

REGULAR ARTICLE

## Export data of the products peanut and peanut oil: volume and value analysis

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The data presented in this study are available on request from the corresponding author.

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### Abstract

This study analyzed the evolution of Brazilian exports of peanuts and peanut oil derivative from 2014 to 2024, focusing on volumes, values, and commercial destinations, in addition to applying the Revealed Comparative Advantage Index (RCAI). The research is applied and exploratory, utilizing a literature and documentary review, in addition to collecting secondary data from official databases such as ComexStat, the Ministry of Agriculture, Livestock, and Supply (MAPA), the Secretariat of Foreign Trade (SECEX), and the National Supply Company (CONAB). The methodology combined qualitative analysis with descriptive statistics, allowing us to identify trends, fluctuations, and factors that impacted export performance. The RCAI confirmed the comparative advantage of the São Paulo state and the municipality of Tupã, with high indices throughout the historical series, regardless of the decentralization of production and the rise of the Minas Gerais state. However, although it is concluded that Brazilian peanuts still have strong international competitiveness, their maintenance in future competition will depend on strategies to reduce climate impacts, improve quality and diversify consumer destinations.

### Keywords

Peanut oil; Exports; Comparative advantage; Agribusiness; São Paulo state



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## 1. Introduction

The product cultivation (*Arachis hypogaea*) in Brazil has deep historical roots, with the first reports being made in the 16th and 17th centuries by European colonizers, who recorded the presence of peanuts in indigenous fields on several Caribbean islands, in Mexico, on the east coast of Brazil, in the Río de la Plata Basin, and in Peru (Suassuna; Costa, 2023).

Initially, the objective of cultivation in Brazil was the vegetable oil and meal market for animal feed; however, with the expansion of soybean in 1970, peanut production entered decline until the end of the 1990s, when demand emerged for the confectionery market (Nogueira Júnior, 1976; Freitas; Amaral, 2002). It is cultivated in several Brazilian states, mainly in the Southeast, South, and Northeast regions. The São Paulo state is responsible for approximately 75–80% of production, part of which is exported. In the other states, production supplies the regional market for in-shell peanuts or local food companies. Peanuts serve as food, vegetable oil, biomass and biodiesel, and as an outlet for the cosmetics industry and others (Suassuna; Costa, 2023), possessing versatility and nutritional value (Toderó et al., 2024).

Research conducted by Embrapa and other Brazilian institutions allowed the development of specific lines, such as Runner IAC 886, highly adapted to Brazilian conditions and with strong agronomic performance (Ferreira et al., 2018; Suassuna et al., 2015). These Runner varieties are also widely used to produce the high-oleic product, a type of grain with greater oxidative stability, highly demanded in foreign markets due to its superior quality and longer shelf life

(CONAB, 2022). Brazilian production jumped from 346.8 thousand tons in the 2014/15 crop season to an estimated 1.18 million tons in the 2024/25 cycle, an increase of 240.2%, as indicated by CONAB data. The good result is mainly a reflection of the increase in the area allocated to the crop and high productivity when the cycles are compared (CONAB, 2022; Fantim, 2025).

At the origin of peanut exports in grains, there are some municipalities in São Paulo. In 2024, the municipality of Tupã accounted for 13.6% of the total exported volume of this commodity, followed by Marília, with 12.7%, and Jaboticabal, with 12.2%. Together, the three municipalities accounted for 38.5% of peanut grain exports in the year 2024/25 (Santos, 2025). Most of the product cultivated in the country was used for export, mainly to Russia (22%), China (21%), Algeria (11%), and the Netherlands (7%). In recent years, China has begun to show increasing interest in Brazilian peanuts, opening new and substantial markets (Brasil, 2022; Santos, 2025). According to data from Sampaio (2016), peanut production systems in the São Paulo state use “Runner” type cultivars, which present higher yield in the field and industry, and meet the needs and quality standards of national and international markets. Based on this theme, this article has its research problem: what is the evolution of exports of peanuts and their derivative, like peanut oil, in the international market, in terms of volume and value, from 2014 to 2024?

The research hypothesis consists of the following: the Tupã municipality and the São Paulo state have been acquiring comparative advantage in the exports of the products at the

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national level. Comparative advantage, according to Diniz (2017), is a theory by David Ricardo, and since it was established, efforts have been made to calculate its index, which was conceived by Balassa (1965), using trade data sources. The Revealed Comparative Advantage Index calculates the representativeness of a good in a country's total exports compared to world exports of the same good under study or even in the relationship of a state in relation to the national level.

The general objective is based on carrying out an analysis of the evolution of exports of peanut and peanut oil products in the international market, in terms of exported volume and value, from 2014 to 2024. Specifically, the objectives were: a) To collect export data on Brazilian peanuts and peanut oil, in terms of volume and value, for the 11-year period. b) To verify the annual trends in export volume and value of these products throughout the study period, identifying patterns of growth or decline. c) To investigate the main export destinations of Brazilian peanuts and their derivative, in terms of volume, highlighting which countries are the main importers and whether there were changes in buyers over the years. The research is justified, among other factors, by the importance of peanut exports to the Brazilian economy, as well as by the potential of the data presented to support decision-making among stakeholders in this sector. In addition, the study contributes to the identification of market trends and opportunities, reinforces the relevance of data as a tool to support the agricultural sector, and enables the assessment of external impacts that may influence peanut exports.

## 2. Materials and methods

This is a scientific research study, applied in nature, following parameters of bibliographic and documentary review, with an exploratory approach to identify annual export data for Brazilian peanuts and others. The methodological procedures involved a comprehensive bibliographic review (narrative) to understand the historical and economic context of exports of Brazilian peanuts and their derivative, the peanut oil. This included reviewing academic studies, reports from international organizations, articles from specialized journals, and other relevant sources. Therefore, scientific articles were searched in the scientific databases: Scielo, Portal Periódicos Capes, and Scopus, using search strings for the application of article inclusion and exclusion criteria.

Another relevant procedure was the analysis of information and the search for secondary data. The bibliographic data, based on qualitative analysis, were organized and confronted with the theoretical framework found during the development of the research, in order to present and discuss the general panorama of Brazilian peanut exports, using comparative indexes, such as the Comparative Advantage Index (Souza; Ilha, 2005), which allowed the analysis of peanut and peanut oil exports from the municipality of Tupã in relation to the São Paulo state, and from the state in relation to the country.

With the objective of identifying comparative advantages, the RCAI was applied based on the formulation by Balassa (1965), which allowed the extraction of results regarding the relative performance of exports of a product by country or region, in order to verify whether or not there are comparative

advantages in a given sector (Dorneles et al., 2013; Pires et al., 2023). The RCAI is given by the following equation:

$$RCAI_{ij} = (X_{ij} / X_i) / (X_{zj} / X_z),$$

where  $j$  represents the analyzed product;  $i$  represents city/state/region; and  $z$  is the reference zone, which may be state/region/country/continent. Therefore,  $X_{ij}$  represents the exports of a given location of product  $j$ ;  $X_i$  is the total export value of a given location;  $X_{zj}$  is the value of Brazilian exports of product  $j$ ; and  $X_z$  is the total value of Brazilian exports. When  $RCA_{ij} > 1$ , the state presents revealed comparative advantage for exports of the product ( $j$ ); when  $1 > RCA_{ij}$ , the state revealed comparative disadvantage for exports of the product (Dorneles et al., 2013). RCAI values  $> 1$  indicate that the locality has a revealed comparative advantage (specialization) above the average of the reference zone.

Secondary data on foreign trade were extracted from the ComexStat system (MDIC), using the detailed database by "Exporter Municipality and Attributes." The query was filtered by the Mercosur Common Nomenclature (NCM) codes: 1202 (peanuts in grains) and 1508 (peanut oil). The analysis covered the historical series from January 2014 to December 2024, allowing the observation of crop cycles and market variations. Other production data were obtained from IBGE (SIDRA database).

The raw data were processed in an Excel spreadsheet to calculate: - Annual Percentage Variation ( $\Delta\%$ ): Calculated using the formula  $((\text{Final value} - \text{Initial value}) / \text{Initial value}) \times 100$ ; to identify annual growth or decline rates. - Relative Representativeness ( $\%$ ): Percentage share of each locality in the total exported by Brazil or by the São Paulo state. - Accumulated Growth Rate: Comparison between the extreme points of the series (2014 vs. 2024). The form of analysis adopted was qualitative but involved simple descriptive statistics. It is worth highlighting that the storage of the data supporting the results is in a private file held by the authors. It may be accessed through a request via e-mail to the authors.

## 3. Results and discussion

### 3.1 Market Expansion and Exports

World peanut production totals approximately 45 to 47 million metric tons annually, with China, India, Nigeria, and the United States being the main producers. In 2022, the United States produced around 2.5 million metric tons. China is the largest global producer, contributing more than one third of the world total, followed by India. Brazil is among the top 10 producers (USDA, 2023). According to CONAB, Brazil has shown an important increase in peanut production in recent years, driven by the modernization of crops and the use of new varieties that are more productive and resistant to pests and diseases (CONAB, 2022). Most exports are composed of high-quality peanuts, mainly of the Runner type, which meets the requirements of international markets, such as the European Union, Russia, and China (Suassuna; Costa, 2023).

The growth of peanut cultivation in Brazil is related to the modernization of agriculture; the adoption of technological innovations; and the strengthening of exports, which allow the country to continue expanding production and maintaining a strategic position in the international market (Buchala et al., 2025). This growth reflects not only the quality of the Brazilian product, but also the country's capacity to meet

international safety and traceability standards, ensuring competitiveness and continuous expansion in the global market (Brasil, 2023). The crop is predominant in states such as São Paulo, which leads national production thanks to its favorable climate, cultivation technologies, and modern irrigation systems; it also has important agricultural activity in the Minas Gerais and Goiás states.

### 3.2 Locations with the Highest Record of Peanut and Peanut Oil Exports

Based on the ComexStat system, which is the official system for extracting Brazilian foreign trade statistics on goods, it was possible to extract export data through a search by NCM code — Mercosur Common Nomenclature. Code 1202 refers to “Peanuts, not roasted or otherwise cooked, whether or not shelled or broken,” and code 1508 corresponds to “Peanut oil and its fractions, whether or not refined, but not chemically modified” (Brasil, 2025). According to the information extracted for the period from 01/2014 to 12/2024, it was possible to define the Brazilian locations with the highest exported volume in kg, highlighting, within Brazil, the two main cities, the two main states, and the total national value, for the purpose of demonstrating quantity.

### 3.3 Analysis of Brazilian Peanut Exports, in Volume

For Table 1, the ComexStat platform (Brasil, 2025) was used to identify, in peanut exports, NCM 1202, the two municipalities, the two states, and the national value in exported tons, with Tupã-SP being the municipality with the highest exported volumes, followed by Borborema-SP; São Paulo is the state that exports the oilseed the most, followed by Minas Gerais.

Brazil achieved significant growth in volume in exports up to the year 2023, except in 2019 and 2021, when 297,717 tons exported were recorded. This performance is the result of a long process of modernization of the production chain, initiated at the end of the 1990s, when technological innovations and institutional improvements were implemented. According to Sampaio and Fredo (2021), the introduction of new technologies and organizational improvements throughout the production chain resulted in significant gains in productivity and quality, in addition to raising sanitary and food safety standards, a determining factor for the insertion of the Brazilian product into more demanding international markets. Based on IBGE data (2026), it is noted

that from 2014 to 2023, the country, the São Paulo state, and the municipalities of Borborema and Tupã also obtained an increase in production, but leveraged by productivity, being respectively, production and productivity data: Brazil (117% and 31%); Minas Gerais state (335% and -75%); São Paulo state (115% and 30%); Borborema (171% and 75%); and Tupã (87% and 5.1%). In addition to technological advances, the strategy of diversifying export destinations also played a fundamental role in strengthening the sector. According to information from the Secretariat of Agriculture and Supply (2024), in 2023, Brazilian peanuts were exported to more than 90 countries, with South Africa practically doubling its imports compared to the previous year. Other prominent markets include Poland, the United Kingdom, Colombia, Spain, and Australia, which also established themselves as relevant markets for the sector.

The opening of new markets, especially the Chinese market, considered the world’s largest consumer of peanuts, was also a determining factor for the positive export performance until 2023. In September 2022, the General Administration of Customs of China (GACC) authorized 47 Brazilian companies to export peanuts to that country, as a result of trade agreements between the countries and the signing of a phytosanitary protocol for the export of peanuts to the Chinese market, which reflect the joint efforts of the Brazilian government and the private sector to expand the participation of the national product in global trade (Brasil, 2022). However, despite this expansion scenario, in 2024, exports suffered a significant decrease of 23.81%, falling to 226,823 tons. This decline is directly associated with adverse climatic factors that impacted the 2023 and 2024 crop seasons. The lack of rainfall and high temperatures, especially during the month of December 2023, severely affected crops in the main producing regions of the São Paulo state, compromising both productivity and grain quality (Secretariat of Agriculture and Supply, São Paulo, 2024a; Sampaio; Neres, 2025).

In addition to climatic effects, the adverse conditions directly impacted on the quality of the product, making it difficult to meet the sanitary and quality standards required by the strictest international markets. This factor was decisive for the reduction in the competitiveness of Brazilian peanuts abroad, since part of the production was unable to meet the requirements for export (Secretariat of Agriculture and Supply, São Paulo, 2024b).

**Table 1.** Brazilian peanut exports (NCM 1202) in tons, from 01/2014 to 12/2024.

YEAR	Tupã-SP	Var. %	Borborema-SP	Var. %	SP state	Var. %	MG state	Var. %	Brazil	Var. %
2014	7,382	-	375	-	63,628	-	0	-	63,780	-
2015	17,919	+142.74	400	+6.67	100,316	+57.66	0	-	100,719	+57.91
2016	20,928	+16.79	650	+62.5	105196	+4.86	0	-	105,809	+5.05
2017	35,016	+67.32	6,224	+857.54	153,075	+45.51	0	-	153,317	+44.90
2018	48,227	+37.73	20,046	+222.08	206,818	+35.11	0	-	207,042	+35.04
2019	62,571	+29.74	30,462	+51.96	197,980	-4.27	0	-	198,028	-4.35
2020	67,208	+7.41	44,159	+44.96	257,673	+30.15	8	-	259,040	+30.80
2021	64,813	-3.56	57,529	+30.28	254,804	-1.11	4	-50	256,586	-0.95
2022	76,502	+18.03	48,994	-14.84	284,188	+11.53	0	-100	285,447	+10.86
2023	81,513	+6.55	50,155	+2.37	296,593	+4.37	6	-	297,717	+4.30
2024	64,500	-20.87	28,415	-43.34	223,873	-24.52	2,750	+45,733	226,823	-23.81
<b>Total</b>	<b>546,579</b>	<b>-</b>	<b>287,413</b>	<b>-</b>	<b>2,144,147</b>	<b>-</b>	<b>2,769</b>	<b>-</b>	<b>2,154,313</b>	<b>-</b>

Source: Prepared by the authors based on data from the ComexStat system (BRASIL, 2025).

### 3.4 Performance of the São Paulo and Minas Gerais States, and the Municipalities of Tupã-SP and Borborema-SP

Between 2014 and 2023, the São Paulo state showed significant growth in peanut exports, rising from 63,628 tons to 297,717 tons, which represents an increase of 367.9%. This progress reflects the consolidation of the state as the country's main exporting hub, driven by improvements in the production chain, investments in technology, infrastructure and professionalization of the sector, and a 30% increase in productivity, according to IBGE (2026). However, in 2024, a significant decline of 24.52% was recorded, reducing the exported volume to 223,873 tons.

The municipality of Tupã-SP showed remarkable growth in exports throughout the analyzed period, increasing from 7,382 tons in 2014 to a peak of 81,513 tons in 2023, which corresponds to an increase of 1,004%. This performance is directly associated with the presence of large exporting companies, the existence of a robust processing, drying and storage infrastructure, as well as the activity of local cooperatives that strengthen the organization of the production chain (Camap, 2023; Neves et al., 2024). In the municipality, there is the Mixed Agricultural Cooperative of Alta Paulista (CAMAP), which creates - together with organizations and producers - an ecosystem of specialized services that reduces transaction costs and increases local competitiveness. Added to this is the role of the Brazilian Association of Peanut Exporters (Abex-Br), headquartered in the municipality, which has been fundamental in representing the interests of the sector and promoting competitiveness, and the increase in crop productivity, of 5.14%, according to IBGE data (2026).

However, in 2024, as observed in the state, the municipality of Tupã also faced a significant drop in exports, registering a decline of 20.87%, with the volume reduced to 64,500 tons. This decrease reflects both climatic challenges, such as prolonged droughts and high temperatures, and issues related to grain quality, which made it difficult to meet the standards required by the main foreign buyers. The municipality of Borborema-SP also deserves mention for its rapid rise in exports, especially in the period from 2016 to

2018, when it jumped from 650 to 20,046 tons, representing a growth of 2,984%.

This advance demonstrates how the municipality quickly consolidated itself as an emerging hub in peanut exports, because of investments in infrastructure, the adoption of advanced technological practices, and the strengthening of local governance of the production chain. However, like Tupã and the São Paulo state, Borborema suffered a strong decline of 43.34% in 2024, reducing its exports to 28,415 tons. The Minas Gerais state, in turn, had a significant increase in 2024, reaching 2,750 tons, a growth of 45.28% compared to previous years, when exported volumes were practically insignificant.

### 3.5 Analysis of Peanut Oil Exports, in Volume

For Table 2, data from the ComexStat platform (Brasil, 2025) were used, with data from the municipality that exports the most peanut oil in Brazil, namely Catanduva-SP. It was compared with Tupã-SP, which is the 7th municipality that exports the product the most. Although it is the largest exporter of raw material in grains, it is not the largest exporter in volume of the peanut oil product.

The states with the highest exports of the product were compared, with São Paulo being the largest and Minas Gerais the second largest exporter of peanut oil; the national export volume of this product was also presented. Throughout the historical series analyzed, it can be observed that Brazilian exports of peanut oil showed consistent growth until the year 2022, when they reached 152,049 tons. However, in the two subsequent years, 2023 and 2024, the sector recorded consecutive declines of -36.68% and -35.91%, respectively, ending 2024 with 61,700 tons exported. This downward movement can generally be attributed to the scenario of a slowdown in international demand, especially due to the reduction in Chinese purchases, which, according to the Institute of Agricultural Economics (2023), reduced its imports by 40% in the comparison between 2022 and 2023. In addition, factors such as unattractive international prices and climatic issues directly impacted the supply and competitiveness of the product in the foreign market (ABEX, 2024).

**Table 2.** Brazilian peanut oil exports (NCM 1508) in tons, from 01/2014 to 12/2024.

YEAR	Tupã - SP	Var. %	Catanduva- SP	Var. %	SP state	Var. %	MG state	Var. %	Brazil	Var. %
2014	26	-	24,051	-	38,389	-	0	-	38,389	-
2015	274	+953.85	26,585	+10.54	58,342	+51.98	0	-	58,729	+52.98
2016	483	+76.28	24,219	-8.9	43,927	-24.71	0	-	45,398	-22.7
2017	611	+26.50	22,743	-6.09	48,683	+10.83	0	-	48,683	+0.6
2018	678	+10.97	26,405	+16.10	62,904	+29.21	0	-	63,429	+30.3
2019	819	+20.80	19,549	-25.96	48,663	-22.64	0	-	48,676	-23.26
2020	519	-36.63	27,425	+40.29	67,309	+38.31	0	-	67,436	+38.54
2021	1,008	+94.22	29,824	+8.75	84,673	+25.8	125	-	84,925	-25.93
2022	1,289	+28.88	35,669	+19.60	148,761	+75.69	2,486	+1,875.94	152,049	+79.04
2023	792	-38.56	24,521	-31.25	94,648	-36.38	1,544	-37.9	96,278	-36.68
2024	1,209	+52.65	20,658	-15.75	60,227	-36.37	1,454	-5.84	61,700	-35.91
<b>Total</b>	<b>7,713</b>	<b>-</b>	<b>281,655</b>	<b>-</b>	<b>756,531</b>	<b>-</b>	<b>5,610</b>	<b>-</b>	<b>765,697</b>	<b>-</b>

Source: Prepared by the authors based on data from the ComexStat system (BRASIL, 2025).

### 3.6 Performance of the São Paulo and Minas Gerais States, and the Municipalities of Catanduva-SP and Tupã-SP

The São Paulo state remains the main exporting hub of peanut oil, accounting for more than 90% of the volume exported by Brazil throughout practically the entire series analyzed. The state reached its peak in 2022, with 148,761 tons exported. However, similarly to the behavior observed in the national scenario, the São Paulo state also showed significant declines in the following two years, with -36.38% in 2023 and -36.37% in 2024. Among the municipalities of São Paulo, Catanduva-SP stands out, leading national exports of peanut oil in volume. The municipality started with 24,051 tons exported in 2014 and reached its highest volume in 2022, with 35,669 tons, representing an increase of 48.3% in the period. Despite this positive performance, the trajectory was marked by fluctuations, especially the decline that occurred between 2016 and 2019. In 2016, the contraction is associated with a reduction in demand, which directly impacted the exported volume, mainly to China and Italy (Sampaio, 2017). In 2019, a scenario is observed in which, although China represented 72% and Italy 26% of Brazilian exports, there was a decrease of just over 17% in value and 23% in volume (Sampaio, 2020). In the years 2023 and 2024, Catanduva-SP suffered new consecutive declines of -31.25% and -15.75%, reflecting the behavior of the national market.

In turn, Tupã-SP, a municipality recognized as one of the main exporters of in natura peanuts in Brazil, presents a distinct dynamic in the peanut oil market. Exports were still not very expressive in 2014, with only 26 tons. However, over

the years, there was a relevant expansion, reaching 1,289 tons in 2022, which corresponds to an accumulated growth of 4,857.7% in the period. Even with the contraction of -38.55% recorded in 2023, there was a partial recovery in 2024, with an increase of 52.64%, totaling 1,209 tons in the last year analyzed. In addition to São Paulo, Minas Gerais also stands out as a state growing in peanut oil exports. Minas Gerais' entry into this market is recent, having begun in 2021, with 125 tons exported. Expressive growth occurred in 2022, when the state reached 2,486 tons, reflecting a positive variation of 1,875.94%. However, as observed in the rest of the country, Minas Gerais suffered a decline of -37.9% in 2023, remaining practically stagnant in 2024.

### 3.7 Analysis of Peanut Exports at the Brazil Level, São Paulo and Minas Gerais States, and the Municipalities of Tupã and Borborema (SP), in Value (2014–2024)

For Table 3, data from the ComexStat platform (Brasil, 2025) expressed in FOB dollars, were used focusing on the municipalities of Tupã and Borborema, as well as São Paulo and Minas Gerais states.

In value, Brazilian peanut exports showed a trajectory of expressive growth during the analyzed period, reaching their peak in 2023, with movement of US\$443.7 million. However, in 2024, a decline of 18.88% is observed, totaling US\$359.9 million. The decrease in the value of Brazilian exports is directly associated with the reduction in exported volume, reflecting a series of factors, such as, for example, climatic issues and the quality of peanuts destined for export.

**Table 3.** Value of Brazilian peanut exports (NCM 1202), in US\$ FOB, from 01/2014 to 12/2024.

YEAR	Tupã-SP	Var. %	Borborema-SP	Var. %	SP state	Var. %	MG state	Var. %	Brazil	Var. %
2014	9,660,762	-	498,924	-	85,859,237	-	307	-	86,103,302	-
2015	19,880,352	+105.78	433,763	-13.06	116,392,011	+35.48	68	-77.85	116,830,839	+35.69
2016	24,222,412	+21.84	746,050	+71.99	119,766,366	+2.91	0	-100	120,530,878	+3.17
2017	43,116,970	+78.00	7,783,850	+943.34	194,538,557	+62.36	0	-	194,860,545	+61.67
2018	52,031,737	+20.68	21,546,704	+176.81	230,472,424	+17.84	0	-	230,706,394	+18.40
2019	71,759,273	+37.91	35,259,116	+63.64	230,584,914	+0.57	119	-	230,635,772	-0.03
2020	85,353,267	+18.94	53,658,478	+52.18	317,445,390	+36.88	27,992	+23,422.69	318,904,411	+38.27
2021	86,883,836	+1.79	73,206,874	+36.43	328,286,479	+3.04	20,116	-28.14	330,531,636	+3.65
2022	93,875,915	+8.05	54,406,578	-25.68	331,279,465	+1.53	0	-100	332,616,431	+0.63
2023	119,884,827	+27.71	77,914,076	+43.21	442,070,789	+33.09	21,659	-	443,714,709	+33.40
2024	101,791,149	-15.09	46,139,102	-40.78	355,521,921	-19.96	4,077,581	+18,726.27	359,963,383	-18.88
<b>Total</b>	<b>708,460,500</b>	<b>-</b>	<b>317,593,515</b>	<b>-</b>	<b>2,752,217,553</b>	<b>-</b>	<b>4,147,842</b>	<b>-</b>	<b>2,765,398,300</b>	<b>-</b>

Source: Prepared by the authors based on data from the ComexStat system (Brasil, 2025).

The São Paulo state remained the absolute protagonist in the value of national exports, concentrating around 90% of the value exported by the country. The state's performance was consistent until 2023, the year in which it reached US\$442 million. However, in 2024, the São Paulo state also faced a decline, recording a decrease of 19.96%, with a total of US\$355.5 million exported. Minas Gerais, in turn, emerges as an emerging state in the export of peanuts and their derivatives. Its effective entry into the market occurred from 2020 onward, with progressive growth. The most expressive leap was recorded in 2024, when the state reached US\$4.07 million in exports, representing a growth of 18,726.27% compared to the previous year. This performance reflects the increase in production capacity and the structuring of the production chain in Minas Gerais, although still in modest volumes when compared to the São Paulo state.

In the municipal scope, the municipality of Tupã-SP stands out, having presented a remarkable growth trajectory during the analyzed period. Exports went from US\$9.6 million in 2014 to a peak of US\$119.8 million in 2023. Despite the 15.09% decrease recorded in 2024, with US\$101.7 million, the municipality maintains a positive medium-term trend. Borborema-SP, another relevant municipality in the São Paulo scenario, showed strong fluctuation throughout the historical series. The highlight is the growth between 2016, when exports totaled US\$746 thousand, and 2018, with an expressive US\$21.5 million. In 2023, Borborema reached US\$77.9 million in exports; however, similarly to the movement observed in the state and in the country, it suffered a significant decrease of 40.78% in 2024, totaling US\$46.1 million.

**3.8 Analysis of Peanut Oil Exports at the Brazil Level, the São Paulo and Minas Gerais States, and the Municipalities of Tupã and Catanduva (SP), in Value (2014–2024)**

Peanut oil represents a strategic niche in the Brazilian agribusiness chain, especially due to its added value compared to the in natura product. Table 4 shows the evolution of exported values in FOB dollars over 11 years. A significant expansion is observed between 2014 and 2023, but also recent instability in 2024.

At the national level, Brazil showed expressive growth regarding the value of peanut oil exports, reaching its highest value in 2022, with US\$275 million, representing an increase of 474% compared to 2014. However, the years 2023 and 2024 were marked by sharp declines of 34.22% and 40.87%, respectively. The decline in exported value is directly associated with the reduction in export volume, caused by climatic challenges that affected production and issues related to product quality (Sampaio; Neres, 2024).

In the state-level scope, São Paulo remains the absolute leader in national peanut oil exports, concentrating most of the country’s production and industrial capacity. In 2022, the state reached US\$269.4 million in exports. However, as occurred at the national level, the state faced significant declines in the subsequent years, following the contraction movement of the foreign market. Minas Gerais, in turn, emerges as a new important state in Brazilian peanut oil exports. Its effective entry occurred in 2021, with US\$217,125, and expressive growth in 2022, reaching US\$4.2 million exported. In the following years, the state was also impacted by the market contraction, recording US\$2.8 million in 2023 and US\$2.4 million in 2024. Despite the decline, Minas Gerais continues to stand out as a growing hub. Within the São Paulo state, the municipalities of Catanduva and Tupã stand out. Catanduva-SP consolidated itself as the main peanut oil exporting hub in Brazil, presenting values above US\$29 million annually until 2019. From 2020 onward, there was expressive growth, culminating in the peak of US\$65 million in 2022. However, the years 2023 and 2024 were marked by consecutive declines of 29.8% and 22.55%, respectively.

Tupã-SP, although presenting a significantly smaller volume compared to the municipality of Catanduva, has shown a consistent growth trajectory in the value of exported peanut oil. In 2014, the municipality exported only US\$81,880, but over the years it experienced expressive appreciation, reaching US\$1.7 million in 2021. The peak was recorded in 2022, with US\$2.6 million. However, in 2023 there was a decline of 23.56%, followed by a slight recovery in 2024, with growth of 26.26%, totaling US\$2.5 million. This fluctuation follows the general movements of the production chain, impacted by the reduction in the availability of peanuts for processing and exportation.

**3.9 Analysis of the Revealed Comparative Advantage Index (RCAI)**

Table 5 presents consolidated data on total exports, to calculate the RCAI, as shown in Table 6. In Table 5, total export value data in US\$ FOB from Tupã-SP, the São Paulo state, and Brazil were considered for comparison purposes with peanut and peanut oil exports based on data obtained through ComexStat. It was then possible to calculate the RCAI for peanuts and peanut oil, as shown in Tables 6 and 7.

**3.10 RCAI Analysis – Peanuts – Tupã (SP) in Relation to the São Paulo State**

The average RCAI of Tupã in relation to the São Paulo state is 192.6 throughout the period, which shows that Tupã holds a significant competitive advantage within the state itself over the 11 years of analysis, with the state’s average RCAI being 4.54, due to the fact that Xz is high at the national level, exporting peanuts in a proportion much higher than the São Paulo state average. This indicates a regional specialization, considering what the authors Scherma, Nascimento and Brandt (2020) observed in forestry in the Contestado region of Santa Catarina, with the creation of areas of greater technical and organizational density. Brun et al. (2026) reports on the regional specialization of the Minas Gerais state, historically for export, in products such as agate, garnet, emerald, aquamarine, tourmaline, citrine, and amethyst.

**Table 4.** Value of Brazilian peanut oil exports (NCM 1508), in US\$ FOB, from 01/2014 to 12/2024.

YEAR	Tupã - SP	Var. %	Catanduva-SP	Var. %	SP state	Var. %	MG state	Var. %	Brazil	Var. %
2014	81,880	-	29,986,660	-	47,892,280	-	0	-	47,892,620	-
2015	516,893	+531.28	33,573,325	+11.96	74,100,518	+54.72	0	-	74,578,356	+55.72
2016	810,813	+56.86	32,967,680	-1.8	60,690,072	-18.10	0	-	63,181,239	-15.28
2017	957,319	+18.07	29,843,479	-9.48	62,807,100	+3.49	0	-	62,807,100	-0.59
2018	904,366	-5.53	29,400,967	-1.48	71,017,517	+13.07	0	-	71,650,356	+14.08
2019	1,013,006	+12.01	23,589,972	-19.42	57,824,709	-18.58	0	-	57,845,360	-19.27
2020	760,590	-24.92	45,392,213	+92.42	111,281,194	+92.45	0	-	111,496,060	+92.75
2021	1,788,054	+135.09	52,229,403	+15.06	150,548,857	+35.29	217,125	-	150,946,845	+35.38
2022	2,652,048	+48.32	65,095,097	+24.63	269,482,775	+79	4,293,227	+1877.31	275,006,810	+82.19
2023	2,027,297	-23.56	45,693,789	-29.8	177,884,605	-33.99	2,862,261	-33.33	180,901,764	-34.22
2024	2,559,735	+26.26	35,388,344	-22.55	104,435,642	-41.29	2,484,817	+13.19	106,960,570	-40.87
<b>Total</b>	<b>14,072,001</b>	<b>-</b>	<b>423,160,929</b>	<b>-</b>	<b>9,857,430</b>	<b>-</b>	<b>1,203,267,080</b>	<b>-</b>	<b>-</b>	<b>-</b>

Source: Prepared by the authors based on data from the ComexStat system (Brasil, 2025).

**Table 5.** Value of Total Exports in US\$ FOB, from 01/2014 to 12/2024.

YEAR	Tupã-SP	State of SP	Brazil
2014	20,932,070	50,900,847,899	220,923,236,838
2015	32,186,055	45,210,162,312	186,782,355,063
2016	38,002,258	46,024,594,648	179,526,129,214
2017	54,158,482	50,522,138,466	214,988,108,353
2018	58,997,310	52,514,173,231	231,889,523,399
2019	80,542,600	48,645,701,644	221,126,807,647
2020	94,845,080	42,525,808,942	209,180,241,655
2021	98,740,651	54,064,207,369	280,814,577,460
2022	105,835,871	69,630,557,731	334,136,038,220
2023	129,390,131	71,490,254,128	339,695,766,008
2024	126,051,498	71,406,470,352	337,046,161,710
<b>TOTAL</b>	<b>839,682,006</b>	<b>602,934,916,722</b>	<b>2,756,108,945,567</b>

Source: Prepared by the authors based on data from the ComexStat system (Brasil, 2025).

**Table 6.** Comparative Advantage Indexes (RCAI) for Peanut Exports (NCM 1202), from 01/2014 to 12/2024.

YEAR	Tupã (SP) and São Paulo state	Tupã (SP) and Brazil	SP state and Brazil
2014	274	1,184	4
2015	240	987	4
2016	245	949	4
2017	207	878	4
2018	201	886	4
2019	188	854	5
2020	121	590	5
2021	145	748	5
2022	186	891	5
2023	150	709	5
2024	162	756	5

Source: Prepared by the authors based on data from the ComexStat system (BRASIL, 2025).

**Table 7.** Revealed Comparative Advantage Indexes (RCAI) for Peanut Oil Exports (NCM 1508) in FOB, from 01/2014 to 12/2024.

YEAR	Tupã and São Paulo state	Tupã and Brazil	São Paulo state and Brazil
2014	4	18	4
2015	10	40	4
2016	16	61	4
2017	14	61	4
2018	11	50	4
2019	11	48	5
2020	3	15	5
2021	7	34	5
2022	6	30	5
2023	6	29	5
2024	14	64	5

Source: Prepared by the authors based on data from the ComexStat system (BRASIL, 2025).

Between 2014 and 2024, Tupã’s RCAI in relation to the São Paulo state shows a decreasing trajectory, starting with a peak of 274 in 2014 and reaching the lowest value of the series, 121, in 2020, followed by a slight recovery in the following years, ending the period at 162. This trend indicates a process of decentralization of peanut production and exports within the

state, reflecting the strengthening of other municipalities in São Paulo, such as Borborema-SP, which showed significant expansion from 2016 to 2024, according to the data presented in Table 1. These data do not indicate an absolute loss of strength by the municipality of Tupã, but rather productive decentralization. In addition, factors such as adverse climatic events and variations in the quality of the grain exported in 2024 also contributed to the relative loss of Tupã’s protagonism in the state scenario. Even so, the RCAI values remain high, all above 100, showing that the municipality continues to play a central role in peanut exports in the São Paulo state (Secretariat of Agriculture and Supply, 2024; Sampaio; Neres, 2025).

**3.11 RCAI Analysis – Peanuts – Tupã (SP) in Relation to Brazil**

The average of the last 11 years is 857.7, which positions Tupã as one of the localities with an important revealed comparative advantage in Brazil for the peanut sector. Tupã’s RCAI values in relation to Brazil remain consistently high throughout the analyzed period, ranging between 590 and 1,184, which confirms the existence of an expressive and sustained comparative advantage at the national level. The decline from 1,184 in 2014 to 590 in 2020 can be attributed to the proportional growth of exports from other regions of the country, with emphasis on the increase in the Minas Gerais state from 2023 onward, as presented in Table 1.

The recovery of the curve from 2021 until reaching 756 points in 2024 demonstrates competitive resilience even in adverse contexts, such as the climatic events that affected national production in 2023 and 2024. This performance demonstrates the municipality’s capacity to maintain its export relevance even in the face of external challenges, such as climatic events and fluctuations in the requirement standards of international markets. And it reinforces the notion that the peanut segment in the São Paulo state, and especially in the municipality of Tupã, evolved from a comparative advantage, natural, to a competitive advantage, created by technology and quality management. Comparative advantage, according to Ramos (2020) and Carbaugh (2004), was presented by David Ricardo, who argued that if a country did not have any product with absolute advantage, it should specialize in the one in which it had comparative advantage. In other words, poor countries or countries without technology would produce goods at the level of efficiency of rich countries if they took into consideration the products in which there was a lower production cost factor.

Competitive advantage, according to Porter (1989), results from the capacity to create value in relation to competitors, which may occur through cost or differentiation, in alignment with its main activities (Porter, 1989). In the case of production in the state and, specifically, in the region of Western São Paulo, where the municipality of Tupã is located, comparative cost studies would need to be carried out, but it can be inferred that the advantage of climate, use of technologies, and land productivity have combined competitive costs and prices, still in the international market. Such facts were discussed in Neves et al. (2024), whose authors analyzed peanut producers from the 2022/2023 crop season in the Western São Paulo region, finding that they had average productivity above the state average, and a preliminary scenario was shown regarding the adoption of Agriculture 4.0 technologies in peanut cultivation in the region.

### 3.12 RCAI Analysis – Peanuts – São Paulo State in Relation to Brazil

With an average RCAI of 4.5, the São Paulo state exhibits national leadership in Brazilian peanut exports. The state presents a stable and consolidated revealed comparative advantage throughout all the years analyzed, with RCAI values ranging between four (4) and five (5), without showing abrupt variations. In addition, the state is responsible for more than 90% of national peanut production, mainly due to the increase in the area allocated to the crop. This reinforces its strategic centrality in the production chain and its importance in maintaining Brazilian competitiveness in the international market (Fantin, 2025).

### 3.13 RCAI Analysis – Peanut Oil – Tupã (SP) in Relation to the São Paulo state and to Brazil, and the São Paulo State in Relation to Brazil

In the analysis of Tupã (SP) in relation to the São Paulo state, the average of 9.3 over the last 11 years indicates that Tupã has relevant specialization in peanut oil exports compared to the state itself, but with greater volatility over the years when compared to in natura grain. The index starts at four (4) in 2014, reaches a peak of 16 in 2016, and shows sharp declines in 2020 and 2022, before regaining strength in 2024. These values can be attributed to the more consolidated exports of other regions, such as, for example, Catanduva-SP, which holds a higher volume and value than Tupã, as presented in Tables 1 and 4.

In the analysis of Tupã (SP) in relation to Brazil, the average of 40.9 shows that Tupã maintains strong national relevance in peanut oil exports, although it presents strong variation between years. In 2014, the index was 18, jumped to 61 between 2016 and 2017, and had an abrupt decline in 2020. The result of 64 in 2024 suggests a vigorous recovery after years of lower performance, possibly linked to the expansion of local industrial capacity. In the analysis of the São Paulo state in relation to Brazil, the average for the period is 4.5, which confirms a revealed comparative advantage in Brazilian peanut oil exports. The index remains stable from four (4) to five (5) throughout the entire period, except for the jump in 2019–2024, when it recurrently reaches five (5). This result may be directly related to the representativeness of some municipalities in peanut oil exports, such as Catanduva and Tupã.

## 4. Conclusions

This research sought to understand the evolution of exports of peanuts and their derivative, peanut oil, in the international market, in terms of volume and value, from 2014 to 2024. In parallel, it analyzed whether the municipality of Tupã and the state São Paulo state have been acquiring a revealed comparative advantage in the exports of these products. The Revealed Comparative Advantage Index (RCAI) reinforced the leadership of the São Paulo state in relation to Brazil in peanut exports, with an average of 4.5. In addition, Tupã-SP held a prominent position, maintaining high levels of comparative advantage both in relation to the São Paulo state and in relation to Brazil, reaching values greater than 100, even in the face of the decentralization of production and the rise of new hubs, such as Borborema-SP and the Minas Gerais state. It can be inferred that the emergence of new hubs, such as Borborema-SP, and the rise of Minas Gerais suggest that peanut cultivation is expanding geographically under the influence of

technological spillovers led by the cultivars developed by Embrapa.

In the case of peanut oil, the results demonstrated a more volatile market, but still a strategic one, with RCAI values above four (4) for all scenarios, also demonstrating a high comparative advantage. It is concluded that the Brazilian peanut sector has economic and strategic relevance for national agribusiness. However, the continuity of growth will depend on strategies aimed at mitigating climate impacts, strengthening peanut quality, and diversifying consumer markets. In this way, Brazil may not only sustain but also expand its international competitiveness, further consolidating itself as a global reference in the production and export of peanuts and their derivatives.

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