al*. (2025)
Campomanesia adamantium	Cardamonin, essential oils, chalcones	Yes	Anti-inflammatory, antitumor, photoprotective	Dermocosmetics and oncological therapies	Alves-Santos *et al*. (2017); De Araújo *et al*. (2023); Oliveira *et al*. (2016); Sá *et al*. (2022)
Campomanesia pubescens	Tannins, flavonoids, saponins	Yes	Prebiotic, antimicrobial, wound-healing	Agricultural bioinputs and tissue regeneration	Cardoso *et al*. (2008)
Campomanesia phaea	Vitamin C, phenolic compounds	No	Antioxidant, hepatoprotective	Functional foods and natural preservatives	Abreu *et al*. (2020)
Campomanesia lineatifolia	Champanones, sesquiterpenes	Yes	Gastroprotective, natural herbicidal activity	Ulcer treatment and green agrochemicals	Neves *et al*. (2022); Rezende (2023)
Campomanesia guazumifolia	Tannins, total phenolics	Yes	Antioxidant, antimicrobial	Herbal medicines for infectious diseases and diabetes management	Pacheco *et al*. (2021)

Source: Authors (2026).

Despite the substantial volume of academic research, a significant gap remains between scientific knowledge generation and patent development, particularly for *Campomanesia phaea* (cambuci), which still lacks patent protection despite its recognized nutritional value. This scenario highlights a strategic opportunity for universities, research institutions, and industry to develop technological assets aimed at innovation in functional foods and other value-added products (Spricigo *et al*., 2021).

The scientific impact of research on the genus is further supported by the bibliometric analysis of the ten most highly cited publications (2001–2025), summarized in Table 4. The study by Pereira *et al*. (2012) ranks first, with 230 citations. Other highly influential publications include studies on the nanoencapsulation of

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

guabiroba extracts (Pereira *et al*., 2018) and pioneering investigations into weight management and glycemic control (Biavatti *et al*., 2004). Most of these highly cited articles focus on biological activities, further emphasizing the functional potential of the genus as a valuable source for the development of advanced pharmaceutical products.

Table 4. Scientometric mapping of the **10 most-cited publications** on the genus *Campomanesia* published between 2001 and 2025.

Rank	Article Title	Total Citations (TC)	Year	Journal	Country
1	Characterization and antioxidant potential of Brazilian fruits from the *Myrtaceae* family	230	2012	*Journal of Agricultural and Food Chemistry*	United States
2	Effect of nanoencapsulation using PLGA on antioxidant and antimicrobial activities of guabiroba fruit phenolic extract	160	2018	*Food Chemistry*	United Kingdom
3	Preliminary studies on *Campomanesia xanthocarpa* (Berg.) and *Cuphea carthagenensis* (Jacq.) J.F. Macbr. aqueous extract: Weight control and biochemical parameters	135	2004	*Journal of Ethnopharmacology*	Ireland
4	Antiulcerogenic effects of *Campomanesia xanthocarpa*	131	2004	*Journal of Ethnopharmacology*	Ireland
5	Antileishmanial activity and cytotoxicity of Brazilian plants	111	2014	*Experimental Parasitology*	United States
6	Assessment of antioxidant and antiproliferative activities and identification of phenolic compounds in exotic Brazilian fruits	106	2013	*Food Research International*	United States
7	Anti-inflammatory and antinociceptive activities of *Campomanesia adamantium*	103	2013	*Journal of Ethnopharmacology*	Ireland
8	Volatile components and antioxidant activity of selected myrtaceous fruits cultivated in southern Brazil	101	2008	*Latin American Journal of Pharmacy*	Argentina
9	Characterization of odor-active volatile compounds in champa (*Campomanesia lineatifolia* R. & P.)	96	2006	*Journal of Agricultural and Food Chemistry*	United States
10	Effects of *Campomanesia xanthocarpa* on biochemical, hematological, and oxidative stress parameters in hypercholesterolemic patients	89	2010	*Journal of Ethnopharmacology*	Ireland

TC: Total citations.
Source: Authors (2026).

REMUNOM
ISSN 2178-6925

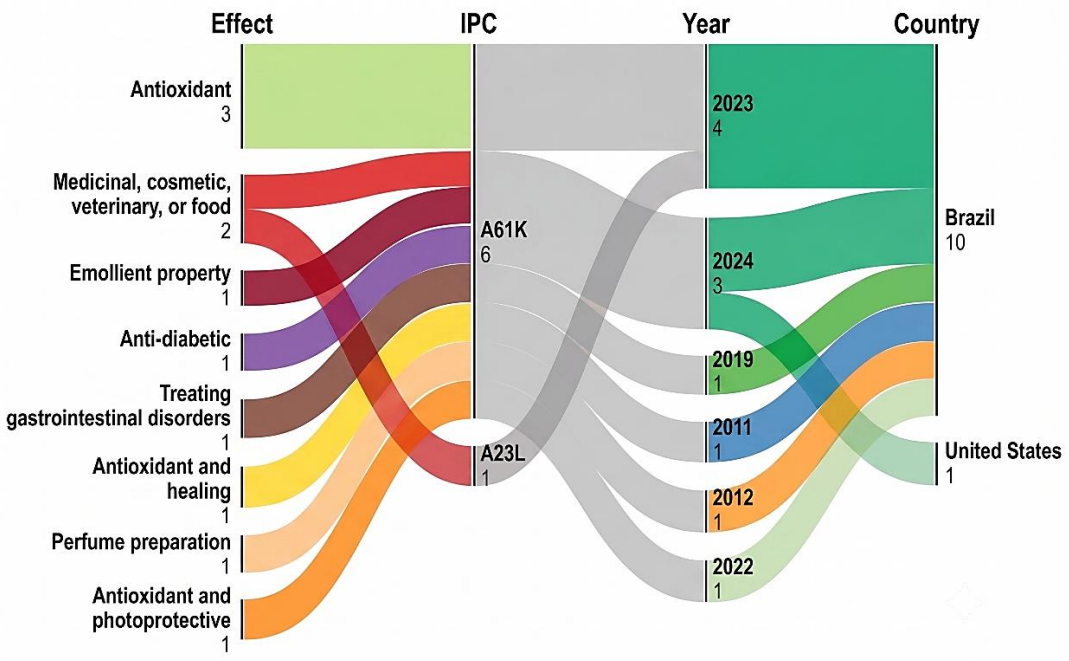
Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

3.3. Technological Production Landscape

Patent analysis provides valuable insights into the translation of scientific knowledge related to the genus *Campomanesia* into market-oriented innovations. Although the current technological landscape remains numerically limited in terms of patent filings, the identified innovations reveal significant potential for exploitation in strategic sectors, highlighting the leading role of Brazilian public research institutions.

When patent documents specifically associated with bioproducts derived from *Campomanesia* species were considered, Brazil emerged as the undisputed leader, accounting for 10 of the 11 patent documents included in the final analysis. The distribution and interrelationships among technological applications, International Patent Classification (IPC) categories, filing years, and countries of origin are presented in Figure 3, which demonstrates the predominance of technologies associated with the pharmaceutical, cosmetic, and antioxidant sectors.

Figure 3. Global patent trends related to *Campomanesia* spp., including the distribution of patent applications according to technological application, International Patent Classification (IPC), year of filing, and country of origin.



A61K: Preparations for medical, dental, or hygienic purposes. **A23L:** Foods, food products, non-alcoholic beverages, and their preparation, treatment, or preservation. Source: Authors (2026).

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

This technological leadership is primarily driven by the Federal University of Mato Grosso do Sul (UFMS), which accounts for four patent applications, establishing itself as the principal innovation hub for technologies involving guavira (*Campomanesia adamantium*). The efforts of university-based Technology Innovation Centers (NITs) have focused on protecting national genetic resources and promoting innovation derived from Brazil's biodiversity, consistent with the neotropical origin of species within the genus.

The patent documents identified during the technological prospecting stage are summarized in Table 5, which presents the technologies developed, their institutional applicants, IPC classifications, and respective technological applications.

Table 5. Selected patent documents related to the genus *Campomanesia* identified through technological prospecting, including application number, technology title, filing year, country of origin, institutional applicant, International Patent Classification (IPC), and technological application in the pharmaceutical, cosmetic, biotechnological, and natural products sectors.

No.	Application Number	Technology Title	Year	Country	Institutional Applicant	IPC Class	Technological Application
1	BR 10 2019 005882 0	Ethanolic extract of *Campomanesia* spp. in photoprotective formulations	2019	Brazil	Uniderp / Salesian Mission	A61K	Cosmetics and sun-protection products
2	CN 113368219 A	Application of Globulol (compound associated with the genus) in cell therapy	2021	China	Guangdong University of Technology	A61K	Respiratory anti-inflammatory therapy
3	CN 108120829 A	Clinical testing method citing the use of plant extracts	2018	China	Alpha Fujian Biotechnology	G01N	Diagnostic and toxicological applications
4	BR 10 2024 006502 6	Synergistic cosmetic composition containing guavira essential oil	2024	Brazil	Federal University of Mato Grosso do Sul (UFMS)	A61K	Perfumery and emollient formulations
5	BR 10 2023 025019 0	Pharmaceutical composition for diabetes prevention	2023	Brazil	Biotec TO Ltda.	A61K	Hypoglycemic phytopharmaceutical
6	PI 1106463-3	Treatment of gastrointestinal disorders (*C. lineatifolia*)	2011	Brazil	Federal University of Minas Gerais (UFMG)	A61K	Antiulcer pharmaceutical product

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

No.	Application Number	Technology Title	Year	Country	Institutional Applicant	IPC Class	Technological Application
7	AU2020348784	Methods for modifying plant traits without genomic alteration	2020	Australia	AgroSource, Inc.	C12N	Agricultural biotechnology
8	CA3154614	Methods for modifying plant traits (Canadian jurisdiction)	2020	Canada	AgroSource, Inc.	A01H	Agricultural biotechnology
9	US20220304273	Methods for modifying plant traits (United States jurisdiction)	2020	United States	AgroSource, Inc.	C12N	Agricultural biotechnology
10	WO2021055656	Methods for modifying plant traits (International PCT application)	2021	United States	AgroSource, Inc.	C12N	Agricultural biotechnology
11	BR 10 2024 011491 4	Guavira protein concentrate for tissue repair	2024	Brazil	Federal University of Mato Grosso do Sul (UFMS)	A61K	Nutritional supplements and wound healing

Source: Authors (2026).

Analysis of the patent portfolio revealed that IPC class A61K **(**preparations for medical, dental, or hygienic purposes) was the most frequently represented category, appearing in six patent applications. To a lesser extent, IPC class A23L, related to food and beverage processing and preservation, was also identified, indicating growing interest in the development of functional food products derived from *Campomanesia* species.

This concentration of patent activity reflects current market demands for bioactive compounds exhibiting antioxidant, anti-inflammatory, antimicrobial, and therapeutic properties. The predominance of pharmaceutical and cosmetic applications further suggests that technological development has largely focused on high-value-added products, particularly phytotherapeutics, dermocosmetics, photoprotective formulations, and nutraceuticals.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Overall, the technological panorama demonstrates that although innovation involving *Campomanesia* remains at an early stage, the existing patent portfolio provides evidence of a gradual transition from basic scientific research toward the development of commercially relevant products. Nevertheless, the limited number of patent applications compared with the volume of scientific publications indicates that substantial opportunities remain for technological development, intellectual property protection, and knowledge transfer.

3.4. Innovation Gap and Technological Maturity Stagnation in *Campomanesia*

The existence of 163 scientific articles compared with only 11 patent documents reveals a substantial innovation gap, indicating that most of the knowledge generated remains confined to the academic environment. This discrepancy suggests that scientific advances involving the genus *Campomanesia* have not yet been effectively translated into protected technological innovations or commercially viable products.

This innovation gap can be better understood through the framework of Technology Readiness Levels (TRLs), which provide a systematic approach for assessing the maturity of scientific and technological developments (Quintella *et al*., 2019). The analysis indicates that research involving *Campomanesia* is predominantly concentrated in the early stages of technological development, with relatively few studies progressing toward validation and commercialization phases (Karataş *et al*., 2024).

As summarized in Table 6, most studies are classified within TRL 1 and TRL 2, corresponding to basic research and initial chemical characterization. These investigations are primarily focused on the identification of bioactive compounds, phytochemical profiling, and preliminary biological evaluations. Examples include studies reporting the characterization of phenolic compounds in *Campomanesia rufa* and other species of the genus.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Table 6. Technological development landscape of *Campomanesia* species: relationship between Technology Readiness Levels (TRLs), development stage, evidence of biotechnological application, and estimated proportion of studies.

TRL Level	Development Stage	Evidence in *Campomanesia*	Estimated Proportion
TRL 1–2	Basic research and initial chemical characterization	Identification and characterization of phenolic compounds in *C. rufa* and other species of the genus	**65%**
TRL 3	Analytical proof of concept (*in vitro*)	Selective cytotoxicity against human glioblastoma cells and other cell-based biological assays	**25%**
TRL 4	Laboratory validation (*in vivo*)	Antidiarrheal effects demonstrated in animal models and preliminary pharmacological validation studies	**7%**
TRL 5–6	Prototype development and validation in a relevant environment	Photoprotective formulations, dermocosmetic products, and pharmaceutical prototypes derived from *Campomanesia* bioactive compounds	**2%**
TRL 7–9	Clinical trials, regulatory approval, and market introduction	Clinical studies involving hypercholesterolemic patients treated with *Campomanesia xanthocarpa* preparations	**< 1%**

Source: Authors (2026).

A smaller proportion of studies (approximately 25%) have reached TRL 3, characterized by analytical proof-of-concept investigations conducted under controlled in vitro conditions. Representative examples include studies demonstrating selective cytotoxicity against human glioblastoma cells and investigations evaluating antioxidant, antimicrobial, and anti-inflammatory activities in cell-based experimental models.

Only a limited number of studies have advanced to TRL 4, involving laboratory validation through in vivo experimentation. Examples include investigations demonstrating antidiarrheal effects in animal models and pharmacological assessments evaluating efficacy and safety under physiological conditions.

More advanced stages of technological development (TRL 5–6) are represented by a small proportion of studies involving prototype development and validation in relevant environments. These include photoprotective formulations, dermocosmetic products, and pharmaceutical preparations derived from *Campomanesia* bioactive compounds. Such developments indicate the initial transition from academic research toward technological innovation.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

Studies classified within TRL 7–9 remain exceptionally rare, accounting for less than 1% of the available literature. These stages encompass clinical validation, regulatory approval processes, and market introduction. One notable example is the clinical evaluation of *Campomanesia xanthocarpa* in hypercholesterolemic patients, representing one of the few investigations to approach the final stages of technological maturation.

The principal technological bottleneck appears to occur during the transition from TRL 3 (analytical proof of concept) to TRL 4 (laboratory validation). Many research groups face significant limitations related to infrastructure, funding availability, stability studies, large-scale safety assessments, and pharmaceutical formulation standardization required for regulatory approval and commercial development (Etzkowitz & Zhou, 2017).

In Brazil, the patenting of innovations derived from native biodiversity requires compliance with Law No. 13,123/2015 and registration within the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen). Although this regulatory framework represents an important advance in biodiversity governance, bureaucratic complexity and legal uncertainties continue to pose challenges for innovation and may discourage industrial investment in biodiversity-based technologies (Brazil, 2015; Malavazi *et al*., 2025).

Overcoming these barriers is essential for strengthening the emerging bioinputs sector, particularly following the enactment of Law No. 15,070/2024, which has reinforced national policies aimed at promoting sustainable biological products (Bavaresco, 2024; Conti *et al*., 2026).

For *Campomanesia* to become established as a high-value biotechnological platform, the adoption of the Triple Helix model is imperative. This approach emphasizes coordinated collaboration among academia, government, and industry to accelerate innovation processes and facilitate technology transfer. Furthermore, regulatory simplification, increased investment in translational research, and incentives

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

for the sustainable use of Brazilian biodiversity are essential strategies for enhancing technological maturity and reducing dependence on imported technological inputs.

Ultimately, bridging the gap between scientific discovery and technological innovation will require integrated efforts that combine scientific excellence, effective intellectual property protection, supportive public policies, and strong partnerships between universities and productive sectors. Such measures are expected to facilitate the transformation of the biological potential of *Campomanesia* into innovative products capable of generating economic, social, and health-related benefits.

4. Conclusions

The scientometric and technological analyses demonstrated that the genus *Campomanesia* has become an important focus of scientific research in the field of natural products, driven by increasing interest in its phytochemical, pharmacological, and biotechnological properties. This progress is evidenced by the continuous growth in scientific output over the last two decades, positioning the genus as a promising source of bioactive metabolites with potential applications in the pharmaceutical, food, cosmetic, and agricultural sectors.

Within the global scientific landscape, Brazil plays a dominant role, accounting for the largest volume of publications and contributing substantially to the advancement of knowledge regarding the bioactive potential of native *Campomanesia* species. This leadership reflects both the broad geographical distribution of these species across Brazilian biomes and the sustained efforts of national research institutions dedicated to biodiversity-based research.

Despite the remarkable expansion of scientific knowledge, this academic progress has not yet translated into a proportional increase in technological innovation. The limited number of patent documents compared with the volume of scientific publications highlights a significant bottleneck in the conversion of scientific discoveries into innovative products and processes. Most studies remain concentrated at low Technology Readiness Levels (TRLs), with research predominantly focused on

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

chemical characterization and preliminary biological evaluations. Consequently, the technological potential of the genus remains largely underexplored.

The persistent innovation gap identified in this study indicates that, despite its scientific prominence, Brazil still faces considerable challenges in transforming its biological wealth into technological sovereignty and tangible socioeconomic and healthcare benefits. Addressing this challenge will require coordinated efforts aimed at strengthening technology transfer mechanisms, expanding intellectual property protection strategies, and fostering greater interaction between academia, industry, and governmental institutions.

Future research should move beyond descriptive investigations and prioritize the development of standardized, safe, and scientifically validated technological innovations. The most promising opportunities are concentrated in the fields of phytopharmaceuticals, nutraceuticals, natural cosmetics, and active pharmaceutical ingredients (APIs), particularly those derived from compounds with demonstrated antioxidant and anti-inflammatory activities. The advancement of these sectors will depend on the integration of high-resolution analytical technologies, artificial intelligence-based approaches, robust intellectual property management, and open innovation strategies.

Ultimately, the transformation of the biological potential of *Campomanesia* into sustainable technological innovation requires a systemic approach that integrates basic and applied research, effective public policies, regulatory frameworks governing access to genetic resources, and strong university–industry partnerships. By embracing these strategic directions, the genus *Campomanesia* may emerge as a valuable platform for the development of high-value bioproducts, contributing simultaneously to biodiversity conservation, technological competitiveness, and sustainable economic development.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

REFERENCES

ABREU, L. A. Ferreira *et al*. Antioxidant activity and physico-chemical analysis of *Campomanesia rufa* (O. Berg) Nied. fruits. **Ciência e Agrotecnologia**, v. 44, p. e016720, 2020.

ALVES, A. M. Caracterização física e química, compostos bioativos e capacidade antioxidante de frutas nativas do Cerrado. **Universidade Federal de Goiás. Goiás**, 2013.

ALVES, A. M. *et al*. Ascorbic acid and phenolic contents, antioxidant capacity and flavonoids composition of Brazilian Savannah native fruits. **Food Science and Technology**, v. 37, n. 4, p. 564-569, 2017.

AMARAL, S. C. *et al*. Cytotoxic effect of crude and purified pectins from *Campomanesia xanthocarpa* Berg on human glioblastoma cells. **Carbohydrate polymers**, v. 224, p. 115140, 2019.

ARAÚJO, L. F. B. *et al*. Water deficit alters morpho-anatomical and antioxidant responses in seedlings of *Campomanesia xanthocarpa* enabling their recovery, **Intl J Agric Biol**, v. 24, p. 1431–1438, 2020.

BARBIERI, S. F. *et al*. Extraction, purification and structural characterization of a galactoglucomannan from the gabiroba fruit (*Campomanesia xanthocarpa* Berg), Myrtaceae family. **Carbohydrate Polymers**, v. 174, p. 887-895, 2017.

BARBIERI, S. F. *et al*. Pectins from the pulp of gabiroba (*Campomanesia xanthocarpa* Berg): Structural characterization and rheological behavior. **Carbohydrate polymers**, v. 214, p. 250-258, 2019.

BIAVATTI, M. W. *et al*. Preliminary studies on *Campomanesia xanthocarpa* (Berg.) and Cuphea carthagenensis (Jacq.) JF Macbr. aqueous extract: weight control and biochemical parameters. **Journal of Ethnopharmacology**, v. 93, n. 2-3, p. 385-389, 2004.

BRASIL. Lei n.º 13.123, de 20 de maio de 2015. Brasília, DF: Presidência da República, 2015. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/l13123.htm.

CARDOSO *et al*. Avaliação da atividade antioxidante, toxicidade ecomposição química por CG-EM do extrato hexânicodas folhas de *Campomanesia pubescens*. **Rev. Ciênc. Farm. Básica Apl.**, v. 29, n.3, p. 297-301, 2008.

CARDOZO, C. M. L. *et al*. Therapeutic potential of Brazilian Cerrado *Campomanesia* species on metabolic dysfunctions. **Molecules**, v. 23, n. 9, p. 2336, 2018.

CASTELUCCI, A. C. L.; SILVA, P. P. M.; SPOTO, M. H. F. Bioactive compounds and in vitro antioxidant activity of pulps from fruits from the Brazilian atlantic forest. **Acta Scientiarum. Technology**, v. 42, p. 1-8, 2020.

CONTI, P. N. *et al.* Bionsumos: Uma alternativa variável. **Revista DCS**, v. 23, n. 86, p. e3870-e3870, 2026.

COUTINHO, I. D. *et al*. Gas Chromatography-Mass Spectrometry (GC-MS) and evaluation of antioxidant and antimicrobial activities of essential oil of *Campomanesia adamantium* (Cambess.) O. Berg (Guavira). **Brazilian Journal of Pharmaceutical Sciences**, v. 45, p. 767-776, 2009.

CRISTOFEL, C. J. Elaboração de hambúrguer de tilápia (*Oreochromis niloticus*) enriquecido com ingrediente funcional e resíduo de guabiroba (*Campomanesia xanthocarpa*): caracteristicas físicas,

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

químicas e sensoriais. **Curso de Engenharia de Alimentos, Universidade Federal da Fronteira** Sul, Laranjeiras do Sul, 2014.

DA SILVA, É. R. *et al*. Anti-inflammatory evaluation and toxicological analysis of *Campomanesia xanthocarpa* Berg. **Inflammation**, v. 39, n. 4, p. 1462-1468, 2016.

DA SILVA, W. V. R.; SILVA-MANN, R. Agricultura de Precisão: monitoramento tecnológico a partir da análise de patentes. **Research, Society and Development**, v. 11, n. 3, p. e42611326852-e42611326852, 2022.

DALASTRA, V. *et al.* Avaliação química e atividade biológica de compostos bioativos de Campomanesia xanthocarpa Berg. **Pesquisa, Sociedade e Desenvolvimento**, v. 11, n. 9, p. e30011931561-e30011931561, 2022.

DE ANDRADE SILVA, C. A.; FONSECA, G. G. Brazilian savannah fruits: Characteristics, properties, and potential applications. **Food Science and Biotechnology**, v. 25, n. 5, p. 1225-1232, 2016.

DE ARAÚJO, L. C. A. *et al*. *Campomanesia adamantium* O Berg. fruit, native to Brazil, can protect against oxidative stress and promote longevity. **Plos one**, v. 18, n. 11, p. e0294316, 2023.

DE SOUZA DUARTE, L. *et al*. *Campomanesia* genus: A literature review of nonvolatile secondary metabolites, phytochemistry, popular use, biological activities, and toxicology. **Eclética Química Journal**, v. 45, n. 2, p. :12-22, 2020.

DIAS, I. P. *et al*. Effects of pressurized hot water extraction on the yield and chemical characterization of pectins from *Campomanesia xanthocarpa* Berg fruits. **International journal of biological macromolecules**, v. 146, p. 431-443, 2020.

DUARTE, W. F. *et al.* Indigenous and inoculated yeast fermentation of gabiroba (*Campomanesia pubescens*) pulp for fruit wine production, **Journal of Industrial Microbiology and Biotechnology**, v. 36, n. 4, p. 557–569, 2009.

EMER, A. *et al*. The physicochemical properties of fruits and seed germination of *Campomanesia aurea* O. Berg. **Acta Scientiarum - Biological Sciences**, v. 40, p. 35007, 2018.

ETZKOWITZ, H.; ZHOU, C. Hélice Tríplice: inovação e empreendedorismo universidadeindústria-governo. **Estudos Avançados**, v. 31, n. 90, p. 23–48, maio 2017.

GUIMARÃES, A. C. G. Potencial antioxidante de treze frutos de espécies de ocorrência no cerrado por diferentes metodologias. **Universidade Federal de Lavras**, Lavras, 2016.

KARATAŞ, A. R. *et al.* A bibliometric mapping analysis of the literature on patent analysis. **World Patent Information**, v. 77, p. 102266, 2024.

KOWALSKI, R.; BAJ, T. Metabolitos secundários de produtos naturais: extração, isolamento e atividades biológicas. **Molecules**, v. 30, n. 21, p. 4233, 2025.

LORENÇONI, M. F. *et al*. Chemical composition and anti-inflammatory activity of essential oil and ethanolic extract of *Campomanesia phaea* (O. Berg.) Landrum leaves. **Journal of Ethnopharmacology**, v. 252, p. 112562, 2020.

MALAVAZI, F. W. *et al*. Access to genetic resources and Associated Traditional Knowledge with federal Science and Technology Institutions in Brazil: A systematic review of regulatory

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

challenges. **Fronteira: Journal of Social, Technological and Environmental Science**, v. 14, n. 1, p. 253-266, 2025.

MORZELLE, M. C. *et al*. Chemical and physical charecteriztion of fruits from cerrado: curriola, gabiroba and murici. **Revista Brasileira de Fruticultura**, v. 37, p. 96-103, 2015.

MOURA-COSTA, G. F. *et al*. Antimicrobial activity of plants used as medicinals on an indigenous reserve in Rio das Cobras, Paraná, Brazil. **Journal of ethnopharmacology**, v. 143, n. 2, p. 631-638, 2012.

NEVES, N. C. V. *et al.* Chemical composition and in vitro anti-Helicobacter pylori activity of *Campomanesia lineatifolia* Ruiz et Pavón (Myrtaceae) essential oil. **Plants**, v. 11, n. 15, p. 1945, 2022.

OLIVEIRA, J. D. *et al*. Chemical composition of essential oil extracted from leaves of *Campomanesia adamantium* subjected to different hydrodistillation times. **Ciência Rural**, v. 47, n. 1, p. e201511131, 2016.

OLIVEIRA, J. D. *et al*. Rendimento, composição química e atividades antimicrobiana e antioxidante do óleo essencial de folhas de *Campomanesia adamantium* submetidas a diferentes métodos de secagem. **Revista Brasileira de Plantas Medicinais**, v. 18, n. 2, p. 502-510, 2016.

OLIVEIRA, M. I. U. *et al*. ***Campomanesia* in Flora e Funga do Brasil**. Jardim Botânico do Rio de Janeiro. Disponível em: <https://floradobrasil.jbrj.gov.br/FB10307>. Acesso em: 12 out. 2025

PACHECO, L. A. *et al*. Chemical characterization and antimicrobial activity of *Campomanesia aurea* against three strains of *Listeria monocytogenes*. **Brazilian Journal of Biology**, v. 81, n. 1, p. 69-76, 2020.

PACHECO, S. M. *et al.* Antioxidant activities and antidiabetic potential of extract of fruits from the Myrtaceae family: inhibitory effects on α-amylase and α-glucosidase activities. **Biomedical and biopharmaceutical research: jornal de investigação biomédica e biofarmacêutica**, v. 18, n. 1, p. 25-37, 2021.

PARANHOS, R. C. S.; RIBEIRO, N. M. Importância da prospecção tecnológica em base em patentes e seus objetivos da busca. **Cadernos de Prospecção**, v. 11, n. 5, p. 1274, 2018.

PEREIRA, C. M. T. *et al*. Análise sensorial descritiva quantitativa de geleia de gabiroba (*Camponesia cambessedeana*). **Desafios - Revista Interdisciplinar da Universidade Federal do Tocantins**, v. 7, n. Especial, p. 3–10. 2020.

PEREIRA, M. C. *et al*. Characterization and antioxidant potential of Brazilian fruits from the Myrtaceae family. **Journal of agricultural and food chemistry**, v. 60, n. 12, p. 3061-3067, 2012.

PEREIRA, M. C. *et al*. Effect of nanoencapsulation using PLGA on antioxidant and antimicrobial activities of guabiroba fruit phenolic extract. **Food Chemistry**, v. 240, p. 396-404, 2018.

PRESTES, A. A. *et al.* Whey block freeze concentration aiming a functional fermented lactic beverage with the addition of probiotic and guabiroba pulp (*Campomanesia xanthocarpa* O. Berg), a native Brazilian fruit. **Ciência e Tecnologia de Alimentos**, 43, 2023.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

QUINTELLA, C. M. *et al*. Maturidade Tecnológica: níveis de prontidão TRL. In: Prospecção tecnológica [Recurso eletrônico on-line] / organizadora Núbia Moura Ribeiro. Salvador (BA): **IFBA: IFBA**, p. 18–54, 2019.

REZENDE, R. B. Relação entre os metabólitos secundários da Campomanesia lineatifolia Ruiz & Pavón e as suas potenciais atividades anti-inflamatória e gastroprotetora. **Acta Farmacêutica Portuguesa**, v. 12, n. 1, p. 3-15, 2023.

SÁ, S. *et al*. Phytochemistry and antimicrobial activity of *Campomanesia adamantium*. **Revista Brasileira de Farmacognosia**, v. 28, n. 3, p. 303-311, 2018.

SÁ, S. *et al*. Variability of Volatile Oils Composition, Tannins, and Phenols from *Campomanesia adamantium* (Cambess.) O. Berg **Fronteira: Journal of Social, Technological and Environmental Science**, v. 11, n. 4, p. 206-223, 2022.

SALMAZZO, G. R. *et al*. Chemical composition and antiproliferative antioxidant and trypanocidal activities of the fruits from *Campomanesia xanthocarpa* (Mart.) O. Berg (Myrtaceae). **Natural Product Research**, p. 1478-6427, 2019.

SANTOS, M. S. *et al*. Antioxidant and fatty acid profile of gabiroba seed (*Campomanesisa xanthocarpa* Berg). **Food Science and Technology**, v. 32, p. 234-238, 2012.

SANTOS, T. G. O., GUIMARÃES, T. M. A., & MOREIRA-ARAÚJO, R. S. dos R. Biscoito tipo sequilho adicionado de farinha de arroz (*Oryza sativa* L) e de geleia de guabiroba (*Campomanesia xanthocarpa*). **Brazilian Journal of Development**, v. 7, n. 1, p. 8019–8028, 2021.

SCHNEIDER, V. S. *et al*. Dietary fibres from guavira pomace, a co-product from fruit pulp industry: Characterization and cellular antioxidant activity. **Food Research International**, v. 132, p. 109065, 2020.

SILVA, C. A. de A.; FONSECA, G. G. Brazilian savannah fruits: Characteristics, properties, and potential applications. **Food Science and Biotechnology**, v. 25, n. 5, p. 1225-1232, 2016.

SILVA, D. L. Prospecção de compostos bioativos, atividade antioxidante e aproveitamento integral da gabiroba (*Campomanesia cambessedeana*). (Tese de doutorado) – **Universidade Federal do Tocantins, Programa de Pós-Graduação em Biodiversidade e Biotecnologia Rede Bionorte**, 119f, Palmas, 2022.

SPRICIGO, P. C. *et al*. Classical food quality attributes and the metabolic profile of cambuci, a native brazilian atlantic rainforest fruit. **Molecules**, v. 26, n. 12, p. 3613, 2021.

TEIXEIRA, P. C. C.; DA COSTA SILVA, L. M. Repartição de benefícios à luz da Lei nº 13.123/2015: casos de empresas com acesso ao patrimônio genético e ao conhecimento tradicional associado. **Revista Fitos**, v. 15, n. 2, p. 204-216, 2021.

TREMEA, C. M. C. *et al.* Functional Properties of *Campomanesia xanthocarpa* Infusions: Phenolic Profile, Digestive Stability, Enzyme Inhibition, and Glycemic Effects. **Foods**, v. 14, n. 14, p. 2469, 2025.

VALLILO, M. I. *et al*. Chemical composition of *Campomanesia adamantium* (Cambessédes) O. Berg'fruits. **Food Science and Technology**, v. 26, p. 805-810, 2006.

REMUNOM
ISSN 2178-6925

Received: 14/06/2026 - **Accepted:** 07/07/2026
Vol: 13.15
DOI: 10.66104/9k6qa589
Pages: 1-27

VIDAL, M. C. *et al.* Bioinsumos: a construção de um Programa Nacional pela Sustentabilidade do Agro Brasileiro. **Economic Analysis of Law Review**, v. 12, n. 3, p. 557-574, 2021.

WIPO – World Intellectual Property Organization. 2025. **International Patent Classification (IPC)**. Disponível em: <https://www.wipo.int/en/web/classification-ipc>. Acesso em: 12 set. 2025.