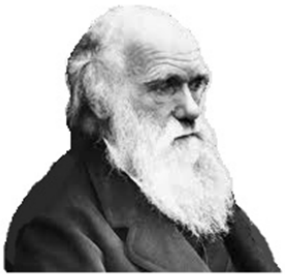
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# The mortar and pestle as markers of Indigenous identity and cultural resilience in Brazil

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**ABSTRACT**

This article examines the mortar and pestle as markers of Indigenous identity and cultural resilience in Brazil. It draws on ethnographic research conducted between 2010 and 2025 in Indigenous communities across different regions of the country. The research combined direct observation, interviews, and documentation of practices related to food processing and ritual life. By situating these implements in their social, symbolic, and ecological contexts, the article explores how the knowledge and skills involved in making and using them are learned and passed on. The analysis highlights the continuity of Indigenous knowledge and practices amid historical processes of colonial disruption and shows how material culture helps sustain collective memory, identity, and modes of subsistence.

***Keywords*:** Indigenous peoples, ethnic group, mortar, pestle, material culture, ethnology

## 1. INTRODUCTION

Material culture plays a fundamental role in the organization of daily life and in the transmission of knowledge among Indigenous peoples. Tools and artifacts are not only functional objects, but also repositories of memory, technique, and social meaning. In Indigenous contexts, everyday instruments often condense complex relationships between

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humans, the environment, and cosmological principles, reflecting accumulated experience and collective learning across generations.

In this sense, technical practices are understood not as isolated applications of knowledge, but as skills developed through continuous engagement with materials and environments, as emphasized in anthropological approaches to technology [1].

Among these implements, the mortar and pestle play a central role in food preparation, particularly in the processing of roots, seeds, and grains. In this article, *mortar* refers to the hollowed receptacle commonly called *pilão* in Brazilian Portuguese, and *pestle* refers to the handheld implement used to pound or grind its contents, known as *mão-de-pilão*. The use of these implements is directly associated with subsistence activities, but also with social interaction, ritual contexts, and the maintenance of culinary traditions. The mortar and pestle embody specific forms of technical knowledge, manual skill, and sensory engagement with materials.

The manufacture and use of mortars and pestles involve careful selection of raw materials, attention to shape, weight, and surface texture, and an understanding of how different stones or woods respond to repeated impact. These choices are informed by empirical observation and long-term experimentation rather than by formalized measurement systems. Knowledge of how to make and use mortars and pestles is transmitted orally and through practice, often learned by observing elders and participating in everyday activities.

From an analytical perspective, such practices can be understood as expressions of traditional knowledge systems grounded in lived experience. They demonstrate that Indigenous technical practices are systematic, coherent, and effective within their environmental and cultural contexts, while also challenging rigid distinctions between nature and culture. In this relational view, humans, materials, and environments are mutually constituted, as discussed in broader anthropological debates [2]. The mortar and pestle therefore provide an entry point for examining how knowledge is produced, maintained, and transmitted through material culture.

This article examines the mortar and pestle as markers of Indigenous identity and cultural resilience in Brazil, drawing on ethnographic research conducted between 2010 and 2025 in multiple Indigenous territories. By combining empirical data with interpretative analysis, the study seeks to highlight how the continued use of these implements reflects broader processes of cultural continuity, adaptation, and resistance in the face of historical and ongoing colonial pressures.

## 2. MATERIALS AND METHODS

This study draws on qualitative ethnographic research conducted between 2010 and 2025 in Indigenous communities across different regions of Brazil. During repeated visits to Indigenous territories, the author conducted participant observation and informal and semi-structured interviews and documented everyday practices related to the manufacture and use of mortars and pestles in domestic and ritual settings. Data collection focused on manufacturing techniques, material selection, uses of the implements, and the transmission of knowledge through hands-on practice and interaction across generations. Field notes, photographs, and oral testimonies were analyzed using a descriptive and interpretive approach to relate these practices to their broader social, environmental, and cultural contexts.

The study involved Indigenous peoples from the Brazilian Amazon, including the Apiaká, Arara (who identify as Ukarãngmâ), Juruna (Yudjá), Kayabi (Kawaiwete), Tenharim (Kagwahiva), Mura, and Sateré-Mawé ethnic groups, as well as Indigenous groups from the Cerrado biome, including the Bororo (Boe), Guarani Kaiowá, Guarani Ñandeva, Xavante (A'uwẽ), and Tapayuna (Kajkwakhratxi), and the Pankararu from the Caatinga biome (Figure 1). The research was conducted with the authorization of the Indigenous communities and the National Indigenous Peoples Foundation (FUNAI), the Brazilian governmental agency responsible for Indigenous affairs in Brazil.




**Figure 1.** Map of Brazil showing the approximate locations of the Indigenous lands studied and selected cities for reference.

Interviews were conducted with the Bororo in August 2010; the Apiaká and Kayabi in June 2011; the Pankararu between May and December 2012; the Guarani Kaiowá and Guarani Ñandeva throughout 2014 and 2015; the Kagwahiva in October and November 2014; the Mura and Sateré-Mawé in January and February 2016 and March 2018; the Arara and Juruna in 2019; the Xavante in February 2023; and the Tapayuna in March and April 2025.

Field research was carried out in multiple Indigenous territories. One of the study areas is the Volta Grande do Xingu (Big Bend of the Xingu River), located in the state of Pará, Brazil, a stretch of approximately 130 km characterized by rapids and braided channels and inhabited by Arara and Juruna peoples. Other study areas include the Tenharim Marmelos Indigenous Land in Amazonas State; the Rio Urubu Indigenous Territory, inhabited by Mura and Sateré-Mawé peoples; Indigenous territories of the Apiaká and Kayabi peoples along the Teles Pires River; Bororo villages in Mato Grosso State; Guarani Kaiowá and Guarani Ñandeva villages in Mato Grosso do Sul; Xavante communities in the Ubawawe Indigenous Territory; Tapayuna villages within the Xingu Indigenous Territory; and Pankararu territories in the state of Pernambuco. Geographic coordinates of these areas are provided to contextualize the spatial distribution of the study.

Open and semi-structured interviews [3] allowed for flexible questioning and encouraged participants to elaborate on their experiences [4]. Participants of different genders and age groups were identified by their communities on the basis of their knowledge and experience. The interviews addressed the manufacture of mortars and pestles, the availability of raw materials, and the uses of these implements.

## 3. RESULTS AND DISCUSSION

Among Indigenous peoples in Brazil, the mortar and pestle are far more than utilitarian tools—they are cultural artifacts embedded in systems of knowledge, social organization, and ritual practice. The *mortar*—often a hollowed tree trunk or a cavity carved into the earth—serves as a container for processing, while the *pestle*, typically a heavy wooden club, is the active instrument that enables the transformation of raw materials into edible or medicinal forms. A comparative example comes from Kawaiwete basketry and textile production, where the transmission and revitalization of artistic knowledge help sustain collective memory and identity [5].

This set is essential to the daily and ceremonial preparation of foods such as manioc, maize, nuts, fruits, and seeds, as well as fermented beverages and traditional remedies. The *pestle* in particular plays a central role, wielded with strength, rhythm, and skill, often in collective female labor contexts.

Mortars and pestles are used in some methods of processing bitter cassava (*Manihot esculenta*). Studies among Tukanoan peoples in northwestern Amazonia documented high cyanogenic potential in bitter cassava cultivars [6]. Grating or pounding disrupts root tissues, and the extent to which cyanogenic compounds are reduced depends on the combination and sequence of processing steps [7].

In the cassava flour preparation sequences that involve a mortar and pestle, pounding draws on technical knowledge and collective participation, particularly among women.

Mortars and pestles are also used to process maize, tucumã palm fruits (*Astrocaryum vulgare*), Brazil nuts (*Bertholletia excelsa*), pequi (*Caryocar brasiliense*), and annatto seeds (*Bixa orellana*). These practices enable the preparation of flours, porridges, cakes, pastes, and other foods that are consumed both in everyday life and in ceremonial settings.

In Amazonia, the diversity of ingredients used in food processing can be understood within a longer history of Indigenous plant management and domestication [8].

The act of pounding is not merely mechanical—it is deeply social and symbolic. Collective pounding sessions, typically carried out by women, serve as moments of intergenerational transmission, storytelling, and communal bonding. Research among the Tsimane' of the Bolivian Amazon has examined how ethnobotanical knowledge and skills are shared across generations and among peers [9].

Pounding ingredients together creates opportunities for women to exchange stories, pass on knowledge to younger generations, and sustain culinary traditions. Symbolically, the mortar and pestle are considered part of the community's intangible heritage. They are associated with origin myths, fertility rites, and shamanic practices. The sound produced by the pestle striking the mortar often carries ritual meaning, signaling the beginning of festivals or communal gatherings. Among the Bororo, mortars are used in funerary rites, with some being ritually broken after final mourning ceremonies. For the Guarani, pestles can symbolize feminine energy, and the knowledge of their making and use is transmitted matrilineally. The Kayabi use mortars and pestles in body-painting ceremonies and birth rituals, with the wood selected under the guidance of shamans.

**Materials and Manufacturing Techniques**

The making of Indigenous mortars and pestles in Brazil requires specialized knowledge about the properties of native woods. Indigenous peoples from across the diverse biomes of Brazil—such as the Amazon, Cerrado, Caatinga, and Atlantic Forest—craft mortars and pestles from a variety of tree species found in their respective territories (Table 1).

Every stage of this process involves a deep technical understanding, beginning with the careful selection of wood. The choice of a tree is based not only on mechanical attributes such as hardness, density, local availability, and resistance to repeated impact, but also on ecological, symbolic, and spiritual considerations.

The selection of the tree destined to become a mortar is deliberate and thoughtful. Often, trees are chosen from remote, less disturbed areas to minimize environmental impact and allow forest regeneration. Among several groups, the decision is not made without guidance: shamans, elders, or signs from the natural world—such as the song of birds or revelatory dreams—may be consulted prior to felling the tree.

In some Indigenous societies, ritual respect is fundamental to this process. Groups like the Apiaká, Bororo, and Kayabi conduct ceremonies to ask permission from the forest spirits. These rites may include offerings of tobacco, ritual chants, and spoken invocations requesting authorization from the guardian entities of the forest.

Once a suitable tree has been chosen, a sturdy log—typically between 50 and 100 cm in height or length—is selected, often from a naturally fallen or leaning tree. The wood must be solid, impact-resistant, and relatively free of knots. Durable woods are preferred for making the mortar itself, while denser and harder species are used for the pestle. For example, Guarani communities commonly use *Cedrela fissilis* (rose cedar) for mortars and *Aspidosperma polyneuron* (peroba-rosa) for pestles.

The extraction of the wood is performed with environmental awareness and care to avoid waste. It may involve axes or chainsaws and sometimes aligns with lunar cycles; felling is preferably done during the waning moon, which is believed to favor the drying of the wood. Once the tree is cut down, its branches are removed, and the trunk is sectioned in the forest. The log is then transported collectively—either dragged with vines or carried by canoe—depending on accessibility. The entire process, from sourcing the raw material to reaching the

village, can take several days. Back in the village, the log is left to dry partially in the sun or shade for a few days or even weeks. Shaping the mortar begins with external modeling using simple hand tools such as knives, machetes, adzes, gouges, axes, or stone tools. The internal hollow is carved to create the concavity using iron tools, wooden scoops, or sharp stones, rotating in a spiral motion. Some groups, like the Mura and the Guarani, also use controlled fire to soften the wood, progressively burning and scraping away the inner surface.

The internal shape of the mortar—conical or flat—varies depending on its intended use. The finishing work to smooth the surfaces includes sanding with abrasive leaves (such as those of *Curatella americana*, used by the Xavante and Bororo), fine sand, vines, or smooth stones. The interior is polished until it is smooth enough for food preparation. Outer edges are leveled and rounded according to cultural preferences. In some communities, such as the Kayabi, traditional carved patterns are added to identify clans or designate the mortar's function (ritual, culinary, or medicinal).

Excavating the cavity typically takes 2 to 3 hours, depending on wood hardness and desired shape. After carving, the mortar is left to dry for several days or weeks, depending on local climate conditions, to prevent cracking and ensure structural stability before it is painted or put to use. This is followed by a stage known as the "activation" of the mortar, in which it is exposed to the smoke of aromatic barks, resins, and leaves. Among the Xavante, mortars may even be ceremonially named if destined for ritual festivities. Its first use often occurs during a significant event, such as the preparation of porridge, flour, or herbal medicines. Only after this inaugural use does the mortar enter everyday life.

In parallel with the mortar's construction, the pestle is also crafted. It is a long wooden club, typically made from a harder species than the mortar, and ranges from 60 to 120 cm in length. The striking end is rounded and polished. In some communities, separate pestles are made according to criteria of weight and balance.

The traditional production of mortars often involves a gendered division of labor. Men are typically responsible for sourcing and preparing the wood, while women carry out the pounding and food preparation. Among the Guarani and Kayabi, pounding with a mortar and pestle in culinary processes—such as the making of manioc flour, tucupi, or *pães de índio* (Indigenous breads)—is accompanied by collective chants and rhythmic coordination, reinforcing cultural bonds and the transmission of knowledge through embodied practice.

**Table 1.** Tree species used by Indigenous participants to make mortars and pestles.

| Product | Portuguese name | Scientific name | Ethnicity |
|---|---|---|---|
| Pestles | Amarelão | *Apuleia leiocarpa* | Arara, Juruna |
| | Angelim-pedra | *Dinizia excelsa* | Tenharim, Mura |
| | Angico | *Anadenanthera* spp. | Guarani |
| | Aroeira | *Myracrodruon urundeuva* | Bororo, Xavante |
| | Jatobá | *Hymenaea courbaril* | Bororo, Kayabi, Guarani, Tenharim, Xavante |

| | | | |
|---|---|---|---|
| | Jequira | *Astronium fraxinifolium* | Apiaká, Kayabi |
| | Lixeira | *Curatella americana* | Xavante |
| | Maçaranduba | *Manilkara elata* | Arara, Juruna |
| | Maçaranduba | *Manilkara bidentata* | Mura, Sateré-Mawé |
| | Peroba-rosa | *Aspidosperma polyneuron* | Guarani |
| | Pequi | *Caryocar brasiliense* | Tapayuna, Xavante |
| | Sucupira | *Bowdichia virgilioides* | Bororo, Xavante |
| | Tucum | *Astrocaryum aculeatum* | Tapayuna |
| Mortars | Açoita-cavalo | *Luehea divaricata* | Guarani |
| | Andiroba | *Carapa guianensis* | Apiaká |
| | Angelim | *Andira coriacea* | Juruna, Mura |
| | Angelim-pedra | *Dinizia excelsa* | Tenharim |
| | Angico | *Anadenanthera peregrina* | Guarani |
| | Baru | *Dipteryx alata* | Xavante |
| | Brocado | *Schinopsis brasiliensis* | Tapayuna |
| | Cedro | *Cedrela odorata* | Kayabi |
| | Cedro-rosa | *Cedrela fissilis* | Guarani |
| | Cumaru | *Dipteryx odorata* | Apiaká, Kayabi |
| | Figueira | *Ficus* spp. | Tapayuna |
| | Guanandi | *Calophyllum brasiliense* | Mura, Tenharim |
| | Guatambu | *Aspidosperma* spp. | Bororo |
| | Ipê-amarelo | *Handroanthus serratifolius* | Arara, Bororo, Juruna |
| | Itaúba | *Mezilaurus itauba* | Mura, Sateré-Mawé, Tenharim |
| | Jatobá | *Hymenaea courbaril* | Bororo, Kayabi, Guarani, Tenharim, Xavante |
| | Lixeira | *Curatella americana* | Bororo, Xavante |
| | Louro | *Aniba* spp. | Kayabi |
| | Maçaranduba | *Manilkara elata* | Arara, Juruna |

| | | | |
|---|---|---|---|
| | Maçaranduba | *Manilkara huberi* | Tenharim |
| | Muirapiranga | *Brosimum* spp. | Tenharim |
| | Paricá | *Schizolobium amazonicum* | Mura |
| | Pequi | *Caryocar brasiliense* | Tapayuna, Xavante |
| | Piquiá | *Caryocar villosum* | Apiaká, Kayabi |
| | Tauari | *Couratari* spp. | Juruna |
| | Vinhático | *Plathymenia reticulata* | Tapayuna, Xavante |

**Uses and Cultural Significance**

Daily activities in the villages of the Indigenous territories visited follow a ritual calendar, with ceremonial practices playing a central role in the life of these communities. Ritual artifacts, when embedded within specific cultural contexts, constitute material expressions that reflect essential aspects of Indigenous social organization, cosmologies, and symbolic practices.

Each community develops its own systems for the production and use of these handcrafted objects, grounded in symbolic and ideological frameworks that confer meaning and legitimacy to such practices. These artifacts not only embody traditional knowledge but also serve as identity markers, contributing to the affirmation of ethnic and cultural diversity.

The mortar and pestle are used to process hard or fibrous foods. Depending on the ingredient, pounding can crush or grind it, loosen its outer layers, or help separate coarse fibers. Pounding can also prepare ingredients such as maize and nuts for drying or further processing.

Among the Tapirapé, maize is one of several ingredients used to prepare *cauim*, a traditional fermented beverage [10]. Collective, rhythmic pounding often marks moments of female cooperation and the intergenerational transmission of culinary and symbolic knowledge. In some Indigenous societies, the use of the mortar and pestle is also associated with rites of passage, childbirth, marriage, or mythological narratives concerning the origins of food.

Mortars and pestles are part of longstanding food preparation practices among the Indigenous communities studied. Among the Tapayuna, both implements are made from woods such as *Caryocar brasiliense* (pequi tree) and are used to pound foods such as maize for flours and other staples. Their manufacture and use are embedded in a body of knowledge transmitted across generations, making them powerful symbols of culture and ancestral wisdom.

The mortar and pestle play an important role in the food systems of many Indigenous peoples in Brazil. These implements are used to process roots, seeds, and fruits into products such as flours, porridges, cakes, beverages, and medicines. The skills involved in their use contribute to food security and cultural resilience in the communities studied.

Cassava Flour

Mortars and pestles are used in some of the processing sequences documented for cassava (*Manihot esculenta*) among Indigenous peoples in Brazil. Bitter cassava requires processing to reduce its cyanogenic compounds before consumption.

Pounding cassava in a mortar breaks down the root tissue and prepares the pulp for subsequent processing. Depending on the method, later steps may include extracting *manipueira*, the liquid released from the roots, as well as pressing, drying, and roasting. Food safety depends on the full sequence of processing steps [7].

In some of the processing sequences documented during fieldwork, the grated cassava was pounded to homogenize the pulp before sieving or pressing. The reduction of cyanogenic compounds depends on the sequence of processing steps [7].

In flour production, the dried and pressed mass may be pounded once more to break it into smaller granules before being sifted and taken to the roasting pan. Pounding can help loosen coarse fibers, which can then be separated from the edible portion, facilitating the preparation of *farinha d'água* (fermented flour), *goma* (starch), or *beiju* (cassava flatbread).

> "*We harvest the cassava and either place it in a sack with the peel and leave it in the stream for three days, or we remove the peel and leave it in a water tank for three days. Then, once it softens, we peel it and place it in the tipiti to dry. The tipiti is used to remove the water (the tipiti is a woven straw press, hung and used to extract the toxic juice from bitter cassava before flour roasting). What remains is a paste, which is then sifted. The fine part that passes through the sieve goes to the wood-fired oven to be roasted for about 30 minutes. Then you have flour. The coarse part, which does not pass through the sieve, is left to dry for five days. Then it is pounded in a mortar and sifted. It's heated in water and turns into porridge or beiju. Beiju is a kind of cake where sugar or salt and nuts are added*" (C. Tenharim, 34 years old, ♀, Mafuí village, Tenharim Marmelos Indigenous Land, November 11, 2014).

In many Indigenous communities, such as among the Apiaká, Guarani, Juruna, Kayabi, Tapayuna, and Tenharim, flour production is a collective and predominantly female activity, carried out in spaces such as *casas de farinha* (flour houses) or communal patios. This practice is deeply linked to traditional divisions of labor, knowledge transmission, and the reinforcement of social bonds.

The act of pounding is often led by elder women, who pass down techniques and guidance to younger generations, ensuring the continuity of food practices and ancestral wisdom. Working together also helps sustain the knowledge associated with foods grown by the community.

Among the Apiaká, Kayabi, and Tenharim peoples, the act of pounding cassava is not merely a technical task, but a culturally embedded practice that articulates with a broader system of meaning—encompassing subsistence, seasonal agricultural cycles, ritual life, and social cohesion. The processing of cassava, in these contexts, unfolds within a cosmological framework in which human engagement with the forest is guided by principles of reciprocity, temporal attunement, and spiritual stewardship. It is through these daily and ceremonial practices that communities affirm their relationship with non-human entities and maintain the delicate balance between society and the environment.

Cassava flour preparation involving a mortar and pestle reflects knowledge of local plants and their processing. In the sequences described here, pounding links food preparation with shared labor and the transmission of knowledge.

Porridges

Porridges, or mingaus, constitute a fundamental component of the diet among many Indigenous peoples of Brazil. Far beyond their nutritional value, these preparations hold deep social and ritual significance within Indigenous communities. They are fed to infants, offered as light nourishment to people who are ill and to older adults, and served on ceremonial occasions, including rites of passage, agricultural festivals, and funerals. Moreover, mingaus are commonly prepared in collective settings, reinforcing social cohesion through shared meals.

These porridges are crafted using a wide variety of plant species, either cultivated in Indigenous agroforestry systems or foraged from the forest. In Indigenous Amazonia, cultivated plants are obtained from diverse agricultural systems, including swidden fields and home gardens [11]. As such, their ingredients and preparation techniques display remarkable diversity. A mortar and pestle are used to pound ingredients into fine pastes for cooking.

Common ingredients used in porridge making include local maize landraces of various colors and sizes, bitter and sweet manioc (*Manihot esculenta*), green and ripe bananas, squash, and native fruits such as *açaí* (*Euterpe oleracea*), *bacaba* (*Oenocarpus bacaba*), *buriti* (*Mauritia flexuosa*), *pupunha* (*Bactris gasipaes*), *pequi* (*Caryocar brasiliense*), *cacauí* (*Theobroma speciosum*), and *cupuaçu* (*Theobroma grandiflorum*). Other ingredients include starchy roots and tubers (yam, sweet potato, and taro), oil-rich seeds and nuts (Brazil nuts, *babaçu*, and peanuts), smoked or dried fish, and flour made from fish or turtle meat.

Preparation methods vary according to ethnic group but often follow a similar pattern: ingredients such as maize, manioc, banana, or tubers are crushed in a mortar or grated using handmade tools; the mash is then slow-cooked in clay pots or cauldrons over an open fire. Water is added, and occasionally natural sweeteners (wild honey, fermented fruits) or vegetable oils (such as *pequi* or *babaçu*) are incorporated.

Among the Guarani and Xavante peoples, maize porridge is especially popular. Prepared from pounded maize—either green or dried—it may be consumed plain or enriched with honey, fruit, or plant-based milks such as those made from Brazil nuts or *babaçu*. This diversity of maize-based preparations underscores the cultural and symbolic significance of the crop among the Guarani, Kaiowá, and Ñandeva.

Cassava-based porridge, sometimes referred to as "liquid *beiju*," is common among the Tapayuna. These porridges are made from bitter or sweet manioc, often fermented or decanted (using *tucupi*, a manioc extract). They are sometimes thickened with flour and may incorporate fruits. In many contexts, they are consumed as ritual foods. In northwestern Amazonia, Dufour [6] found high cyanide levels in bitter manioc cultivars commonly used by Tukanoan peoples.

Among the Tenharim, banana porridge—prepared from either green or ripe fruit—is a common and culturally significant food. The bananas are traditionally pounded and simmered into a thick paste, often enhanced with forest-sourced ingredients such as nut oils or wild honey. The preparation involves multiple steps: cooking the fruit, pounding it in a wooden mortar, and straining the mash to remove fibrous material. The resulting mixture is then diluted with water, gently reheated, and may be consumed either on its own or enriched with peanut paste. This nutrient-rich and naturally sweet porridge holds particular appeal for children and is often associated with moments of care and familial intimacy.

Certain Amazonian groups such as the Arara, Juruna, Kayabi, and Mura also prepare porridges using forest fruits like *açaí*, *pupunha*, *buriti*, and *bacaba*, combined with manioc flour or *puba* (fermented manioc).

Protein-rich porridges—prepared with fish or meat flour—are a distinctive element in the culinary practices of several Indigenous groups. Dried or roasted fish is ground into a fine flour and mixed with cooked banana or manioc, resulting in a dense, nourishing preparation that serves both as ritual sustenance and a vital source of protein for children and elders. In all its variations, *mingau* stands as a dynamic expression of Indigenous culinary knowledge, ecological adaptation, and collective identity, bridging sustenance with spirituality and social practice.

Pamonha

In Indigenous Brazilian food systems, maize (*Zea mays*) holds a central place, giving rise to a diverse array of dishes such as porridges, pamonhas, cakes, and beverages. These preparations reflect a sophisticated repertoire of culinary techniques and the strategic use of vegetal additives, rooted in deep ecological knowledge and cultural tradition.

Indigenous peoples across Brazil cultivate a broad spectrum of *maize landraces*, exhibiting rich diversity in color, flavor, and culinary application. White maize is typically used in the preparation of fermented porridges and pamonhas, while yellow maize is most common in sweet pamonhas. Genetic studies have identified distinct groups of maize landraces in lowland South America [12].

The term *pamonha* refers to a traditional maize-based preparation. Its etymology traces to the Tupi word *pamunã*, and although its precise origins remain uncertain, *pamonha* is widely recognized as a distinctly Indigenous food. Maize, a domesticated crop originating in Mesoamerica thousands of years ago, is the core ingredient in *pamonha* and a foundational species in Indigenous agro-food systems throughout the Americas. The preparation of pamonha involves diverse combinations of annually cultivated maize varieties, tailored to local ecological conditions and cultural practices.

The Brazilian Indigenous *pamonha* is an ancestral preparation made from maize, encompassing a broad diversity of techniques, ingredients, and cultural meanings that vary across different peoples and regions. While the popular Brazilian version—consisting of a paste of green maize, sweetened or salted, and cooked in its own husk—is widely known, its roots lie in Indigenous maize-processing practices disseminated across numerous ethnic groups. These preparations vary in name, composition, and method, reflecting specific cultural and cosmological frameworks.

Among many Indigenous peoples—such as the Kayabi, Xavante, and Guarani—the mortar and pestle play a central role in the transformation of maize kernels into edible forms. Depending on the recipe, maize may be pounded raw or lightly toasted. The resulting paste is then shaped and cooked in various ways.

Techniques involved in pamonha-making vary according to the food culture and cosmology of each people. Among the Guarani, for instance, pamonha is called *mbaipy*. It is prepared with fresh grated or pounded maize, wrapped in corn husks and either boiled in water or roasted on embers. The Kayabi, in turn, prepare pamonhas from pounded maize mixed with wild honey or mashed fruits, highlighting a sensorial blend of sweetness and cultural symbolism.

Ultimately, *pamonha* exemplifies the dynamic interplay between biodiversity, cultural identity, and culinary ingenuity in Indigenous foodways—anchored in millennia of maize domestication and innovation across the South American lowlands.

Paçoca

Paçoca—a preparation based on peanuts, Brazil nuts, or dried meat—is a traditional and nutritionally significant food among numerous Indigenous peoples of Brazil. Its relevance is particularly notable in ritual, festive, and itinerant contexts. Found widely across the North, Northeast, and Central-West regions of the country, *paçoca* is characteristically produced using wooden mortars and pestles.

Indigenous *paçoca* is a high-energy, shelf-stable food made from local ingredients such as peanuts, nuts, manioc flour, and, in some variations, dried meat. It serves both practical and symbolic functions: it is a portable and nourishing food for travel and displacement; a staple during rituals and communal celebrations; and an important element in daily subsistence, especially during periods of scarcity or during extractive and hunting expeditions.

The following account of paçoca is based on the author's fieldwork among the Xavante, Pankararu, and Tenharim. Peanut-based paçoca was commonly eaten in the Xavante and Pankararu communities visited. Among the Tenharim, paçoca was made with Brazil nuts (*Bertholletia excelsa*), manioc flour, and salt and served with roasted coró, beetle larvae collected from babaçu palm nuts (*Attalea speciosa*) (author's field notes, 2014). Preparation involved toasting the peanuts or nuts and pounding them with manioc flour using a wooden mortar and pestle. Depending on the recipe, dried meat, salt, or pepper was added. Pounding released oils from the peanuts or nuts, helping the mixture hold together. Some preparations could be shaped by hand and kept for several days or, in some cases, weeks.

Overall, *paçoca* exemplifies a synthesis of sustainability, adaptability, and cultural symbolism in Indigenous culinary systems. Its preparation methods reflect intimate knowledge of local ecologies and social practices, reinforcing its role not only as sustenance, but as a medium of cultural transmission and resilience.

Couscous

Couscous is a food commonly found in the diets of various Indigenous peoples across Brazil, though its preparation methods and ingredients vary significantly depending on the ethnic group and region. In the Brazilian context, the term *cuscuz* encompasses preparations made from maize, cassava, or rice, usually steamed, and often refers to traditional Indigenous dishes that were later appropriated and adapted by Brazilian popular cuisine. Within Indigenous foodways, the mortar and pestle play a central role in the traditional preparation of couscous, particularly in the processing of maize and cassava.

Among the Guarani, maize-based couscous is particularly prevalent and is produced using artisanal techniques that preserve symbolic and social meanings deeply embedded in their cosmology. Dried maize is pounded in a mortar to produce coarse grains or granulated flour, a practice through which ancestral techniques are passed on.

In contrast, field observations among the Juruna, Pankararu, and Xavante reveal the incorporation of a more *northeastern Brazilian* variant of couscous, prepared with commercially processed corn flakes and steamed in aluminum pans (cuscuzeiras), evidencing forms of cultural adaptation and hybridization.

Mortars and pestles are used in several traditional Indigenous methods of preparing couscous. Pounding can break dried maize into coarse grains or flour, break down cooked or dried cassava into a granulated mass, and, in some groups, aerate and blend the dough before cooking. These practices link food processing with the transmission of culinary knowledge.

Urucum (Achiote)

The pulp surrounding the seeds of *Bixa orellana*, commonly known as urucum or annatto, a plant native to the Amazon basin, is traditionally extracted by many Indigenous peoples in Brazil using manual techniques involving water, friction, crushing, and, in some cases, gentle pounding in a mortar. Urucum holds a multifaceted role in Indigenous life, serving as a key component in food preparation, traditional medicine, body painting, cosmetics, and ritual culture.

The outer layer of annatto seeds contains bixin, the principal pigment responsible for annatto's characteristic color [13]. The Indigenous method of extracting this colored pulp may vary between groups but generally includes water-assisted manual extraction. Among groups such as the Bororo, Juruna, Tapayuna, Tenharim, and the Xavante, the seeds are gently crushed in a mortar with a wooden pestle, loosening the red pulp without fully pulverizing them. This delicate pounding process, which may require several hours of labor, is traditionally carried out exclusively by women.

After crushing, the pulp is mixed with water or with vegetable oils, such as andiroba or babassu, or with animal fats, to produce either a paste or body paint. Depending on the mixture, the resulting compound may be used as a medicinal ointment or as a symbolic substance in rituals and body adornment. The urucum thus serves as a powerful marker of identity, health, and spirituality, maintaining its place at the intersection of daily life and cosmological meaning in Indigenous Amazonian societies.

Oils

Among many Indigenous peoples of Brazil, the traditional extraction of oils from native nuts and seeds involves a series of artisanal techniques including drying, crushing, roasting, and manual pressing. Crushing may be carried out with a wooden mortar and pestle. These oils are of multifaceted importance, being employed not only for nutrition, but also for traditional medicine, ritual practices, spiritual protection, cosmetics, lighting, insect repellent, and skin and hair care.

In dietary contexts, the most commonly used oils include those derived from *pequi* (*Caryocar brasiliense*), *babaçu* (*Attalea speciosa*), and Brazil nut, more commonly known in Brazil as *castanha-do-pará* (*Bertholletia excelsa*). The oil of *andiroba* (*Carapa guianensis*) is renowned for its anti-inflammatory, healing, and insect-repellent properties. The harvesting of andiroba seeds and the extraction of oil for traditional use have been documented in the eastern Brazilian Amazon [14]. Oils from *buriti* (*Mauritia flexuosa*), *murumuru* (*Astrocaryum murumuru*), *ucuuba* (*Virola surinamensis*), and *babaçu* are widely used for moisturizing skin and hair; for instance, the Juruna and Tenharim use babaçu oil specifically to darken the hair. Denser oils, like *andiroba*, are traditionally used as lamp fuel, and in many communities, they are mixed with pigments such as *urucum* (*Bixa orellana*) to produce body paints with both decorative and spiritual functions. Certain oils are also applied to waterproof baskets, arrows, and wooden tools.

Though extraction methods vary by plant species and local tradition, the typical oil extraction process among Indigenous peoples follows a general cycle: collecting mature fruits or seeds; sun-drying them on straw mats or woven nets; optionally roasting (especially for seeds like *andiroba* or *pequi*); using the pestle to crack open hard shells (as with nuts like *murumuru*, *andiroba*, or Brazil nut); and pounding the kernels or pulp into an oily mass. The mass is then

either lightly heated or manually pressed—often between cloths or braided leaves—to release the oil. Afterward, the oil is separated from the solid residue by decantation, which takes advantage of the difference in density between liquids.

Depending on the method, a wooden pestle can be used to crack hard shells. A mortar and pestle can also be used to pound kernels or pulp into a paste before pressing or heating. Among the Arara and Juruna, the process of extracting oil from babaçu (*Attalea speciosa*) involves intense manual labor: the nuts are cracked open using a machete or axe, and the kernels are then pounded into a paste with a wooden pestle.

This paste is boiled with water. As the mixture simmers, the oil separates naturally due to its lower density and floats to the surface, from where it is carefully collected using ceramic ladles or gourds (*cuias*) from the *Cucurbitaceae* plant family. The oil is then stored in dedicated containers. Because the babaçu fruiting cycle occurs throughout the year, oil extraction can be performed continuously. As stated by M. Vieira (46 years old, ♀, Juruna ethnic group, Lakariká village, Paquiçamba Indigenous Land, April 26, 2019): "*Babaçu oil is good for hair and for frying fish*."

The Tenharim gather babaçu coconuts from groves near their cultivated plots and transport them to the village in woven baskets known as *paneiros* and *jamanchis*. The cracking of the coconuts and separation of the kernels is typically a task undertaken by women, using machetes. The kernels are then lightly roasted in large pans and pounded with wooden pestles. This roasting and pounding cycle is repeated several times until a thick, oily paste is formed. This paste is sieved, mixed with water, and heated until all the moisture evaporates and the pure oil is extracted.

For such purposes, the Tenharim make the mortars for use during the Mbotawa festival, where *anta* (tapir) meat is pounded together with Brazil nuts as part of ceremonial food preparation. These mortars are made from specific tree species, particularly from the genus *Brosimum* (known locally as *ywapirağu* and *bururehu*), using a method where the wood is hollowed and fire-hardened. As noted by A. Tenharim (50 years old, ♂, Mafuí village, Tenharim Marmelos Indigenous Land, November 7, 2014): "*The chief orders it to be made, and once the mortar is ready, he keeps it safe until the day of the festival.*"

Medicines

In the communities studied, the mortar and pestle were used to crush and macerate leaves, bark, roots, seeds, and fruits in the preparation of traditional plant-based remedies known as *remédios do mato*. The use of these implements was part of community care practices shaped by spiritual beliefs and by knowledge passed down orally across generations.

Among Mbyá-Guarani communities in southern Brazil, exchanges of medicinal plants between villages help maintain access to plants used in traditional medicine [15].

A mortar and pestle are used to prepare certain remedies that require crushing, pounding, or grinding individual plants or plant mixtures. Among the Juruna, the term commonly used for this process is *pisar (to pound), which in this context refers to pounding the plant in a mortar*. With the gradual adoption of blenders due to convenience, a new verb—*bater* (to blend)—has emerged in vernacular usage, though it lacks the ritual and symbolic weight of *pisar*.

Pounding breaks down the fibrous structures of plant matter, thereby releasing bioactive compounds found in the leaves, bark, or roots. Maceration may occur dry or with the addition of water, depending on the intended medicinal form: herbal teas (infusions or decoctions), ointments and poultices (applied directly to the skin), purification baths, ritual washings, or the

preparation of sacred tinctures and ceremonial beverages such as *caiçuma* or, in some groups, *ayahuasca*.

Several plant species with complementary properties may also be pounded together in the same mortar—a practice frequently undertaken by curandeiros, pajés, or other traditional medicine specialists.

In many communities, the mortar is regarded as a sacred object or spiritual mediator, transforming raw plant material into something medicinal and powerful. Its use is often accompanied by chants, prayers, and strict protocols, reflecting the intimate relationship between medicinal practice and spiritual cosmology.

Medicinal pestles are often smaller and more delicate than those used in food preparation, made from resinous, "neutral" woods that do not interfere with the plants' flavors or properties, such as *Anadenanthera peregrina* (angico), *Hymenaea courbaril* (jatobá), and *Cedrela odorata* (cedar).

Among the Arara, the process of preparing herbal medicine involves a complex set of rituals. Pounding the plant in a mortar is preceded by several preparatory steps: plants are harvested in the forest, wrapped in the large leaves of *sororoca* (*Phenakospermum guyannense*), and tied with vines such as *jitirana* (*Ipomoea* spp.). The plants and tools—including the mortar and pestle—must be carefully washed before use:

> "*This mortar belongs to Leôncio. I ask Sema, Adalto's mother. She gives it to me when I need to pound medicine. First, I wash the mortar thoroughly. It's made from ipê wood, and the pestle is made of amarelão wood. I wash the leaves of this plant well, remove all the dirt, and place them in the mortar. This other plant is mastruz—you have to remove the seeds, or the remedy won't work. I also wash the pestle. Then I begin the pounding. See how the liquid comes out? I squeeze the leaves with the pestle. Then I strain everything—three times. A remedy must be clean, well-macerated, so it won't upset the stomach. In the Arara language, the pestle is called wytchapiti*" (A.P. Arara, 42 years old, ♂, Arara ethnic group, Terrawangã village, Arara's Big Bend of Xingu Indigenous Land, January 30, 2019).

During fieldwork, Indigenous interlocutors described multiple forms of medicinal preparation using plants and a mortar and pestle:

Maceration: the plant or its active part is soaked in water at room temperature, often after being crushed in a mortar, or burnt to ash and then ingested.

Poultices: crushed fresh plant material, or its ashes, is applied directly to the skin over injuries, insect bites, swelling, or itching.

Rapé: a snuff-like medicine prepared from a mixture of plants that are dried or roasted and then pounded into a fine powder in a mortar, later administered via nasal inhalation.

### Beverages

Mortars and pestles play a fundamental role in the preparation of traditional Indigenous beverages in Brazil. They are primarily employed in the pounding and maceration of fruits, roots, and grains, which are essential processes for extracting juice, starch, or fermentable sugars that serve as the base for nutritional, ritual, and medicinal drinks.

These beverages vary widely depending on ethnicity, local ecosystems, and intended use (everyday or ceremonial). Many involve natural fermentation, a process understood by Indigenous peoples as both biological and spiritual. In some preparations, pounding the ingredients in a mortar is an early step that breaks down plant tissues.

Fruits like *bacaba* (*Oenocarpus bacaba*), *açaí* (*Euterpe oleracea*), and *murici* (*Byrsonima* spp.) are pounded to extract their pulp or juice. Cooked cassava roots are pounded to produce drinks such as *caxiri* or *caiçuma*. Among the Juruna (Yudjá), caxiri made from cassava and sweet potatoes has been studied in terms of its microbial succession and physicochemical changes during fermentation [16]. After pounding, the material is mixed with water and left to ferment naturally—sometimes for several days—in large gourds, ceramic pots, or woven baskets. Pounding helps break down the ingredients and produce a finer texture.




**Figure 2.** (A) and (B) *An Arara shaman uses a mortar and pestle to prepare a remedy from the root of Chamaecostus lanceolatus*; (C) annatto seeds (*Bixa orellana*) being ground in a mortar in a Juruna village and, subsequently, (D) the annatto paste being sieved for use. (Photos by Fabio Rossano Dario).




**Figure 3.** (A) Kaiowá people pounding maize to prepare chicha; (B) Tenharim mortar used during the Mbotawa festival; (C) shelled maize being pounded in a mortar in a Tenharim village; (D) Tenharim preparation of paçoca by pounding roasted Brazil nuts, manioc flour, and salt together; (E) Xavante mortar and pestle made from lixeira wood (*Curatella americana*) (Photos by Fabio Rossano Dario).



**Figure 4.** Different types of mortars documented in Tapayuna villages in the Xingu Indigenous Territory (Photos by Fabio Rossano Dario).

Among the Guarani and Xavante communities visited, maize was pounded to prepare a fermented maize beverage. Among the Guarani, this beverage was known as *chicha*. The

Tapayuna ferment *bacaba* fruit, while the Sateré-Mawé prepare fermented drinks from *açaí*. The Kayabi make a drink called *kami*, a fermented beverage derived from the pulp of sweet potato, yam, or cassava, and sometimes maize or peanuts. The tubers are washed, grated (raw, in the case of sweet potato) or cooked (in the case of yam and cassava), then pounded in a mortar and diluted in water. The mixture is sieved and left to rest for 2–3 days until it ferments, foams, and develops a sour smell. This slightly alcoholic drink, highly appreciated by the Kayabi, can last up to five days without refrigeration. It was often offered to us during visits, accompanied by roasted yam or sweet potato. The preparation of fermented beverages, particularly in ceremonial contexts, is typically a collective task led by women. Among certain groups, these beverages are central to ritual festivals and rites of passage, where the pounding in the mortar is done with song, rhythm, and elder instruction. Fermentation is understood not just as chemistry but as a sacred, living transformation.

For beverage preparation, mortars are typically large and deep, made from durable woods such as *Hymenaea courbaril* (jatobá) and *Dipteryx odorata* (cumaru). Pestles may be used singly or in pairs, with two people pounding in alternating rhythm.

Figures 2–4 show mortars and pestles documented during fieldwork and illustrate some of their uses.

## 4. CONCLUSIONS

In the Indigenous communities studied, mortars and pestles linked food preparation and other everyday tasks to shared labor, the transmission of knowledge, and ceremonial life. Making these implements drew on knowledge of local woods and their properties. In communities where women pounded ingredients together, younger participants learned by observing and taking part in the work. These practices helped sustain both livelihoods and the knowledge needed to carry them on.

The uses documented in this study show how a shared technique can serve different purposes. In some cassava-processing sequences, pounding helped homogenize grated pulp before sieving or pressing. In other settings, mortars and pestles were used to process seeds into flour or prepare ingredients for fermented beverages. Among the Tenharim, a mortar made for the Mbotawa festival was used to pound tapir meat with Brazil nuts. This case illustrates how the making and use of a particular implement can acquire ceremonial significance.

Mortars and pestles serve as markers of Indigenous identity and cultural resilience through the practices that give them meaning. The selection of wood, the skills involved in making and using the implements, and their place in domestic and ceremonial life show how technical knowledge and collective memory are sustained across generations. By documenting these practices in their local contexts, this study provides an ethnographic basis for understanding the relationships among material culture, traditional ecological knowledge, and the use of local plant resources.

## References

[1] T. Ingold. Eight themes in the anthropology of technology. *Social Analysis: The International Journal of Social and Cultural Practice* 41(1) (1997) 106-138

[2] P. Descola. Beyond nature and culture: The traffic of souls. *Journal of Ethnographic Theory* 2(1) (2012) 473-500

[3] C. Dearnley. A reflection on the use of semi-structured interviews. *Nurse researcher* 13(1) (2005) 19-28

[4] S.E. Rabionet. How I learned to design and conduct semi structured interviews: an ongoing and continuous journey. *The Qualitative Report* 16 (2011) 563-566

[5] S. Athayde, J. Silva-Lugo, M. Schmink, A. Kaiabi, M. Heckenberger. Reconnecting art and science for sustainability: learning from indigenous knowledge through participatory action-research in the Amazon. *Ecology and Society* 22(2) (2017) 36

[6] D.L. Dufour. Cyanide content of cassava (*Manihot esculenta*, Euphorbiaceae) cultivars used by Tukanoan Indians in Northwest Amazonia. *Economic Botany* 42(2) (1988) 255–266

[7] J.A. Montagnac, C.R. Davis, S.A. Tanumihardjo. Processing techniques to reduce toxicity and antinutrients of cassava for use as a staple food. *Comprehensive Reviews in Food Science and Food Safety* 8(1) (2009) 17–27

[8] C.R. Clement, M. de Cristo-Araújo, G. Coppens d'Eeckenbrugge, A.A. Pereira, D. Picanço-Rodrigues. Origin and domestication of native Amazonian crops. *Diversity* 2(1) (2010) 72–106

[9] V. Reyes-García, J. Broesch, L. Calvet-Mir, N. Fuentes-Peláez, T.W. McDade, S. Parsa, S. Tanner, T. Huanca, W.R. Leonard, M.R. Martínez-Rodríguez. Cultural transmission of ethnobotanical knowledge and skills: an empirical analysis from an Amerindian society. *Evolution and Human Behavior* 30(4) (2009) 274–285

[10] E.G. Almeida, C.C.T.C. Rachid, R.F. Schwan. Microbial population present in fermented beverage 'cauim' produced by Brazilian Amerindians. *International Journal of Food Microbiology* 120(1–2) (2007) 146–151

[11] D.L. Dufour. Use of tropical rainforests by native Amazonians. *BioScience* 40(9) (1990) 652–659

[12] M. Bracco, J. Cascales, J. Cámara Hernández, L. Poggio, A.M. Gottlieb, V.V. Lia. Dissecting maize diversity in lowland South America: genetic structure and geographic distribution models. *BMC Plant Biology* 16 (2016) 186

[13] M. Scotter. The chemistry and analysis of annatto food colouring: a review. *Food Additives & Contaminants* 26(8) (2009) 1123–1145

[14] C. Plowden. The ecology and harvest of andiroba seeds for oil production in the Brazilian Amazon. *Conservation & Society* 2(2) (2004) 251–272

[15] J.H.C. de Andrade et al. Notes on current Mbyá-Guarani medicinal plant exchanges in southern Brazil. *Journal of Ethnobiology and Ethnomedicine* 17 (2021) 38

[16] C.C.A.A. Santos, E.G. Almeida, G.V.P. Melo, R.F. Schwan. Microbiological and physicochemical characterisation of caxiri, an alcoholic beverage produced by the indigenous Juruna people of Brazil. *International Journal of Food Microbiology* 156(2) (2012) 112–121