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***Astrocaryum* tucuma: the correct name of a socially and economically important Amazonian palm**

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Abstract

Tucumã is a palm of notable economic and cultural relevance in the Amazon region. Although its nomenclatural status is formally settled under the International Code of Nomenclature for algae, fungi, and plants, its scientific name in the literature remains characterized by persistent misapplication. The name *Astrocaryum aculeatum* has been applied to this species for several decades, replacing *A. tucuma*, the previously accepted name. However, nearly twenty years ago, it was demonstrated that the type specimen of *A. aculeatum* corresponds to a distinct palm, *A. gynacanthum*. Considering this misapplied name, a proposal to conserve *A. aculeatum* with a conserved type for the *tucumã* was submitted in 2008, but subsequently not recommended by the Nomenclature Committee for Vascular Plants in 2011. In the same report, this Committee suggested the reestablishment of *A. tucuma* as the correct name and the submission of a new proposal to deal with the names *A. aculeatum* and *A. gynacanthum*. These decisions were later evaluated and ratified by the

General Committee in 2011. Despite these committees evaluations, a review of the literature from 2011 to 2025 indicates that the scientific community did not adopt the change suggested. The name *A. aculeatum* remains dominant for the *tucumã* palm, appearing 60 times more frequently than *A. tucuma*, which was identified in only 1.6% of the eligible records. This study elucidates the intricate nomenclatural history of the species and underscores the necessity of reaffirming *A. tucuma* as the correct name. The continued application of *A. aculeatum* to the *tucumã* palm, after the exhaustion of all procedures established by the *Code*, represents a persistent ambiguity that must be resolved to ensure nomenclatural stability and accuracy within the genus.

Keywords: Amazon, Arecaceae, nomenclatural stability, palm, tucumã

The palm commonly known as tucumã (Fig. 1A) is a species of considerable economic and sociocultural importance throughout the Amazon basin (Smith, 2015). It is widely distributed across the region, occurring in Bolivia, Brazil, Colombia, Guyana, Suriname, Trinidad and Tobago, and Venezuela (Henderson *et al.*, 1995; Kahn, 2008; Lorenzi *et al.*, 2010). Throughout its range, it is recognized by various local and indigenous names, including *tucumá* or *cumare* in Colombia and Venezuela, *chonta* in Bolivia, as well as indigenous denominations such as *panima* (Chácobo) and *eri si* (Yanomami) (Henderson, 1995; Kahn, 2008; Galeano & Bernal, 2010; Smith, 2015). The species thrives in disturbed environments and is uncommon in primary forests. Furthermore, its population appears to be increasing due to the growing demand for its diverse uses (Henderson & Scariot, 1993; Henderson *et al.*, 1995; Kahn & Moussa, 1999; Schroth *et al.*, 2004; Miranda & Rabelo, 2008; Baker, 2021).

Records of its use date back to pre-Columbian times, when it was extensively utilized by Indigenous peoples, a tradition that continues to the present day (Kahn & Moussa, 1997; 1999; Didonet & Ferraz, 2014). It is a multipurpose palm, with nearly all of its structures employed for a variety of applications (Costa *et al.*, 2010; Didonet & Ferraz, 2014; Silva *et al.*, 2021). The stem is valued in construction for its hardness and durability, serving as raw material for furniture, tables, and decorative objects (Miranda & Rabelo, 2006; 2008; Smith, 2015). The palm heart is consumed as food (Kahn & Moussa, 1999), and fibers extracted from young leaves are traditionally used in the manufacture of hammocks and other woven items (Henderson & Scariot, 1993; Miranda & Rabelo, 2006; 2008; Lorenzi *et al.*, 2010).

The fruits of the species are widely commercialized and consumed throughout the Amazon region (Fig. 1B), either fresh or in a variety of culinary preparations (Henderson & Scariot, 1993; Kahn & Moussa, 1999; Miranda & Rabelo, 2006; 2008; Lorenzi *et al.*, 2010). The pulp is also used by Indigenous communities as fish bait and for oil extraction (Miranda & Rabelo, 2006; 2008), while the endocarp can be polished and carved into a wide range of handcrafted products (Kahn & Moussa, 1999; Miranda & Rabelo, 2006; 2008; Smith, 2015).

The fruits of the *tucumã* palm have become an emblematic symbol of the city of Manaus, consolidating this species as one of the most representative palms of the capital of the state of Amazonas, Brazil (Kahn & Moussa, 1997; Costa *et al.*, 2010). The increasing popularity of the fruit is closely associated with its culinary and cultural value, particularly in the preparation of the traditional sandwich “*X-Caboquinho*” (Fig. 1C), which is highly appreciated by the local population and officially recognized as part of the city’s Intangible Cultural Heritage (Kahn & Moussa, 1999; Miranda & Rabelo, 2006; Costa *et al.*, 2010; Smith, 2015; Manaus, 2019).

As a result of its cultural and economic prominence, the *tucumã* supports an important local market, contributing significantly to employment and income generation for a substantial portion of the population in Manaus and other municipalities of the central Amazon region (Kahn & Moussa, 1997; 1999; Schroth *et al.*, 2004; Costa *et al.*, 2010; Kieling *et al.*, 2019; Martins & Ferreira, 2022). It is estimated that in 2012, 367 tons of *tucumã* fruits were traded in Manaus (Didonet & Ferraz, 2014). By 2017, an assessment of the production chain reported an average monthly commercialization of 86,066 kg, surpassing 1,000 tons annually (Kieling *et al.*, 2019). This volume represents an increase of 168% within five years. In recent years, several studies have evaluated the bioactive composition of the fruits, their potential health benefits, and their biotechnological applications, reinforcing the increasing demand for this palm (Silva *et al.*, 2021; Machado *et al.*, 2022).

Despite its ecological, economic, and cultural relevance, the correct scientific nomenclature of this species has been the subject of extensive debate. The name *Astrocaryum aculeatum* G.Mey. has been adopted over the past six decades as the accepted name (Wessels Boer, 1965; Lima & Almeida Jr., 2024), replacing *A. tucuma* Mart., which had been considered correct for most of the nineteenth and twentieth centuries (Lima & Almeida Jr., 2024). Following the rediscovery of the original herbarium specimens of *A. aculeatum* and the clarification of the true identity associated with that name (Bernal, 2008; Lima & Almeida Jr., 2024), the present study aims to elucidate and summarize the complex nomenclatural history

of this palm, and to reaffirm *A. tucuma* as the correct name for the tucumã, as suggested by specialists of the Nomenclature Committee for Vascular Plants (Brummitt, 2011).

Regarding the nomenclatural trajectory of the tucumã, multiple independent descriptions in the nineteenth century marked the beginning of the scientific naming of this palm. The first description was provided by Martius (1824) under *A. tucuma*, based on specimens observed along several rivers of the Amazon basin. The specific epithet adopted by Martius reflected the vernacular name used throughout the region. Grisebach (1864) subsequently described *A. aureum* Griseb. & H.Wendl. from specimens collected in Trinidad and Tobago. Later, Barbosa Rodrigues published a series of binomials (Barbosa Rodrigues, 1875; 1888; 1891), occasionally associated with varietal names, to refer to this palm and its morphological forms, including *A. caudescens* Barb.Rodr., *A. manaoense* Barb.Rodr., *A. princeps* Barb.Rodr., *A. princeps* var. *aurantiacum* Barb.Rodr., *A. princeps* var. *flavum* Barb.Rodr., *A. princeps* var. *sulphureum* Barb.Rodr., and *A. princeps* var. *vitellinum* Barb.Rodr.

Among these names, *A. tucuma* became the most widely accepted and consistently applied to the tucumã palm throughout the nineteenth and twentieth centuries. This usage is corroborated by multiple works available through the Biodiversity Heritage Library (BHL, 2025), including those of Wallace (1853), Burret (1934), and Dahlgren (1936). As taxonomic knowledge advanced, the remaining names, as well as several others described during the twentieth century, were subsequently treated as heterotypic synonyms of *A. tucuma*. This pattern is recurrent among palm species exhibiting broad distributions and abundant populations across the Amazon region (Stropp *et al.*, 2025). Within this area, taxonomic consolidation through synonymization has been particularly frequent, resulting in an 82% reduction in the total number of accepted names over recent decades (Stropp *et al.*, 2025).

From the 1960s onward, however, a significant shift occurred in the binomial used to designate this palm. In his taxonomic study of the palms of Suriname, Wessels Boer (1965) interpreted *A. aculeatum*, based on the fruit description provided in the protologue, as conspecific with *A. tucuma*. By establishing this equivalence, he concluded that the name *A. aculeatum* also applied to the palm commonly known as tucumã. Based on this interpretation and the principle of nomenclatural priority [Art. 11.4 of the *International Code of Nomenclature for algae, fungi, and plants* (ICN) - *Madrid Code*; Turland *et al.*, 2025], Wessels Boer placed *A. tucuma* in synonymy, since *A. aculeatum* had been described earlier. Until that time, the precise identity of *A. aculeatum* had remained uncertain for more than two centuries following its publication by Meyer (1818), despite several attempts by prominent botanists to clarify it. Martius (1824), Drude (1881), Barbosa Rodrigues (1903),

and Burret (1934) all discussed the identity of the taxon but reached no definitive conclusion. The absence of traceable type specimens or other original material contributed to the uncertain status conferred upon the name by these authors. Martius (1824) prepared a diagnosis based on Meyer's original description and suggested that the species resembled his *A. gynacanthum* Mart. and *A. mumbaca* Mart., both names associated with the palm commonly known as *mumbaca*, a hypothesis later followed by Barbosa Rodrigues (1903). Drude (1881) classified *A. aculeatum* as *incertae sedis* ("of uncertain position"). Burret (1934), while maintaining this status, proposed that the taxon might belong to *A.* subg. *Monogynanthus* Burret, though he noted inconsistencies in Meyer's description of the fruits, particularly regarding their shape and size, which he regarded as atypical for that subgenus. Moreover, Burret (1934) hypothesized that the fruits described in the protologue might not correspond to the inflorescence cited by Meyer, but rather to material originating from *A. tucuma*.

Despite these earlier uncertainties concerning the identity of *A. aculeatum*, the circumscription proposed by Wessels Boer (1965) was widely accepted and subsequently consolidated within the taxonomic literature. Since then, the binomial *A. aculeatum* has been extensively adopted to designate the *tucumã* palm in taxonomic revisions, floristic treatments, and a wide range of scientific studies, including those addressing the bioactive composition of its fruits and their biotechnological applications (Wessels Boer, 1971; Kahn & Millán, 1992; Henderson *et al.*, 1995; Kückmeister *et al.*, 1999; Kahn, 2008; Miranda *et al.*, 2008; Lorenzi *et al.*, 2010; Moraes, 2014; Smith, 2015; Moraes, 2020; Silva *et al.*, 2021; Machado *et al.*, 2022). Consequently, *A. tucuma* came to be treated as a synonym in most literature referring to the species, with only a few exceptions in which this binomial was retained as the accepted name (Schroth *et al.*, 2004; Costa *et al.*, 2010). It is important to emphasize that when proposing this circumscription, still followed today, Wessels Boer (1965) did not have access to the original material of *A. aculeatum*, basing his interpretation solely on part of the protologue.

The discovery by Bernal (2008) of an original herbarium specimen of *A. aculeatum* at the GOET herbarium (E. Rodschied s.n., GOET), which had been mentioned by Meyer in the protologue and was previously presumed lost, revealed a historical misapplication of the name. As previously suggested by Burret (1934), the protologue of *A. aculeatum* was based on a fruitless, flower-bearing specimen corresponding to *A. gynacanthum*, supplemented by second-hand information on fruits most likely belonging to *A. tucuma*. This combination led to the long-standing incorrect application of the name *A. aculeatum* to the palm known as

tucumã. According to Bernal (2008), it is probable that Meyer's (1818) description of the fruits was based on reports by E. Rodschied, who had observed them but was uncertain whether they belonged to the same individual as the specimen described, thus reinforcing the hypothesis that the protologue merged traits from distinct species.

Bernal's (2008) analysis indicated that the binomial *A. aculeatum* should in fact apply to the *mumbaca* palm, currently recognized as *A. gynacanthum*. This conclusion was based on the original specimen (later designated as the lectotype by Lima & Almeida Jr. (2024) and the information in the protologue, while disregarding Rodschied's second-hand information about the fruits. This interpretation would represent the correct application of the name *A. aculeatum*. Following the rule of priority (Art. 11.4 of the ICN), the correct name for *A. gynacanthum* would therefore be *A. aculeatum*, whereas the species presently known as *A. aculeatum* should be reinstated as *A. tucuma*, thereby recovering the original and proper usage of that name for the *tucumã* palm.

Considering the nomenclatural changes that could result from the rediscovery of the type, Bernal (2008) proposed conserving the name *A. aculeatum* with a conserved type, as provided under Art. 14.9 of the *International Code of Nomenclature for algae, fungi, and plants* (ICN), assigning it to the *tucumã* palm. This proposal sought to prevent disruptive name changes affecting two widely distributed and well-known species in the Amazon basin (the *mumbaca* and *tucumã* palms) by applying one of the mechanisms provided in the ICN (Turland *et al.*, 2025) to avoid undesirable nomenclatural instability arising from strict enforcement of the Code. However, the Nomenclature Committee for Vascular Plants, which initially reviewed the proposal following its submission, did not recommend its approval (Brummitt, 2011). In its report, it considered an alternative solution, suggested by Wendy L. Applequist, proposing that *A. tucuma* should be reinstated in its original and correct sense to designate the *tucumã* palm, since this name had been in long-standing use for more than a century and a half (Brummitt, 2011). This Committee also suggested that it might be desirable either to reject *A. aculeatum* or to conserve *A. gynacanthum* against it, thereby maintaining the established use of *A. gynacanthum* for the *mumbaca* palm (Brummitt, 2011). Subsequently, the General Committee voted in accordance with the report from the Nomenclature Committee for Vascular Plants, not recommending Bernal's proposal (Barrie, 2011).

Following this scenario and in accordance with the suggestions outlined by Brummitt (2011), we subsequently submitted a formal proposal to conserve the name *A. gynacanthum* against *A. aculeatum* (Lima & Almeida Jr., 2024), under Art. 14 of the ICN. This proposal aimed to

ensure nomenclatural stability and to safeguard the traditional and well-established use of the name *A. gynacanthum* for the *mumbaca* palm, a scientific name that has been consistently applied since the nineteenth century (Lima & Almeida Jr., 2024). The proposal was recommended by the Nomenclatural Committee for Vascular Plants (Applequist, 2026) and will be evaluated by the General Committee.

Regarding the binomials *A. aculeatum* and *A. tucuma*, it should be emphasized that, following the rejection of Bernal's (2008) proposal, no further legal mechanisms remain available to maintain the use of *A. aculeatum* for the *tucumã* palm. All procedures provided and permitted under the ICN have already been executed with the purpose of protecting the traditional use of *A. aculeatum* over the past decades, even though it conflicts with the identity of the rediscovered type specimen (Bernal, 2008). Therefore, the only viable alternative is the reestablishment of *A. tucuma* as the accepted name for this palm, as already suggested by Brummitt (2011).

Despite Brummitt's (2011) suggestion to reinstate the use of *A. tucuma*, the current situation still reveals a nomenclatural impasse. More than a decade after that suggestion, persistent inconsistencies remain across nomenclatural indexing platforms such as POWO (2025), Tropicos (2025), and Flora e Funga do Brasil (2025), where *A. aculeatum* continues to be listed or applied to the *tucumã*. Likewise, recent articles still employ *A. aculeatum* to refer to the species. To document this scenario of the misapplication of the names involved, we conducted a survey partially following the PRISMA 2020 protocol (Page *et al.*, 2021). We consulted the Scopus (2025) and Web of Science (Clarivate, 2025) databases in the survey, selected for their comprehensive coverage and relevance as primary indexing platforms for high-impact scientific journals.

The investigation was restricted to the interval from September 1, 2011, to December 31, 2025. This starting date was selected to immediately follow the publication of the General Committee report in August 2011 (Barrie, 2011). We used the scientific names *Astrocaryum aculeatum* and *Astrocaryum tucuma* as primary descriptors. To ensure that retrieved records referred precisely to the same biological entity, we used the vernacular name “*tucumã*” as a secondary descriptor with the Boolean operator “AND”. Despite the vast diversity of regional and indigenous names identified for the species, this selection is justified by the prevalence of “*tucumã*” as the primary social and trade name, as well as its consistent application in scientific indexing to identify the taxon under study. Search strings consisted of the combinations (“*Astrocaryum aculeatum*” AND “*tucumã*”) and (“*Astrocaryum tucuma*” AND “*tucumã*”), applied to titles, abstracts, and keywords.

Data collection was strictly limited to peer-reviewed articles. Duplicate records between the databases were identified and removed. Additionally, during the screening stage, we verified the records for biological consistency; those clearly referring to distinct or ambiguous taxa were excluded.

The database search yielded a total of 110 records (Table 1). After screening, 61 eligible articles remained. Of these, 60 articles identified the species as *A. aculeatum*, with its use clearly referring to the *tucumã* palm. In contrast, the name *A. tucuma* was employed in only one study (Stachin *et al.*, 2016), representing 1.6% of the total eligible articles (a frequency 60 times lower than that observed for *A. aculeatum*).

This situation recalls a case discussed by Baker (1997), a renowned palm specialist, in his article “*Name changes — a necessary nuisance.*” The author reported the strong negative reaction that followed the revision of the circumscription of the genus *Dypsis* Noronha ex Mart., which resulted in the transfer of numerous species previously assigned to other palm genera into *Dypsis*. According to Baker (1997), the change was so poorly received that one author published an essay in *The Palm Journal* vehemently criticizing the practice of botanists who implement nomenclatural changes precisely when long-established names begin to gain widespread acceptance among the scientific community and among applied users such as horticulturists, ecologists, biochemists, conservationists, and natural resource managers.

However, as Baker (1997) emphasized, although such changes may initially be perceived as inconvenient by both the scientific community and applied users of taxonomy, they are intrinsic to the advancement of systematic knowledge. The author also highlighted the importance of effective communication regarding these changes to minimize negative impacts and to ensure that accurate information is disseminated and integrated into the various disciplines that depend on precise taxonomic data. Thus, the careful publication and appropriate dissemination of new names or combinations represent not merely a technical procedure but also an ethical responsibility, essential to maintaining clarity and the functional integrity of botanical nomenclature.

Within this context, the present study aligns with this broader commitment to scientific communication by advocating the reestablishment and correct use of the name *Astrocaryum tucuma* Mart. for the *tucumã* palm. The rediscovery of the type material of *A. aculeatum* by Bernal (2008) demonstrated that the long-standing application of this name to the *tucumã* palm was based on a misinterpretation. Furthermore, following the rejection of the conservation proposal submitted by Bernal (2008), no legal mechanisms remain available to

maintain the use of *A. aculeatum* for this species. Its continued use therefore constitutes a nomenclatural error that must be rectified (Lima & Almeida Jr., 2024).

The adoption of the name *A. tucuma*, in addition to conforming to the provisions of the *International Code of Nomenclature for algae, fungi, and plants* (Turland *et al.*, 2025), represents an essential measure to restore taxonomic accuracy and to promote nomenclatural stability within the genus *Astrocaryum* G.Mey. This article therefore contributes to the ongoing dialogue surrounding nomenclatural correction and scientific transparency, recognizing the challenges inherent in taxonomic name changes while reaffirming the ethical and scientific commitment to their appropriate communication within the botanical community and among all users of taxonomic information.

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Authors' Contributions

GPL: Conceptualization, Investigation and Writing – original draft; IPAM: Writing – review and editing; EBAJ: Writing – review and editing.

Conflicts of Interest

The authors declare that there are no conflicts of interest related to the publication of this manuscript.

Data Availability Statement

No new data were created or analyzed in this study.

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Table and Figure Captions

Figure 1. A. *Tucumã* palm; B. fruits in a street market; C. *x-caboquinho* sandwich. Photographs by Juliana Lins (A), Eleano Rodrigues (B) and Fundação Manauscult (C).



Table 1. Number of articles using the names *Astrocaryum aculeatum* and *Astrocaryum tucuma* identified through a survey in Scopus and Web of Science databases (2011–2025).

	<i>Astrocaryum aculeatum</i>	<i>Astrocaryum tucuma</i>
Records in Scopus	58	1
Records in Web of Science	50	1
Total eligible articles	60	1

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